

# KYIO-L Series Remote I/O Operation Manual

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# 1 Product Overview

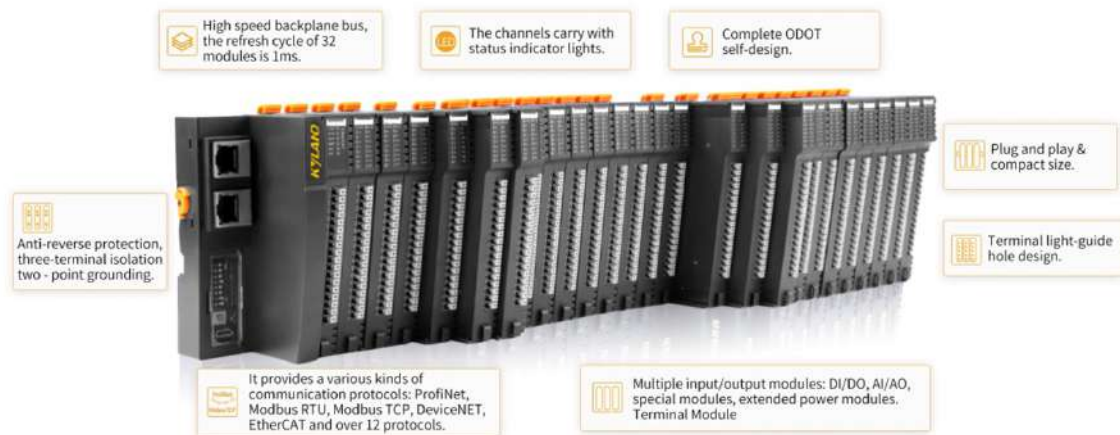
Remote IO system consists of network adapter module and extended IO module. The network adapter module controls fieldbus communication and it realizes communication link with host station controller or host computer software.

The extended IO module controls the connection with the input and output sensors in the field. At first the Input IO module collects the field signals and sends it to the network adapter through the internal bus. Secondly the controller reads and processing data from the adapter through the field bus, and it writes the output data into the network adapter, then the network adapter could write the output data into the output IO module via the internal bus, so the field equipment control could be realized.

According to the communication interface of the controller system, the network adapter could select the corresponding bus module and mainstream industrial communication protocols including Modbus, Profibus-DP, Profinet, EtherCAT, EtherNet/IP, CANsopen, CC-Link, PowerLink, etc. And there are 6 categories of extended IO modules such as: digital input module, digital output module, analog input module, analog output module, special module, hybrid IO module, etc.

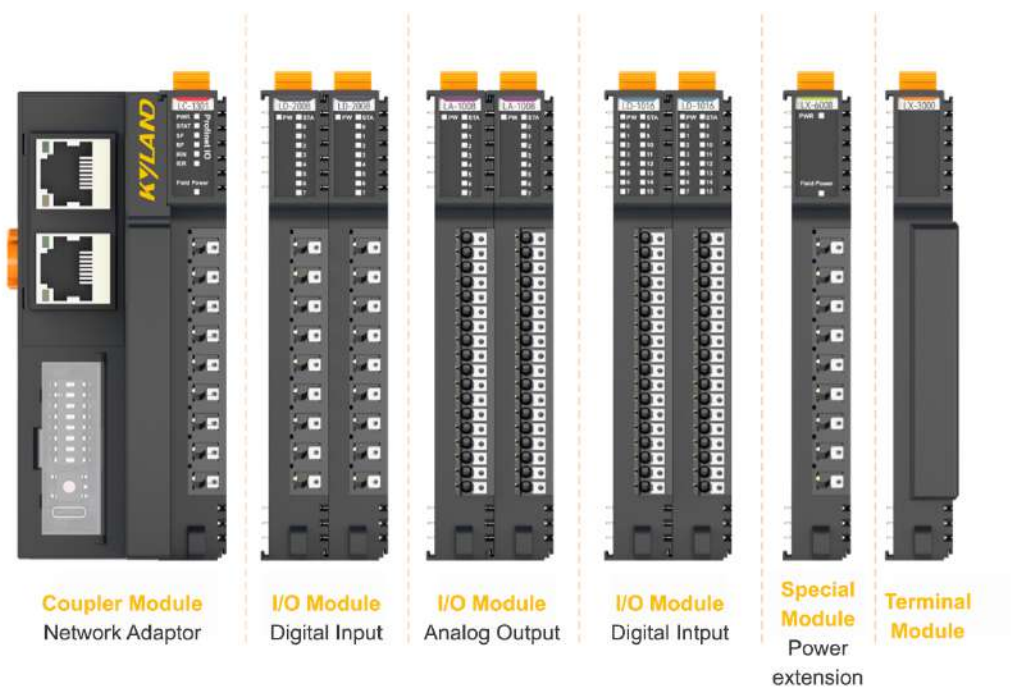
The network adapter and the extended IO module could be freely combined according to the field requirements, and it could achieve lower cost with the Remote IO module when the project requires more data points.

## 1.1 Module Feature



## 1.2 Module Layout

The KYIO-L series is a remote I/O module. The adapter module lies on the far left, and on the right are extended I/O modules.



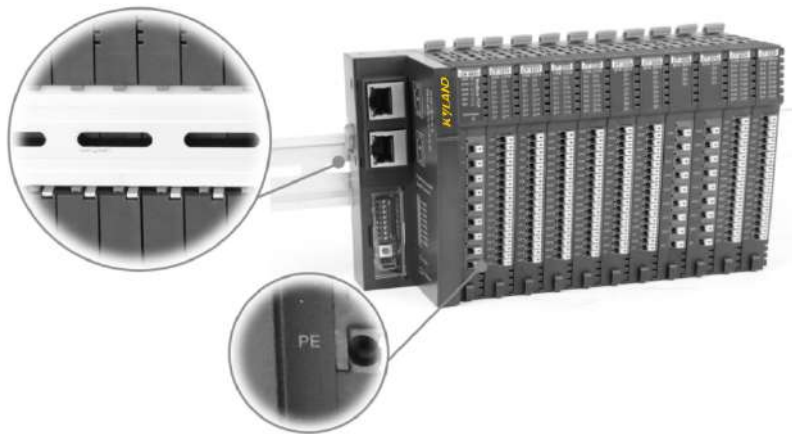
### 1.3 LED Indicators

The user can easily check the power state of adapter and I/O module, I/O module operating state, and the number of I/O channels through LED state. And the detailed indicator state should refer to the related adapter or IO modules.



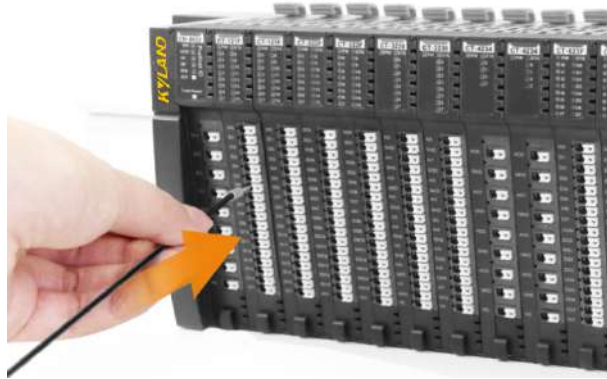
### 1.4 Ground Protection

There is one metal Spring sheet on the back of the module, which is used for effective grounding with the guide rail. The metal spring sheet and the adapter PE (protective earthing) are connected internally.

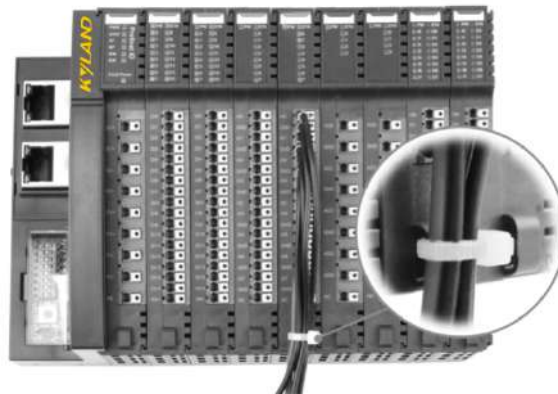


## 1.5 Wiring

Use push-in method to connect single-wire or crimp terminal wires without any other tools. Users can save wiring time and ensure a safe operation regardless of wiring experience.

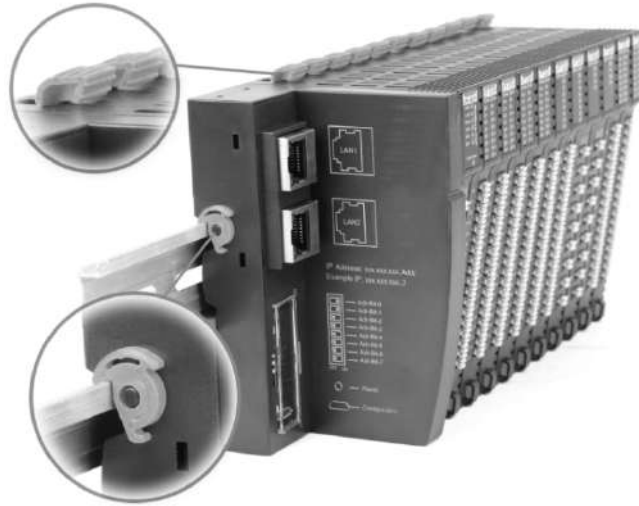


The module equips with a wiring fixed end for cable harness, which is used to fix the cable when the IO module is wired with multiple cables.

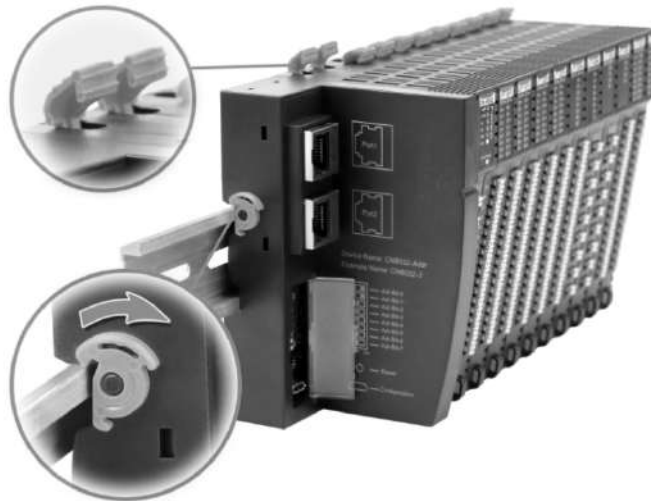


## 1.6 Installation and Removal

DIN-Rail Lock could be safely and reliably installed on 35 mm DIN-Rail. There is a manual closure buckle on the upper side of all modules for locking, and a manual buckle is on the left side of the adapter for locking the guide rail.



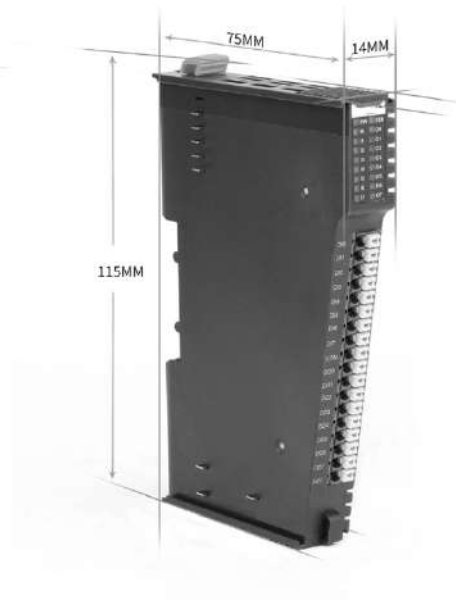
When the module is removed, it needs to manually unlock the guide rail on the upper side of the module. For the adapter module, you also need to unlock the left rail buckle counterclockwise.



## 1.7 Installation Size

Adapter size: 115\*51.5\*75mm

I/O module size: 115\*14\*75mm



## 2 BUS Adapter & Network Adapter

### LC-1101 Modbus TCP Network Adapter

#### 1 Module Overview

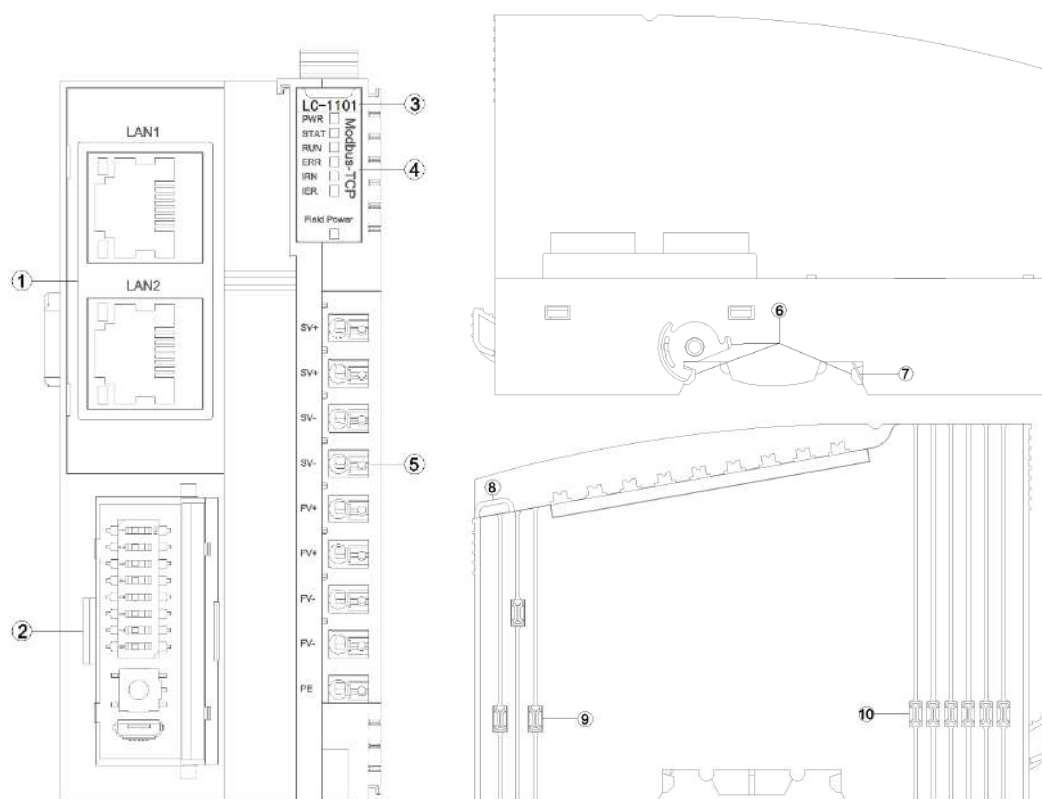
LC-1101 Modbus TCP Network Adapter supports the standard Modbus TCP Server Communication, and Ethernet supports the cascade function of dual-port switches. This adapter supports access to 5 Modbus TCP clients simultaneously, supports Modbus function code 01/02/03/04/05/06/15/16 /23, supports the Modbus application of watchdog, supports the process data maximum sum of input and output of 8192 bytes, and supports number of the extension IO module of 32. Module carries with the diagnostic function and it can monitor the communication state of IO module in real time.

#### 2 Technical Parameters

| Hardware Specification                |                                                          |
|---------------------------------------|----------------------------------------------------------|
| System Power                          | Nominal:24Vdc, Range: 9-36Vdc<br>Reverse Protection: YES |
| Power Consumption                     | 50mA@24Vdc                                               |
| Current Output                        | Max.2.5A@5VDC                                            |
| Isolation                             | System Power to Field Power Isolation                    |
| Field Power                           | Nominal:24Vdc, Range:22-28Vdc                            |
| Field Power Current                   | Max. 8A                                                  |
| IO Modules Supported                  | 32 pcs                                                   |
| Wiring                                | Max.1.0mm <sup>2</sup> (AWG 17)                          |
| Mounting Type                         | 35mm DIN-Rail                                            |
| Size                                  | 115*51.5*75mm                                            |
| Weight                                | 130g                                                     |
| Environment Specification             |                                                          |
| Operation Temperature                 | -40~85°C                                                 |
| Operation Humidity                    | 5%-95% (No Condensation)                                 |
| Ingress Protection Rating             | IP20                                                     |
| Communication Interface Specification |                                                          |
| Protocol                              | Modbus-TCP                                               |
| Process Data Area                     | Sum of input and output:8192 Byte                        |
| Diagnostic Function                   | Supported                                                |
| Number of TCP                         | 5 Clients                                                |
| TCP Keepalive                         | YES                                                      |
| Modbus Watchdog                       | YES (Default: Enable, 30 Seconds)                        |
| Function Code                         | 01/02/03/04/05/06/15/16/23                               |

|                   |                                          |
|-------------------|------------------------------------------|
| Network Interface | 2*RJ45                                   |
| Speed             | 10/100Mbps, MDI/MIDX, Full-Duplex        |
| Distance          | 100m                                     |
| IP Address        | DIP switch set or IO-Config software set |

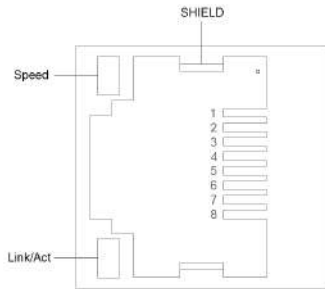
### 3 Hardware Interface



- ① Network Interface
- ② Config Interface
- ③ Module Type
- ④ LED Indicator
- ⑤ Wiring Terminal
- ⑥ Buckle
- ⑦ Grounding Spring Sheet
- ⑧ Fixed Wiring Harness
- ⑨ Field Power
- ⑩ Internal Bus

### 3.1 Network Interface

LAN1/LAN2 support switch function, 10Mbps and 100Mbps data rates, MDI/MID-X auto crossover.



Speed: Network Speed (Green)

ON:100Mbps

OFF:10Mbps

Link/Act: Link State、Active State(Orange)

ON: Link UP

OFF: Link DOWN

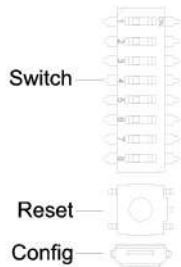
Flash: Active

SHIELD: RJ45 Shield Interface

RJ45 Pin definition

| Pin | Definition | Description                 |
|-----|------------|-----------------------------|
| 1   | TD+        | Transmitter Signal Positive |
| 2   | TD-        | Transmitter Signal Negative |
| 3   | RD+        | Receiver Signal Positive    |
| 4   | --         | --                          |
| 5   | --         | --                          |
| 6   | RD-        | Receiver Signal Negative    |
| 7   | --         | --                          |
| 8   | --         | --                          |

## 3.2 Configuration Interface



**Switch:** the DIP switch is used for setting the IP address (the default IP address is 192.168.1.100).

When the dial value is 0, all 4 bytes of the IP address are configured by the software or use the default IP address (192.168.1.100).

When the dial code value is not 0, the last byte of the IP address is determined by the dial code value, and the first three bytes could be configured by the software or use the default address(192.168.1).

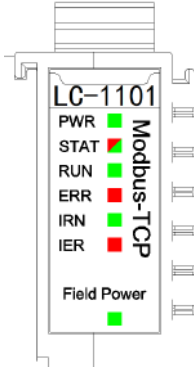
The relationship between IP address and dial code value is shown in the following table:

| Switch Bit Number (ON: 1, OFF: 0)                                  |   |   |   |   |   |   |   | Switch Value | IP Address             |
|--------------------------------------------------------------------|---|---|---|---|---|---|---|--------------|------------------------|
| 1                                                                  | 2 | 3 | 4 | 5 | 6 | 7 | 8 |              |                        |
| 0                                                                  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0            | Configured by software |
| 1                                                                  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1            | x.x.x.1                |
| 0                                                                  | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2            | x.x.x.2                |
| 1                                                                  | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3            | x.x.x.3                |
| .                                                                  | . | . | . | . | . | . | . | .            | .                      |
| .                                                                  | . | . | . | . | . | . | . | .            | .                      |
| 0                                                                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 254          | x.x.x.254              |
| 1                                                                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 255          | x.x.x.255              |
| Notice: The default IP address after device reset is 192.168.1.100 |   |   |   |   |   |   |   |              |                        |

**Reset:** Module reset button, long pressing the button for more than 5 seconds and all parameters of the module will be restored to the default value. When the Reset button is activated, a green indicator will light up in the upper left corner of the button.

**Config:** Configure port, a standard Micro USB interface for configuring device parameters and firmware upgrades.

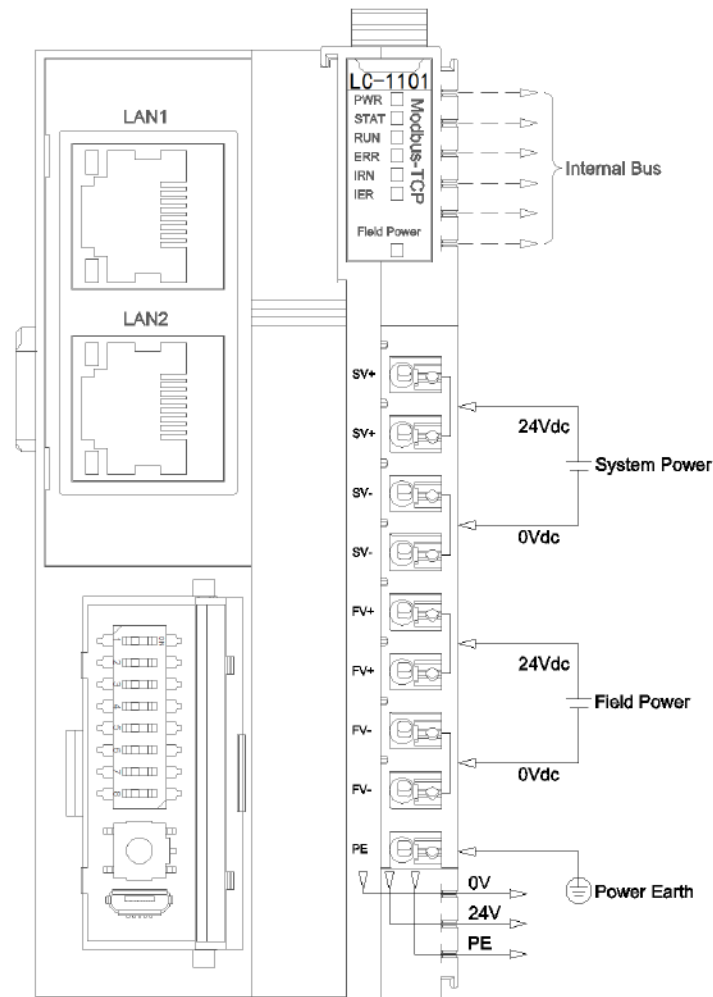
### 3.3 LED indicator



| PWR Power State (GREEN)       | Definition                          |
|-------------------------------|-------------------------------------|
| ON                            | System Power Normal                 |
| OFF                           | System Power Failure                |
| STAT Module State (RED/GREEN) | Definition                          |
| Double Flash (RED)            | Module Soft Restarted by Hard-Fault |
| ON(GREEN)                     | Running                             |
| Single Flash (GREEN)          | Stopping                            |
| Flash(2.5Hz) (RED/GREEN)      | Boot Mode                           |
| Flash(10Hz) (RED/GREEN)       | Firmware Updating                   |
| RUN Network State (GREEN)     | Definition                          |
| ON                            | Modbus connected                    |
| OFF                           | Modbus disconnected                 |
| Flash                         | Modbus read-write                   |
| Quadruple Flash               | Led test                            |
| Flash(10Hz)                   | MAC address error                   |
| ERR Network Error (RED)       | Definition                          |
| Flash(2.5Hz)                  | LAN1 and LAN2 Link-Down             |
| OFF                           | LAN1 or LAN2 Link-Up                |
| Flash(10Hz)                   | MAC Address Error                   |
| IRN IO Run (GREEN)            | Definition                          |
| ON                            | IO initialization normal            |
| OFF                           | IO initialization failure           |
| IER IO Error (RED)            | Definition                          |
| OFF                           | IO communication normal             |
| Double Flash                  | IO communication failure            |
| Field Power State (GREEN)     | Definition                          |
| ON                            | Field Power Normal                  |
| OFF                           | Field Power Failure                 |

## 4 Wiring

Please note when wiring: for the internal construction, two terminals of SV+ have been short-connected, two terminals of SV- have been short-connected, two terminals of FV+ have been short-connected, and two terminals of FV- have been short-connected. For external it only needs to access one system power supply and one field power supply.



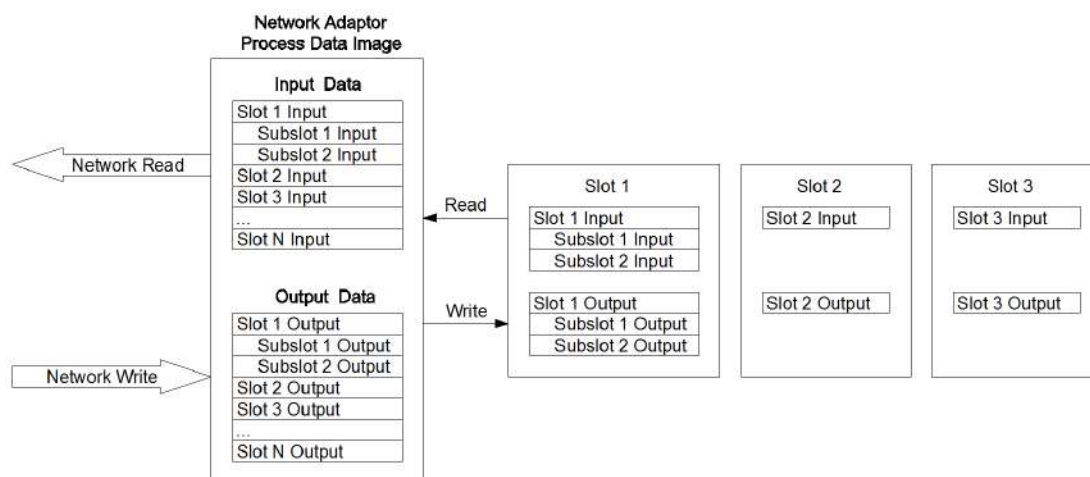
## 5 Process data definition

### 5.1 Adapter process data definition

Modbus-TCP adapter itself has no input-output process data.

### 5.2 IO Module process data mapping

The network adapter reads and writes input and output process data of IO module in real time through the internal bus, and its data mapping model is shown as follow:



Modbus address mapping table varies according to module combination, and the I/O module address mapping table carried by LC-1101 has two modes.

In the 1<sup>st</sup> mode, it could use the IOConfig configured software to check whether DI is mapped to area 1, DO is mapped to area 0, AI is mapped to area 3, and AO is mapped to area 4. For special module addresses, it could check the address table in the IOConfig configured software.

In another mode, DI, DO, AI, AO, and special module addresses are all mapped to area 4, and they are corresponding to different address ranges respectively. The addresses of special modules are sorted backwards in sequence referred to the address table in IOConfig. And the mapping address ranges are shown in the following table.

| Module Type | Address Offset |         | Read/Write   |
|-------------|----------------|---------|--------------|
|             | Hex            | Decimal |              |
| AO          | 0x0000         | 0       | read & write |
| DO          | 0x3000         | 12288   | read & write |
| AI          | 0x4000         | 16384   | read only    |
| DI          | 0x5000         | 20480   | read only    |

## 6 Configuration Parameter Definition

| Configuration Parameter |       |       |       |       |       |       |       |       |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Bit No                  | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |

| Byte 0  | Reserved         | Sniffer Port | Port Mirroring | Reserved | Fault Action for Input | Source of Config Data |
|---------|------------------|--------------|----------------|----------|------------------------|-----------------------|
| Byte 1  | MAC Address [0]  |              |                |          |                        |                       |
| Byte 2  | MAC Address [1]  |              |                |          |                        |                       |
| Byte 3  | MAC Address [2]  |              |                |          |                        |                       |
| Byte 4  | MAC Address [3]  |              |                |          |                        |                       |
| Byte 5  | MAC Address [4]  |              |                |          |                        |                       |
| Byte 6  | MAC Address [5]  |              |                |          |                        |                       |
| Byte 7  | IP Address [0]   |              |                |          |                        |                       |
| Byte 8  | IP Address [1]   |              |                |          |                        |                       |
| Byte 9  | IP Address [2]   |              |                |          |                        |                       |
| Byte 10 | IP Address [3]   |              |                |          |                        |                       |
| Byte 11 | Net Mask [0]     |              |                |          |                        |                       |
| Byte 12 | Net Mask [1]     |              |                |          |                        |                       |
| Byte 13 | Net Mask [2]     |              |                |          |                        |                       |
| Byte 14 | Net Mask [3]     |              |                |          |                        |                       |
| Byte 15 | Net Gateway [0]  |              |                |          |                        |                       |
| Byte 16 | Net Gateway [1]  |              |                |          |                        |                       |
| Byte 17 | Net Gateway [2]  |              |                |          |                        |                       |
| Byte 18 | Net Gateway [3]  |              |                |          |                        |                       |
| Byte 19 | Modbus Port      |              |                |          |                        |                       |
| Byte 20 |                  |              |                |          |                        |                       |
| Byte 21 | Reserved         |              |                |          |                        | Watch dog             |
| Byte 22 | Watchdog Time(s) |              |                |          |                        |                       |
| Byte 23 |                  |              |                |          |                        |                       |

Data declaration:

**Source of Config Data:** Parameter configuration mode (Default: 0)

0: Configuration Software

**Fault Action for Input:** Input fault handling mode, when IO module is offline, the adapter will process IO module input data according to this mode.

0: Hold Last Input Value

1: Clear Input Value

**Port Mirroring:** The port mirroring function could mirror the message of adapter network data to LAN1 or LAN2 for output. (Default: 0)

0: Disable

1: Enable

**Sniffer Port:** Mirror port, which is used to monitor adapter network message data when port mirror function is enabled. (Default: 0)

0: LAN1

1: LAN2

**MAC Address:** MAC address, read-only property.

**IP Address:** Adapter IP address, when the value of the dial-code switch is not 0, the last byte of the IP address is replaced by the dial-code value.

**Net Mask:** Subnet mask.

**Net Gateway:** Gateway address.

**Modbus Port:** Modbus-TCP server port number. (Default: 502)

**Watchdog:** Modbus watchdog. (Default: 1)

0: Disable

1: Enable

**Watchdog Time(s):** Modbus application watchdog period, when the watchdog is enabled, if there is no Modbus data exchange on the TCP connection in this period, the TCP connection will be disconnected (other TCP connections with data exchange will be remained normally). (Default: 30)

## 7. System diagnostic area

System diagnostic area is divided into two parts.

The first part: "State input" storage area, address 0x2000 ~ 0x2068, a total of 105 Word.

| No. | Storage Type | Description                     | Storage Capacity | Address Range | Read-write |
|-----|--------------|---------------------------------|------------------|---------------|------------|
| 1   | 3 Area       | System diagnosis - Status input | 105 Word         | 0x2000~0x2068 | RO         |

Modbus client

monitors the address area 0x2000~0x2068 by calling Modbus 04 function code to obtain the current working status and error code of the adapter and IO module, the data format is shown as below:

| No. | Modbus Address (Decimalism) | Address (Hexadecimal) | Data Name         | Description  |
|-----|-----------------------------|-----------------------|-------------------|--------------|
| 1   | 8192                        | 0x2000                | <u>Reset Mode</u> | Reset State* |
| 2   | 8193                        | 0x2001                | Reserve           |              |
| 3   | 8194                        | 0x2002                | DIP switch value  |              |

|    |      |        |                          |                                           |
|----|------|--------|--------------------------|-------------------------------------------|
| 4  | 8195 | 0x2003 | Running time -<br>Second |                                           |
| 5  | 8196 | 0x2004 | Running time -<br>Minute |                                           |
| 6  | 8197 | 0x2005 | Running time -<br>Hour   |                                           |
| 7  | 8198 | 0x2006 | Running time -<br>Day    |                                           |
| 8  | 8199 | 0x2007 | MAC                      | Current Device MAC                        |
| 9  | 8200 | 0x2008 |                          |                                           |
| 10 | 8201 | 0x2009 |                          |                                           |
| 11 | 8202 | 0x200A | IP                       | Current Device IP                         |
| 12 | 8203 | 0x200B |                          |                                           |
| 13 | 8204 | 0x200C | MASK                     | Current Device<br>MASK                    |
| 14 | 8205 | 0x200D |                          |                                           |
| 15 | 8206 | 0x200E | GATEWAY                  | Current Device<br>GATEWAY                 |
| 16 | 8207 | 0x200F |                          |                                           |
| 17 | 8208 | 0x2010 | DI-size                  | Discrete quantity<br>input area data size |
| 18 | 8209 | 0x2011 | DO-size                  | Coil output area data<br>size             |
| 19 | 8210 | 0x2012 | AI-size                  | Input register area<br>data size          |
| 20 | 8211 | 0x2013 | AO-size                  | Holding register area<br>data size        |
| 21 | 8212 | 0x2014 | Config-Client-IP         | Configured client IP                      |
| 22 | 8213 | 0x2015 |                          |                                           |
| 23 | 8214 | 0x2016 | Config-Client-Port       | Configured client<br>port                 |
| 24 | 8215 | 0x2017 | Modbus-Client-<br>Number | Connected Modbus<br>client number         |
| 25 | 8216 | 0x2018 | Modbus-Client-1-<br>IP   | Client 1-IP                               |
| 26 | 8217 | 0x2019 |                          |                                           |
| 27 | 8218 | 0x201A | Modbus-Client-1-<br>Port | Client 1-Port                             |
| 28 | 8219 | 0x201B | Modbus-Client-2-<br>IP   | Client 2-IP                               |
| 29 | 8220 | 0x201C |                          |                                           |
| 30 | 8221 | 0x201D | Modbus-Client-2-<br>Port | Client 2-Port                             |
| 31 | 8222 | 0x201E | Modbus-Client-3-<br>IP   | Client 3-IP                               |
| 32 | 8223 | 0x201F |                          |                                           |

|    |      |        |                      |                      |
|----|------|--------|----------------------|----------------------|
| 33 | 8224 | 0x2020 | Modbus-Client-3-Port | Client 3-Port        |
| 34 | 8225 | 0x2021 | Modbus-Client-4-IP   | Client 4-IP          |
| 35 | 8226 | 0x2022 |                      |                      |
| 36 | 8227 | 0x2023 | Modbus-Client-4-Port | Client 4-Port        |
| 37 | 8228 | 0x2024 | Modbus-Client-5-IP   | Client 5-IP          |
| 38 | 8229 | 0x2025 |                      |                      |
| 39 | 8230 | 0x2026 | Modbus-Client-5-Port | Client 5-Port        |
| 40 | 8231 | 0x2027 | Module_Error[0]      | Module 0 error code  |
| 41 | 8232 | 0x2028 |                      |                      |
| 42 | 8233 | 0x2029 | Module_Error[1]      | Module 1 error code  |
| 43 | 8234 | 0x202A |                      |                      |
| 44 | 8235 | 0x202B | Module_Error[2]      | Module 2 error code  |
| 45 | 8236 | 0x202C |                      |                      |
| 46 | 8237 | 0x202D | Module_Error[3]      | Module 3 error code  |
| 47 | 8238 | 0x202E |                      |                      |
| 48 | 8239 | 0x202F | Module_Error[4]      | Module 4 error code  |
| 49 | 8240 | 0x2030 |                      |                      |
| 50 | 8241 | 0x2031 | Module_Error[5]      | Module 5 error code  |
| 51 | 8242 | 0x2032 |                      |                      |
| 52 | 8243 | 0x2033 | Module_Error[6]      | Module 6 error code  |
| 53 | 8244 | 0x2034 |                      |                      |
| 54 | 8245 | 0x2035 | Module_Error[7]      | Module 7 error code  |
| 55 | 8246 | 0x2036 |                      |                      |
| 56 | 8247 | 0x2037 | Module_Error[8]      | Module 8 error code  |
| 57 | 8248 | 0x2038 |                      |                      |
| 58 | 8249 | 0x2039 | Module_Error[9]      | Module 9 error code  |
| 59 | 8250 | 0x203A |                      |                      |
| 60 | 8251 | 0x203B | Module_Error[10]     | Module 10 error code |
| 61 | 8252 | 0x203C |                      |                      |
| 62 | 8253 | 0x203D | Module_Error[11]     | Module 11 error code |
| 63 | 8254 | 0x203E |                      |                      |
| 64 | 8255 | 0x203F | Module_Error[12]     | Module 12 error code |
| 65 | 8256 | 0x2040 |                      |                      |
| 66 | 8257 | 0x2041 | Module_Error[13]     | Module 13 error code |
| 67 | 8258 | 0x2042 |                      |                      |
| 68 | 8259 | 0x2043 | Module_Error[14]     | Module 14 error code |
| 69 | 8260 | 0x2044 |                      |                      |
| 70 | 8261 | 0x2045 | Module_Error[15]     |                      |

|     |      |        |                  |                      |
|-----|------|--------|------------------|----------------------|
| 71  | 8262 | 0x2046 |                  | Module 15 error code |
| 72  | 8263 | 0x2047 | Module_Error[16] | Module 16 error code |
| 73  | 8264 | 0x2048 |                  |                      |
| 74  | 8265 | 0x2049 | Module_Error[17] | Module 17 error code |
| 75  | 8266 | 0x204A |                  |                      |
| 76  | 8267 | 0x204B | Module_Error[18] | Module 18 error code |
| 77  | 8268 | 0x204C |                  |                      |
| 78  | 8269 | 0x204D | Module_Error[19] | Module 19 error code |
| 79  | 8270 | 0x204E |                  |                      |
| 80  | 8271 | 0x204F | Module_Error[20] | Module 20 error code |
| 81  | 8272 | 0x2050 |                  |                      |
| 82  | 8273 | 0x2051 | Module_Error[21] | Module 21 error code |
| 83  | 8274 | 0x2052 |                  |                      |
| 84  | 8275 | 0x2053 | Module_Error[22] | Module 22 error code |
| 85  | 8276 | 0x2054 |                  |                      |
| 86  | 8277 | 0x2055 | Module_Error[23] | Module 23 error code |
| 87  | 8278 | 0x2056 |                  |                      |
| 88  | 8279 | 0x2057 | Module_Error[24] | Module 24 error code |
| 89  | 8280 | 0x2058 |                  |                      |
| 90  | 8281 | 0x2059 | Module_Error[25] | Module 25 error code |
| 91  | 8282 | 0x205A |                  |                      |
| 92  | 8283 | 0x205B | Module_Error[26] | Module 26 error code |
| 93  | 8284 | 0x205C |                  |                      |
| 94  | 8285 | 0x205D | Module_Error[27] | Module 27 error code |
| 95  | 8286 | 0x205E |                  |                      |
| 96  | 8287 | 0x205F | Module_Error[28] | Module 28 error code |
| 97  | 8288 | 0x2060 |                  |                      |
| 98  | 8289 | 0x2061 | Module_Error[29] | Module 29 error code |
| 99  | 8290 | 0x2062 |                  |                      |
| 100 | 8291 | 0x2063 | Module_Error[30] | Module 30 error code |
| 101 | 8292 | 0x2064 |                  |                      |
| 102 | 8293 | 0x2065 | Module_Error[31] | Module 31 error code |
| 103 | 8294 | 0x2066 |                  |                      |
| 104 | 8295 | 0x2067 | Module_Error[32] | Module 32 error code |
| 105 | 8296 | 0x2068 |                  |                      |

\*Reset state Register 38193 address data format is shown as below:

| Address offset | Address name | Description | Power on default value |
|----------------|--------------|-------------|------------------------|
|----------------|--------------|-------------|------------------------|

|           |                    |                   |     |
|-----------|--------------------|-------------------|-----|
| Bit 0     | Power_On_Reset     | Power on reset    | 0/1 |
| Bit 1-3   | Reserved           | Reserved          | 0   |
| Bit 4     | External_Reset     | External Reset    | 0/1 |
| Bit 5     | Reserved           | Reserved          | 0   |
| Bit 6     | Soft_Reset_Request | Soft Reset        | 0   |
| Bit 7     | Reserved           | Reserved          | 0   |
| Bit 8     | HardFault          | Hard Fault Reset  | 0   |
| Bit 9     | StackOver          | Stack Over Reset  | 0   |
| Bit 10    | MemoryOver         | Memory Over Reset | 0   |
| Bit 11-15 | Reserved           | Reserved          | 0   |

The second part: "Control Output" storage area, address 0x2000, a total of 1 Word.

| No. | Storage Type | Description                       | Storage Capacity | Address Range | Read-write |
|-----|--------------|-----------------------------------|------------------|---------------|------------|
| 1   | 4 Area       | System diagnosis - Control output | 1 Word           | 0x2000        | RW         |

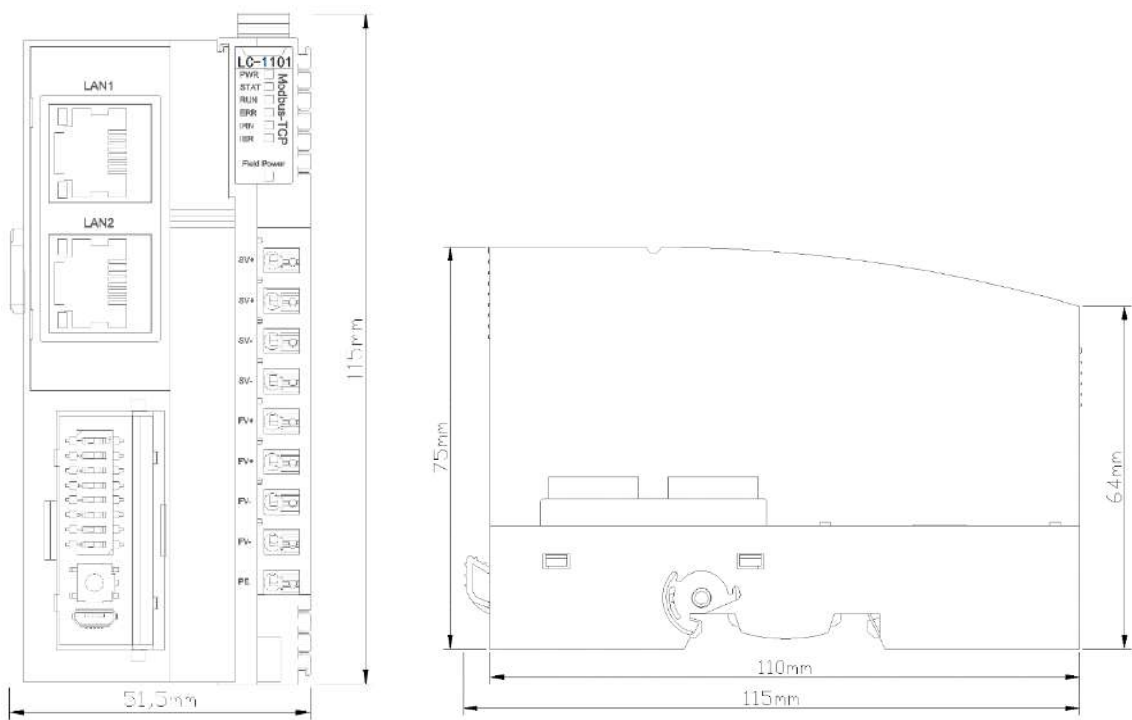
The

Modbus client controls the address 0x2000 by calling Modbus 06/16 function code to implement block reset or port mirroring control.

Register 408193 address data format is shown as below:

| Addres offset | Address Name | Description                                                | Value range | Default value  |
|---------------|--------------|------------------------------------------------------------|-------------|----------------|
| Bit 0         | Restart      | 0->1 Rising edge triggering system reset                   | 0-1         | 0              |
| Bit1          | Port_mirror  | Port mirroring function enable<br>0: disabled<br>1: enable | 0-1         | 0:<br>disabled |
| Bit 2         | Sniffer_port | Mirror port selection<br>0:LAN1<br>1:LAN2                  | 0-1         | 0:LAN1         |
| Bit 3-15      | Reseived     | Reserved                                                   | 0           | 0              |

A Dimension Drawing



# LC-1201 EtherCAT Network Coupler

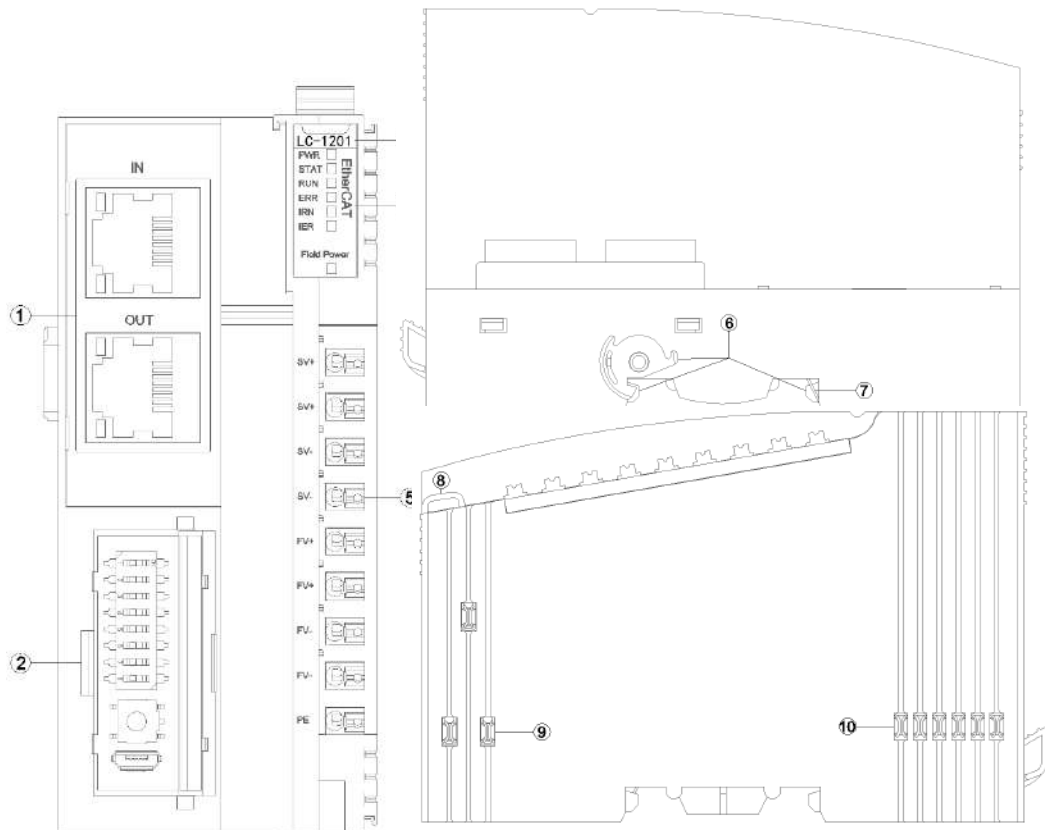
## 1 Module Overview

The LC-1201 EtherCAT I/O module supports standard EtherCAT protocol access. The coupler supports a maximum input of 1024 bytes and a maximum output of 1024 bytes. The number of supported expansion I/O modules is 32.

## 2 Technical Parameters

| Hardware Specification    |                                                          |
|---------------------------|----------------------------------------------------------|
| System Power              | Nominal:24Vdc, Range: 9-36Vdc<br>Reverse Protection: YES |
| Power Consumption         | 50mA@24Vdc                                               |
| Current Output            | Max.2.5A@5VDC                                            |
| Isolation                 | System Power to Field Power Isolation                    |
| Field Power               | Nominal:24Vdc, Range:22-28Vdc                            |
| Field Power Current       | Max. 8A                                                  |
| IO Modules Supported      | 32 pcs                                                   |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                          |
| Mounting Type             | 35mm DIN-Rail                                            |
| Size                      | 115*51.5*75mm                                            |
| Weight                    | 130g                                                     |
| Environment Specification |                                                          |
| Operation Temperature     | -40~85°C                                                 |
| Operation Humidity        | 5%-95% (No Condensation)                                 |
| Ingress Protection Rating | IP20                                                     |
| EtherCAT Specification    |                                                          |
| Protocol                  | EtherCAT                                                 |
| Process Data Area         | Max input 1024 Byte, Max output 1024 Byte                |
| Network Interface         | 2*RJ45                                                   |
| Speed                     | 10/100Mbps, MDI/MIDX, Full-Duplex                        |
| Distance                  | 100m                                                     |

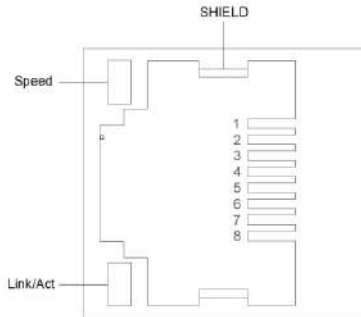
### 3 Hardware Interface



- ① Network Interface
- ② Config Interface
- ③ Module Type
- ④ LED Indicator
- ⑤ Wiring Terminal
- ⑥ Buckle
- ⑦ Grounding Spring Sheet
- ⑧ Fixed Wiring Harness
- ⑨ Field Power
- ⑩ Internal Bus

### 3.1 Network Interface

IN is the EtherCAT input port, OUT is the EtherCAT output port, with a 10M/100M adaptive rate.



Speed: Network speed indicator light (green)

ON:100M

OFF:10M

Link/Act: Link status indicator, Active activity indicator light (orange)

ON:Link UP

OFF:Link DOWN

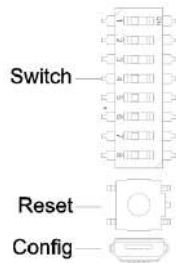
Flash:Active

SHIELD: RJ45 crystal head shield layer interface

#### RJ45 Interface Pin Definition

| Pin | Definition | Description |
|-----|------------|-------------|
| 1   | TD+        | Transmit+   |
| 2   | TD-        | Transmit-   |
| 3   | RD+        | Receive+    |
| 4   | --         | --          |
| 5   | --         | --          |
| 6   | RD-        | Receive-    |
| 7   | --         | --          |
| 8   | --         | --          |

## 3.2 Configuration Interface



### Switch: Setting of Station Alias

When the dip switch value is not 0, the dip value is the station alias. The station alias will take effect only after a power-off reboot when the dip switch is set. When the dip switch value is 0, the station alias set by the PLC master station or stored in the EEPROM memory is used.

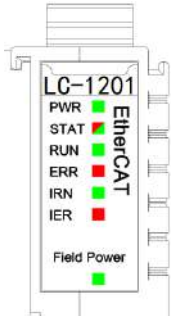
The relationship between the station alias and the dip switch value is shown in the following table:

| Switch Bit Number (ON: 1, OFF: 0) |   |   |   |   |   |   |   | Switch Value | IP Address |
|-----------------------------------|---|---|---|---|---|---|---|--------------|------------|
| 1                                 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |              |            |
| 0                                 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0            | 0          |
| 1                                 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1            | 1          |
| 0                                 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2            | 2          |
| .                                 | . | . | . | . | . | . | . | .            | .          |
| 0                                 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 10           | 10         |
| .                                 | . | . | . | . | . | . | . | .            | .          |
| 0                                 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 254          | 254        |
| 1                                 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 255          | 255        |

**Reset:** Module reset button. Press and hold the button for more than 5 seconds, and all module parameters will be restored to default values. When the Reset is effective, a green indicator light will illuminate in the upper left corner of the button.

**Config:** Configuration port, standard MicroUSB interface, used for configuring device parameters and firmware upgrades.

### 3.3 LED indicator

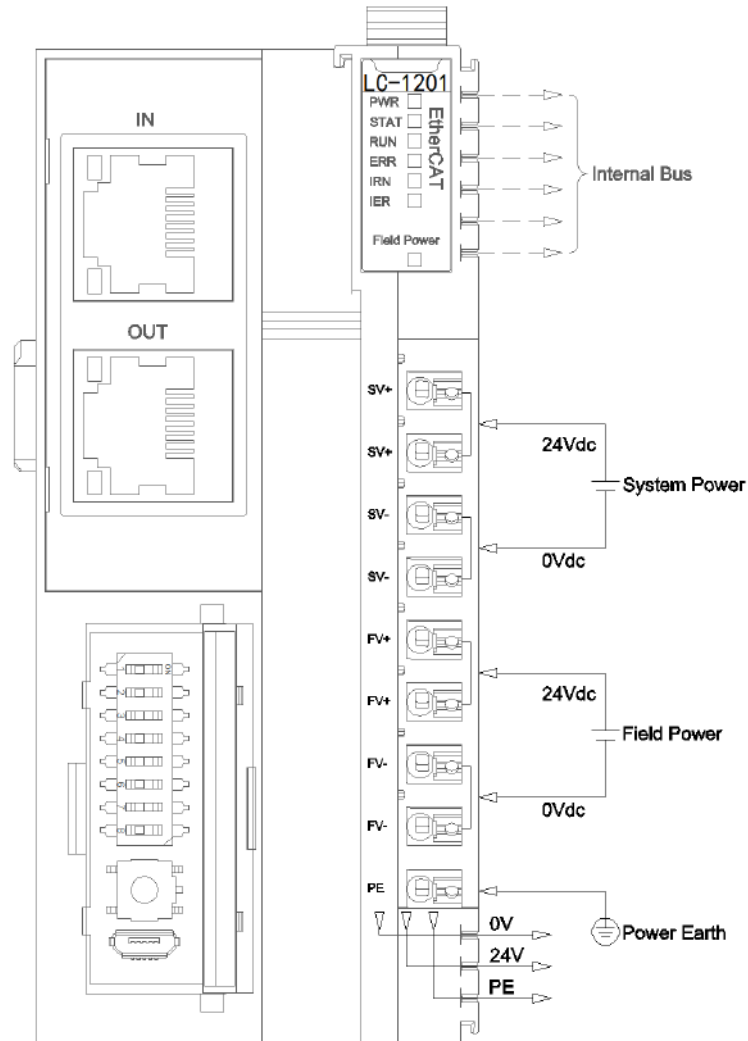


| PWR Power State (GREEN)       | Definition                                |
|-------------------------------|-------------------------------------------|
| ON                            | System Power Normal                       |
| OFF                           | System Power Failure                      |
| STAT Module State (RED/GREEN) | Definition                                |
| Double Flash (RED)            | Module Soft Restarted by Hard-Fault       |
| ON(GREEN)                     | Running                                   |
| Single Flash (GREEN)          | Stopping                                  |
| Flash(2.5Hz) (RED/GREEN)      | Boot Mode                                 |
| Flash(10Hz) (RED/GREEN)       | Firmware Updating                         |
| RUN Network State (GREEN)     | Definition                                |
| ON                            | Operating Status                          |
| OFF                           | Initialization State                      |
| Flash(10Hz)                   | During startup or in BootStrap state      |
| Flash (2.5Hz)                 | Pre-operational State                     |
| Flash                         | Safe Operating State                      |
| ERR Network Error (RED)       | Definition                                |
| Flash(2.5Hz)                  | No Error                                  |
| OFF                           | Application Control Failure               |
| Flash(10Hz)                   | Startup Error                             |
| Flash (2.5Hz)                 | Invalid Configuration                     |
| Flash                         | Local Error, Unrequested State Transition |
| Double Flash                  | Watchdog Error                            |
| IRN IO Run (GREEN)            | Definition                                |
| ON                            | IO initialization normal                  |
| OFF                           | IO initialization failure                 |
| IER IO Error (RED)            | Definition                                |
| OFF                           | IO communication normal                   |
| Double Flash                  | IO communication failure                  |
| Field Power State (GREEN)     | Definition                                |

|     |                     |
|-----|---------------------|
| ON  | Field Power Normal  |
| OFF | Field Power Failure |

## 4 Wiring

Please note during wiring: Internally, two terminals of SV+ are short-circuited, two terminals of SV- are short-circuited, two terminals of FV+ are short-circuited, and two terminals of FV- are short-circuited. Externally, it is only necessary to connect one system power supply and one field power supply.



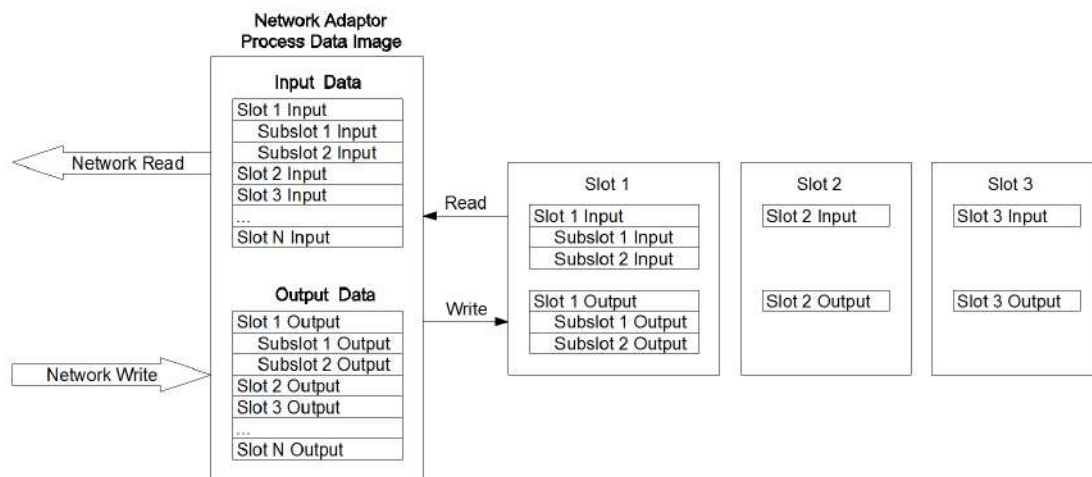
## 5 Process data definition

### 5.1 Adapter process data definition

N/A

### 5.2 IO Module process data mapping

The network coupler reads and writes the process data of the I/O module inputs and outputs in real time through the internal bus. The data mapping model is as shown in the following diagram:



The maximum input byte size of the EtherCAT network coupler is 1024 bytes, and the maximum output byte size is 1024 bytes.

## 6 Configuration Parameter Definition

| Configuration Parameter |          |       |       |       |       |                         |                        |                       |
|-------------------------|----------|-------|-------|-------|-------|-------------------------|------------------------|-----------------------|
| Bit No                  | Bit 7    | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2                   | Bit 1                  | Bit 0                 |
| Byte 0                  | Reserved |       |       |       |       | Fault Action for Output | Fault Action for Input | Source of Config Data |

Data Description:

**Source of Config Data:** Method of parameter configuration. (Default value: 0)

- 0: Configuration software settings
- 1: Fieldbus configuration

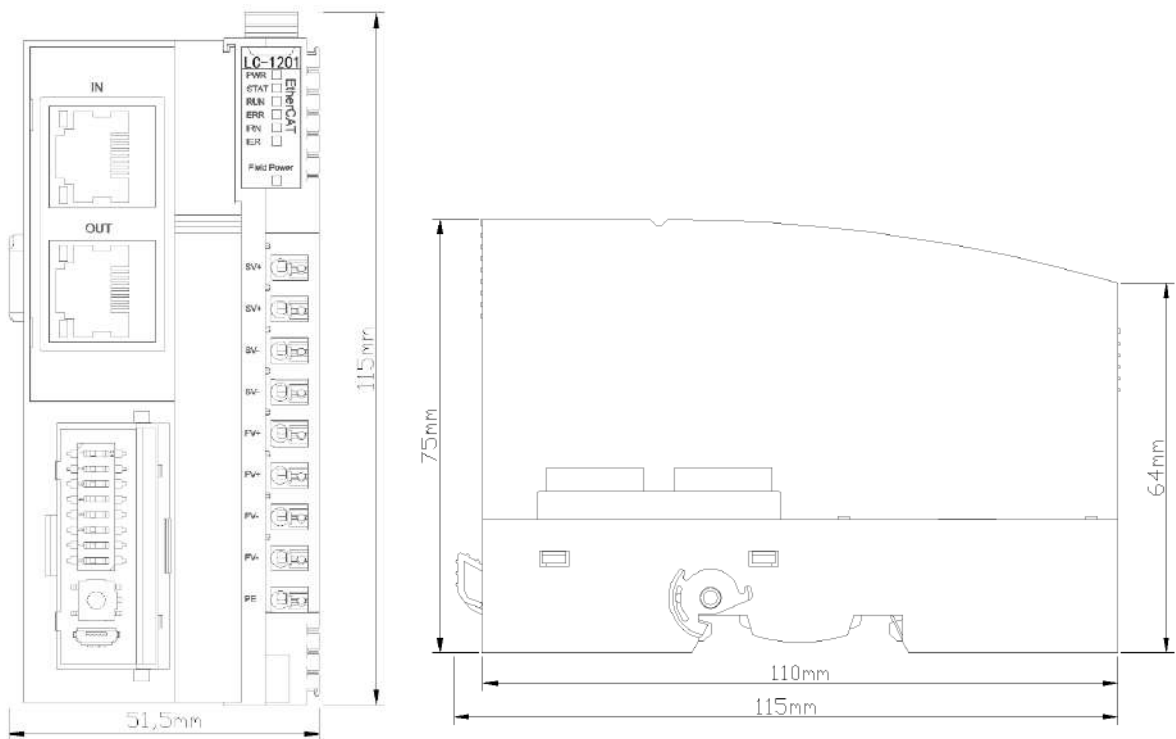
**Fault Action for Input:** Method of handling input faults. When an IO module goes offline, the coupler processes the input data of the IO module in this mode. (Default value: 0)

- 0: Maintain the last input value
- 1: Clear the input value

**Fault Action for Output:** Method of handling output faults. When the fieldbus goes offline, the coupler processes the output data of the IO module in this mode. (Default value: 0)

- 0: Maintain the last output value
- 1: Clear the output value

**A Dimension Drawing**



# LC-1301 Profinet Network Adapter

## 1 The module overview

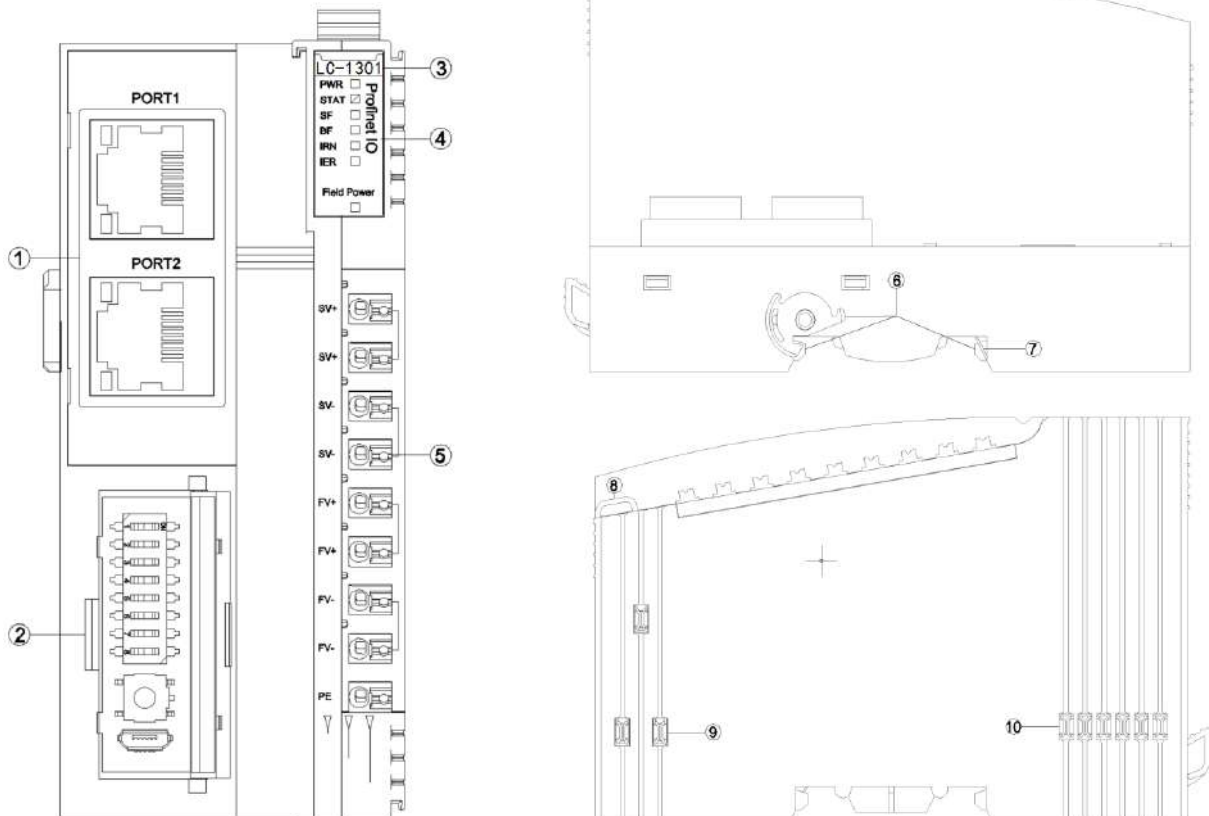
The LC-1301 Profinet network adapter supports standard Profinet IO Device Communication. The adapter supports MRP media redundancy, and it could realize ring network redundancy. And it supports RT/IRT real-time and synchronous communication mode, with its RT real-time communication minimum period of 1ms and IRT synchronous communication minimum period of 250us. The adapter supports a maximum input of 1440 bytes, a maximum output of 1440 bytes, and the number of the extended IO modules it supports is 32.

## 2 Technical Parameters

| Hardware Specification    |                                                                                               |
|---------------------------|-----------------------------------------------------------------------------------------------|
| System Power              | Nominal: 24Vdc, Range: 9-36Vdc<br>Protection: Overcurrent Protection, Reverse Protection: YES |
| Power Consumption         | 110mA@24Vdc                                                                                   |
| Current Output            | Max:2A@5Vdc                                                                                   |
| Isolation                 | System Power to Field Power Isolation                                                         |
| Field Power               | Nominal: 24Vdc, Range: 22-28Vdc                                                               |
| Field Power Current       | Max DC 8A                                                                                     |
| IO Modules Supported      | 32 pcs                                                                                        |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                                                               |
| Mounting Type             | 35mm DIN-Rail                                                                                 |
| Size                      | 115*51.5*75mm                                                                                 |
| Weight                    | 130g                                                                                          |
| Environment Specification |                                                                                               |
| Operational Temperature   | -40~85°C                                                                                      |
| Operational Humidity      | 5%-95% (No Condensation)                                                                      |
| Ingress Protection Rating | IP20                                                                                          |
| Profinet Parameter        |                                                                                               |
| Protocol                  | Profinet IO Device                                                                            |
| I/O Data Size             | Input Max 1440 Bytes, Output Max 1440 Bytes                                                   |
| RT                        | Supported, Min.1ms                                                                            |
| IRT                       | Supported, Min.250us                                                                          |
| MRP                       | Supported                                                                                     |
| MRPD                      | Not supported                                                                                 |
| Network Interface         | 2*RJ45                                                                                        |
| Speed                     | 10/100Mbps, MDI/MIDX, Full-Duplex                                                             |
| Max bus distance          | 100m                                                                                          |
| Profinet Device Name      | DIP switch setting or Profinet monitor modifying                                              |

Notice: The adapter does not support the MRPD (Media Redundancy for Planned Duplication) function, so the MRP and IRT functions cannot be used simultaneously.

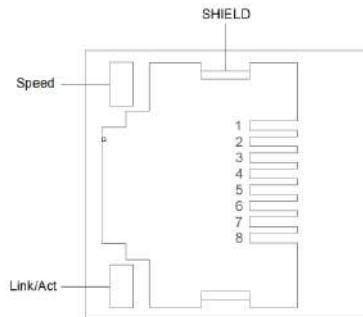
### 3 Hardware Interface



- ① Network Interface
- ② Config Interface
- ③ Module Type
- ④ LED Indicator
- ⑤ Wiring Terminal
- ⑥ Buckle
- ⑦ Grounding Spring Sheet
- ⑧ Fixed Wiring Harness
- ⑨ Field Power
- ⑩ Internal Bus

### 3.1 Network Interface

PORT1 and PORT2 are both Profinet communication port, and support switch function with 10Mbps and 100Mbps data rates, MDI/MID-X auto crossover.



Speed: Network Speed LED (Green)

ON: 100Mbps

OFF: 10Mbps

Link/Act: Link State、Active State(Orange)

ON: Link UP

OFF: Link DOWN

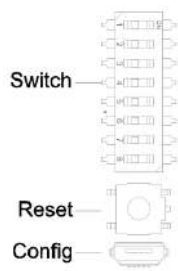
Flash: Active

SHIELD: RJ45 Shield Interface

RJ45 Pin definition

| Pin | Definition | Description                 |
|-----|------------|-----------------------------|
| 1   | TD+        | Transmitter Signal Positive |
| 2   | TD-        | Transmitter Signal Negative |
| 3   | RD+        | Receiver Signal Positive    |
| 4   | --         | --                          |
| 5   | --         | --                          |
| 6   | RD-        | Receiver Signal Negative    |
| 7   | --         | --                          |
| 8   | --         | --                          |

### 3.2 Configuration Interface



**Switch:** The DIP switch is used to set the name of Profinet device.

When the DIP switch value is 0, the device default name is cn8032-addr, and it could use Profinet monitor to set the device name online.

When the dial-code switch value is not 0, the device name is determined by the value of the DIP switch. The relationship between the device name and the dial value is shown in the following table:

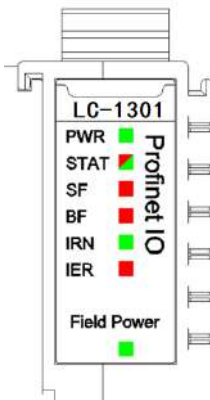
| Switch Bit Number(ON:1,OFF:0)                                                      |   |   |   |   |   |   |   | Switch Value | Profinet Deice Name                             |
|------------------------------------------------------------------------------------|---|---|---|---|---|---|---|--------------|-------------------------------------------------|
| 1                                                                                  | 2 | 3 | 4 | 5 | 6 | 7 | 8 |              |                                                 |
| 0                                                                                  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0            | Configured By Software<br>(Default:cn8032-addr) |
| 1                                                                                  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1            | cn8032-1                                        |
| 0                                                                                  | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2            | cn8032-2                                        |
| .                                                                                  | . | . | . | . | . | . | . | .            | .                                               |
| 0                                                                                  | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 10           | cn8032-10                                       |
| .                                                                                  | . | . | . | . | . | . | . | .            | .                                               |
| 0                                                                                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 254          | cn8032-254                                      |
| 1                                                                                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 255          | cn8032-255                                      |
| Description: Factory default dial code value is 0, the device name is cn8032-addr. |   |   |   |   |   |   |   |              |                                                 |

**Reset:** Module reset button. All parameters of the module will be restored to the default value after pressing the button for more than 5 seconds. When the Reset button is pressed, a green LED will light up in the upper left corner of the button.

**Config:** Configure port, a standard Micro USB interface for configuring device parameters and firmware upgrades.

Description: device parameters can be set in Profinet IO controller configuration software.

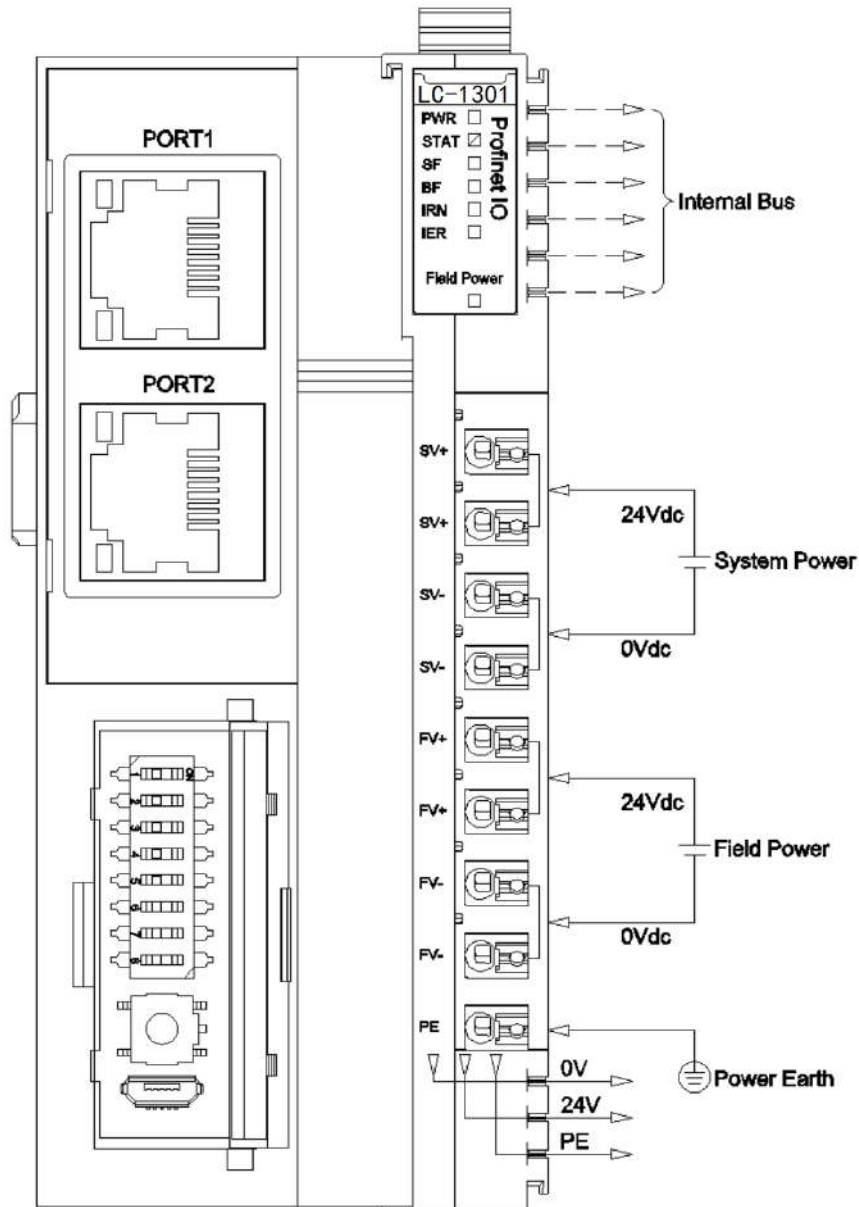
### 3.3 LED Indicators



| PWR Power State (GREEN)       | Definition                        |
|-------------------------------|-----------------------------------|
| ON                            | System Power Normal               |
| OFF                           | System Power Failure              |
| STAT Module State (RED/GREEN) | Definition                        |
| Double Flash (RED)            | Module Soft Restart by Hard-Fault |
| ON(GREEN)                     | Operating                         |
| Single Flash (GREEN)          | Stopping                          |
| Flash(2.5Hz) (RED/GREEN)      | Boot Mode                         |
| Flash(10Hz) (RED/GREEN)       | Firmware Update                   |
| SF System Failure (RED)       | Definition                        |
| OFF                           | Normal                            |
| ON                            | System Failure, Topology Error    |
| Flash                         | Led light test                    |
| Flash(10Hz)                   | MAC address error                 |
| BF Bus Failure (RED)          | Definition                        |
| ON                            | Port1 and Port2 Link-Down         |
| Flash(2.5Hz)                  | Offline mode                      |
| OFF                           | Online mode                       |
| Flash(10Hz)                   | MAC address error                 |
| IRN IO RUN(GREEN)             | Definition                        |
| ON                            | IO initialization normal          |
| OFF                           | IO initialization failure         |
| IER IO Error (RED)            | Definition                        |
| OFF                           | IO communication normal           |
| Double Flash                  | IO communication failure          |
| Field Power State (GREEN)     | Definition                        |
| ON                            | Field Power Normal                |
| OFF                           | Field Power Failure               |

## 4 Wiring

Please note when wiring: for the internal construction, two terminals of SV+ have been short-connected, two terminals of SV- have been short-connected, two terminals of FV+ have been short-connected, and two terminals of FV- have been short-connected. For external it only needs to access one system power supply and one field power supply.



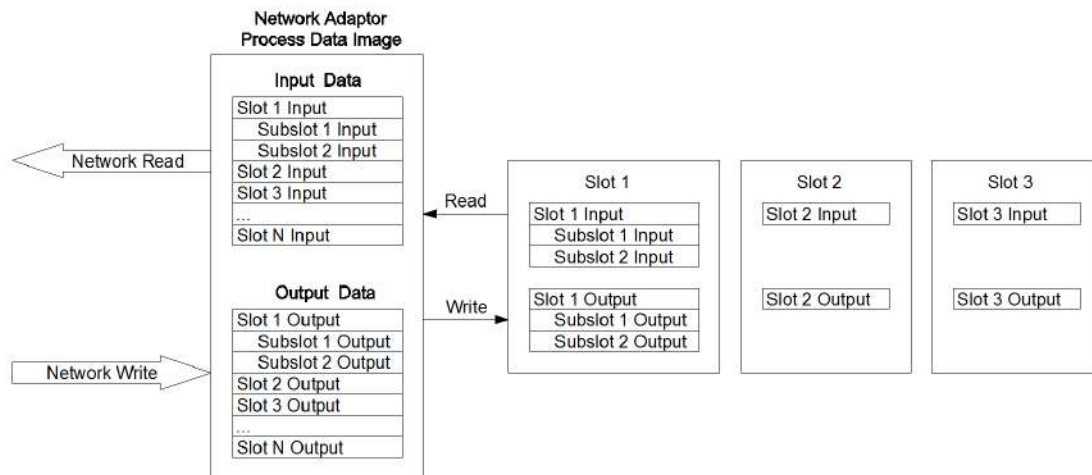
## 5 Process data definition

### 5.1 Adapter process data definition

Profinet adapter itself has no input-output process data.

### 5.2 IO module process data mapping

The network adapter reads and writes input and output process data of IO module in real time through the internal bus, and its data mapping model is shown as follow:



The maximum number of input bytes of the Profinet network adapter is 1440 bytes, and the maximum number of output bytes is 1440 bytes.

## 6 Configuration parameters definition

| Configuration parameters  |                      |       |       |       |       |                         |                        |                       |
|---------------------------|----------------------|-------|-------|-------|-------|-------------------------|------------------------|-----------------------|
| Bit No                    | Bit 7                | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2                   | Bit 1                  | Bit 0                 |
| Byte 0                    | Reserved             |       |       |       |       | Fault Action for Output | Fault Action for Input | Source of Config Data |
| Byte 1                    | MAC Address [0]      |       |       |       |       |                         |                        |                       |
| Byte 2                    | MAC Address [1]      |       |       |       |       |                         |                        |                       |
| Byte 3                    | MAC Address [2]      |       |       |       |       |                         |                        |                       |
| Byte 4                    | MAC Address [3]      |       |       |       |       |                         |                        |                       |
| Byte 5                    | MAC Address [4]      |       |       |       |       |                         |                        |                       |
| Byte 6                    | MAC Address [5]      |       |       |       |       |                         |                        |                       |
| Byte 7                    | IP Address [0]       |       |       |       |       |                         |                        |                       |
| Byte 8                    | IP Address [1]       |       |       |       |       |                         |                        |                       |
| Byte 9                    | IP Address [2]       |       |       |       |       |                         |                        |                       |
| Byte 10                   | IP Address [3]       |       |       |       |       |                         |                        |                       |
| Byte 11                   | Net Mask [0]         |       |       |       |       |                         |                        |                       |
| Byte 12                   | Net Mask [1]         |       |       |       |       |                         |                        |                       |
| Byte 13                   | Net Mask [2]         |       |       |       |       |                         |                        |                       |
| Byte 14                   | Net Mask [3]         |       |       |       |       |                         |                        |                       |
| Byte 15                   | Net Gateway [0]      |       |       |       |       |                         |                        |                       |
| Byte 16                   | Net Gateway [1]      |       |       |       |       |                         |                        |                       |
| Byte 17                   | Net Gateway [2]      |       |       |       |       |                         |                        |                       |
| Byte 18                   | Net Gateway [3]      |       |       |       |       |                         |                        |                       |
| Byte 19<br>...<br>Byte 82 | Profinet Device Name |       |       |       |       |                         |                        |                       |

Data description:

**Source of Config Data:** Parameter configuration mode (Default: 1)

0: Configure software

1: Field Bus

**Fault Action for Input:** Input fault handling mode, when IO module is offline, the adapter will process IO module input data according to this mode. (Default: 0)

0: Hold Last Input Value

1: Clearing Input Value

**Fault Action for Output:** Output fault handling mode, when the fieldbus is offline the adapter will process the IO module output data according to this mode. (Default: 1)

0: Hold Last Output Value

1: Clearing Output Value

**MAC Address:** MAC address, read-only attribute.

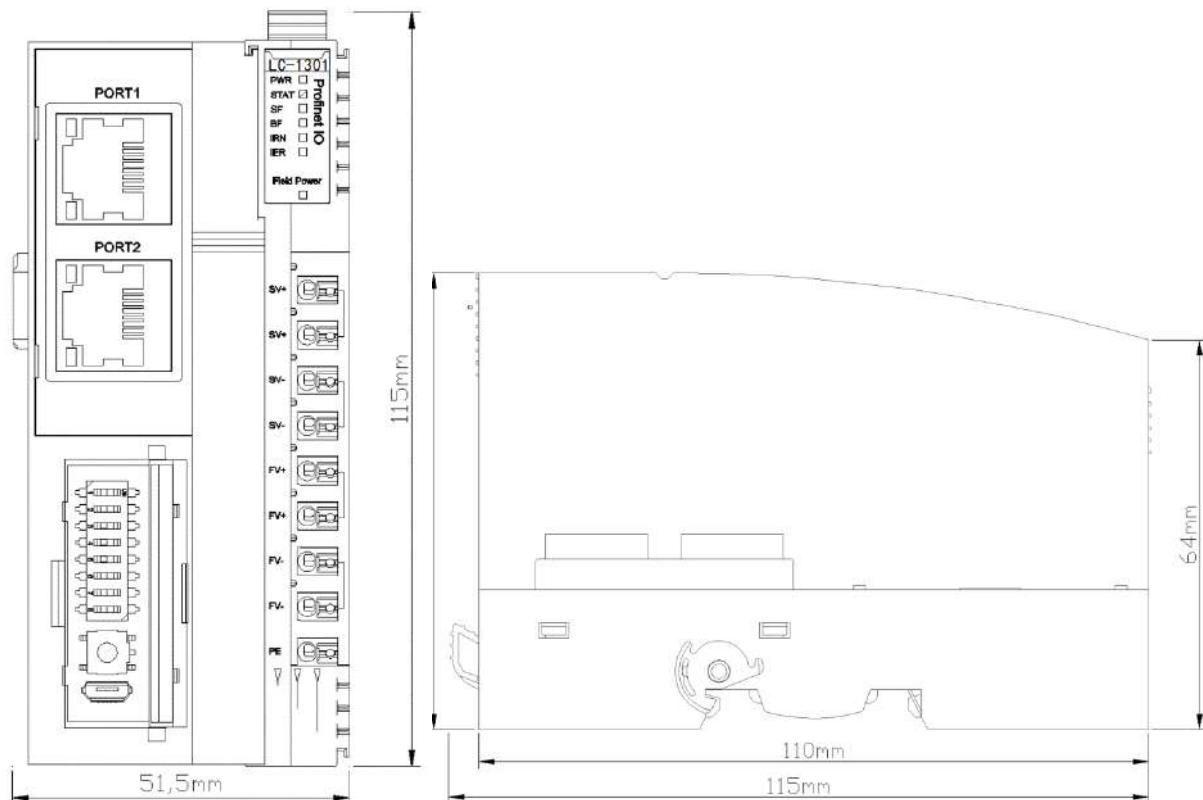
**IP Address:** IP address, read-only attribute.

**Net Mask:** Subnet mask, read-only attribute.

**Net Gateway:** Gateway address, read-only attribute.

**Profinet Device Name:** Profinet device name, read-only attribute. (Device name is determined by the DIP switch)

## A Dimension drawing



# LC-1401 Ethernet/IP Network Adapter

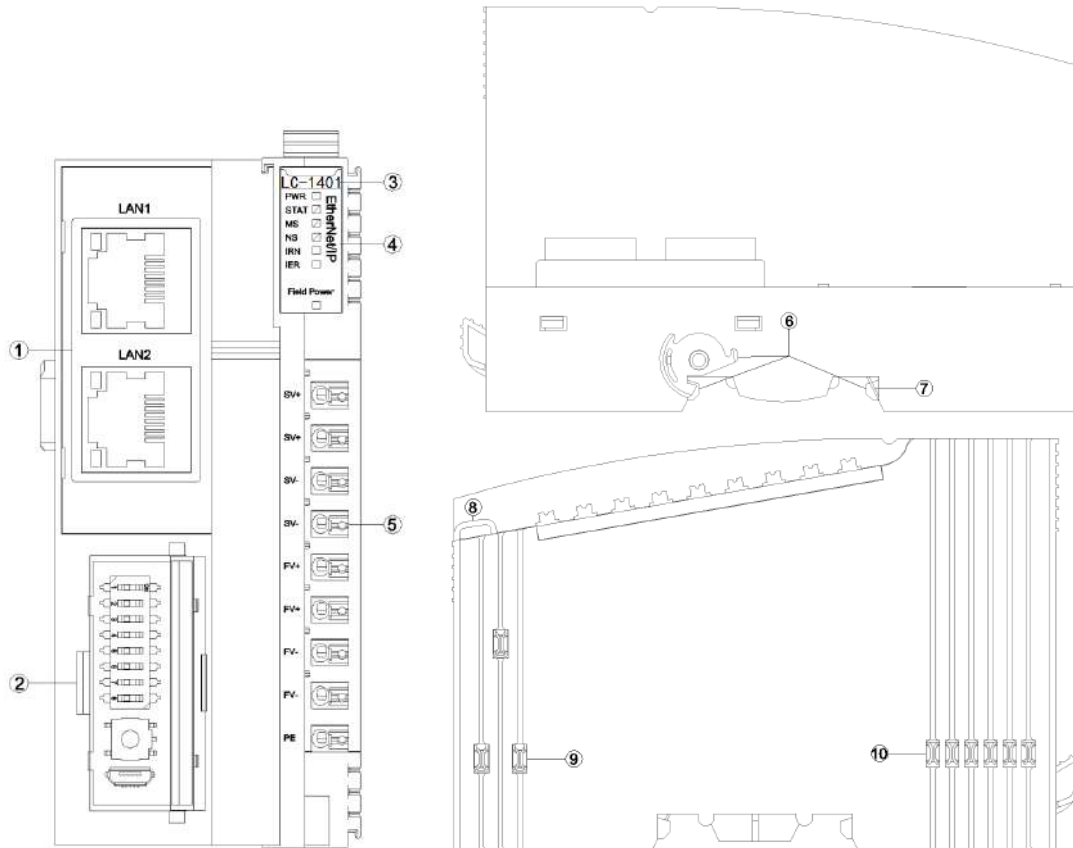
## 1 The module overview

The LC-1401 Ethernet/IP I/O module supports standard Ethernet/IP protocol access. The adapter supports a Max. input of 504 bytes and a Max. output of 504 bytes. It supports 32 pcs of extended IO modules.

## 2 Technical Parameters

| Hardware Specification                   |                                                                                               |
|------------------------------------------|-----------------------------------------------------------------------------------------------|
| System Power                             | Nominal: 24Vdc, Range: 9-36Vdc<br>Protection: Overcurrent Protection, Reverse Protection: YES |
| Power Consumption                        | 110mA@24Vdc                                                                                   |
| Internal BUS Supply Current              | Max.2A@5VDC                                                                                   |
| Isolation                                | System Power to Field Power Isolation                                                         |
| Field Power Supply                       | Power Supply: 22~28V (Nominal 24VDC)                                                          |
| Field Power Supply Current               | Max. DC 8A                                                                                    |
| I/O Modules supported                    | 32 pcs                                                                                        |
| Wiring                                   | Max.1.0mm <sup>2</sup> (AWG 17)                                                               |
| Mounting Type                            | 35mm Size DIN-Rail                                                                            |
| Size                                     | 115*51.5*75mm                                                                                 |
| Weight                                   | 130g                                                                                          |
| Environment Specification                |                                                                                               |
| Operational Temperature                  | -40~85°C                                                                                      |
| Operational Humidity                     | 5%~95% RH(No Condensation)                                                                    |
| Ingress Protection Rating                | IP20                                                                                          |
| Ethernet/IP Parameter                    |                                                                                               |
| Protocol                                 | Ethernet/IP                                                                                   |
| Max. input length                        | 504 Bytes per assembly instance                                                               |
| Max. output length                       | 504 Bytes per assembly instance                                                               |
| Max. no. of explicit message connections | 10                                                                                            |
| Max. no. of implicit message connections | 5                                                                                             |
| Max. no. of CIP connections              | 10                                                                                            |
| Network Interface                        | 2*RJ45                                                                                        |
| Speed                                    | 10/100Mbps, MDI/MIDX, Full-Duplex                                                             |
| Max.Bus Legenth                          | 100m                                                                                          |

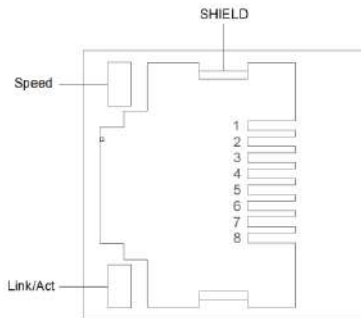
### 3 Hardware Interface



- ① Network Interface
- ② Config Interface
- ③ Module Type
- ④ LED Indicator
- ⑤ Wiring Terminal
- ⑥ Buckle
- ⑦ Grounding Spring Sheet
- ⑧ Fixed Wiring Harness
- ⑨ Field Power
- ⑩ Internal Bus

### 3.1 Network Interface

LAN1/LAN2 are the Ethernet/IP Ethernet port which support switch functions, 10Mbps and 100Mbps data rates, MDI/MID-X auto crossover.



Speed: Network Speed LED Indicator (Green)

ON:100M

OFF:10M

Link/Act: Link State, Active State (Orange)

ON:Link UP

OFF:Link DOWN

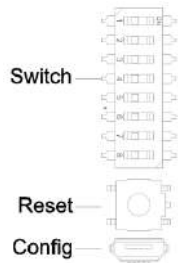
Flash:Active

SHIELD: RJ45 Shield Interface

RJ45 Pin definition

| Pin | Definition | Description                 |
|-----|------------|-----------------------------|
| 1   | TD+        | Transmitter Signal Positive |
| 2   | TD-        | Transmitter Signal Negative |
| 3   | RD+        | Receiver Signal Positive    |
| 4   | --         | --                          |
| 5   | --         | --                          |
| 6   | RD-        | Receiver Signal Positive    |
| 7   | --         | --                          |
| 8   | --         | --                          |

## 3.2 Configuration Interface



**Switch:** the DIP switch is used for setting the IP address (the default IP address is 192.168.1.200).

When the dial value is 0, all 4 bytes of the IP address are configured by the software or use the default IP address (192.168.1.200).

When the dial code value is not 0, the last byte of the IP address is determined by the dial code value, and the first three bytes could be configured by the software or use the default address(192.168.1).

The relationship between IP address and dial code value is shown as below:

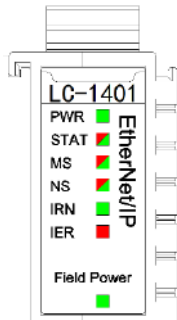
| Dial - code Switch Bit Number (ON: 1, OFF: 0) |   |   |   |   |   |   |   | Dial - code switch value | IP Address                            |
|-----------------------------------------------|---|---|---|---|---|---|---|--------------------------|---------------------------------------|
| 1                                             | 2 | 3 | 4 | 5 | 6 | 7 | 8 |                          |                                       |
| 0                                             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0                        | Configured by software ( or default ) |
| 1                                             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1                        | x.x.x.1                               |
| 0                                             | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2                        | x.x.x.2                               |
| 1                                             | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3                        | x.x.x.3                               |
| .                                             | . | . | . | . | . | . | . | .                        | .                                     |
| .                                             | . | . | . | . | . | . | . | .                        | .                                     |
| 0                                             | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 254                      | x.x.x.254                             |
| 1                                             | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 255                      | x.x.x.255                             |

**Note:** The default IP address after device reset is 192.168.1.200

**Reset:** Module reset button, long pressing the button for more than 5 seconds and all parameters of the module will be restored to the default value. When the Reset button is activated, a green indicator will light up in the upper left corner of the button.

**Config:** Configure port, a standard Micro USB interface for configuring device parameters and firmware upgrades.

### 3.3 LED indicator

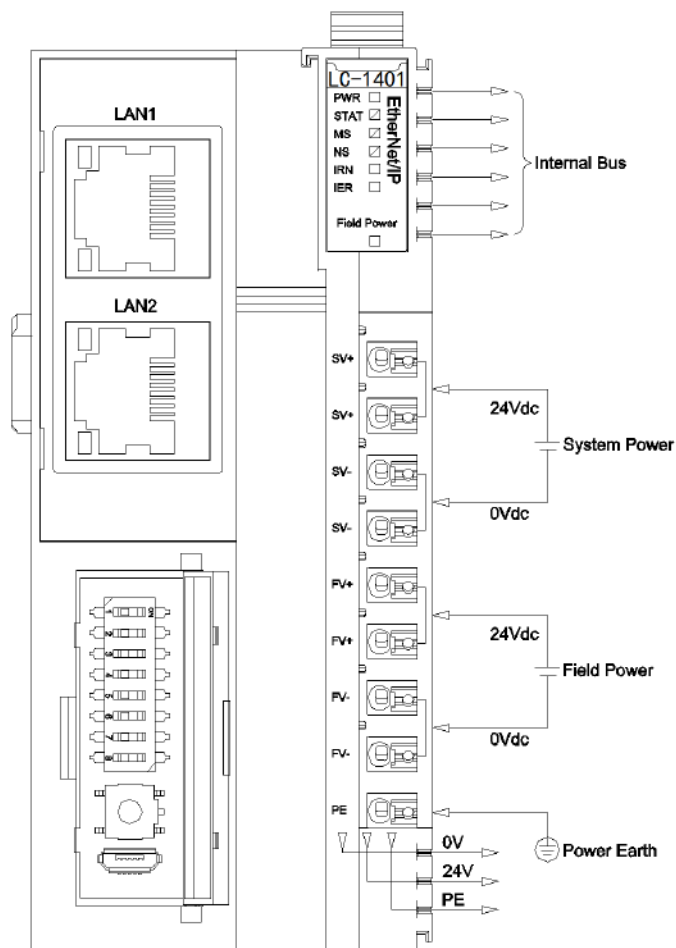


| PWR Power State (RED)         | Definition                                                                                                                                                |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| ON                            | System Power Normal                                                                                                                                       |
| OFF                           | System Power Failure                                                                                                                                      |
| STAT Module State (RED/GREEN) | Definition                                                                                                                                                |
| Double Flash (RED)            | Module Soft Restarted by Hard-Fault                                                                                                                       |
| ON(GREEN)                     | Running                                                                                                                                                   |
| Single Flash (GREEN)          | Stopping                                                                                                                                                  |
| Flash(2.5Hz) (RED/GREEN)      | Boot Mode                                                                                                                                                 |
| Flash(10Hz) (RED/GREEN)       | Firmware Updating                                                                                                                                         |
| MS module state indicator     | Definition                                                                                                                                                |
| ON(GREEN)                     | Module running state correct                                                                                                                              |
| Flash(1Hz) (GREEN)            | Module not configured                                                                                                                                     |
| Flash( GREEN/RED/GREEN )      | Module power on self-test state                                                                                                                           |
| Flash(1Hz) (RED)              | The module detects a recoverable failure state                                                                                                            |
| Red(GREEN)                    | The module detects an unrecoverable failure status                                                                                                        |
| OFF                           | Module power off                                                                                                                                          |
| NS network state indicator    | Definition                                                                                                                                                |
| ON(GREEN)                     | The connection has been established.IP address configuration completed, at least one CIP connection established, the master connection does not time out. |
| Flash(1Hz) (GREEN)            | The connection not established.IP address configuration completed, CIP connection not established, the master connection does not time out.               |
| Flash( GREEN/RED/OFF)         | Module power on self-test state.                                                                                                                          |
| Flash(1Hz) (RED)              | The connection times out, IP address configuration completed, the master connection times out.                                                            |
| ON(RED)                       | Duplicate IP, the IP address is already in use.                                                                                                           |
| OFF                           | Not powered, no IP address.                                                                                                                               |
| IRN - IO RUN(GREEN)           | Definition                                                                                                                                                |
| ON                            | IO initialization normal                                                                                                                                  |
| OFF                           | IO initialization failure                                                                                                                                 |
| IER - IO Error (RED)          | Definition                                                                                                                                                |

|                         |                               |
|-------------------------|-------------------------------|
| OFF                     | IO communication normal       |
| Double flash            | IO communication failure      |
| Field Power - Indicator | Definition                    |
| ON                      | On-site power supply normal   |
| OFF                     | On-site power supply abnormal |

## 4 Wiring

Please note when wiring: for the internal construction, two terminals of SV+ have been short-connected, two terminals of SV- have been short-connected, two terminals of FV+ have been short-connected, and two terminals of FV- have been short-connected. For external it only needs to access one system power supply and one field power supply.



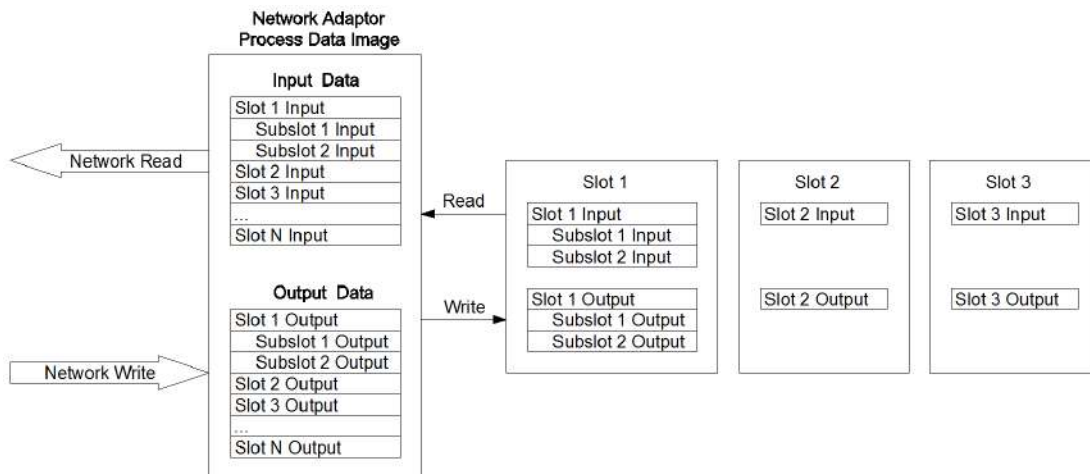
## 5 Process data definition

### 5.1 Adapter process data definition

Ethernet/IP adapter itself has no input/output process data.

### 5.2 IO module process data mapping

The network adapter reads and writes input and output process data of IO module in real time through the internal bus, and its data mapping model is shown as follow:



The maximum number of input bytes of the Ethernet/IP network adapter is 504 bytes, and the maximum number of output bytes is 504 bytes.

## 6 Configuration parameters definition

| Configuration parameters |                    |       |       |                                     |                                     |                                      |                                 |                                 |
|--------------------------|--------------------|-------|-------|-------------------------------------|-------------------------------------|--------------------------------------|---------------------------------|---------------------------------|
| Bit No                   | Bit 7              | Bit 6 | Bit 5 | Bit 4                               | Bit 3                               | Bit 2                                | Bit 1                           | Bit 0                           |
| Byte 0                   | Reserved           |       |       | O-->T<br>Transf<br>er<br>Forma<br>t | T-->O<br>Transf<br>er<br>Forma<br>t | Fault<br>Action<br>for<br>Outpu<br>t | Fault<br>Action<br>for<br>Input | Sourc<br>e of<br>Config<br>Data |
| Byte 1                   | MAC Address[0]     |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 2                   | MAC Address[1]     |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 3                   | MAC Address[2]     |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 4                   | MAC Address[3]     |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 5                   | MAC Address[4]     |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 6                   | MAC Address[5]     |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 7                   | IP Address[0]      |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 8                   | IP Address[1]      |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 9                   | IP Address[2]      |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 10                  | IP Address[3]      |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 11                  | Net Mask[0]        |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 12                  | Net Mask[1]        |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 13                  | Net Mask[2]        |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 14                  | Net Mask[3]        |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 15                  | Net Gateway[0]     |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 16                  | Net Gateway[1]     |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 17                  | Net Gateway[2]     |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 18                  | Net Gateway[3]     |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 19                  | T-->O Size (Bytes) |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 20                  |                    |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 21                  | O-->T Size (Bytes) |       |       |                                     |                                     |                                      |                                 |                                 |
| Byte 22                  |                    |       |       |                                     |                                     |                                      |                                 |                                 |

Data description:

**Source of Config Data:** Parameter configuration mode (Default: 0)

0: Configured software configuration

1: Field Bus configuration

**Fault Action for Input:** Input fault handling mode, when IO module is offline, the adapter will process IO module input data according to this mode. (Default: 0)

0: Hold Last Input Value

1: Clearing Input Value

**Fault Action for Output:** Output fault handling mode, when the fieldbus is offline

the adapter will process the IO module output data according to this mode. (Default: 0)

0: Hold Last Output Value

1: Clearing Output Value

**T-->O Transfer Format:** T-->O Input conversion format, read only.

**O-->T Transfer Format:** O-->T Output conversion format, read only.

**MAC Address:** MAC address, read only.

**IP Address:** IP Address

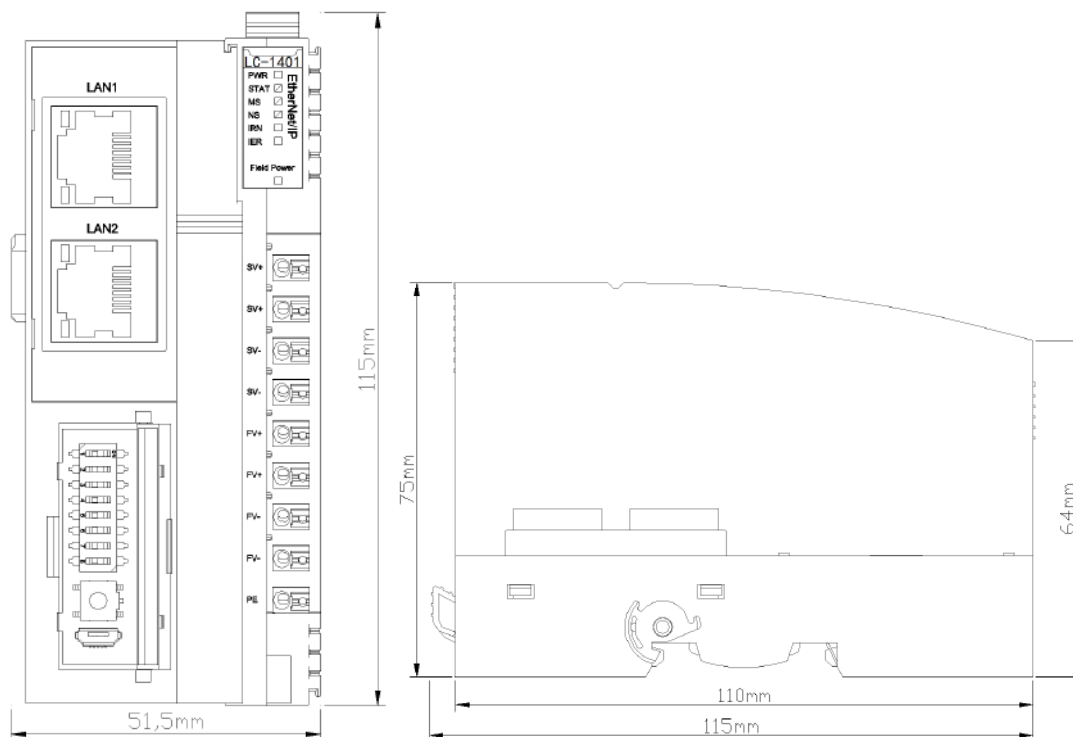
**Subnet Mask**

**Gateway Address**

T-->O Size (Bytes): O-->T length (Bytes) , read only.

O-->T Size (Bytes): O-->T length (Bytes) , read only.

## A Dimension drawing



# LC-2101 Modbus-RTU Bus Adapter

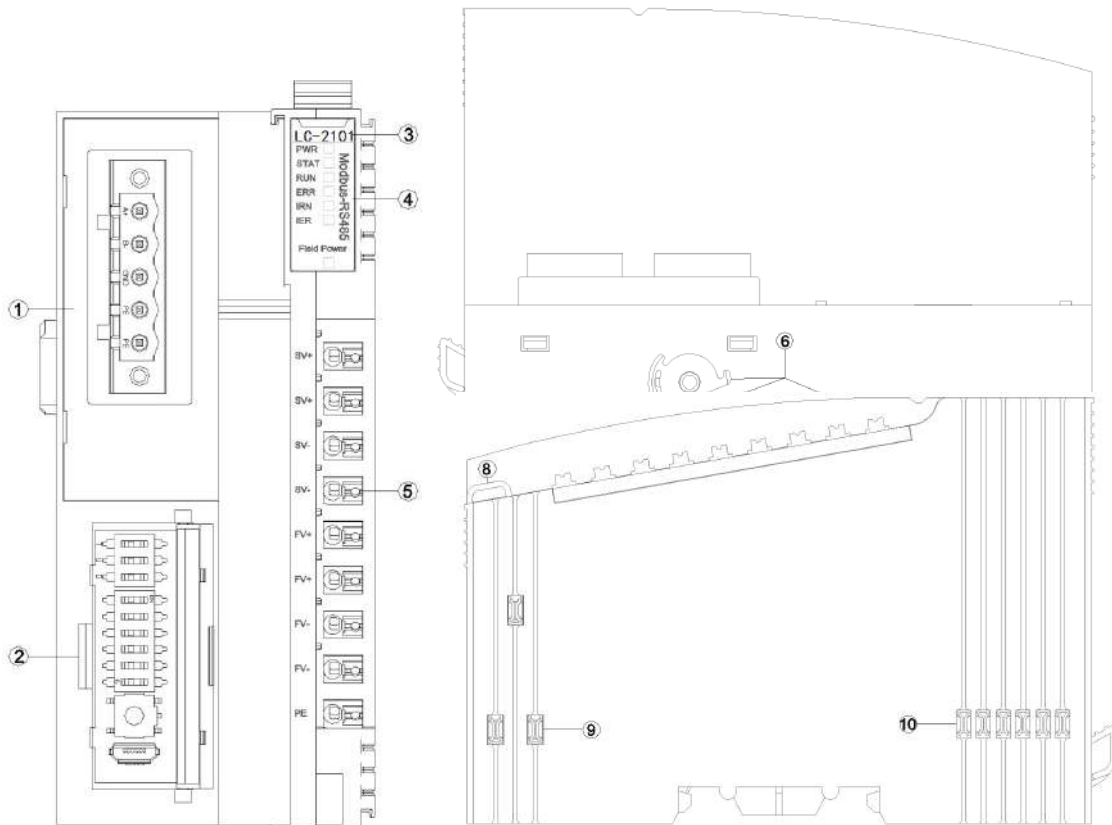
## 1 Module Overview

LC-2101 Modbus-RTU bus adapter supports standard Modbus-RTU communication, it supports function code of 01/02/03/04/05/06/15/16/23, and this device could monitor the IO module communication state in real time.

## 2 Technical Parameter

| Adapter Hardware Parameter                |                                                                        |
|-------------------------------------------|------------------------------------------------------------------------|
| System Power                              | Nominal:24Vdc, Range: 9-36Vdc<br>Reverse Protection: YES               |
| Power Consumption                         | 30mA@24Vdc                                                             |
| Internal Bus Supply Current               | Max: 2.5A@5VDC                                                         |
| Isolation                                 | System Power to Field Power Isolation                                  |
| Power Supply                              | Nominal:24Vdc, Range:22-28Vdc                                          |
| Field Power Current                       | Max. DC 8A                                                             |
| IO Modules Supported                      | 32 pcs                                                                 |
| Wiring                                    | Max.1.0mm <sup>2</sup> (AWG 17)                                        |
| Mounting Type                             | 35mm DIN-Rail                                                          |
| Size                                      | 115*51.5*75mm                                                          |
| Weight                                    | 130g                                                                   |
| Environment Specification                 |                                                                        |
| Operation Temperature                     | -40~85°C                                                               |
| Operation Humidity                        | 5%-95% (No Condensation)                                               |
| Ingress Protection Rating                 | IP20                                                                   |
| Modbus-RTU Parameter                      |                                                                        |
| Protocol                                  | Modbus-RTU/ASCII                                                       |
| Function Code                             | 01 / 02 / 03 / 04 / 05 / 06 / 15 / 16                                  |
| Baud Rate                                 | 2400~115200bps                                                         |
| Station No.                               | 1~63(Dial-code switchconfiguration),<br>64~247(Software configuration) |
| Interface                                 | 5 Pin screw terminal                                                   |
| Data Bits                                 | 7, 8                                                                   |
| Parity Checking                           | None, Even, ODD                                                        |
| Stop Bit                                  | 1, 2                                                                   |
| Max. bus length                           | 1200m (RS485, 2400 baud rate)                                          |
| Terminal resistance and offset resistance | DIP switch configuration                                               |

### 3 Hardware Interface



- ① RS485 port
- ② Config Interface
- ③ Module type
- ④ LED Indicator
- ⑤ Wiring Terminal
- ⑥ Buckle
- ⑦ Grounding Spring Sheet
- ⑧ Fixed Wiring Harness
- ⑨ Field Power
- ⑩ Internal Bus

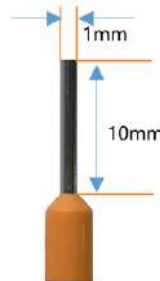
### 3.1 RS485 Interface

Modbus RS485 port is 5 Pin screw terminals and its Pin definition is as below:

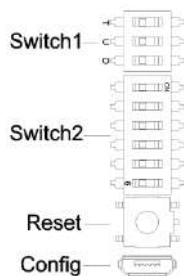
| Pin | Definition | Description        |
|-----|------------|--------------------|
| 1   | A+         | RS485 A+           |
| 2   | B-         | RS485 B-           |
| 3   | SGND       | Signal Grounded    |
| 4   | Shield     | Earthing of Shield |
| 5   | PE         | Protect Earthing   |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

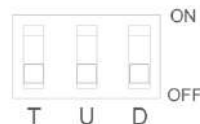
The cold-pressed terminal parameters are as follows:



### 3.2 Configuration Interface

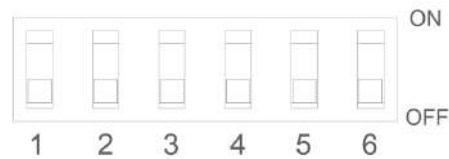


Switch1: DIP switch used to set the terminal resistance, pull up and down resistance. T: terminal resistance, U: pull up resistance, D: pull down resistance.



The Switch2: DIP switch used to set the adapter module address. It is set by an 8-bit binary hardware dial - code switch, and each Modbus adapter has a unique station address (1~63).

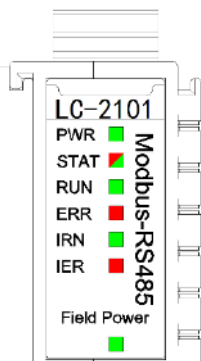
(Special note: When the address needs to be set beyond 63, the address should be dialed to set it to 0, and the station address should be set in IO Config software)



**Reset:** Module reset button, long pressing the button for more than 5 seconds and all parameters of the module will be restored to the default value. When the Reset button is activated, a green indicator will light up in the upper left corner of the button.

**Config:** configured ports, it is standard MicroUSB interface for configuring device parameters and firmware upgrades.

### 3.3 LED Indicator

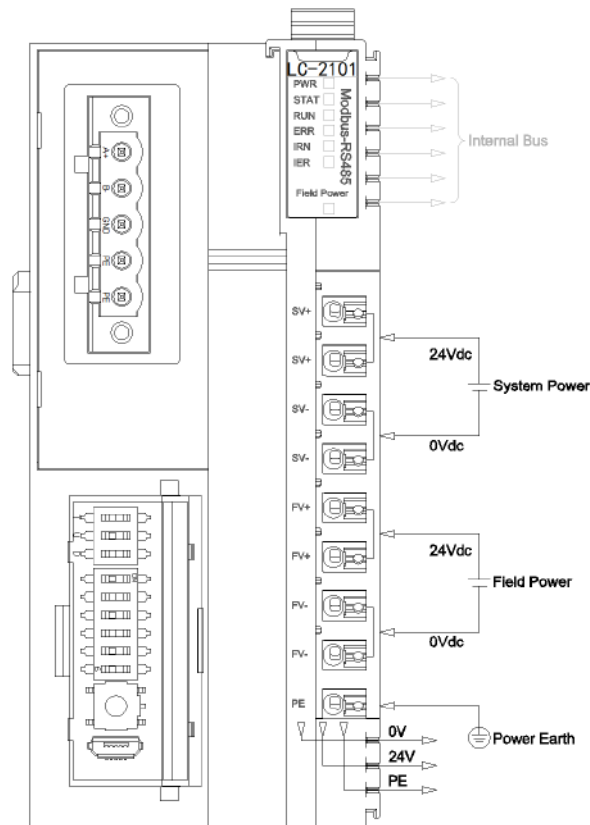


| PWR Power State (GREEN)       | Definition                          |
|-------------------------------|-------------------------------------|
| ON                            | System Power Normal                 |
| OFF                           | System Power Failure                |
| STAT Module State (RED/GREEN) | Definition                          |
| Double Flash (RED)            | Module Soft Restarted by Hard-Fault |
| ON(GREEN)                     | Running                             |
| Single Flash (GREEN)          | Stopping                            |
| Flash(2.5Hz) (RED/GREEN)      | Boot Mode                           |
| Flash(10Hz) (RED/GREEN)       | Firmware Updating                   |
| RUN Network State (GREEN)     | Definition                          |
| OFF                           | No data exchanging.                 |
| Flash                         | Modbus data exchanging              |
| ERR Network Error (RED)       | Definition                          |
| OFF                           | Modbus data exchanging normal       |
| ON                            | Modbus data exchanging failure      |
| IRN IO Run (GREEN)            | Definition                          |
| ON                            | IO initialization normal            |
| OFF                           | IO initialization failure           |
| IER IO Error (RED)            | Definition                          |

|                           |                          |
|---------------------------|--------------------------|
| OFF                       | IO communication normal  |
| Double Flash              | IO communication failure |
| Field Power State (GREEN) | Definition               |
| ON                        | Field Power Normal       |
| OFF                       | Field Power Failure      |

## 4 Wiring

Please note when wiring: for the internal construction, two terminals of SV+ have been short-connected, two terminals of SV- have been short-connected, two terminals of FV+ have been short-connected, and two terminals of FV- have been short-connected. For external it only needs to access one system power supply and one field power supply.



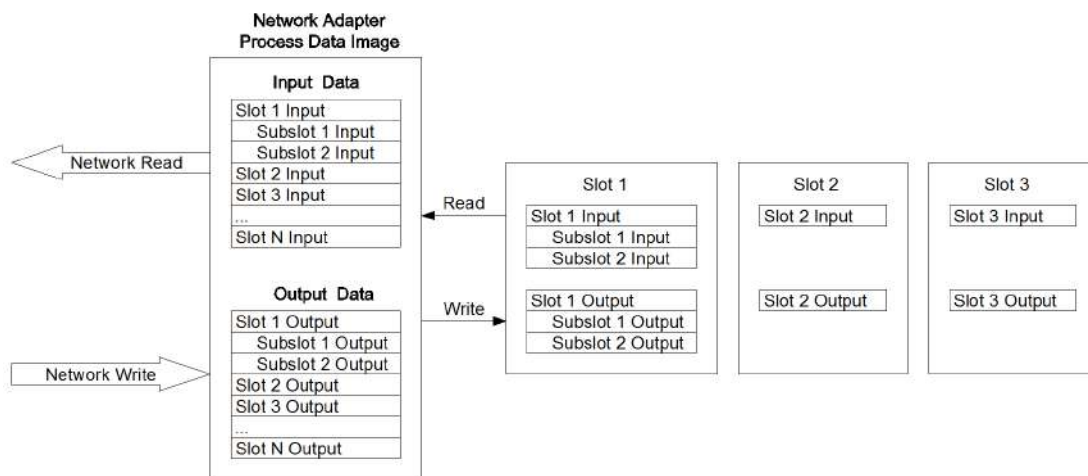
## 5 Process data definition

### 5.1 Adapter process data definition

Modbus-RTU Adapter itself has no input-output process data.

### 5.2 IO Module process data mapping

The network adapter reads and writes input and output process data of IO module in real time through the internal bus, and its data mapping model is shown as follow:



Modbus address mapping table varies according to module combination, and detailed address mapping table could be viewed through IO Config – the configuration software.

## 6 Configuration Parameter Definition

| Configuration Parameter |                    |             |           |       |             |                         |                        |                              |
|-------------------------|--------------------|-------------|-----------|-------|-------------|-------------------------|------------------------|------------------------------|
| Bit No                  | Bit 7              | Bit 6       | Bit 5     | Bit 4 | Bit 3       | Bit 2                   | Bit 1                  | Bit 0                        |
| Byte 0                  |                    |             |           |       |             | Fault Action for Output | Fault Action for Input | Source of Configuration Data |
| Byte 1                  | Slave ID           |             |           |       |             |                         |                        |                              |
| Byte 2                  | BaudRate           |             |           |       |             |                         |                        |                              |
| Byte 3                  |                    |             |           |       |             |                         |                        |                              |
| Byte 4                  |                    |             |           |       |             |                         |                        |                              |
| Byte 5                  |                    |             |           |       |             |                         |                        |                              |
| Byte 6                  |                    | Serial Mode | Stop Bits |       | Parity Bits |                         | Data Bits              |                              |
| Byte 7                  | Char Pitch         |             |           |       |             |                         |                        |                              |
| Byte 8                  | Response Delay(ms) |             |           |       |             |                         |                        |                              |
| Byte 9                  |                    |             |           |       |             |                         |                        |                              |

Data declaration:

**Source of Config Data:** Parameter configuration mode (Default: 0)

0: Configuration Software

**Fault Action for Input:** Input fault handling mode, when IO module is offline, the adapter will process IO module input data according to this mode. (Default: 0, Hold Last Input Value)

0: Hold Last Input Value

1: Clear Input Value

**Fault Action for Output:** Output fault handling mode, when the IO module is offline, the adapter will process the IO module output data according to this mode. (Default: 1, Clearing Output Value)

0: Hold Last Output Value

1: Clearing Output Value

**Slave ID:** Modbus slave ID, hardware dial code or software configuration, 1-247

**Baud Rate:** Serial port baud rate, (Default: 2, 9600bps)

0: 2400bps

1: 4800bps

2: 9600bps

3: 14400bps

4: 19200bps

5: 38400bps

6: 57600bps

7: 115200bps

**Data Bits:** data bits, (default: Bit 1, 8)

0: Bit 7

1: Bit 8

**Parity Bits:** Parity Checking, (default: 0, no parity)

0: None

1: ODD

2: EVEN

**Stop Bits:** stop bits, (default: Bit 0, 1)

0: Bit 1

1: Bit 2

**Serial Mode:** Serial port mode (default: 0, RTU)

0: RTU

1: ASCII

**Char Pitch:** Character Pitch is the detection time of frame interval when receiving a message (T is the time of single character transmission, related to baud rate) (default: 2, 5 characters)

0: 1.5 characters

1: 3.5 characters

2: 5 characters

3: 10 characters

4: 20 characters

5: 50 characters

6: 100 characters

7: 200 characters

**Response Delay(ms):** Reply delay time from Slave, self-defined, default 10ms, effective range: 0-65535.

## 7 System Diagnostic Area

Part One: 'Status Input' storage area, address 0x2000-0x2068, a total of 105 words.

| S/N | Storage Type | Description                       | Storage Capacity | Address Range | Read/Write |
|-----|--------------|-----------------------------------|------------------|---------------|------------|
| 1   | Area 3       | System Diagnostics - Status Input | 105 Word         | 0x2000~0x2068 | RO         |

The Modbus client monitors the address area 0x2000~0x2068 by calling the Modbus Function Code 04, which allows it to obtain the current working status and error codes of the coupler and IO modules. The data format is as shown in the following table:

| S/N | Modbus Addr (decimal) | Modbus Addr (hexadecimal) | Data Name                | Description                   |
|-----|-----------------------|---------------------------|--------------------------|-------------------------------|
| 1   | 8192                  | 0x2000                    | Reset Status             | Reset Status* *               |
| 2   | 8193                  | 0x2001                    | Reserved                 |                               |
| 3   | 8194                  | 0x2002                    | DIP Switch Value         |                               |
| 4   | 8195                  | 0x2003                    | Operating Time - Seconds |                               |
| 5   | 8196                  | 0x2004                    | Operating Time - Minutes |                               |
| 6   | 8197                  | 0x2005                    | Operating Time - Hours   |                               |
| 7   | 8198                  | 0x2006                    | Operating Time - Days    |                               |
| 8   | 8199                  | 0x2007                    | Nil                      | Reserved                      |
| 9   | 8200                  | 0x2008                    |                          |                               |
| 10  | 8201                  | 0x2009                    |                          |                               |
| 11  | 8202                  | 0x200A                    | Nil                      |                               |
| 12  | 8203                  | 0x200B                    |                          |                               |
| 13  | 8204                  | 0x200C                    | Nil                      |                               |
| 14  | 8205                  | 0x200D                    |                          |                               |
| 15  | 8206                  | 0x200E                    | Nil                      |                               |
| 16  | 8207                  | 0x200F                    |                          |                               |
| 17  | 8208                  | 0x2010                    | DI-size                  | Discrete Input Area Data Size |

|    |      |            |                 |                                 |
|----|------|------------|-----------------|---------------------------------|
| 18 | 8209 | 0x201<br>1 | DO-size         | Coil Output Area Data Size      |
| 19 | 8210 | 0x201<br>2 | AI-size         | Input Register Area Data Size   |
| 20 | 8211 | 0x201<br>3 | AO-size         | Holding Register Area Data Size |
| 21 | 8212 | 0x201<br>4 | Nil             | Reserved                        |
| 22 | 8213 | 0x201<br>5 |                 |                                 |
| 23 | 8214 | 0x201<br>6 | Nil             |                                 |
| 24 | 8215 | 0x201<br>7 | Nil             |                                 |
| 25 | 8216 | 0x201<br>8 | Nil             |                                 |
| 26 | 8217 | 0x201<br>9 |                 |                                 |
| 27 | 8218 | 0x201<br>A | Nil             |                                 |
| 28 | 8219 | 0x201<br>B | Nil             |                                 |
| 29 | 8220 | 0x201<br>C |                 |                                 |
| 30 | 8221 | 0x201<br>D | Nil             |                                 |
| 31 | 8222 | 0x201<br>E | Nil             | Reserved                        |
| 32 | 8223 | 0x201<br>F |                 |                                 |
| 33 | 8224 | 0x202<br>0 | Nil             |                                 |
| 34 | 8225 | 0x202<br>1 | Nil             |                                 |
| 35 | 8226 | 0x202<br>2 |                 |                                 |
| 36 | 8227 | 0x202<br>3 | Nil             |                                 |
| 37 | 8228 | 0x202<br>4 | Nil             |                                 |
| 38 | 8229 | 0x202<br>5 |                 |                                 |
| 39 | 8230 | 0x202<br>6 | Nil             |                                 |
| 40 | 8231 | 0x202<br>7 | Module_Error[0] | Module 0 Error Code             |
| 41 | 8232 | 0x202<br>8 |                 |                                 |
| 42 | 8233 | 0x202<br>9 | Module_Error[1] | Module 1 Error Code             |
| 43 | 8234 | 0x202<br>A |                 |                                 |
| 44 | 8235 | 0x202<br>B | Module_Error[2] | Module 2 Error Code             |
| 45 | 8236 | 0x202      |                 |                                 |

|    |      | C          |                  |                      |
|----|------|------------|------------------|----------------------|
| 46 | 8237 | 0x202<br>D | Module_Error[3]  | Module 3 Error Code  |
| 47 | 8238 | 0x202<br>E |                  |                      |
| 48 | 8239 | 0x202<br>F | Module_Error[4]  | Module 4 Error Code  |
| 49 | 8240 | 0x203<br>0 |                  |                      |
| 50 | 8241 | 0x203<br>1 | Module_Error[5]  | Module 5 Error Code  |
| 51 | 8242 | 0x203<br>2 |                  |                      |
| 52 | 8243 | 0x203<br>3 | Module_Error[6]  | Module 6 Error Code  |
| 53 | 8244 | 0x203<br>4 |                  |                      |
| 54 | 8245 | 0x203<br>5 | Module_Error[7]  | Module 7 Error Code  |
| 55 | 8246 | 0x203<br>6 |                  |                      |
| 56 | 8247 | 0x203<br>7 | Module_Error[8]  | Module 8 Error Code  |
| 57 | 8248 | 0x203<br>8 |                  |                      |
| 58 | 8249 | 0x203<br>9 | Module_Error[9]  | Module 9 Error Code  |
| 59 | 8250 | 0x203<br>A |                  |                      |
| 60 | 8251 | 0x203<br>B | Module_Error[10] | Module 10 Error Code |
| 61 | 8252 | 0x203<br>C |                  |                      |
| 62 | 8253 | 0x203<br>D | Module_Error[11] | Module 11 Error Code |
| 63 | 8254 | 0x203<br>E |                  |                      |
| 64 | 8255 | 0x203<br>F | Module_Error[12] | Module 12 Error Code |
| 65 | 8256 | 0x204<br>0 |                  |                      |
| 66 | 8257 | 0x204<br>1 | Module_Error[13] | Module 13 Error Code |
| 67 | 8258 | 0x204<br>2 |                  |                      |
| 68 | 8259 | 0x204<br>3 | Module_Error[14] | Module 14 Error Code |
| 69 | 8260 | 0x204<br>4 |                  |                      |
| 70 | 8261 | 0x204<br>5 | Module_Error[15] | Module 15 Error Code |
| 71 | 8262 | 0x204<br>6 |                  |                      |
| 72 | 8263 | 0x204<br>7 | Module_Error[16] | Module 16 Error Code |

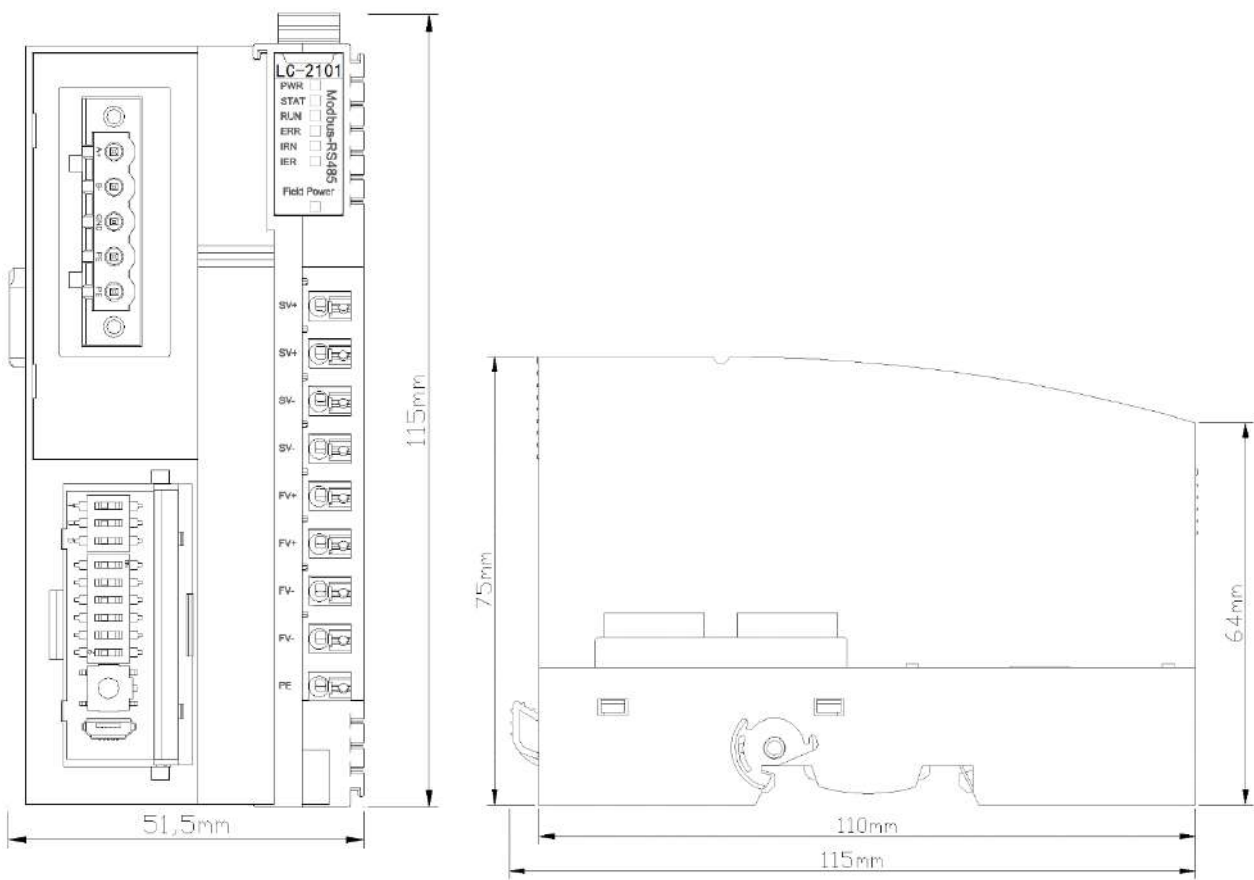
|     |      |            |                  |                      |
|-----|------|------------|------------------|----------------------|
| 73  | 8264 | 0x204<br>8 |                  |                      |
| 74  | 8265 | 0x204<br>9 | Module_Error[17] | Module 17 Error Code |
| 75  | 8266 | 0x204<br>A |                  |                      |
| 76  | 8267 | 0x204<br>B | Module_Error[18] | Module 18 Error Code |
| 77  | 8268 | 0x204<br>C |                  |                      |
| 78  | 8269 | 0x204<br>D | Module_Error[19] | Module 19 Error Code |
| 79  | 8270 | 0x204<br>E |                  |                      |
| 80  | 8271 | 0x204<br>F | Module_Error[20] | Module 20 Error Code |
| 81  | 8272 | 0x205<br>0 |                  |                      |
| 82  | 8273 | 0x205<br>1 | Module_Error[21] | Module 21 Error Code |
| 83  | 8274 | 0x205<br>2 |                  |                      |
| 84  | 8275 | 0x205<br>3 | Module_Error[22] | Module 22 Error Code |
| 85  | 8276 | 0x205<br>4 |                  |                      |
| 86  | 8277 | 0x205<br>5 | Module_Error[23] | Module 23 Error Code |
| 87  | 8278 | 0x205<br>6 |                  |                      |
| 88  | 8279 | 0x205<br>7 | Module_Error[24] | Module 24 Error Code |
| 89  | 8280 | 0x205<br>8 |                  |                      |
| 90  | 8281 | 0x205<br>9 | Module_Error[25] | Module 25 Error Code |
| 91  | 8282 | 0x205<br>A |                  |                      |
| 92  | 8283 | 0x205<br>B | Module_Error[26] | Module 26 Error Code |
| 93  | 8284 | 0x205<br>C |                  |                      |
| 94  | 8285 | 0x205<br>D | Module_Error[27] | Module 27 Error Code |
| 95  | 8286 | 0x205<br>E |                  |                      |
| 96  | 8287 | 0x205<br>F | Module_Error[28] | Module 28 Error Code |
| 97  | 8288 | 0x206<br>0 |                  |                      |
| 98  | 8289 | 0x206<br>1 | Module_Error[29] | Module 29 Error Code |
| 99  | 8290 | 0x206<br>2 |                  |                      |
| 100 | 8291 | 0x206      | Module_Error[30] | Module 30 Error Code |

|     |      |            |                  |                      |
|-----|------|------------|------------------|----------------------|
|     |      | 3          |                  |                      |
| 101 | 8292 | 0x206<br>4 |                  |                      |
| 102 | 8293 | 0x206<br>5 | Module_Error[31] | Module 31 Error Code |
| 103 | 8294 | 0x206<br>6 |                  |                      |
| 104 | 8295 | 0x206<br>7 | Module_Error[32] | Module 32 Error Code |
| 105 | 8296 | 0x206<br>8 |                  |                      |

**\*Reset State: The data format for register 38193 bit address is as follows:**

| Bit Offset | Bit Name           | Description           | Power-on Default Value |
|------------|--------------------|-----------------------|------------------------|
| Bit 0      | Power_On_Reset     | Power-on Reset Flag   | 0/1                    |
| Bit 1-3    | Reserved           | Reserved              | 0                      |
| Bit 4      | External_Reset     | External Reset Flag   | 0/1                    |
| Bit 5      | Reserved           | Reserved              | 0                      |
| Bit 6      | Soft_Reset_Request | Software Reset Flag   | 0                      |
| Bit 7      | Reserved           | Reserved              | 0                      |
| Bit 8      | HardFault          | Hard Fault Reset      | 0                      |
| Bit 9      | StackOver          | Stack Overflow Reset  | 0                      |
| Bit 10     | MemoryOver         | Memory Overflow Reset | 0                      |
| Bit 11-15  | Reserved           | Reserved              | 0                      |

A Dimension drawing



# LC-2201 Profibus-DP Bus Adapter

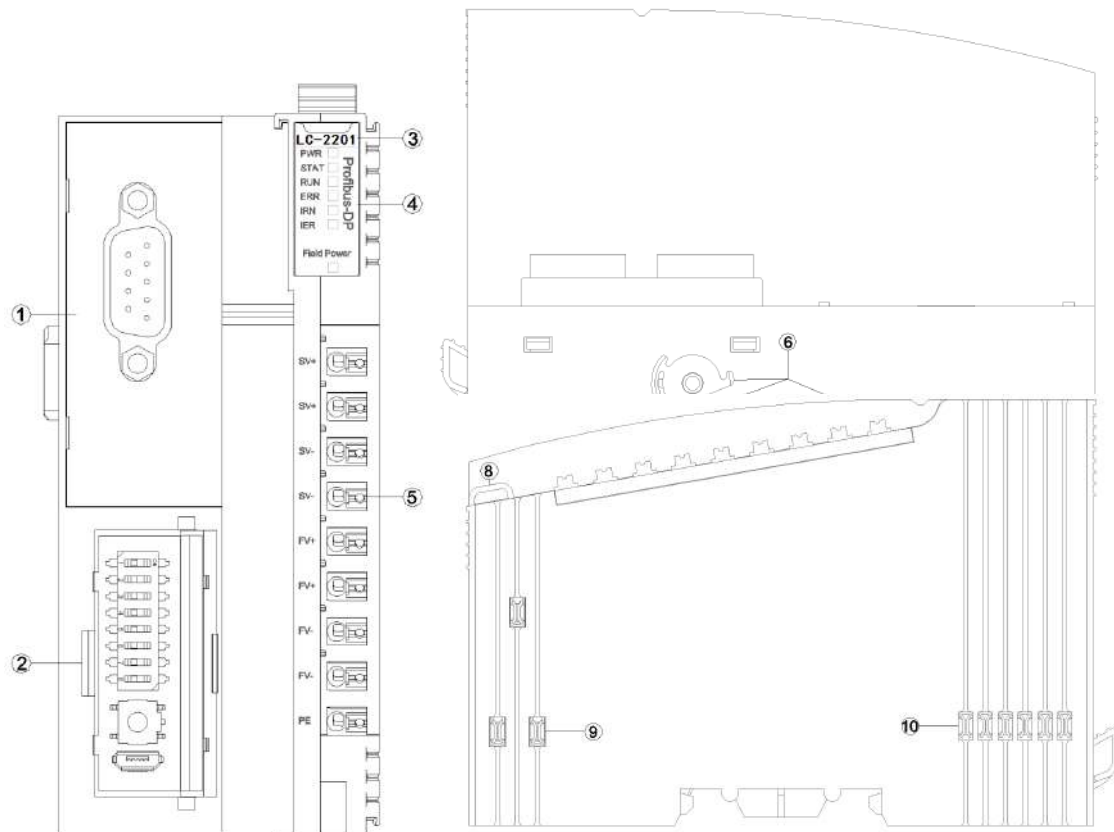
## 1 Module Overview

PROFIBUS-DP bus adapter supports access of standard PROFIBUS-DP, and the protocol version it supports is DPV0.

## 2 Technical Parameter

| Adapter Hardware Parameter  |                                                                                            |
|-----------------------------|--------------------------------------------------------------------------------------------|
| System Power                | Nominal:24Vdc, Range: 9-36Vdc<br>Reverse Protection: YES                                   |
| Power Consumption           | 30mA@24Vdc                                                                                 |
| Internal Bus Supply Current | Max: 2.5A@5VDC                                                                             |
| Isolation                   | System Power to Field Power Isolation                                                      |
| Power Supply                | Nominal:24Vdc, Range:22-28Vdc                                                              |
| Field Power Current         | Max. DC 8A                                                                                 |
| IO Modules Supported        | 32 pcs                                                                                     |
| Wiring                      | Max.1.0mm <sup>2</sup> (AWG 17)                                                            |
| Mounting Type               | 35mm DIN-Rail                                                                              |
| Size                        | 115*51.5*75mm                                                                              |
| Weight                      | 130g                                                                                       |
| Environment Specification   |                                                                                            |
| Operation Temperature       | -40~85°C                                                                                   |
| Operation Humidity          | 5%-95% (No Condensation)                                                                   |
| Ingress Protection Rating   | IP20                                                                                       |
| Profibus-DP Parameter       |                                                                                            |
| Protocol                    | PROFIBUS DPV0                                                                              |
| Interface Type              | DB9 female head                                                                            |
| Station Type                | PROFIBUS Slave                                                                             |
| Station Address             | Dial code switch configuration                                                             |
| Topology                    | Bus topology                                                                               |
| Configuration Max. Length   | 232 bytes                                                                                  |
| IO data Max. Length         | Input: Max. 244 bytes, Output: Max. 244 bytes,<br>Sum of input and out put: Max. 288 bytes |

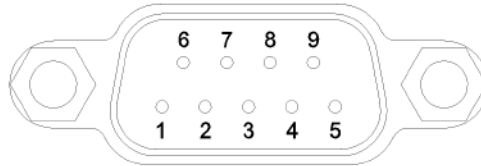
### 3 Hardware Interface



- ① Profibus-DP port
- ② Config Interface
- ③ Module type
- ④ LED Indicator
- ⑤ Wiring Terminal
- ⑥ Buckle
- ⑦ Grounding Spring Sheet
- ⑧ Fixed Wiring Harness
- ⑨ Field Power
- ⑩ Internal Bus

### 3.1 Profibus-DP Interface

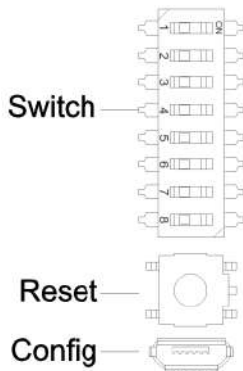
Profibus-DP port is 9 Pin terminals and its Pin definition is as below:



Interface Pin Definition

| Pin | Definition | Description         |
|-----|------------|---------------------|
| 1   | Shield     | Earthing of Shield  |
| 2   | --         | --                  |
| 3   | B          | Data line B         |
| 4   | CNTR-P     | Direction control-P |
| 5   | DGND       | Signal Grounded     |
| 6   | VP(+)      | +5v                 |
| 7   | --         | --                  |
| 8   | A          | Data lineA          |
| 9   | CNTR-N     | Direction control-N |

### 3.2 Configuration Interface



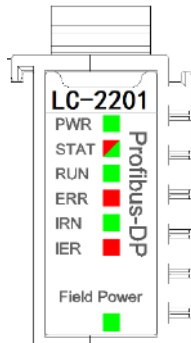
**Switch:** The station address of the Profibus DP adapter. It is set by an 8-bit binary hardware dial code switch, and each PROFIBUS adapter has a unique station address (1~127).



**Reset:** Module reset button, long pressing the button for more than 5 seconds and all parameters of the module will be restored to the default value. When the Reset button

is activated, a green indicator will light up in the upper left corner of the button.  
 Config: configured ports, it is standard MicroUSB interface for configuring device parameters and firmware upgrades.

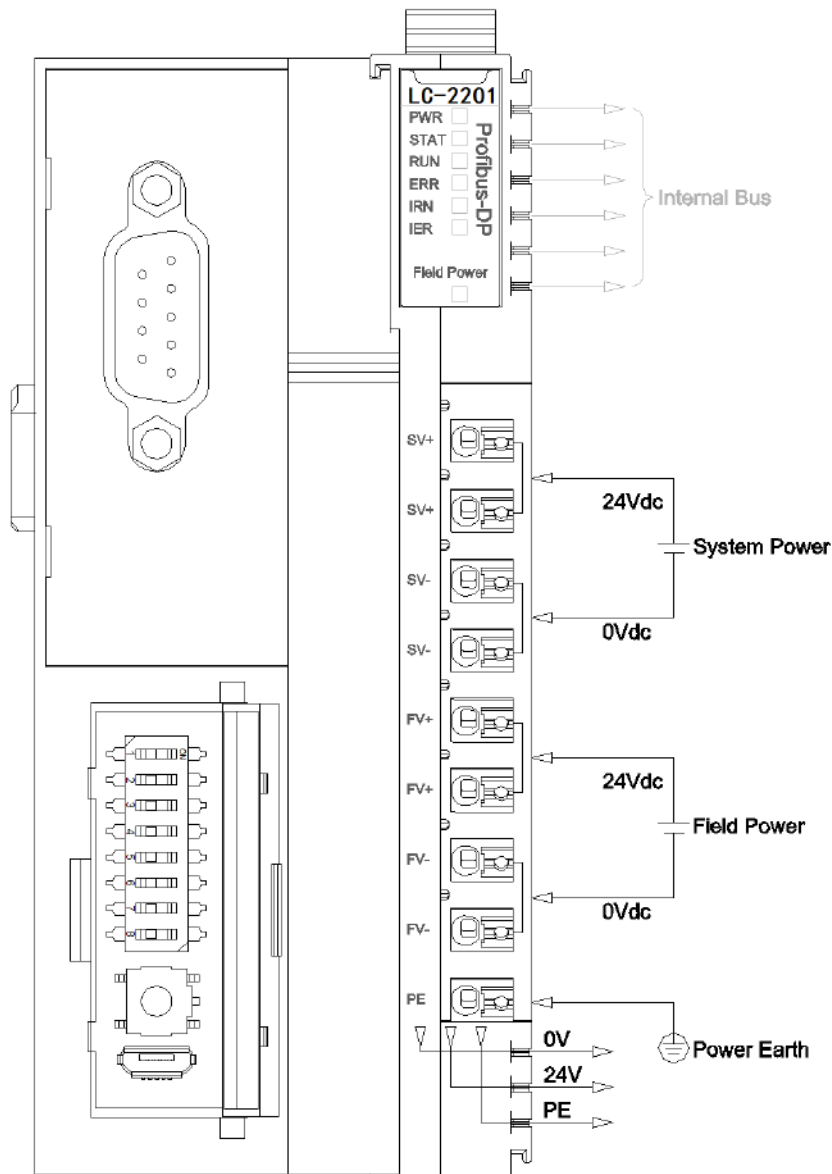
### 3.3 LED Indicator



| PWR Power State (GREEN)       | Definition                          |
|-------------------------------|-------------------------------------|
| ON                            | System Power Normal                 |
| OFF                           | System Power Failure                |
| STAT Module State (RED/GREEN) | Definition                          |
| Double Flash (RED)            | Module Soft Restarted by Hard-Fault |
| ON(GREEN)                     | Running                             |
| Single Flash (GREEN)          | Stopping                            |
| Flash(2.5Hz) (RED/GREEN)      | Boot Mode                           |
| Flash(10Hz) (RED/GREEN)       | Firmware Updating                   |
| RUN Network State (GREEN)     | Definition                          |
| OFF                           | DP off-line mode                    |
| ON                            | DP data exchanging mode             |
| ERR Network Error (RED)       | Definition                          |
| Off                           | DP data exchanging mode             |
| Flash                         | DP off-line mode                    |
| IRN IO Run (GREEN)            | Definition                          |
| ON                            | IO initialization normal            |
| OFF                           | IO initialization failure           |
| IER IO Error (RED)            | Definition                          |
| OFF                           | IO communication normal             |
| Double Flash                  | IO communication failure            |
| Field Power State (GREEN)     | Definition                          |
| ON                            | Field Power Normal                  |
| OFF                           | Field Power Failure                 |

## 4 Wiring

Please note when wiring: for the internal construction, two terminals of SV+ have been short-connected, two terminals of SV- have been short-connected, two terminals of FV+ have been short-connected, and two terminals of FV- have been short-connected. For external it only needs to access one system power supply and one field power supply.



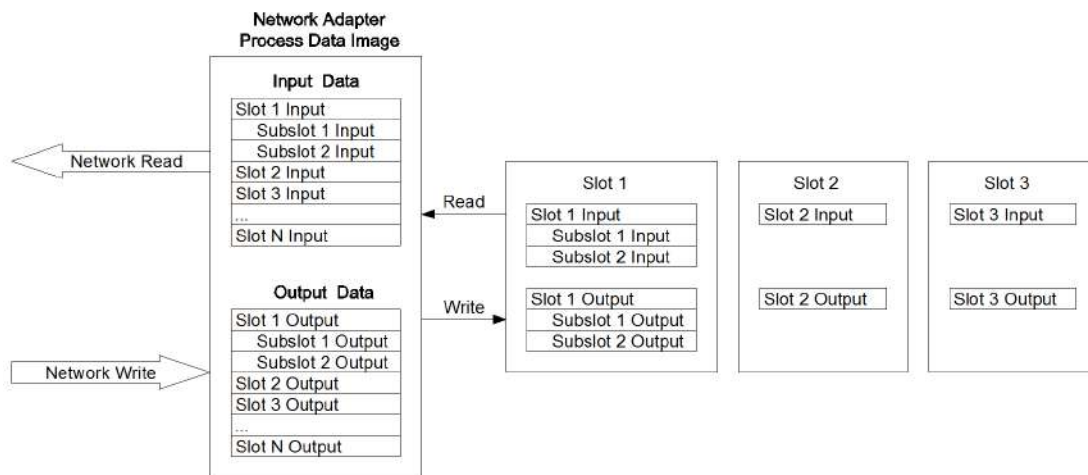
## 5 Process data definition

### 5.1 Adapter process data definition

Profibus-DP Adapter itself has no input-output process data.

### 5.2 IO Module process data mapping

The network adapter reads and writes input and output process data of IO module in real time through the internal bus, and its data mapping model is shown as follow:



Real-time data exchange is conducted between the network adapter and the extended IO module, and the data address table could be dynamically allocated according to the different modules inserted in the IO slot.

The actual mapping address should be added IO module manually in STEP 7, TIA or other configured software, and the address would be automatically mapped, so the actual mapping address could be checked.

## 6 Configuration Parameter Definition

| Configuration Parameter |            |       |       |       |       |                         |                        |                              |
|-------------------------|------------|-------|-------|-------|-------|-------------------------|------------------------|------------------------------|
| Bit No                  | Bit 7      | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2                   | Bit 1                  | Bit 0                        |
| Byte 0                  |            |       |       |       |       | Fault Action for Output | Fault Action for Input | Source of Configuration Data |
| Byte 1                  | DP Address |       |       |       |       |                         |                        |                              |

Data declaration:

**Source of Config Data:** Parameter configuration mode (Default: 1, Field BUS configuration)

0: Configured software configuration

1: Field BUS configuration

**Fault Action for Input:** Input fault handling mode, when IO module is offline, the adapter will process IO module input data according to this mode. (Default: 0, Hold Last Input Value)

0: Hold Last Input Value

1: Clear Input Value

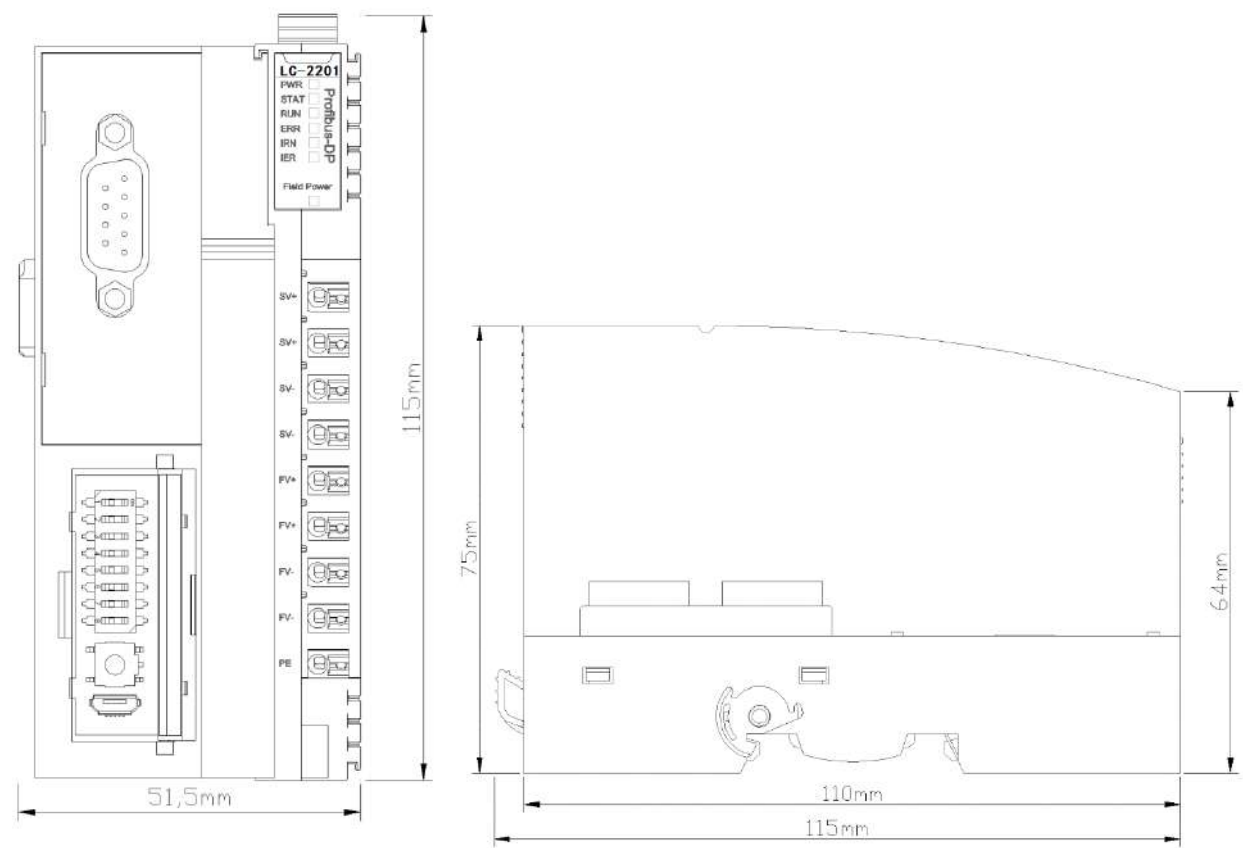
**Fault Action for Output:** Output fault handling mode, when the IO module is offline, the adapter will process the IO module output data according to this mode. (Default: 1, Clearing Output Value)

0: Hold Last Output Value

1: Clearing Output Value

**DP Address:** DP slave device no. (Read-only, displayed as the value of the dial code switch)

A Dimension drawing



# LC-2501 CC-Link Bus Adapter

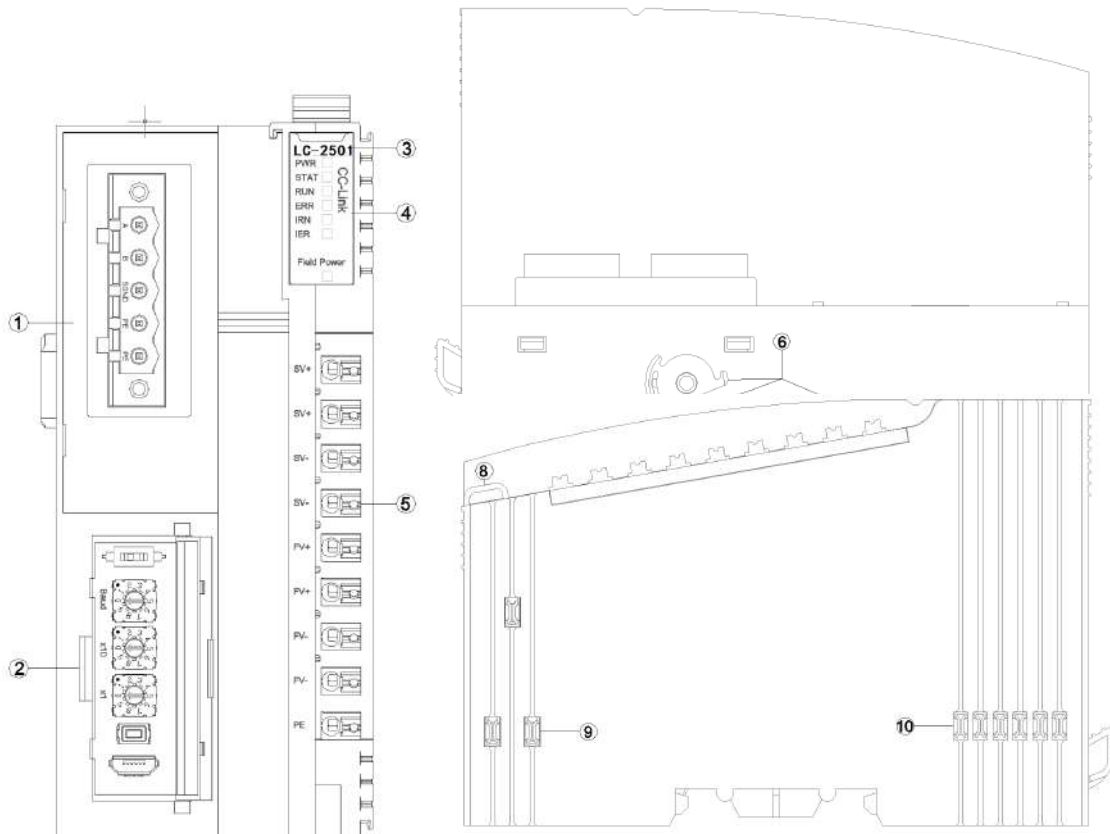
## 1 Module Overview

LC-2501 CC-Link bus adapter supports standard CC-Link Ver.2 communication and it could monitor the communication status of IO modules in real time.

## 2 Technical Parameter

| Adapter Hardware Parameter          |                                                                                                           |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------|
| System Power                        | Nominal:24Vdc, Range: 9-36Vdc<br>Reverse Protection: YES                                                  |
| Power Consumption                   | 110mA@24Vdc                                                                                               |
| Internal Bus Supply Current         | Max: 2.5A@5Vdc                                                                                            |
| Isolation                           | System Power to Field Power Isolation                                                                     |
| Power Supply                        | Nominal:24Vdc, Range:22-28Vdc                                                                             |
| Field Power Current                 | Max. DC 8A                                                                                                |
| IO Modules Supported                | 32pcs                                                                                                     |
| Wiring                              | Max.1.0mm <sup>2</sup> (AWG 17)                                                                           |
| Mounting Type                       | 35mm DIN-Rail                                                                                             |
| Size                                | 115*51.5*75mm                                                                                             |
| Weight                              | 130g                                                                                                      |
| Environment Specification           |                                                                                                           |
| Operation Temperature               | -40~85°C                                                                                                  |
| Operation Humidity                  | 5%-95% ( No Condensation)                                                                                 |
| Ingress Protection Rating           | IP20                                                                                                      |
| CC-Link Parameter                   |                                                                                                           |
| Protocol                            | CC-Link Ver.2                                                                                             |
| Station Type                        | Remote device station                                                                                     |
| Number of Logical Stations Occupied | 1, 2, 3, 4                                                                                                |
| Extended Loop Setup                 | 1 time, 2 times, 4 times, 8 times                                                                         |
| I/O Data Capacity                   | RX/Ry capacity (bit) max. 896<br>RWw/RWw capacity (word) max. 128                                         |
| Baud Rate                           | 156K/625K/2.5M/5M/10Mbps                                                                                  |
| Node Station (Station No.)          | 1~64(DIP switch configuration), when DIP switch value is not 1~64, and the mandatory station number is 1. |
| Interface                           | 5 Pin screw terminal                                                                                      |
| Max. bus length                     | 1200m (156kbps)                                                                                           |
| Terminal resistance                 | 120ohm                                                                                                    |

### 3 Hardware Interface



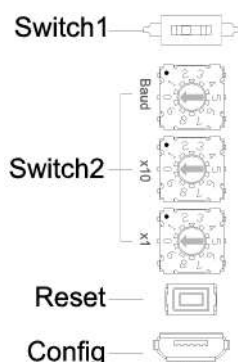
- ① CC-LINK port
- ② Config Interface
- ③ Module type
- ④ LED Indicator
- ⑤ Wiring Terminal
- ⑥ Buckle
- ⑦ Grounding Spring Sheet
- ⑧ Fixed Wiring Harness
- ⑨ Field Power
- ⑩ Internal Bus

### 3.1 CC-Link Interface

Modbus RS485 port is 5 Pin screw terminals and its Pin definition is as below:

| Pin | Definition | Description        |
|-----|------------|--------------------|
| 1   | DA         | Signal DA          |
| 2   | DB         | Signal DB          |
| 3   | DG         | Signal Grounded    |
| 4   | SLD        | Earthing of Shield |
| 5   | FG         | Protect Earthing   |

### 3.2 Configuration Interface



Switch1: DIP switch is used to set the terminal resistance.

The Switch2: DIP switch is used to set the adapter module node address (station number) and baud rate.

The node address is set by two hardware DIP switches of decimal number, and each CC-Link adapter has a unique node address (1~64).

(Please note: when the DIP switch value is not 1~64, the node address ie the station number is compelled to be 1.)

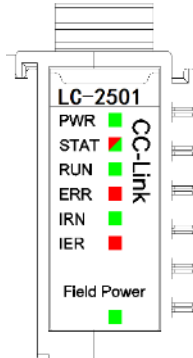
The corresponding relation between baud rate and dial code is:

| Code configuration | Communication Rate (bps) |
|--------------------|--------------------------|
| 0                  | 156k                     |
| 1                  | 625k                     |
| 2                  | 2.5M                     |
| 3                  | 5M                       |
| 4                  | 10M                      |

Reset: Module reset button, long pressing the button for more than 5 seconds and all parameters of the module will be restored to the default value. When the Reset button is activated, a green indicator will light up in the upper left corner of the button.

Config: configured ports, it is standard MicroUSB interface for configuring device parameters and firmware upgrades.

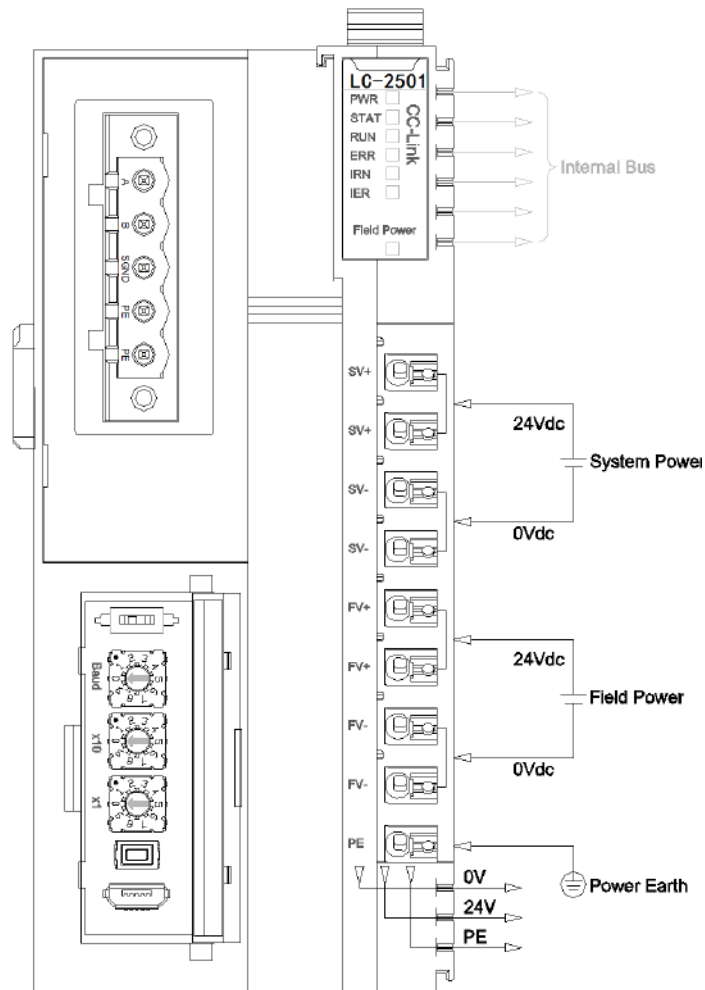
### 3.3 LED Indicator



| PWR Power State (GREEN)       | Definition                                                                                       |
|-------------------------------|--------------------------------------------------------------------------------------------------|
| ON                            | System Power Normal                                                                              |
| OFF                           | System Power Failure                                                                             |
| STAT Module State (RED/GREEN) | Definition                                                                                       |
| Double Flash (RED)            | Module Soft Restarted by Hard-Fault                                                              |
| ON(GREEN)                     | Running                                                                                          |
| Single Flash (GREEN)          | Stopping                                                                                         |
| Flash(2.5Hz) (RED/GREEN)      | Boot Mode                                                                                        |
| Flash(10Hz) (RED/GREEN)       | Firmware Updating                                                                                |
| RUN Network State (GREEN)     | Definition                                                                                       |
| OFF                           | No data exchanging.                                                                              |
| ON                            | CC-Link data exchanging                                                                          |
| ERR Network Error (RED)       | Definition                                                                                       |
| OFF                           | CC-Link data exchanging normal                                                                   |
| ON                            | CC-Link data exchanging failure                                                                  |
| Flash                         | When CC-Link communication normally functiones, the station number or baud rate will get changed |
| IRN IO Run (GREEN)            | Definition                                                                                       |
| ON                            | IO initialization normal                                                                         |
| OFF                           | IO initialization failure                                                                        |
| IER IO Error (RED)            | Definition                                                                                       |
| OFF                           | IO communication normal                                                                          |
| Double Flash                  | IO communication failure                                                                         |
| Field Power State (GREEN)     | Definition                                                                                       |
| ON                            | Field Power Normal                                                                               |
| OFF                           | Field Power Failure                                                                              |

## 4 Wiring

Please note when wiring: for the internal construction, two terminals of SV+ have been short-connected, two terminals of SV- have been short-connected, two terminals of FV+ have been short-connected, and two terminals of FV- have been short-connected. For external it only needs to access one system power supply and one field power supply.



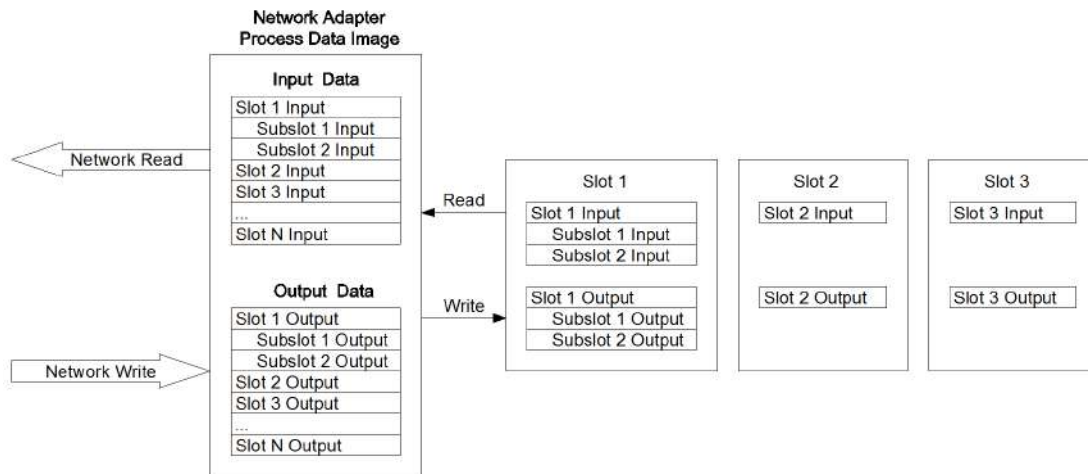
## 5 Process data definition

### 5.1 Adapter process data definition

CC-Link Adapter itself has no input-output process data.

### 5.2 IO Module process data mapping

The network adapter reads and writes input and output process data of IO module in real time through the internal bus, and its data mapping model is shown as follow:



## 6 Configuration Parameter Definition

| Configuration Parameter |                      |       |       |       |       |                         |                        |                              |
|-------------------------|----------------------|-------|-------|-------|-------|-------------------------|------------------------|------------------------------|
| Bit No                  | Bit 7                | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2                   | Bit 1                  | Bit 0                        |
| Byte 0                  |                      |       |       |       |       | Fault Action for Output | Fault Action for Input | Source of Configuration Data |
| Byte 1                  | Slave ID             |       |       |       |       |                         |                        |                              |
| Byte 2                  | BaudRate             |       |       |       |       |                         |                        |                              |
| Byte 3                  | Occupied Stations    |       |       |       |       |                         |                        |                              |
| Byte 4                  | Extesion Cycles      |       |       |       |       |                         |                        |                              |
| Byte 5                  | Auto Stations/Cycles |       |       |       |       |                         |                        |                              |
| Byte 6                  | RX/RX Size(Bits)     |       |       |       |       |                         |                        |                              |
| Byte 7                  |                      |       |       |       |       |                         |                        |                              |
| Byte 8                  | RWw/RWw Size(words)  |       |       |       |       |                         |                        |                              |
| Byte 9                  |                      |       |       |       |       |                         |                        |                              |

Data declaration:

**Source of Configuration Data:** Parameter configuration mode (Default: 0)

0: Configuration Software

**Fault Action for Input:** Input fault handling mode, when IO module is offline, the adapter will process IO module input data according to this mode. (Default: 0, Hold Last Input Value)

0: Hold Last Input Value

1: Clear Input Value

**Fault Action for Output:** Output fault handling mode, when the IO module is offline, the adapter will process the IO module output data according to this mode. (Default: 1, Clearing Output Value)

0: Hold Last Output Value

1: Clearing Output Value

**Slave ID:** CC-Link slave ID number, hardware DIP switch setting, 1-64

Baud Rate: Serial port baud rate, (Default: 0, 156bps))

0: 156Kbps

1: 625Kbps

2: 2.5Mbps

3: 5Mbps

4: 10Mbps

**Occupied Stations:** The number of logical stations occupied (Default: 3, 4 stations)

- RWr/RWw Size(words):** RWr/RWw Capacity (Word)

Technical drawings of the LC-2501 power supply unit. The left drawing is a top view showing the front panel with a terminal block (51.5mm wide), a connector block (51.5mm wide), and a control panel (115mm wide). The right drawing is a side view showing the unit's profile with a height of 75mm and a base width of 115mm.

# LC-3101 CANopen Bus Adapter

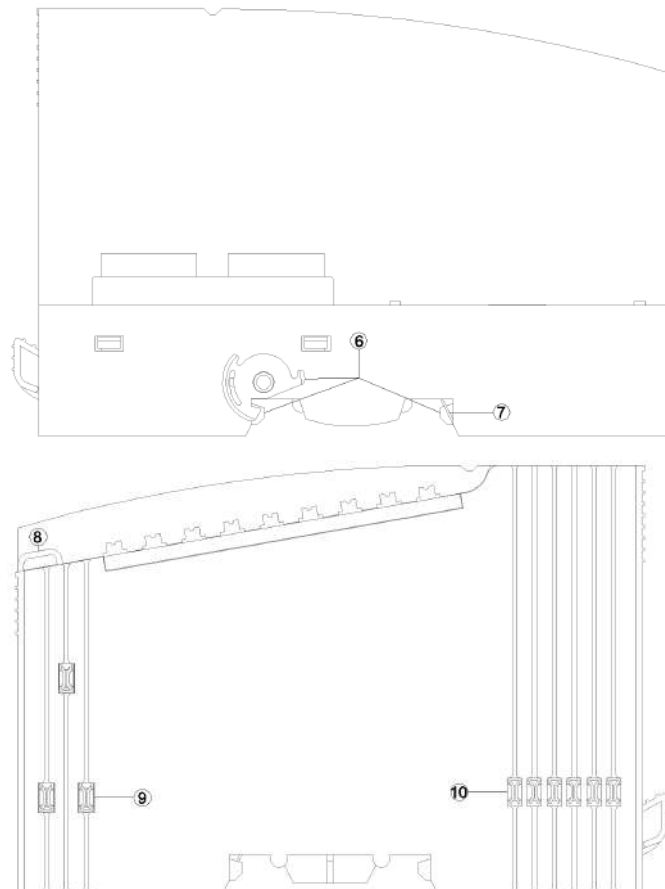
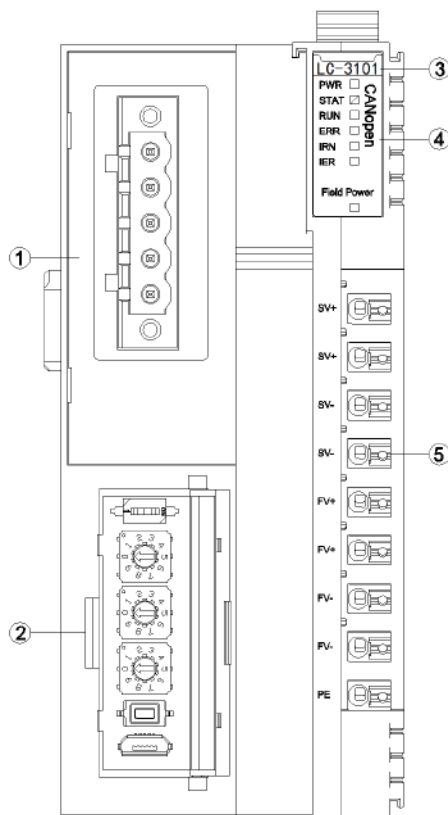
## 1 Module Overview

LC-3101 CANopen bus adapter supports standard CANopen communication and device specification DS401.

## 2 Technical Parameter

| Adapter Hardware Parameter  |                                                                                                            |
|-----------------------------|------------------------------------------------------------------------------------------------------------|
| System Power                | Nominal:24Vdc, Range: 9-36Vdc<br>Reverse Protection: YES                                                   |
| Power Consumption           | 50mA@24Vdc                                                                                                 |
| Internal Bus Supply Current | Max: 2.5A@5VDC                                                                                             |
| Isolation                   | System Power to Field Power Isolation                                                                      |
| Power Supply                | Nominal:24Vdc, Range:22-28Vdc                                                                              |
| Field Power Current         | Max. DC 8A                                                                                                 |
| IO Modules Supported        | 32 pcs                                                                                                     |
| Wiring                      | Max.1.0mm <sup>2</sup> (AWG 17)                                                                            |
| Size                        | 115*51.5*75mm                                                                                              |
| Weight                      | 130g                                                                                                       |
| Environment Specification   |                                                                                                            |
| Operation Temperature       | -40~85°C                                                                                                   |
| Operation Humidity          | 5%-95% (No Condensation)                                                                                   |
| Ingress Protection Rating   | IP20                                                                                                       |
| CANOPEN Parameter           |                                                                                                            |
| Protocol                    | CANopen DS401                                                                                              |
| Connect the interface       | 5PIN terminal                                                                                              |
| Station Address             | Dial code setting (1-127)                                                                                  |
| Process Data                | Input Max. 512 Byte<br>Output Max. 512 Byte                                                                |
| Configuration Interface     | Type-C                                                                                                     |
| Transmission Rate           | 10 kbit/s, 20 kbit/s, 50 kbit/s, 100 kbit/s, 125 kbit/s, 250 kbit/s,<br>500 kbit/s, 800 kbit/s,1000 kbit/s |

### 3 Hardware Interface



- ① CANOpen port
- ② Config Interface
- ③ Module type
- ④ LED Indicator
- ⑤ Wiring Terminal
- ⑥ Buckle
- ⑦ Grounding Spring Sheet
- ⑧ Fixed Wiring Harness
- ⑨ Field Power
- ⑩ Internal Bus

### 3.1 CANopen Interface

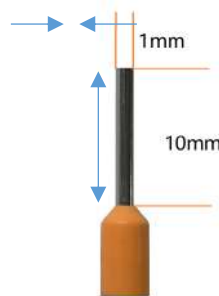
The device wiring adopts 5 Pin screw terminals and its Pin definition is as below:

CANopen interface pin definition

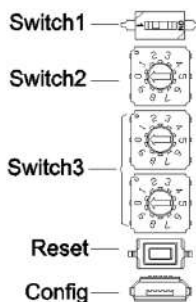
| Pin | Definition | Description                    |
|-----|------------|--------------------------------|
| 1   | NC         | Empty                          |
| 2   | CANH       | CAN_H signal bus line          |
| 3   | PE         | Protecting Earthing            |
| 4   | CANL       | CAN_L signal terminal bus line |
| 5   | GND        | Signal Grounded                |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



### 3.2 Configuration Interface



Switch1: DIP switch is used to set the terminal resistance.

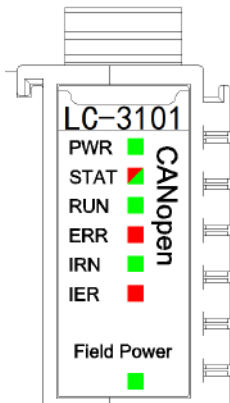
Switch2: DIP switch is used to set the communication baud rate

Switch3: DIP switch is used to set the address of the adapter module. It is set by a 2-bit decimal hardware DIP switch, and each CANopen adapter has a unique station address (1~99).

Reset: Module reset button, long pressing the button for more than 5 seconds and all parameters of the module will be restored to the default value. When the Reset button is activated, a green indicator will light up in the upper left corner of the button.

Config: configured ports, it is standard MicroUSB interface for configuring device parameters and firmware upgrades.

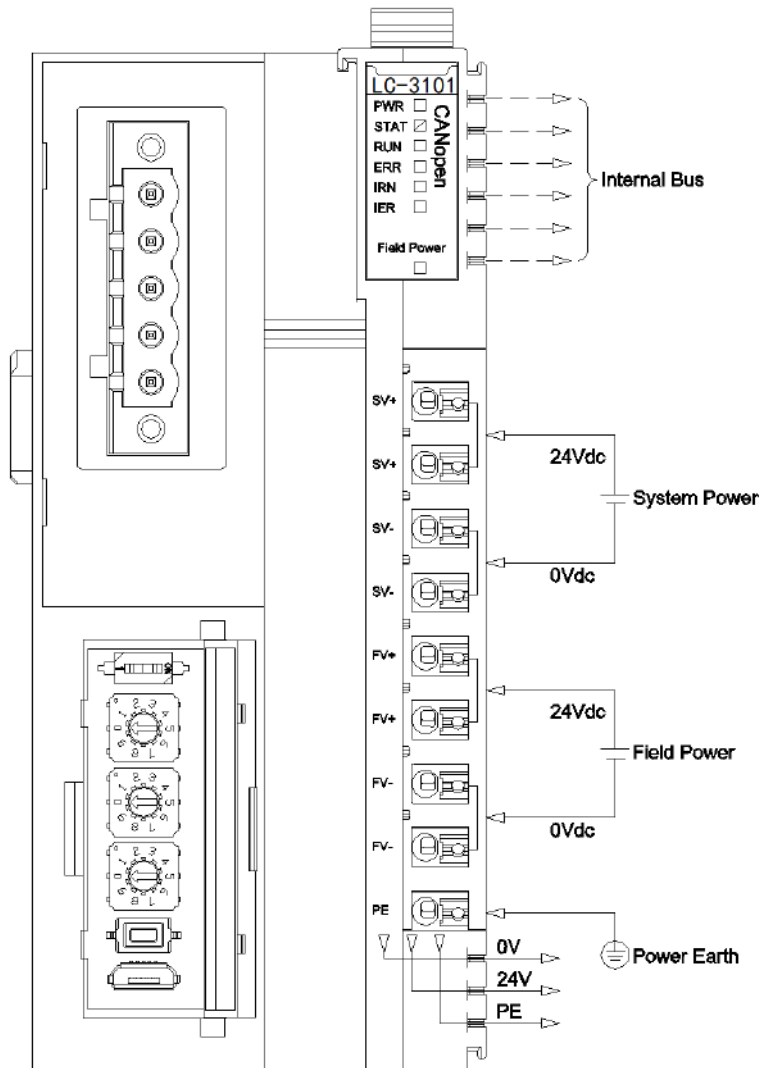
### 3.4 LED Indicator



| PWR Power State (GREEN)             | Definition                               |
|-------------------------------------|------------------------------------------|
| ON                                  | System Power Normal                      |
| OFF                                 | System Power Failure                     |
| STAT Module State (RED/GREEN)       | Definition                               |
| Double Flash (RED)                  | Module Soft Restarted by Hard-Fault      |
| ON(GREEN)                           | Running                                  |
| Single Flash (GREEN)                | Stopping                                 |
| Flash(2.5Hz) (RED/GREEN)            | Boot Mode                                |
| Flash(10Hz) (RED/GREEN)             | Firmware Updating                        |
| RUN Network State (GREEN)           | Definition                               |
| ON                                  | CAN communication has been established   |
| Flash                               | The CAN communication is not established |
| ERR Network Error (RED)             | Definition                               |
| OFF                                 | no error                                 |
| Flash                               | error existing                           |
| IRN IO Run Indicator (GREEN)        | Definition                               |
| ON                                  | IO initialization normal                 |
| OFF                                 | IO initialization failure                |
| IER IO Error Indicator (RED)        | Definition                               |
| OFF                                 | IO communication normal                  |
| Double Flash                        | IO communication failure                 |
| Field Power State Indicator (GREEN) | Definition                               |
| ON                                  | Field Power Normal                       |
| OFF                                 | Field Power Failure                      |

## 4 Wiring

Please note when wiring: for the internal construction, two terminals of SV+ have been short-connected, two terminals of SV- have been short-connected, two terminals of FV+ have been short-connected, and two terminals of FV- have been short-connected. For external it only needs to access one system power supply and one field power supply.



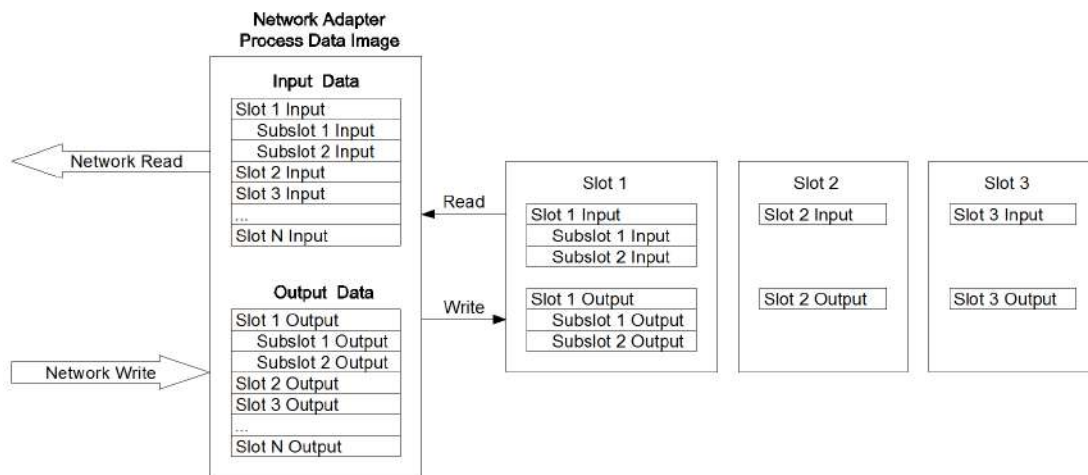
## 5 Process data definition

### 5.1 Adapter process data definition

CANopen Adapter itself has no input-output process data.

### 5.2 IO Module process data mapping

The network adapter reads and writes input and output process data of IO module in real time through the internal bus, and its data mapping model is shown as follow:



Input and output data of the IO module are mapped to objects 6000,6200, 6401,6411 based on data types. TPDO and RPDO both support variable PDO mapping.

## 6 Configuration Parameter Definition

| Configuration Parameter  |                       |                         |                        |                              |
|--------------------------|-----------------------|-------------------------|------------------------|------------------------------|
| No.                      | Description           |                         |                        |                              |
| Byte 0                   | Reserved              | Fault Action for Output | Fault Action for Input | Source of Configuration Data |
| Byte 1                   | CAN BaudRate          |                         |                        |                              |
| Byte 2                   | CANopen Slave Address |                         |                        |                              |
| Byte 3                   | Reserved              |                         | Auto Start             | Auto Generate PDO COB-ID     |
| Byte 4                   |                       |                         |                        |                              |
| Byte 5<br>...<br>Byte 19 | Reserved              |                         |                        |                              |

Data declaration:

**Source of Configuration Data:** Parameter configuration mode (Default: 0)

0: Configured software configuration is valid

1: Fieldbus controller configuration is valid

**Fault Action for Input:** Input data handling mode when IO occurs fault (Default: 0)

0: Hold Last Input Value

1: Clear Input Value

**Fault Action for Output:** Output data handling mode when IO occurs fault (Default: 1)

0: Hold Last Output Value

1: Clear Output Value

**CANopen Slave Address:** CANopen slave device number (read only, default: 1)

**CAN BaudRate:** CAN bus baud rate Settings (default: 2)

0: 1 MBit/sec

1: 800 kBit/sec

2: 500 kBit/sec

3: 250 kBit/sec

4: 125 kBit/sec

5: 100 kBit/sec

6: 50 kBit/sec

7: 20 kBit/sec

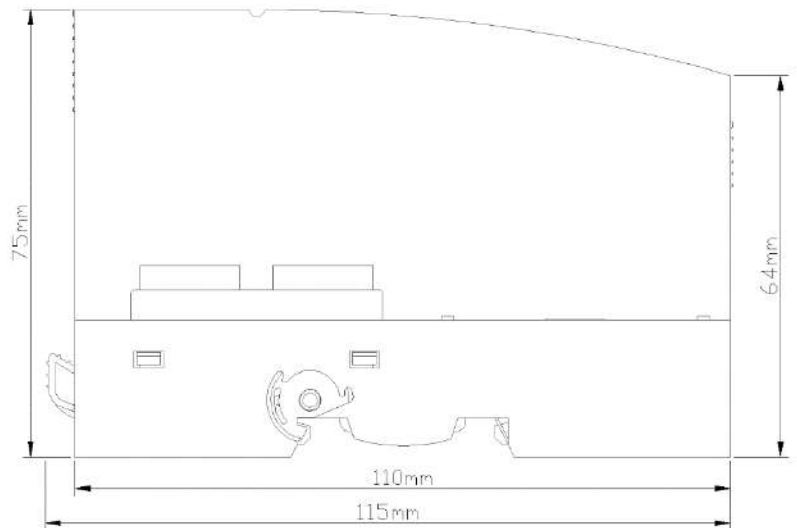
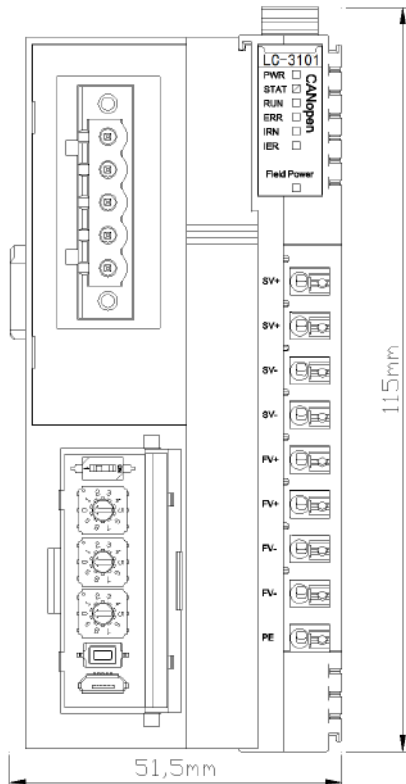
8: 10 kBit/sec

**Auto Generate PDO COB-ID:** PDO identifiers can be automatically assigned, the Enable and the Disable is optional. After the PDO identifier is enabled, the PDO identifier could be automatically assigned to the I/O module. After the PDO identifier is disabled, only 4 predefined PDO are available, and more PDO need to be set by the

CANOPEN master. It is disabled by default.

**Auto Start:** The slave is automatically started. Enable and disable is optional. After this function is enabled, the site will proactively send a PDO message and uploads the message when there is data. It is disabled by default.

## A Dimension drawing



### **3 Extended IO module**

#### **LD-0008 8-channel digital input**

***24VDC/ source or sink type & 8-channel digital output /24VDC/ source type***

##### **1 Module features**

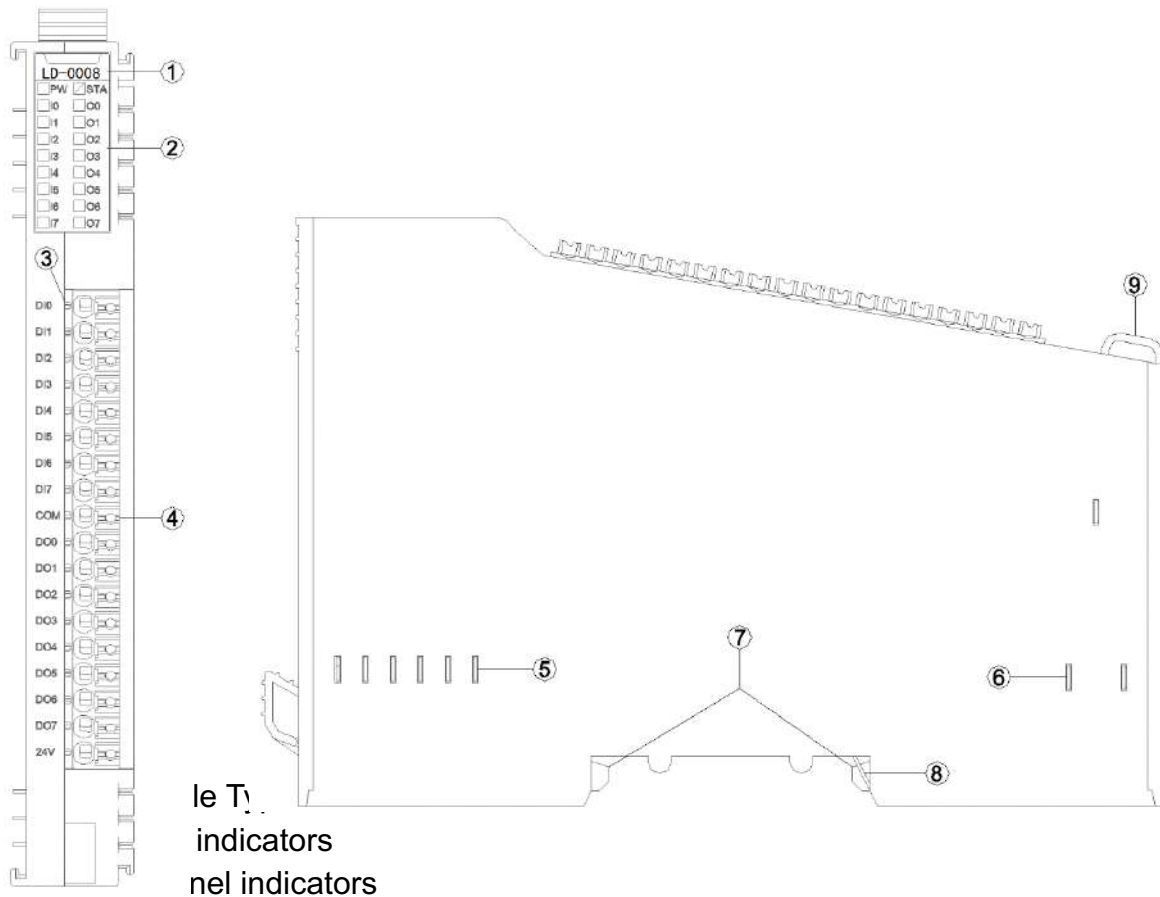
- ◆ The module supports 8-channel digital input, and supports source type and sink type two-way input. The input voltage is 0V/24VDC.
- ◆ The module supports 8-channel digital output, Output high level valid, and the output voltage is 24VDC.
- ◆ Module input channel can collect digital output signal of field equipment. (dry contact or active output)
- ◆ The module input channel can be connected to the 2-wire or 3-wire digital sensor.
- ◆ Module input channel supports 32-bit counter for each channel, the counting frequency < 200Hz.
- ◆ The input channel of the module supports the signal maintenance function, and the maintenance time can be set.
- ◆ The input channel of the module can set the digital signal input filtering time and the byte transfer order of the counter.
- ◆ The input channel of the module can set the counting mode and counting direction independently.
- ◆ Module output channel can drive field equipment .(relay, solenoid valve, etc.)
- ◆ The output channel of the module is equipped with short circuit, thermal shutdown and overvoltage protection functions.
- ◆ Module internal bus and field input and output , using Optocoupler isolation.
- ◆ Module has 16 digital input and output channel LED indicator light.

## 2 Technical parameters

| General Parameters        |                                                                                                       |
|---------------------------|-------------------------------------------------------------------------------------------------------|
| Power                     | Max.85mA@5.0Vdc                                                                                       |
| Isolation                 | I/O to internal bus: opto-coupler isolation (3KVrms)                                                  |
| Field Power               | Nominal voltage: 24Vdc<br>Input range: 22~28Vdc                                                       |
| Wiring                    | I/O wiring: Max.1.0mm <sup>2</sup> (AWG 17)                                                           |
| Installation              | 35mm DIN-Rail                                                                                         |
| Size                      | 115*14*75mm                                                                                           |
| Weight                    | 65g                                                                                                   |
| Environment Specification |                                                                                                       |
| Working temperature       | -40~85°C                                                                                              |
| Environmental humidity    | 5%-95% (No Condensation)                                                                              |
| Ingress Protection Rating | IP20                                                                                                  |
| Environmental Parameters  |                                                                                                       |
| Channel Number            | 8-channel source/sink type input                                                                      |
| Indicator                 | 8 channel input indicators                                                                            |
| Open voltage              | High input: Min.10Vdc to Max.28Vdc (Common: 0Vdc)<br>Low input: Min.0Vdc to Max.14Vdc (Common: 24Vdc) |
| Close voltage             | High input: Max.5Vdc (Common: 0Vdc)<br>Low input: Min.19Vdc (Common: 24Vdc)                           |
| Open current              | Max.5mA/ channel @28V                                                                                 |
| Input impedance           | >7.5kΩ                                                                                                |
| Input delay               | OFF to ON: Max.3ms<br>ON to OFF: Max.2ms                                                              |
| Prop filter               | Default: 10ms                                                                                         |
| Sampling frequency        | 500Hz                                                                                                 |
| Count frequency           | <200Hz                                                                                                |
| Output parameter          |                                                                                                       |
| Channel Number            | 8 channel source type output                                                                          |
| LED Indicator             | 8 channel output indicators                                                                           |
| Rated current             | Typical value:0.5A                                                                                    |
| Leakage current           | Maximum value: 10uA                                                                                   |
| Output impedance          | <200mΩ                                                                                                |
| Output delay              | OFF to ON: Max.100us<br>ON to OFF: Max.150us                                                          |

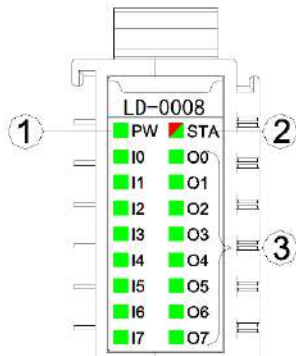
|                     |                                                                                                                           |
|---------------------|---------------------------------------------------------------------------------------------------------------------------|
| Protection function | Temperature protection: typical value 135°C<br>Protection current: typical value 1.1A<br>Short circuit protection support |
|---------------------|---------------------------------------------------------------------------------------------------------------------------|

### 3 Hardware interfaces



- ④ Wiring Terminal and Marking
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicators Definition



- ① Power indicator (green)
- ② Module state indicator (red/green)
- ③ Input/output channel indicators (green)

| PW power indicator              | Definition                                    |
|---------------------------------|-----------------------------------------------|
| ON                              | Internal bus power supply normal              |
| OFF                             | Internal bus power supply failure             |
| STA module state indicator      | Definition                                    |
| Green slow flash (2.5hz)        | The internal bus of the module is not started |
| Red slow flash (2.5hz)          | Module internal bus offline                   |
| Green normally on               | Module works normally                         |
| Flash(2.5Hz) (RED/GREEN)        | Operating mode                                |
| Flash(10Hz) (RED/GREEN)         | Firmware upgrading                            |
| Red flashes twice               | Module exception has been soft-restarted      |
| I0-I7 input channel indicators  | Definition                                    |
| ON                              | input signal valid                            |
| OFF                             | input signal invalid                          |
| O0-O7 output channel indicators | Definition                                    |
| ON                              | Output signal valid                           |
| OFF                             | Output signal invalid                         |

### 3.2 Field input channel LED indicator (red/green)



When the COM terminal is connected to a low level and the input channel signal is at a high level, the corresponding channel green indicator is on.

When the COM terminal is connected to a high level and the input channel signal is at a low level, the corresponding channel red indicator is on.

### 3.3 Field output channel LED indicator (green)



When the output signal of the output channel is valid, the corresponding channel indicator is on.

### 3.4 Terminal definition

| Terminal Number | Symbol | Instruction           |
|-----------------|--------|-----------------------|
| 1               | DI0    | Signal input          |
| 2               | DI1    |                       |
| 3               | DI2    |                       |
| 4               | DI3    |                       |
| 5               | DI4    |                       |
| 6               | DI5    |                       |
| 7               | DI6    |                       |
| 8               | DI7    |                       |
| 9               | COM    | Input common terminal |
| 10              | DO0    | Signal output         |
| 11              | DO1    |                       |
| 12              | DO2    |                       |
| 13              | DO3    |                       |
| 14              | DO4    |                       |
| 15              | DO5    |                       |

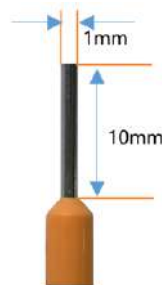
|    |     |                     |
|----|-----|---------------------|
| 16 | DO6 |                     |
| 17 | DO7 |                     |
| 18 | 24V | Power input (Note1) |

Note 1: when the red LED indicator beside the 24V wiring terminal lights up, it indicates that the fieldbus is powered on, then the maximum output current of each channel is 500mA, and the maximum sum of all output channel currents is 2A.

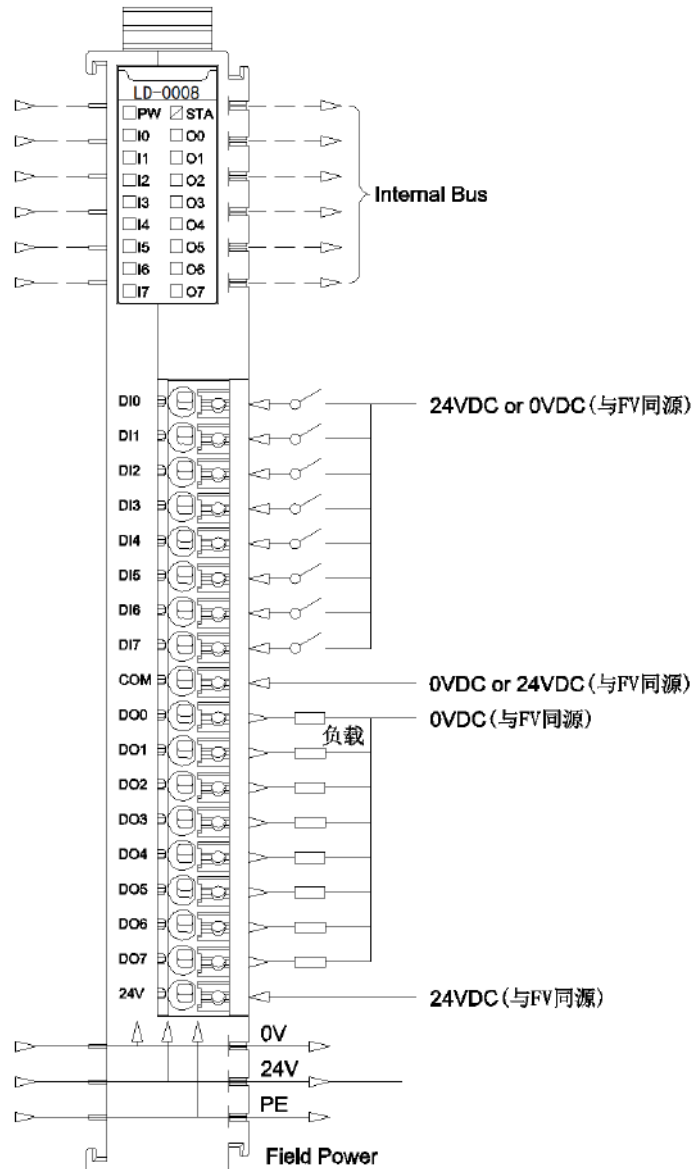
When the 24VDC power is supplied to the 24V wiring terminal separately, the sum of all the output channel currents is at the maximum of 4A (Whether the fieldbus is powered on or not, 24V wiring terminals can both be connected to 24VDC power supply).

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



## 4 Wiring



### <8DI&8DO IO State> Submodule procedure data definition

Data description:

1: Input signal valid

1: Output signal valid

| Input data |                    |       |       |       |       |       |       |       |
|------------|--------------------|-------|-------|-------|-------|-------|-------|-------|
| Bit No     | Bit 7              | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0     | Counter Value Ch#0 |       |       |       |       |       |       |       |
| Byte 1     |                    |       |       |       |       |       |       |       |
| Byte 2     |                    |       |       |       |       |       |       |       |
| Byte 3     |                    |       |       |       |       |       |       |       |
| Byte 4     | Counter Value Ch#1 |       |       |       |       |       |       |       |
| Byte 5     |                    |       |       |       |       |       |       |       |
| Byte 6     |                    |       |       |       |       |       |       |       |
| Byte 7     |                    |       |       |       |       |       |       |       |
| Byte 8     | Counter Value Ch#2 |       |       |       |       |       |       |       |
| Byte 9     |                    |       |       |       |       |       |       |       |
| Byte 10    |                    |       |       |       |       |       |       |       |
| Byte 11    |                    |       |       |       |       |       |       |       |
| Byte 12    | Counter Value Ch#3 |       |       |       |       |       |       |       |
| Byte 13    |                    |       |       |       |       |       |       |       |
| Byte 14    |                    |       |       |       |       |       |       |       |
| Byte 15    |                    |       |       |       |       |       |       |       |
| Byte 16    | Counter Value Ch#4 |       |       |       |       |       |       |       |

|             |                    |                    |                    |                    |                    |                    |                    |                    |
|-------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Byte 17     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 18     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 19     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 20     | Counter Value Ch#5 |                    |                    |                    |                    |                    |                    |                    |
| Byte 21     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 22     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 23     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 24     | Counter Value Ch#6 |                    |                    |                    |                    |                    |                    |                    |
| Byte 25     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 26     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 27     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 28     | Counter Value Ch#7 |                    |                    |                    |                    |                    |                    |                    |
| Byte 29     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 30     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 31     |                    |                    |                    |                    |                    |                    |                    |                    |
| Output data |                    |                    |                    |                    |                    |                    |                    |                    |
| Bit No      | Bit 7              | Bit 6              | Bit 5              | Bit 4              | Bit 3              | Bit 2              | Bit 1              | Bit 0              |
| Byte 0      | Counter Reset Ch#7 | Counter Reset Ch#6 | Counter Reset Ch#5 | Counter Reset Ch#4 | Counter Reset Ch#3 | Counter Reset Ch#2 | Counter Reset Ch#1 | Counter Reset Ch#0 |

Data description:

**Counter Value Ch#(0-7):** count value, 32-bit unsigned integer, automatically zeroing after overflow.

**Counter Reset Ch#(0-7):** when the data bit changes from 0 to 1 (rising edge), the input counter of the corresponding channel will be cleared.

**Note:** The maximum counting frequency of the input channel is 200Hz. When the input signal exceeds this frequency, the counting result may be inconsistent with the actual value.

## 6 Configuration parameter definition

<8DI&8DO IO State> Submodule configuration parameter definition

| Configuration parameter |                              |                              |                              |                              |                              |                              |                              |                              |
|-------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Bit No                  | Bit 7                        | Bit 6                        | Bit 5                        | Bit 4                        | Bit 3                        | Bit 2                        | Bit 1                        | Bit 0                        |
| Byte 0                  | Input Filtering Time(ms)     |                              |                              |                              |                              |                              |                              |                              |
| Byte 1                  |                              |                              |                              |                              |                              |                              |                              |                              |
| Byte 2                  | Reserved                     |                              |                              |                              |                              | Input Holding Time(ms)       |                              |                              |
| Byte 3                  | Fault Action for Output Ch#7 | Fault Action for Output Ch#6 | Fault Action for Output Ch#5 | Fault Action for Output Ch#4 | Fault Action for Output Ch#3 | Fault Action for Output Ch#2 | Fault Action for Output Ch#1 | Fault Action for Output Ch#0 |
| Byte 4                  | Fault Value for Output Ch#7  | Fault Value for Output Ch#6  | Fault Value for Output Ch#5  | Fault Value for Output Ch#4  | Fault Value for Output Ch#3  | Fault Value for Output Ch#2  | Fault Value for Output Ch#1  | Fault Value for Output Ch#0  |

Data description:

**Input Filtering Time(ms):** Channel input filtering time, unit: ms. (Default: 10)

**Input Holding Time(ms):** Channel input signal holding time, unit: ms. (Default: 0)

0: Disable

1: 200ms

2: 500ms

3: 1000ms

4: 1500ms

5: 2000ms

6: 3000ms

7: 5000ms

**Fault Action for Output Ch#(0-7):** Fault Output mode. When the IO module detects an internal bus exception and fails to communicate with the adapter, the module enters offline mode, the output data will be processed in this way. (Default: 0)

0: keep the last time output state.

1: output fault value.

**Fault Value for Output Ch#(0-7):** When the fault output mode is 1, the bit sets the fault output value, which is output when the IO module internal bus is offline. (Default: 0)

0: output low level.

1: output high level.

<8DI Counter Submodule> Submodule configuration parameter definition

| Configuration parameter |       |       |       |       |       |       |       |       |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Bit No                  | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |

|        |                      |                      |                      |                      |                      |                      |                      |                      |
|--------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Byte 0 | Reserved             |                      |                      |                      | Storage Enable       | Storage Function     | 32Bit Data Format    |                      |
| Byte 1 | Count Mode Ch#3      |                      | Count Mode Ch#2      |                      | Count Mode Ch#1      |                      | Count Mode Ch#0      |                      |
| Byte 2 | Count Mode Ch#7      |                      | Count Mode Ch#6      |                      | Count Mode Ch#5      |                      | Count Mode Ch#4      |                      |
| Byte 3 | Count Direction Ch#7 | Count Direction Ch#6 | Count Direction Ch#5 | Count Direction Ch#4 | Count Direction Ch#3 | Count Direction Ch#2 | Count Direction Ch#1 | Count Direction Ch#0 |

Data description:

**32Bit Data Format:** Byte transmission order of channel count values (Default: 0).

0: AB-CD

1: BA-DC

2: CD-AB

3: DC-BA

**Storage Function:** storage Function is support or not, read only attribute, and this value is the actual value of the module when uploading device parameters.

0: storage is not support

1: storage is support

**Storage Enable:** Storage enable, when the Storage Function enables, the IO module will save the count value in real time to non-volatile memory, and load the last saved count value when it is powered on next time. (Default: 1)

0: Disabled

1: Enable

**Count Mode Ch#(0-7):** Input channel count mode. (Default: 0)

0: Rising edge count

1: Falling edge count

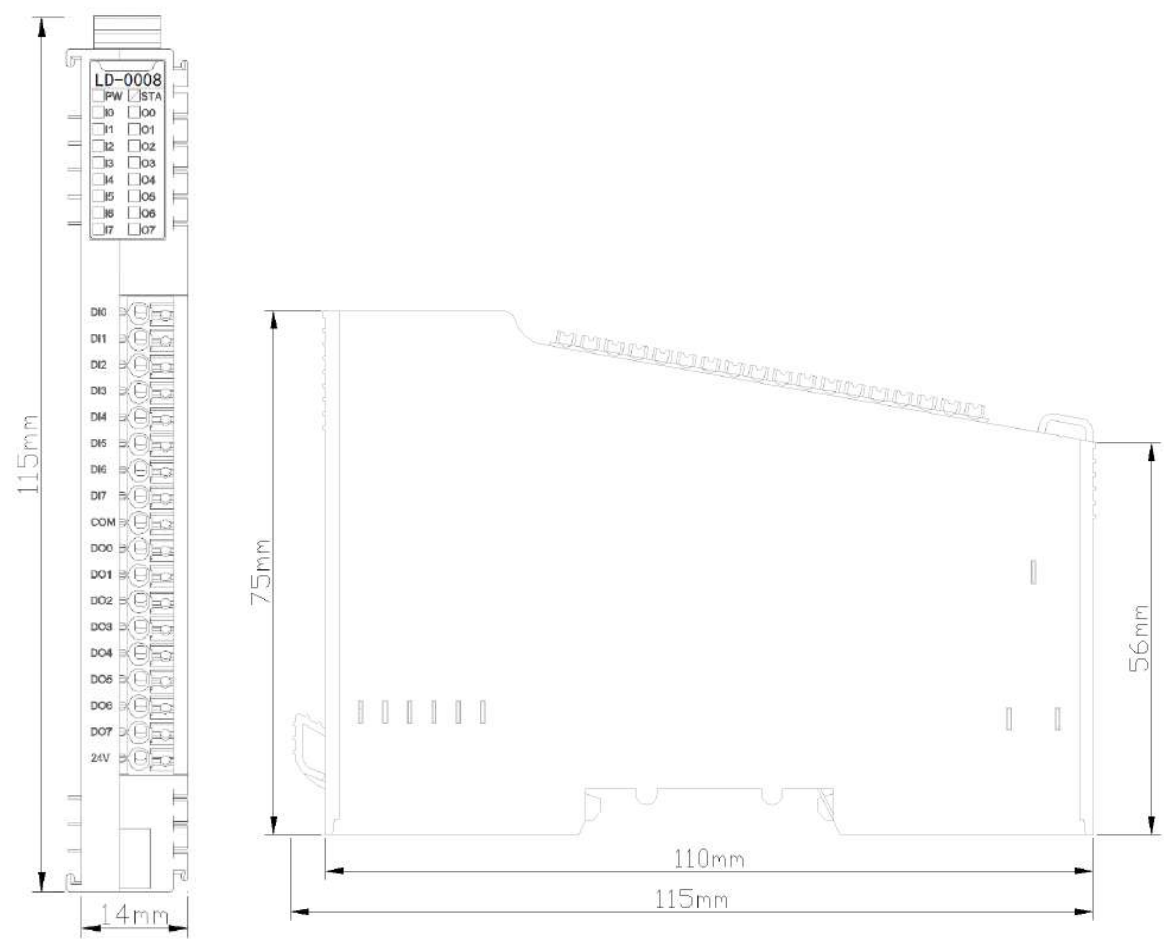
2: Double edge count

**Count Direction Ch#(0-7):** The counting direction of the input channel. (Default: 0)

0: Count up

1: Count down

A Dimension drawing



## **LD-1308 8 channels digital input/24VDC/PNP**

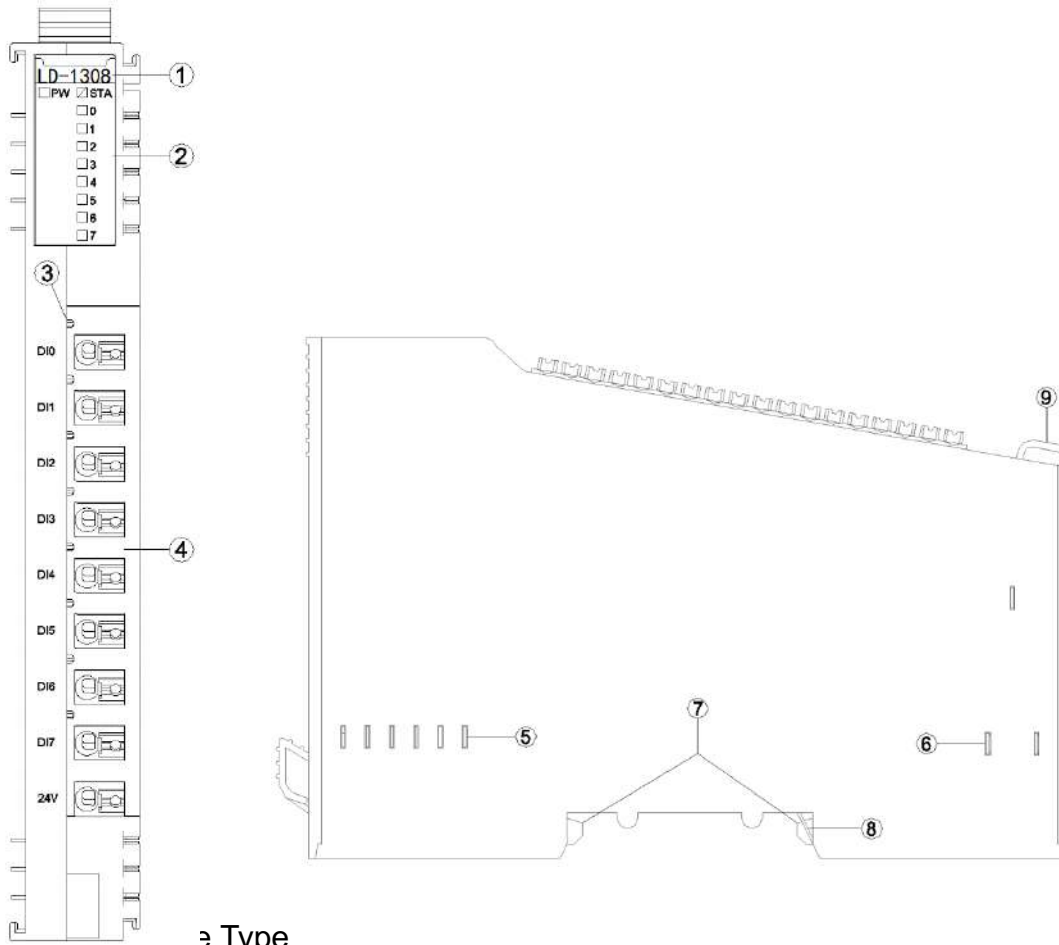
### **1 Module features**

- ◆the module supports 8 channels digital input, supports sink input, and the input voltage is 24VDC and the input high level is valid. It could support PNP sensor.
- ◆the module could collect digital output signal of field equipment (dry contact or active output).
- ◆the module could be accessed to 2-wire or 3-wire digital sensor.
- ◆the internal bus and field input of the module use opto-isolator.
- ◆the module supports the input signal holding function, and the holding time can be set.
- ◆the module carries 8 digital input channels with LED indicator on each channel.
- ◆supports counting function after adding counting sub-module.
- ◆each input channel of the module supports a 32-bit counter with the counting frequency <200Hz.
- ◆the module could be set the digital signal input filtering time and the byte transmission order of the counter.
- ◆each channel of the module could be set the counting mode and counting direction independently.

## 2 Technical parameters

| General parameters        |                                                     |
|---------------------------|-----------------------------------------------------|
| Power Consumption         | Max.52mA@5.0Vdc                                     |
| Isolation                 | I/O to internal bus: opto-couple isolation (3KVrms) |
| Field Power               | Nominal:24Vdc, Range:22-28Vdc                       |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                     |
| Mounting Type             | 35mm DIN-Rail                                       |
| Size                      | 115*14*75mm                                         |
| Weight                    | 65g                                                 |
| Environment Specification |                                                     |
| Operational Temperature   | -40~85°C                                            |
| Operational Humidity      | 5%-95% (No Condensation)                            |
| Ingress Protection Rating | IP20                                                |
| Input parameters          |                                                     |
| Channel Number            | 8 channel sink input                                |
| LED Indicator             | 8 channel input LED indicator                       |
| Turn-on voltage           | Min.10Vdc to Max.28Vdc                              |
| Turn-off Voltage          | Max.5Vdc                                            |
| Turn-on current           | Max.5mA/channel@28V                                 |
| Input impedance           | >7.5kΩ                                              |
| Input delay               | OFF to ON: Max.3ms<br>ON to OFF: Max.2ms            |
| Filter time               | Default 10ms                                        |
| Sample frequency          | 500Hz                                               |
| Counter frequency         | <200Hz                                              |

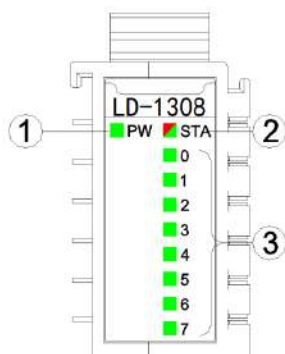
### 3 Hardware interfaces



≡ Type

- ② State indicator
- ③ Channel indicator
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

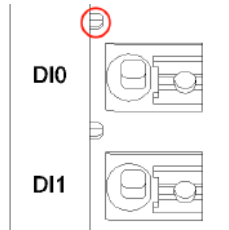
### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Input channel LED indicator (green)

| PW Power State (GREEN)       | Definition                               |
|------------------------------|------------------------------------------|
| ON                           | Internal bus Power Normal                |
| OFF                          | Internal bus Power Failure               |
| STA Module State (RED/GREEN) | Definition                               |
| Green slow flash (2.5Hz)     | Module internal bus is not started       |
| Red slow flash (2.5Hz)       | Module internal bus offline              |
| ON (GREEN)                   | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)     | Upgrading mode                           |
| Flash(10Hz) (RED/GREEN)      | Firmware Update                          |
| Double Flash (RED)           | Module Exception has been soft-restarted |
| 0-7 channel LED indicator    | Definition                               |
| ON                           | Input signal valid                       |
| OFF                          | Input signal invalid                     |

### 3.2 Field channel LED indicator (Green)



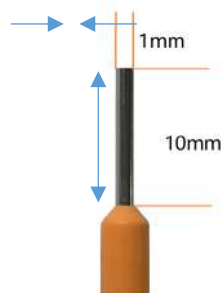
When input signal of input channel is valid, the corresponding field channel LED indicator is on.

### 3.3 Terminal definition

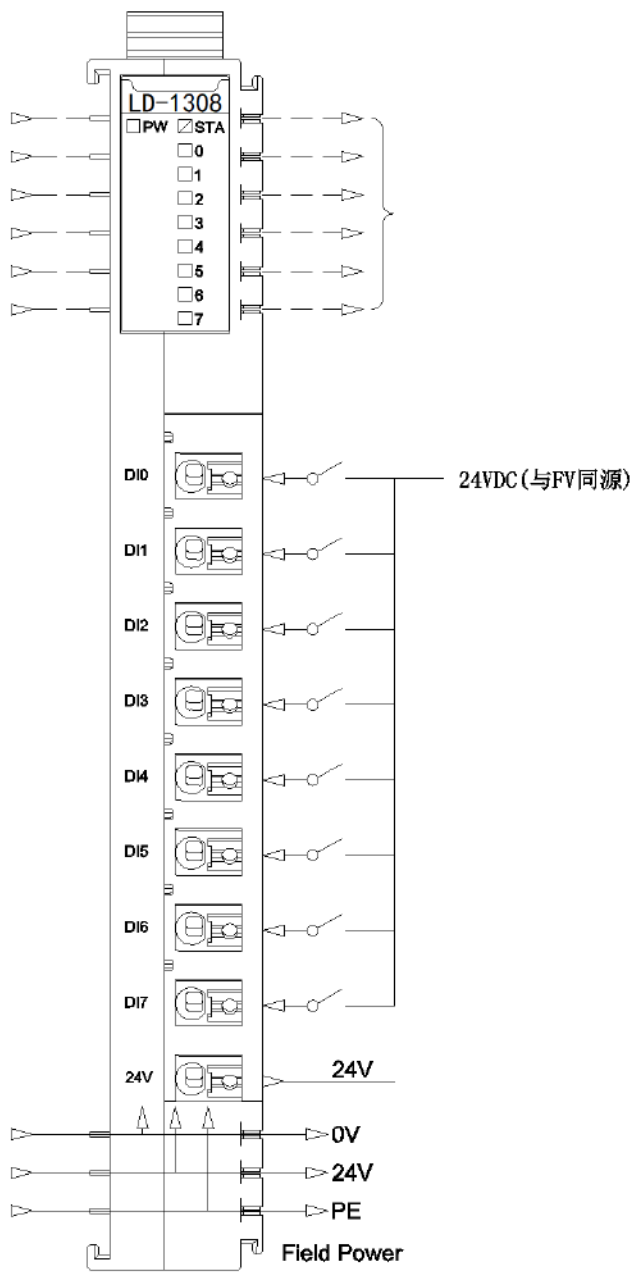
| Terminal Number | Symbol | Description  |
|-----------------|--------|--------------|
| 1               | DI0    | Signal input |
| 2               | DI1    |              |
| 3               | DI2    |              |
| 4               | DI3    |              |
| 5               | DI4    |              |
| 6               | DI5    |              |
| 7               | DI6    |              |
| 8               | DI7    |              |
| 9               | 24V    | Power output |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



4 Wiring



### <8DI Input Status> Submodule process data definition

### Data description:

0: Input signal invalid

1: Input signal valid

| Input data |                    |       |       |       |       |       |       |       |
|------------|--------------------|-------|-------|-------|-------|-------|-------|-------|
| Bit No     | Bit 7              | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0     | Counter Value Ch#0 |       |       |       |       |       |       |       |
| Byte 1     |                    |       |       |       |       |       |       |       |
| Byte 2     |                    |       |       |       |       |       |       |       |
| Byte 3     |                    |       |       |       |       |       |       |       |
| Byte 4     | Counter Value Ch#1 |       |       |       |       |       |       |       |
| Byte 5     |                    |       |       |       |       |       |       |       |
| Byte 6     |                    |       |       |       |       |       |       |       |
| Byte 7     |                    |       |       |       |       |       |       |       |
| Byte 8     | Counter Value Ch#2 |       |       |       |       |       |       |       |
| Byte 9     |                    |       |       |       |       |       |       |       |
| Byte 10    |                    |       |       |       |       |       |       |       |
| Byte 11    |                    |       |       |       |       |       |       |       |
| Byte 12    | Counter Value Ch#3 |       |       |       |       |       |       |       |

|             |                    |                    |                    |                    |                    |                    |                    |                    |
|-------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Byte 13     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 14     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 15     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 16     | Counter Value Ch#4 |                    |                    |                    |                    |                    |                    |                    |
| Byte 17     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 18     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 19     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 20     | Counter Value Ch#5 |                    |                    |                    |                    |                    |                    |                    |
| Byte 21     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 22     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 23     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 24     | Counter Value Ch#6 |                    |                    |                    |                    |                    |                    |                    |
| Byte 25     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 26     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 27     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 28     | Counter Value Ch#7 |                    |                    |                    |                    |                    |                    |                    |
| Byte 29     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 30     |                    |                    |                    |                    |                    |                    |                    |                    |
| Byte 31     |                    |                    |                    |                    |                    |                    |                    |                    |
| Output data |                    |                    |                    |                    |                    |                    |                    |                    |
| Bit No      | Bit 7              | Bit 6              | Bit 5              | Bit 4              | Bit 3              | Bit 2              | Bit 1              | Bit 0              |
| Byte 0      | Counter Reset Ch#7 | Counter Reset Ch#6 | Counter Reset Ch#5 | Counter Reset Ch#4 | Counter Reset Ch#3 | Counter Reset Ch#2 | Counter Reset Ch#1 | Counter Reset Ch#0 |

Data description:

**Counter Value Ch#(0-7):** Count value, 32-bit unsigned integer, automatically zeroing after overflow.

**Counter Reset Ch#(0-7):** When the data bit changes from 0 to 1 (rising edge), the input counter of the corresponding channel is cleared.

Note: the maximum counting frequency of the input channel is 200Hz. When the input signal exceeds this frequency, the counting result may be inconsistent with the actual value.

## 6 Configuration parameter definitions

<8DI Input Status> Submodule configuration parameter definition

| Configuration parameters |                          |       |       |       |       |                        |       |       |
|--------------------------|--------------------------|-------|-------|-------|-------|------------------------|-------|-------|
| Bit No                   | Bit 7                    | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2                  | Bit 1 | Bit 0 |
| Byte 0                   | Input Filtering Time(ms) |       |       |       |       |                        |       |       |
| Byte 1                   |                          |       |       |       |       |                        |       |       |
| Byte 2                   | Reserved                 |       |       |       |       | Input Holding Time(ms) |       |       |

Data description:

**Input Filtering Time(ms):** Input filter time of Channel (ms) (Default: 10)

**Input Holding Time(ms):** Signal input holding time of Channel (ms) (Default:0)

0: Disable

1: 200ms

2: 500ms

3: 1000ms

4: 1500ms

5: 2000ms

6: 3000ms

7: 5000ms

<8DI Counter Submodule> Submodule configuration parameter definition

| Configuration parameters |                      |                      |                      |                      |                      |                      |                      |                      |
|--------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Bit No                   | Bit 7                | Bit 6                | Bit 5                | Bit 4                | Bit 3                | Bit 2                | Bit 1                | Bit 0                |
| Byte 0                   | Reserved             |                      |                      |                      | Storage Enable       | Storage Function     | 32Bit Data Format    |                      |
| Byte 1                   | Count Mode Ch#3      |                      | Count Mode Ch#2      |                      | Count Mode Ch#1      |                      | Count Mode Ch#0      |                      |
| Byte 2                   | Count Mode Ch#7      |                      | Count Mode Ch#6      |                      | Count Mode Ch#5      |                      | Count Mode Ch#4      |                      |
| Byte 3                   | Count Direction Ch#7 | Count Direction Ch#6 | Count Direction Ch#5 | Count Direction Ch#4 | Count Direction Ch#3 | Count Direction Ch#2 | Count Direction Ch#1 | Count Direction Ch#0 |

Data description:

**32Bit Data Format:** Byte transfer order of Channel count value (Default: 0)

0: AB-CD

1: BA-DC

2: CD-AB

3: DC-BA

**Storage Function:** Storage Function is supported or not, read only attribute, and this value is the actual value of the module when uploading device parameters.

0: storage is not supported

1: storage is supported

**Storage Enable:** Storage enable, when the Storage Function enables, the IO module will save the count value in real time to non-volatile memory, and load the last saved count value on the next power on. (Default: 1)

0: Disabled

1: Enable

**Count Mode Ch# (0-7):** Count mode of the input channel. (Default: 0)

0: rising edge count

1: falling edge count

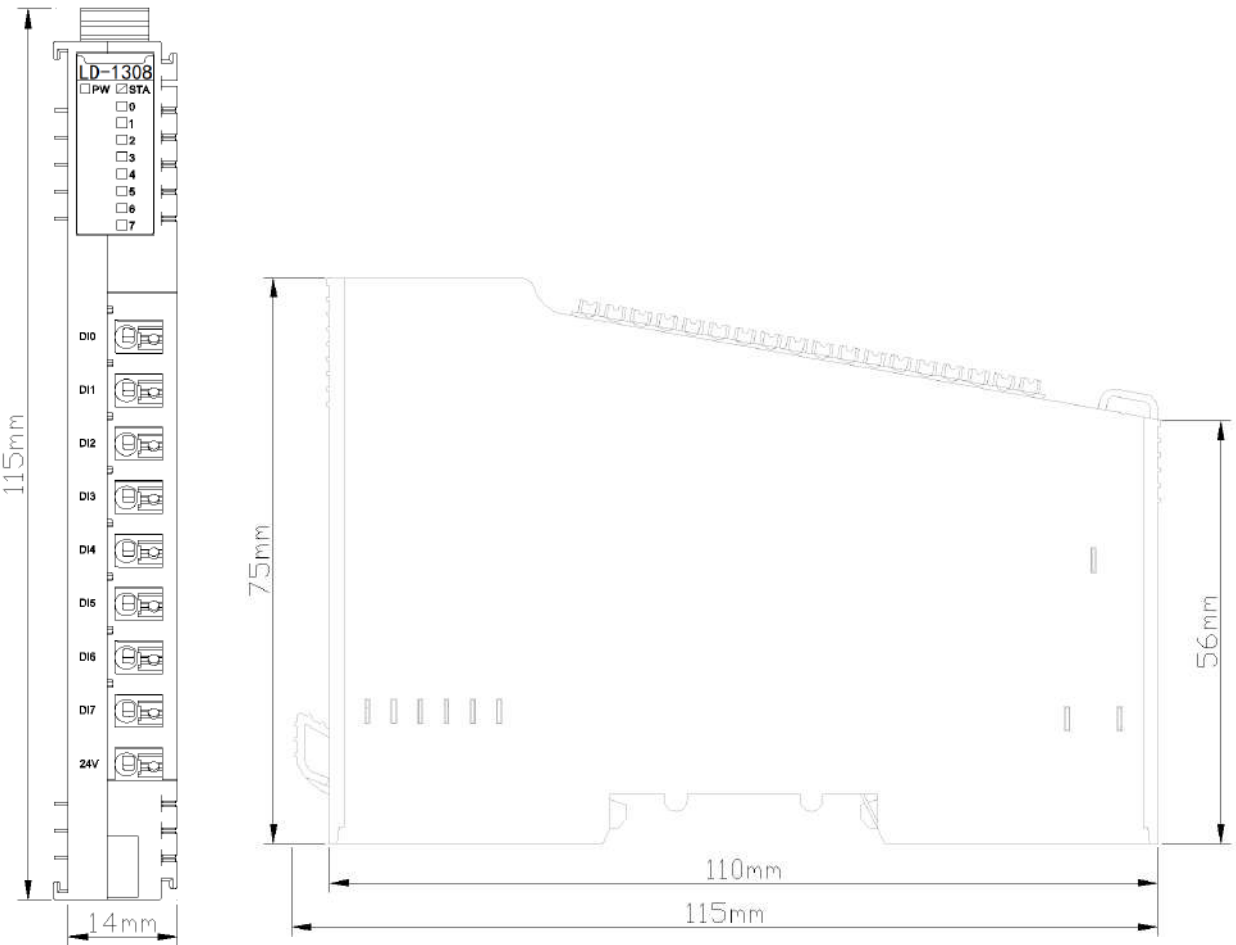
2: double edge count

**Count Direction Ch# (0-7):** The counting direction of the input channel. (Default: 0)

0: count up

1: count down

**A Dimension drawing**



# LD-1016 16 channels digital input/24VDC/ PNP

## 1 Module features

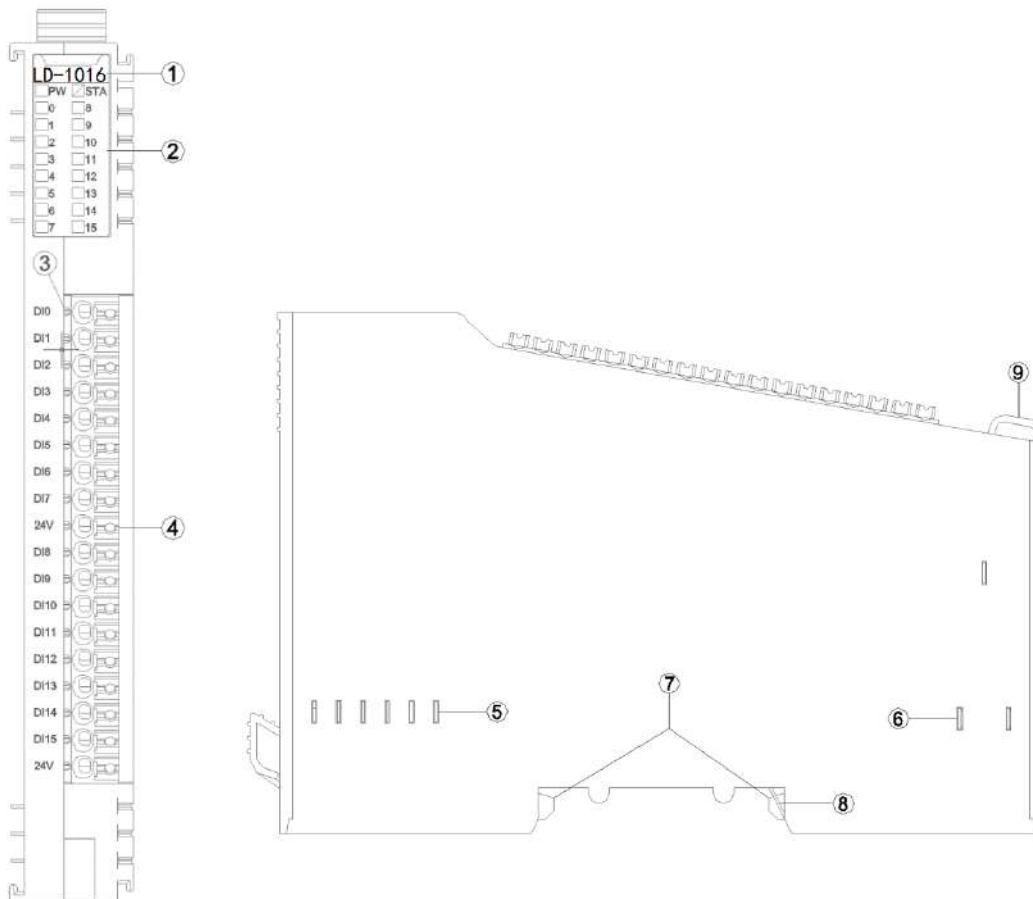
- ◆ the module supports 16 channels digital input, supports sink input, and the input voltage is 24VDC and the input high level is valid. It could support PNP sensor.
- ◆ the module could collect digital output signal of field equipment (dry contact or active output).
- ◆ the module could be accessed to 2-wire or 3-wire digital sensor.
- ◆ the internal bus and field input of the module use opto-isolator.
- ◆ the module supports the input signal holding function, and the holding time can be set.
- ◆ the module carries 16 digital input channels with LED indicator on each channel.
- ◆ supports counting function after adding counting sub-module.
- ◆ each input channel of the module supports a 32-bit counter with the counting frequency <200Hz.
- ◆ the module could be set the digital signal input filtering time and the byte transmission order of the counter.
- ◆ each channel of the module could be set the counting mode and counting direction independently.

## 2 Technical parameters

| General parameters        |                                                     |
|---------------------------|-----------------------------------------------------|
| Power Consumption         | Max.60mA@5.0Vdc                                     |
| Isolation                 | I/O to internal bus: opto-couple isolation (3KVrms) |
| Field Power               | Nominal:24Vdc, Range:22-28Vdc                       |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                     |
| Mounting Type             | 35mm DIN-Rail                                       |
| Size                      | 115*14*75mm                                         |
| Weight                    | 65g                                                 |
| Environment Specification |                                                     |
| Operational Temperature   | -40~85°C                                            |
| Operational Humidity      | 5%-95% (No Condensation)                            |
| Ingress Protection Rating | IP20                                                |
| Input parameters          |                                                     |
| Channel Number            | 16 channel sink input                               |
| LED Indicator             | 16 channel input LED indicator                      |
| Turn-on voltage           | Min.10Vdc to Max.28Vdc                              |

|                   |                                          |
|-------------------|------------------------------------------|
| Turn-off Voltage  | Max.5Vdc                                 |
| Turn-on current   | Max.5mA/channel@28V                      |
| Input impedance   | >7.5k $\Omega$                           |
| Input delay       | OFF to ON: Max.3ms<br>ON to OFF: Max.2ms |
| Filter time       | Default 10ms                             |
| Sample frequency  | 500Hz                                    |
| Counter frequency | <200Hz                                   |

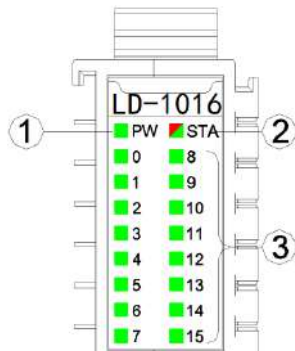
### 3 Hardware interfaces



- ① Module Type
- ② State indicator
- ③ Channel indicator
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle

- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

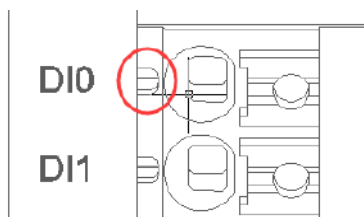
### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Input channel LED indicator (green)

| PW Power State (GREEN)       | Definition                               |
|------------------------------|------------------------------------------|
| ON                           | Internal bus Power Normal                |
| OFF                          | Internal bus Power Failure               |
| STA Module State (RED/GREEN) | Definition                               |
| Green slow flash (2.5Hz)     | Module internal bus is not started       |
| Red slow flash (2.5Hz)       | Module internal bus offline              |
| ON (GREEN)                   | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)     | Upgrading mode                           |
| Flash(10Hz) (RED/GREEN)      | Firmware Update                          |
| Double Flash (RED)           | Module Exception has been soft-restarted |
| 0-15 channel indicator light | Definition                               |
| ON                           | Input signal valid                       |
| OFF                          | Input signal invalid                     |

### 3.2 Field channel LED indicator (Green)



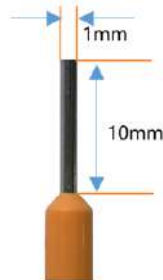
When input signal of input channel is valid, the corresponding field channel LED indicator is on.

### 3.3 Terminal definition

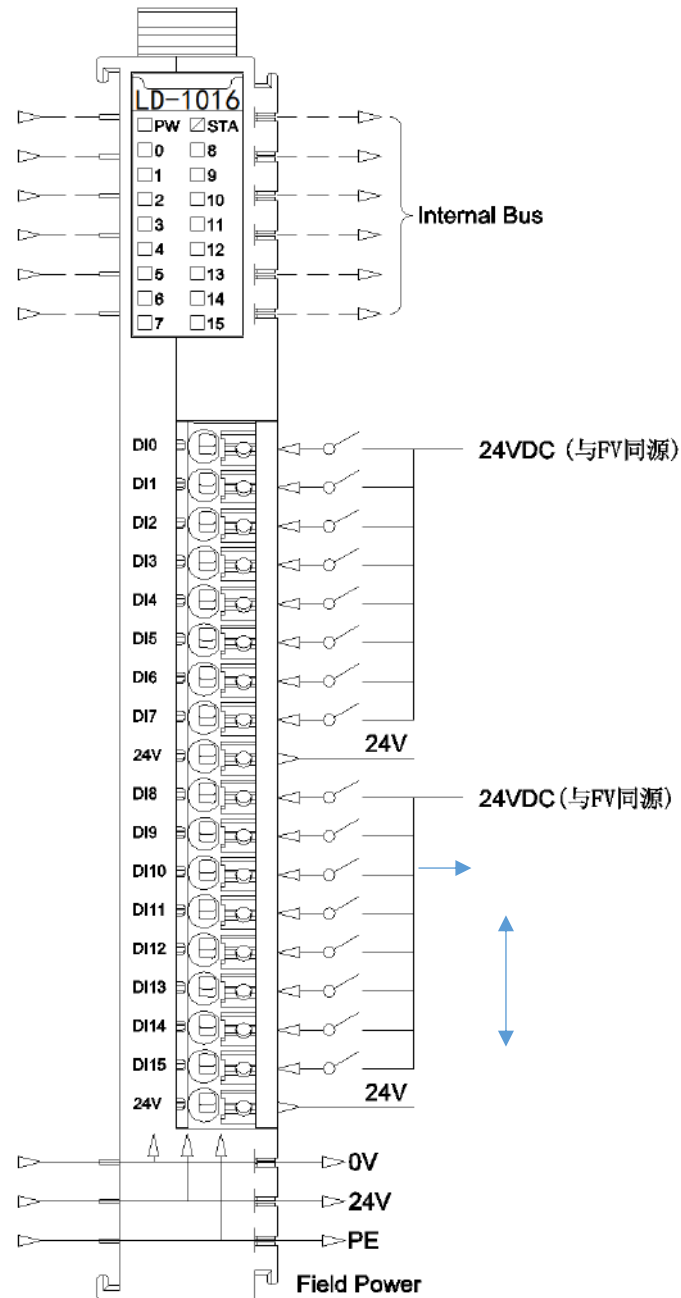
| Terminal Number | Symbol | Description  |
|-----------------|--------|--------------|
| 1               | DI0    | Signal input |
| 2               | DI1    |              |
| 3               | DI2    |              |
| 4               | DI3    |              |
| 5               | DI4    |              |
| 6               | DI5    |              |
| 7               | DI6    |              |
| 8               | DI7    |              |
| 9               | 24V    | Power output |
| 10              | DI8    | Signal input |
| 11              | DI9    |              |
| 12              | DI10   |              |
| 13              | DI11   |              |
| 14              | DI12   |              |
| 15              | DI13   |              |
| 16              | DI14   |              |
| 17              | DI15   |              |
| 18              | 24V    | Power output |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



## 4 Wiring



## 5 Process data definition

<16DI Input State> Submodule process data definition

| Input data |       |       |       |       |       |       |       |       |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Bit No     | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |

<16DI Counter Submodule> Submodule process data definition:

| Input data |                    |       |       |       |       |       |       |       |
|------------|--------------------|-------|-------|-------|-------|-------|-------|-------|
| Bit No     | Bit 7              | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0     | Counter Value Ch#0 |       |       |       |       |       |       |       |
| Byte 1     |                    |       |       |       |       |       |       |       |
| Byte 2     |                    |       |       |       |       |       |       |       |
| Byte 3     |                    |       |       |       |       |       |       |       |
| Byte 4     | Counter Value Ch#1 |       |       |       |       |       |       |       |
| Byte 5     |                    |       |       |       |       |       |       |       |
| Byte 6     |                    |       |       |       |       |       |       |       |
| Byte 7     |                    |       |       |       |       |       |       |       |
| Byte 8     | Counter Value Ch#2 |       |       |       |       |       |       |       |
| Byte 9     |                    |       |       |       |       |       |       |       |
| Byte 10    |                    |       |       |       |       |       |       |       |
| Byte 11    |                    |       |       |       |       |       |       |       |
| Byte 12    | Counter Value Ch#3 |       |       |       |       |       |       |       |
| Byte 13    |                    |       |       |       |       |       |       |       |
| Byte 14    |                    |       |       |       |       |       |       |       |
| Byte 15    |                    |       |       |       |       |       |       |       |
| Byte 16    | Counter Value Ch#4 |       |       |       |       |       |       |       |
| Byte 17    |                    |       |       |       |       |       |       |       |
| Byte 18    |                    |       |       |       |       |       |       |       |
| Byte 19    |                    |       |       |       |       |       |       |       |
| Byte 20    | Counter Value Ch#5 |       |       |       |       |       |       |       |
| Byte 21    |                    |       |       |       |       |       |       |       |
| Byte 22    |                    |       |       |       |       |       |       |       |

|            |                     |
|------------|---------------------|
| Byte<br>23 |                     |
| Byte<br>24 | Counter Value Ch#6  |
| Byte<br>25 |                     |
| Byte<br>26 |                     |
| Byte<br>27 |                     |
| Byte<br>28 | Counter Value Ch#7  |
| Byte<br>29 |                     |
| Byte<br>30 |                     |
| Byte<br>31 |                     |
| Byte<br>32 | Counter Value Ch#8  |
| Byte<br>33 |                     |
| Byte<br>34 |                     |
| Byte<br>35 |                     |
| Byte<br>36 | Counter Value Ch#9  |
| Byte<br>37 |                     |
| Byte<br>38 |                     |
| Byte<br>39 |                     |
| Byte<br>40 | Counter Value Ch#10 |
| Byte<br>41 |                     |
| Byte<br>42 |                     |
| Byte<br>43 |                     |
| Byte<br>44 | Counter Value Ch#11 |
| Byte<br>45 |                     |
| Byte<br>46 |                     |
| Byte<br>47 |                     |
| Byte<br>48 | Counter Value Ch#12 |

|             |                          |                          |                          |                          |                          |                          |                    |                    |
|-------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------|--------------------|
| Byte 49     |                          |                          |                          |                          |                          |                          |                    |                    |
| Byte 50     |                          |                          |                          |                          |                          |                          |                    |                    |
| Byte 51     |                          |                          |                          |                          |                          |                          |                    |                    |
| Byte 52     | Counter Value Ch#13      |                          |                          |                          |                          |                          |                    |                    |
| Byte 53     |                          |                          |                          |                          |                          |                          |                    |                    |
| Byte 54     |                          |                          |                          |                          |                          |                          |                    |                    |
| Byte 55     |                          |                          |                          |                          |                          |                          |                    |                    |
| Byte 56     | Counter Value Ch#14      |                          |                          |                          |                          |                          |                    |                    |
| Byte 57     |                          |                          |                          |                          |                          |                          |                    |                    |
| Byte 58     |                          |                          |                          |                          |                          |                          |                    |                    |
| Byte 59     |                          |                          |                          |                          |                          |                          |                    |                    |
| Byte 60     | Counter Value Ch#15      |                          |                          |                          |                          |                          |                    |                    |
| Byte 61     |                          |                          |                          |                          |                          |                          |                    |                    |
| Byte 62     |                          |                          |                          |                          |                          |                          |                    |                    |
| Byte 63     |                          |                          |                          |                          |                          |                          |                    |                    |
| Output data |                          |                          |                          |                          |                          |                          |                    |                    |
| Bit No      | Bit 7                    | Bit 6                    | Bit 5                    | Bit 4                    | Bit 3                    | Bit 2                    | Bit 1              | Bit 0              |
| Byte 0      | Counter Reset Ch#7       | Counter Reset Ch#6       | Counter Reset Ch#5       | Counter Reset Ch#4       | Counter Reset Ch#3       | Counter Reset Ch#2       | Counter Reset Ch#1 | Counter Reset Ch#0 |
| Byte 1      | Counter Reset Ch#15<br>5 | Counter Reset Ch#14<br>4 | Counter Reset Ch#13<br>3 | Counter Reset Ch#12<br>2 | Counter Reset Ch#11<br>1 | Counter Reset Ch#10<br>0 | Counter Reset Ch#9 | Counter Reset Ch#8 |

Data description:

**Counter Value Ch#(0-15):** Count value, 32-bit unsigned integer, automatically zeroing after overflow.

**Counter Reset Ch#(0-15):** When the data bit changes from 0 to 1 (rising edge), the input counter of the corresponding channel is cleared.

**Note:** the maximum counting frequency of the input channel is 200Hz. When the input signal exceeds this frequency, the counting result may be inconsistent with the actual

value.

## 6 Configuration parameter definitions

<16DI Input State> Submodule configuration parameter definition

| Configuration parameters |                          |       |       |       |       |                        |       |       |
|--------------------------|--------------------------|-------|-------|-------|-------|------------------------|-------|-------|
| Bit No                   | Bit 7                    | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2                  | Bit 1 | Bit 0 |
| Byte 0                   | Input Filtering Time(ms) |       |       |       |       |                        |       |       |
| Byte 1                   |                          |       |       |       |       |                        |       |       |
| Byte 2                   | Reserved                 |       |       |       |       | Input Holding Time(ms) |       |       |

Data description:

**Input Filtering Time(ms):** Input filter time of Channel (ms) (Default: 10)

**Input Holding Time(ms):** Signal input holding time of Channel (ms) (Default:0)

0: Disable

1: 200ms

2: 500ms

3: 1000ms

4: 1500ms

5: 2000ms

6: 3000ms

7: 5000ms

<16DI Counter Submodule> Submodule configuration parameter definition

| Configuration parameters |                      |                      |                      |                      |                      |                      |                      |                      |
|--------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Bit No                   | Bit 7                | Bit 6                | Bit 5                | Bit 4                | Bit 3                | Bit 2                | Bit 1                | Bit 0                |
| Byte 0                   | Reserved             |                      |                      |                      | Storage Enable       | Storage Function     | 32Bit Data Format    |                      |
| Byte 1                   | Count Mode Ch#3      |                      | Count Mode Ch#2      |                      | Count Mode Ch#1      |                      | Count Mode Ch#0      |                      |
| Byte 2                   | Count Mode Ch#7      |                      | Count Mode Ch#6      |                      | Count Mode Ch#5      |                      | Count Mode Ch#4      |                      |
| Byte 3                   | Count Mode Ch#11     |                      | Count Mode Ch#10     |                      | Count Mode Ch#9      |                      | Count Mode Ch#8      |                      |
| Byte 4                   | Count Mode Ch#15     |                      | Count Mode Ch#14     |                      | Count Mode Ch#13     |                      | Count Mode Ch#12     |                      |
| Byte 5                   | Count Direction Ch#7 | Count Direction Ch#6 | Count Direction Ch#5 | Count Direction Ch#4 | Count Direction Ch#3 | Count Direction Ch#2 | Count Direction Ch#1 | Count Direction Ch#0 |

|        |                                     |                                     |                                     |                                     |                                     |                                     |                            |                            |
|--------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|----------------------------|----------------------------|
| Byte 6 | Count<br>Directi<br>on<br>Ch#1<br>5 | Count<br>Directi<br>on<br>Ch#1<br>4 | Count<br>Directi<br>on<br>Ch#1<br>3 | Count<br>Directi<br>on<br>Ch#1<br>2 | Count<br>Directi<br>on<br>Ch#1<br>1 | Count<br>Directi<br>on<br>Ch#1<br>0 | Count<br>Direction<br>Ch#9 | Count<br>Direction<br>Ch#8 |
|--------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|----------------------------|----------------------------|

Data description:

**32Bit Data Format:** Byte transfer order of Channel count value (Default: 0)

- 0: AB-CD
- 1: BA-DC
- 2: CD-AB
- 3: DC-BA

**Storage Function:** Storage Function is supported or not, read only attribute, and this value is the actual value of the module when uploading device parameters.

- 0: storage is not supported
- 1: storage is supported

**Storage Enable:** Storage enable, when the Storage Function enables, the IO module will save the count value in real time to non-volatile memory, and load the last saved count value on the next power on. (Default: 1)

- 0: Disabled
- 1: Enable

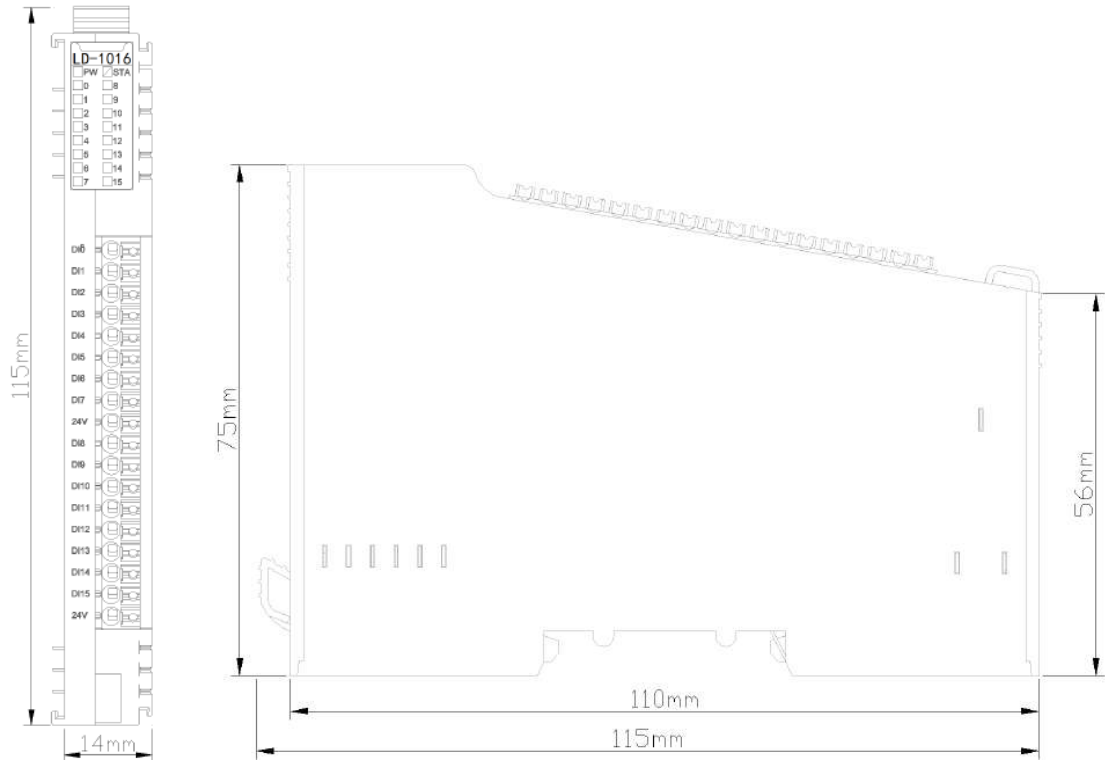
**Count Mode Ch# (0-15):** Count mode of the input channel. (Default: 0)

- 0: rising edge count
- 1: falling edge count
- 2: double edge count

**Count Direction Ch# (0-15):** The counting direction of the input channel. (Default: 0)

- 0: count up
- 1: count down

## A Dimension drawing



## LD-3108 8 channels digital input/24VDC/NPN

### 1 Module features

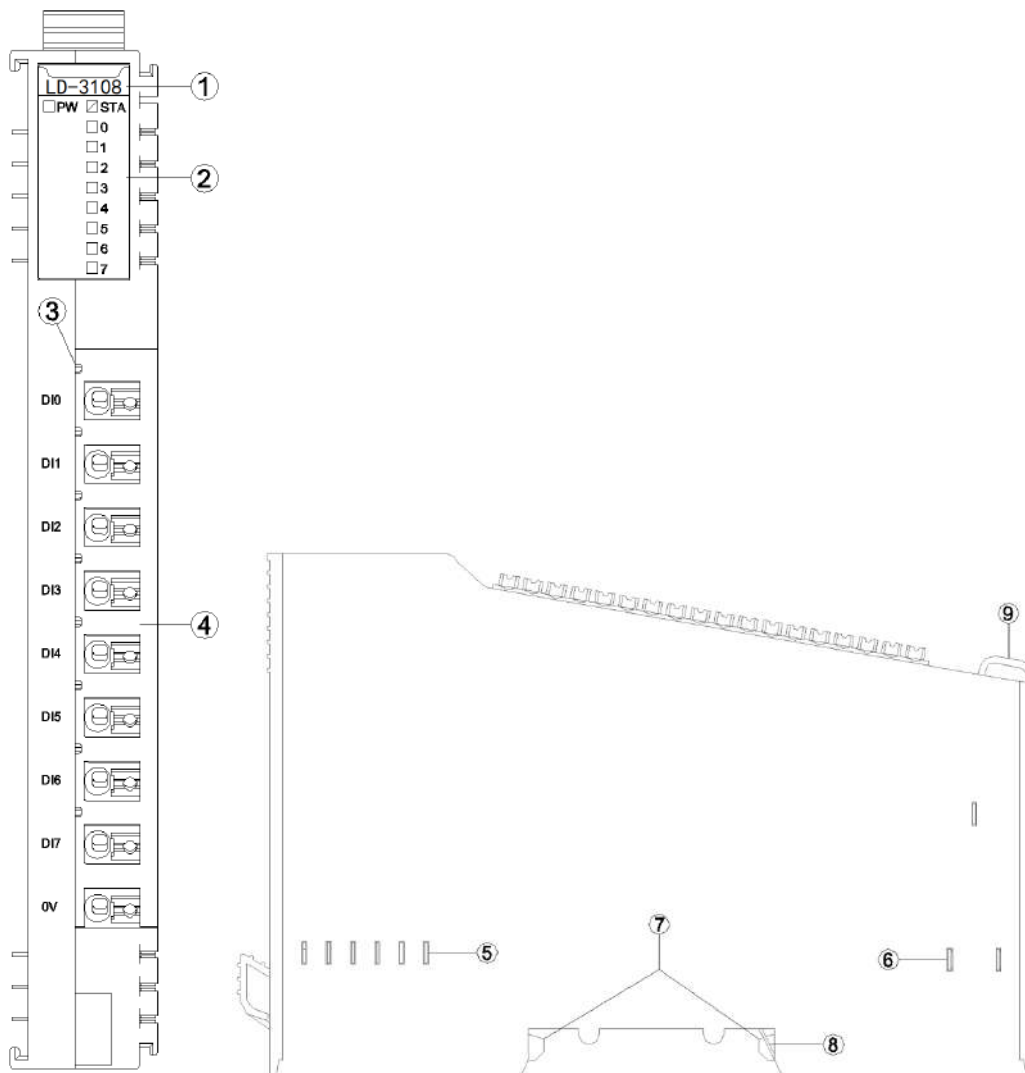
- ◆ the module supports 8 channels digital input, and the input low level is valid. It could support NPN sensor.
- ◆ the module could collect digital output signal of field equipment (dry contact or active output).
- ◆ the module could be accessed to 2-wire or 3-wire digital sensor.
- ◆ the internal bus and field input of the module use opto-isolator.
- ◆ the module supports the input signal holding function, and the holding time can be set.
- ◆ the module carries 8 digital input channels with LED indicator on each channel.
- ◆ supports counting function after adding counting sub-module.
- ◆ each input channel of the module supports a 32-bit counter with the counting frequency <200Hz.
- ◆ the module could be set the digital signal input filtering time and the byte transmission order of the counter.
- ◆ each channel of the module could be set the counting mode and counting direction independently.



## 2 Technical parameters

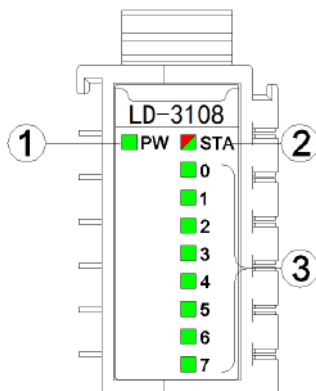
| General parameters        |                                                     |
|---------------------------|-----------------------------------------------------|
| Power Consumption         | Max.85mA@5.0Vdc                                     |
| Isolation                 | I/O to internal bus: opto-couple isolation (3KVrms) |
| Field Power               | Nominal:24Vdc, Range:22-28Vdc                       |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                     |
| Mounting Type             | 35mm DIN-Rail                                       |
| Size                      | 115*14*75mm                                         |
| Weight                    | 65g                                                 |
| Environment Specification |                                                     |
| Operational Temperature   | -40~85°C                                            |
| Operational Humidity      | 5%-95% (No Condensation)                            |
| Ingress Protection Rating | IP20                                                |
| Input parameters          |                                                     |
| Channel Number            | 8 channels input                                    |
| LED Indicator             | 8 channels input LED indicator                      |
| Turn-on voltage           | Min.10Vdc to Max.28Vdc                              |
| Turn-off Voltage          | Max.5Vdc                                            |
| Turn-on current           | Max.5mA/channel@28V                                 |
| Input impedance           | >7.5kΩ                                              |
| Input delay               | OFF to ON: Max.3ms<br>ON to OFF: Max.2ms            |
| Filter time               | Default 10ms                                        |
| Sample frequency          | 500Hz                                               |
| Counter frequency         | <200Hz                                              |

### 3 Hardware interfaces



- ① Module Type
- ② State indicator
- ③ Channel indicator
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

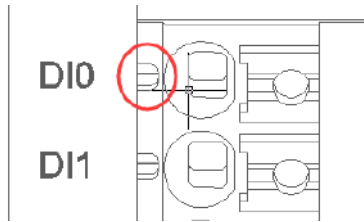
### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Input channel LED indicator (green)

| PW Power State (GREEN)       | Definition                               |
|------------------------------|------------------------------------------|
| ON                           | Internal bus Power Normal                |
| OFF                          | Internal bus Power Failure               |
| STA Module State (RED/GREEN) | Definition                               |
| Green slow flash (2.5Hz)     | Module internal bus is not started       |
| Red slow flash (2.5Hz)       | Module internal bus offline              |
| ON (GREEN)                   | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)     | Upgrading mode                           |
| Flash(10Hz) (RED/GREEN)      | Firmware Update                          |
| Double Flash (RED)           | Module Exception has been soft-restarted |
| 0-7 channel LED indicator    | Definition                               |
| ON                           | Input signal valid                       |
| OFF                          | Input signal invalid                     |

### 3.2 Field channel LED indicator (Green)



When input signal of input channel is valid, the corresponding field channel LED indicator is on.

### 3.3 Terminal definition

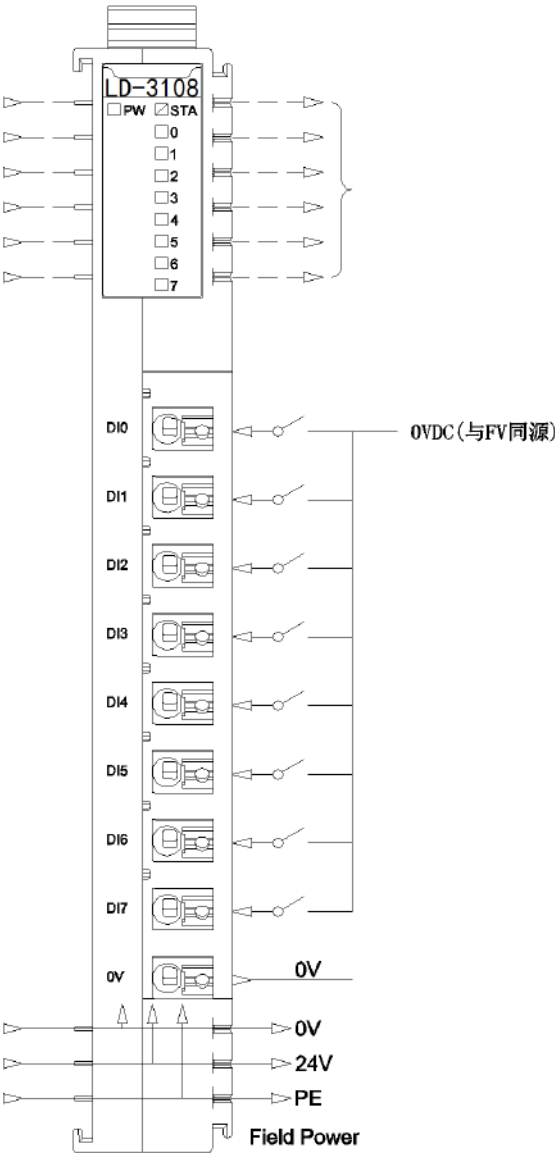
| Terminal Number | Symbol | Description  |
|-----------------|--------|--------------|
| 1               | DI0    | Signal input |
| 2               | DI1    |              |
| 3               | DI2    |              |
| 4               | DI3    |              |
| 5               | DI4    |              |
| 6               | DI5    |              |
| 7               | DI6    |              |
| 8               | DI7    |              |
| 9               | 0V     | Power V-     |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



4 Wiring



### <8DI Input Status> Submodule process data definition

### Data description:

0: Input signal invalid

<8DI Counter Submodule> Submodule process data definition:

| Input data |                    |       |       |       |       |       |       |       |
|------------|--------------------|-------|-------|-------|-------|-------|-------|-------|
| Bit No     | Bit 7              | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0     | Counter Value Ch#0 |       |       |       |       |       |       |       |
| Byte 1     |                    |       |       |       |       |       |       |       |
| Byte 2     |                    |       |       |       |       |       |       |       |
| Byte 3     |                    |       |       |       |       |       |       |       |
| Byte 4     | Counter Value Ch#1 |       |       |       |       |       |       |       |
| Byte 5     |                    |       |       |       |       |       |       |       |
| Byte 6     |                    |       |       |       |       |       |       |       |
| Byte 7     |                    |       |       |       |       |       |       |       |
| Byte 8     | Counter Value Ch#2 |       |       |       |       |       |       |       |
| Byte 9     |                    |       |       |       |       |       |       |       |
| Byte 10    |                    |       |       |       |       |       |       |       |
| Byte 11    |                    |       |       |       |       |       |       |       |
| Byte 12    | Counter Value Ch#3 |       |       |       |       |       |       |       |
| Byte 13    |                    |       |       |       |       |       |       |       |

|             |                              |                              |                              |                              |                              |                              |                              |                              |
|-------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Byte<br>14  |                              |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>15  |                              |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>16  | Counter Value Ch#4           |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>17  |                              |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>18  |                              |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>19  |                              |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>20  | Counter Value Ch#5           |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>21  |                              |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>22  |                              |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>23  |                              |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>24  | Counter Value Ch#6           |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>25  |                              |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>26  |                              |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>27  |                              |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>28  | Counter Value Ch#7           |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>29  |                              |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>30  |                              |                              |                              |                              |                              |                              |                              |                              |
| Byte<br>31  |                              |                              |                              |                              |                              |                              |                              |                              |
| Output data |                              |                              |                              |                              |                              |                              |                              |                              |
| Bit<br>No   | Bit<br>7                     | Bit<br>6                     | Bit<br>5                     | Bit<br>4                     | Bit 3                        | Bit<br>2                     | Bit<br>1                     | Bit<br>0                     |
| Byte<br>0   | Count<br>er<br>Reset<br>Ch#7 | Count<br>er<br>Reset<br>Ch#6 | Count<br>er<br>Reset<br>Ch#5 | Count<br>er<br>Reset<br>Ch#4 | Counte<br>r<br>Reset<br>Ch#3 | Count<br>er<br>Reset<br>Ch#2 | Count<br>er<br>Reset<br>Ch#1 | Count<br>er<br>Reset<br>Ch#0 |

Data description:

**Counter Value Ch#(0-7):** Count value, 32-bit unsigned integer, automatically zeroing after overflow.

**Counter Reset Ch#(0-7):** When the data bit changes from 0 to 1 (rising edge), the input counter of the corresponding channel is cleared.

Note: the maximum counting frequency of the input channel is 200Hz. When the input signal exceeds this frequency, the counting result may be inconsistent with the actual value.

## 6 Configuration parameter definitions

<8DI Input Status> Submodule configuration parameter definition

| Configuration parameters |                          |       |       |       |       |                        |       |       |
|--------------------------|--------------------------|-------|-------|-------|-------|------------------------|-------|-------|
| Bit No                   | Bit 7                    | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2                  | Bit 1 | Bit 0 |
| Byte 0                   | Input Filtering Time(ms) |       |       |       |       |                        |       |       |
| Byte 1                   |                          |       |       |       |       |                        |       |       |
| Byte 2                   | Reserved                 |       |       |       |       | Input Holding Time(ms) |       |       |

Data description:

**Input Filtering Time(ms):** Input filter time of Channel (ms) (Default: 10)

**Input Holding Time(ms):** Signal input holding time of Channel (ms) (Default:0)

0: Disable

1: 200ms

2: 500ms

3: 1000ms

4: 1500ms

5: 2000ms

6: 3000ms

7: 5000ms

<8DI Counter Submodule> Submodule configuration parameter definition

| Configuration parameters |                      |                      |                      |                      |                      |                      |                      |                      |
|--------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Bit No                   | Bit 7                | Bit 6                | Bit 5                | Bit 4                | Bit 3                | Bit 2                | Bit 1                | Bit 0                |
| Byte 0                   | Reserved             |                      |                      |                      | Storage Enable       | Storage Function     | 32Bit Data Format    |                      |
| Byte 1                   | Count Mode Ch#3      |                      | Count Mode Ch#2      |                      | Count Mode Ch#1      |                      | Count Mode Ch#0      |                      |
| Byte 2                   | Count Mode Ch#7      |                      | Count Mode Ch#6      |                      | Count Mode Ch#5      |                      | Count Mode Ch#4      |                      |
| Byte 3...4               | Reserved             |                      |                      |                      |                      |                      |                      |                      |
| Byte 5                   | Count Direction Ch#7 | Count Direction Ch#6 | Count Direction Ch#5 | Count Direction Ch#4 | Count Direction Ch#3 | Count Direction Ch#2 | Count Direction Ch#1 | Count Direction Ch#0 |

Data description:

**32Bit Data Format:** Byte transfer order of Channel count value (Default: 0)

0: AB-CD

1: BA-DC

2: CD-AB

3: DC-BA

**Storage Function:** Storage Function is supported or not, read only attribute, and this value is the actual value of the module when uploading device parameters.

0: storage is not supported

1: storage is supported

**Storage Enable:** Storage enable, when the Storage Function enables, the IO module will save the count value in real time to non-volatile memory, and load the last saved count value on the next power on. (Default: 1)

0: Disabled

1: Enable

**Count Mode Ch#(0-7):** Count mode of the input channel. (Default: 0)

0: rising edge count

1: falling edge count

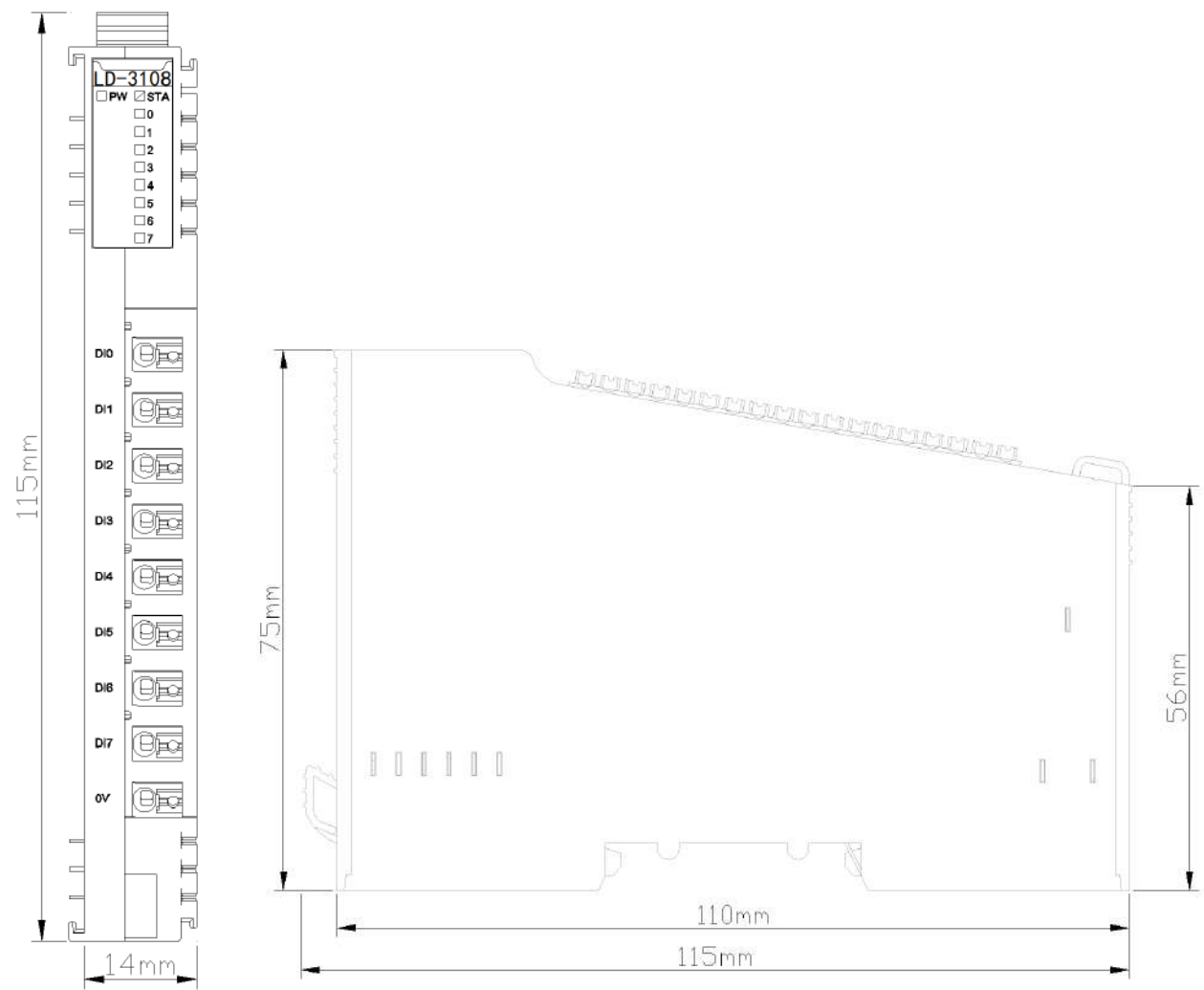
2: double edge count

**Count Direction Ch#(0-7):** The counting direction of the input channel. (Default: 0)

0: count up

1: count down

A Dimension drawing



## LD-3016 16 channels digital input/24VDC/NPN

### 1 Module features

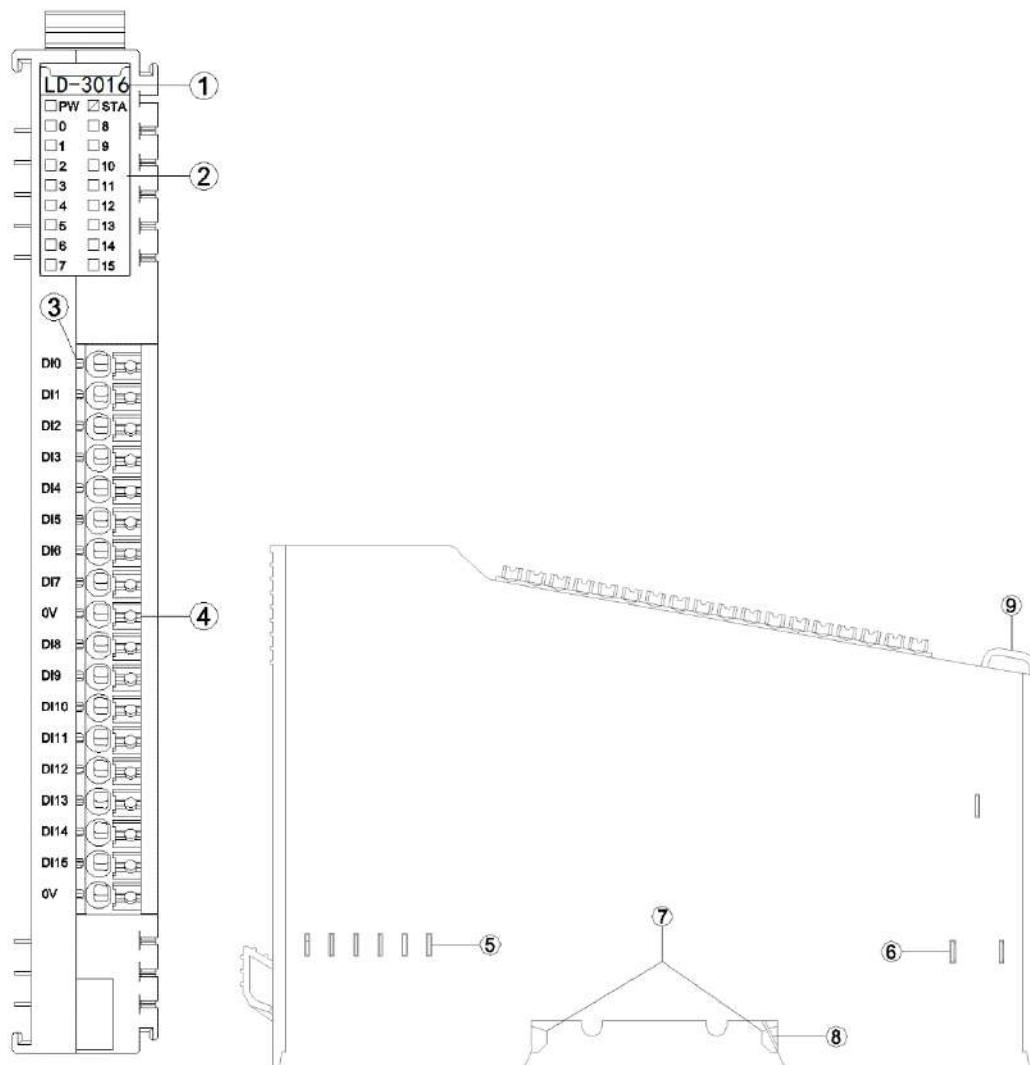
- ◆ the Module supports 16 channels digital input, supports source input, the input voltage is 0V and the input low level is valid.
- ◆ the module could collect the digital output signal of field equipment (dry contact or active output).
- ◆ the module could be connected to a 2-wire or 3-wire digital sensor.
- ◆ the internal bus of the module and field input are isolated by optocoupler.
- ◆ the module supports input signal holding function, holding time can be set.
- ◆ the module carries with 16 digital input channel LED indicator.
- ◆ after adding counting submodule, the counting function is effective.
- ◆ each input channel of the module supports 32-bit counter with counting frequency <200Hz.
- ◆ the module could be set the digital signal input filter time and counter byte transmission sequence.
- ◆ each channel of the module could be set the counting mode and counting direction independently.

### 2 Technical parameters

| General parameters        |                                                     |
|---------------------------|-----------------------------------------------------|
| Power Consumption         | Max.60mA@5.0Vdc                                     |
| Isolation                 | I/O to internal bus: opto-couple isolation (3KVrms) |
| Field Power               | Nominal:24Vdc, Range:22-28Vdc                       |
| Wiring                    | I/O Wiring: Max.1.0mm <sup>2</sup> (AWG 17)         |
| Mounting Type             | 35mm DIN-Rail                                       |
| Size                      | 115*14*75mm                                         |
| Weight                    | 65g                                                 |
| Environment Specification |                                                     |
| Operational Temperature   | -40~85°C                                            |
| Operational Humidity      | 5%-95% (No Condensation)                            |
| Ingress Protection Rating | IP20                                                |
| Input parameters          |                                                     |
| Channel Number            | 16 channels source input                            |
| LED Indicator             | 16 channels input LED indicator                     |
| Turn-on voltage           | Min.10Vdc to Max.28Vdc                              |
| Turn-off Voltage          | Max.5Vdc                                            |

|                   |                                          |
|-------------------|------------------------------------------|
| Turn-on current   | Max.5mA/channel@28V                      |
| Input impedance   | >7.5kΩ                                   |
| Input delay       | OFF to ON :Max.3ms<br>ON to OFF :Max.2ms |
| Filter time       | Default 10ms                             |
| Sample frequency  | 500Hz                                    |
| Counter frequency | <200Hz                                   |

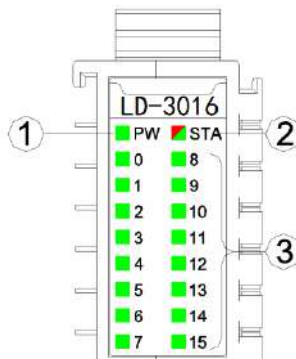
### 3 Hardware interfaces



- ① Module Type
- ② State indicator
- ③ Channel indicator
- ④ Wiring Terminal and identification

- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

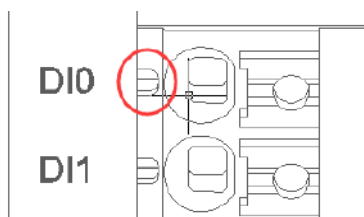
### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Input channel LED indicator (green)

| PW Power State (GREEN)       | Definition                               |
|------------------------------|------------------------------------------|
| ON                           | Internal bus Power Normal                |
| OFF                          | Internal bus Power Failure               |
| STA Module State (RED/GREEN) | Definition                               |
| Green slow flash (2.5Hz)     | Module internal bus is not started       |
| Red slow flash (2.5Hz)       | Module internal bus offline              |
| ON (GREEN)                   | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)     | Upgrading mode                           |
| Flash(10Hz) (RED/GREEN)      | Firmware Update                          |
| Double Flash (RED)           | Module Exception has been soft-restarted |
| 0-15 channel indicator light | Definition                               |
| ON                           | Input signal valid                       |
| OFF                          | Input signal invalid                     |

### 3.2 Field channel LED indicator (Green)



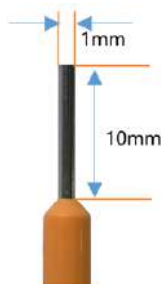
When input signal of input channel is valid, the corresponding field channel LED indicator is on.

### 3.3 Terminal definition

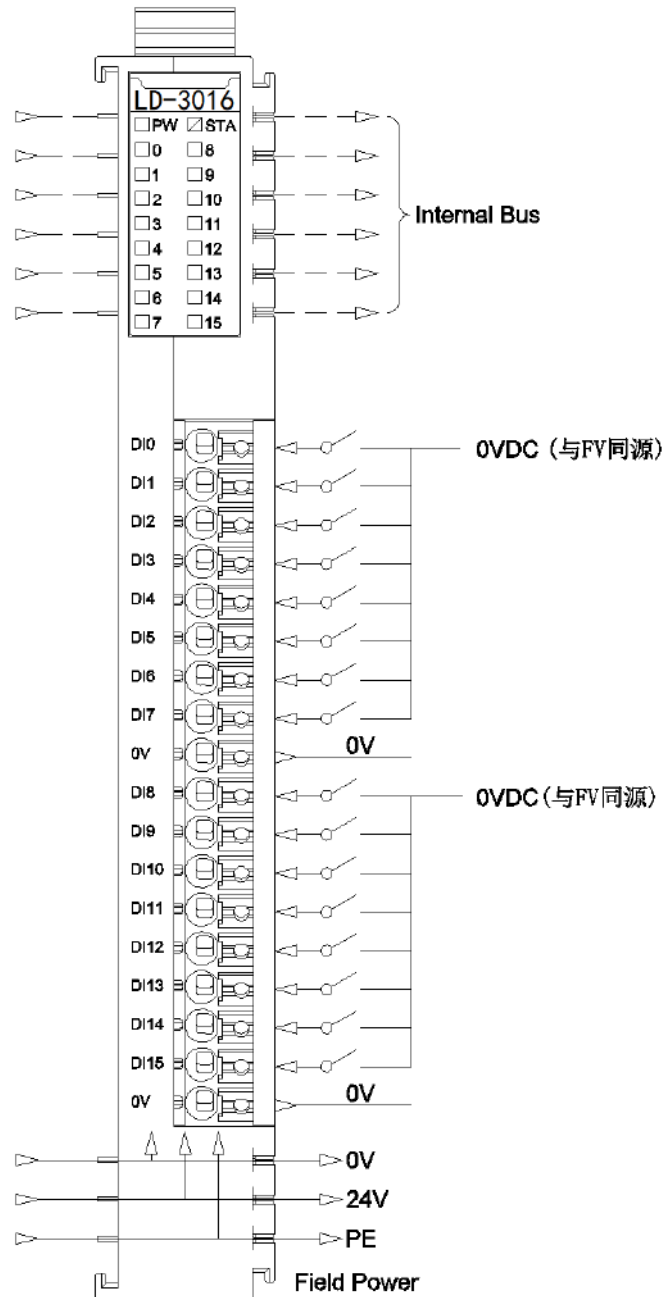
| Terminal Number | Symbol | Description     |
|-----------------|--------|-----------------|
| 1               | DI0    | Signal input    |
| 2               | DI1    |                 |
| 3               | DI2    |                 |
| 4               | DI3    |                 |
| 5               | DI4    |                 |
| 6               | DI5    |                 |
| 7               | DI6    |                 |
| 8               | DI7    |                 |
| 9               | 0V     | Power V-        |
| 10              | DI8    | Signal input    |
| 11              | DI9    |                 |
| 12              | DI10   |                 |
| 13              | DI11   |                 |
| 14              | DI12   |                 |
| 15              | DI13   |                 |
| 16              | DI14   |                 |
| 17              | DI15   |                 |
| 18              | 24V    | Power output V- |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



## 4 Wiring



## 5 Process data definition

<16DI Input State> Submodule process data definition

| Input data |         |         |         |         |         |         |         |         |
|------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Bit No     | Bit 7   | Bit 6   | Bit 5   | Bit 4   | Bit 3   | Bit 2   | Bit 1   | Bit 0   |
| Byte 0     | DI Ch#7 | DI Ch#6 | DI Ch#5 | DI Ch#4 | DI Ch#3 | DI Ch#2 | DI Ch#1 | DI Ch#0 |

### Data description:

0: Input signal invalid

1: Input signal valid

| Input data |                    |       |       |       |       |       |       |       |
|------------|--------------------|-------|-------|-------|-------|-------|-------|-------|
| Bit No     | Bit 7              | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0     | Counter Value Ch#0 |       |       |       |       |       |       |       |
| Byte 1     |                    |       |       |       |       |       |       |       |
| Byte 2     |                    |       |       |       |       |       |       |       |
| Byte 3     |                    |       |       |       |       |       |       |       |
| Byte 4     | Counter Value Ch#1 |       |       |       |       |       |       |       |
| Byte 5     |                    |       |       |       |       |       |       |       |
| Byte 6     |                    |       |       |       |       |       |       |       |
| Byte 7     |                    |       |       |       |       |       |       |       |
| Byte 8     | Counter Value Ch#2 |       |       |       |       |       |       |       |
| Byte 9     |                    |       |       |       |       |       |       |       |
| Byte 10    |                    |       |       |       |       |       |       |       |
| Byte 11    |                    |       |       |       |       |       |       |       |
| Byte 12    | Counter Value Ch#3 |       |       |       |       |       |       |       |
| Byte 13    |                    |       |       |       |       |       |       |       |
| Byte 14    |                    |       |       |       |       |       |       |       |
| Byte 15    |                    |       |       |       |       |       |       |       |

|         |                    |
|---------|--------------------|
| Byte 16 | Counter Value Ch#4 |
| Byte 17 |                    |
| Byte 18 |                    |
| Byte 19 |                    |
| Byte 20 | Counter Value Ch#5 |
| Byte 21 |                    |
| Byte 22 |                    |
| Byte 23 |                    |
| Byte 24 | Counter Value Ch#6 |
| Byte 25 |                    |
| Byte 26 |                    |
| Byte 27 |                    |
| Byte 28 | Counter Value Ch#7 |
| Byte 29 |                    |
| Byte 30 |                    |
| Byte 31 |                    |
| Byte 32 | Counter Value Ch#8 |
| Byte 33 |                    |
| Byte 34 |                    |
| Byte 35 |                    |
| Byte 36 | Counter Value Ch#9 |
| Byte 37 |                    |
| Byte 38 |                    |

|            |                     |
|------------|---------------------|
| Byte<br>39 |                     |
| Byte<br>40 | Counter Value Ch#10 |
| Byte<br>41 |                     |
| Byte<br>42 |                     |
| Byte<br>43 |                     |
| Byte<br>44 | Counter Value Ch#11 |
| Byte<br>45 |                     |
| Byte<br>46 |                     |
| Byte<br>47 |                     |
| Byte<br>48 | Counter Value Ch#12 |
| Byte<br>49 |                     |
| Byte<br>50 |                     |
| Byte<br>51 |                     |
| Byte<br>52 | Counter Value Ch#13 |
| Byte<br>53 |                     |
| Byte<br>54 |                     |
| Byte<br>55 |                     |
| Byte<br>56 | Counter Value Ch#14 |
| Byte<br>57 |                     |
| Byte<br>58 |                     |
| Byte<br>59 |                     |
| Byte<br>60 | Counter Value Ch#15 |
| Byte<br>61 |                     |

|             |                          |                          |                          |                          |                          |                     |                    |                    |
|-------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------|--------------------|--------------------|
| Byte 62     |                          |                          |                          |                          |                          |                     |                    |                    |
| Byte 63     |                          |                          |                          |                          |                          |                     |                    |                    |
| Output data |                          |                          |                          |                          |                          |                     |                    |                    |
| Bit No      | Bit 7                    | Bit 6                    | Bit 5                    | Bit 4                    | Bit 3                    | Bit 2               | Bit 1              | Bit 0              |
| Byte 0      | Counter Reset Ch#7       | Counter Reset Ch#6       | Counter Reset Ch#5       | Counter Reset Ch#4       | Counter Reset Ch#3       | Counter Reset Ch#2  | Counter Reset Ch#1 | Counter Reset Ch#0 |
| Byte 1      | Counter Reset Ch#15<br>5 | Counter Reset Ch#14<br>4 | Counter Reset Ch#13<br>3 | Counter Reset Ch#12<br>2 | Counter Reset Ch#11<br>1 | Counter Reset Ch#10 | Counter Reset Ch#9 | Counter Reset Ch#8 |

Data description:

**Counter Value Ch#(0-15):** Count value, 32-bit unsigned integer, automatically zeroing after overflow.

**Counter Reset Ch#(0-15):** When the data bit changes from 0 to 1 (rising edge), the input counter of the corresponding channel is cleared.

**Note:** the maximum counting frequency of the input channel is 200Hz. When the input signal exceeds this frequency, the counting result may be inconsistent with the actual value.

## 6 Configuration parameter definitions

<16DI Input State> Submodule configuration parameter definition

| Configuration parameters |                          |       |       |       |       |                        |       |       |
|--------------------------|--------------------------|-------|-------|-------|-------|------------------------|-------|-------|
| Bit No                   | Bit 7                    | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2                  | Bit 1 | Bit 0 |
| Byte 0                   | Input Filtering Time(ms) |       |       |       |       |                        |       |       |
| Byte 1                   |                          |       |       |       |       |                        |       |       |
| Byte 2                   | Reserved                 |       |       |       |       | Input Holding Time(ms) |       |       |

Data description:

**Input Filtering Time(ms):** Input filter time of Channel (ms) (Default: 10)

**Input Holding Time(ms):** Signal input holding time of Channel (ms) (Default:0)

0: Disable

1: 200ms

2: 500ms

3: 1000ms

4: 1500ms

5: 2000ms

6: 3000ms

7: 5000ms

<16DI Counter Submodule> Submodule configuration parameter definition

| Configuration parameters |                      |                      |                      |                      |                      |                      |                      |                      |
|--------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Bit No                   | Bit 7                | Bit 6                | Bit 5                | Bit 4                | Bit 3                | Bit 2                | Bit 1                | Bit 0                |
| Byte 0                   | Reserved             |                      |                      |                      | Storage Enable       | Storage Function     | 32Bit Data Format    |                      |
| Byte 1                   | Count Mode Ch#3      |                      | Count Mode Ch#2      |                      | Count Mode Ch#1      |                      | Count Mode Ch#0      |                      |
| Byte 2                   | Count Mode Ch#7      |                      | Count Mode Ch#6      |                      | Count Mode Ch#5      |                      | Count Mode Ch#4      |                      |
| Byte 3                   | Count Mode Ch#11     |                      | Count Mode Ch#10     |                      | Count Mode Ch#9      |                      | Count Mode Ch#8      |                      |
| Byte 4                   | Count Mode Ch#15     |                      | Count Mode Ch#14     |                      | Count Mode Ch#13     |                      | Count Mode Ch#12     |                      |
| Byte 5                   | Count Direction Ch#7 | Count Direction Ch#6 | Count Direction Ch#5 | Count Direction Ch#4 | Count Direction Ch#3 | Count Direction Ch#2 | Count Direction Ch#1 | Count Direction Ch#0 |

| Byte<br>6 | Count<br>Directio<br>n<br>Ch#15 | Count<br>Directi<br>on<br>Ch#1<br>4 | Count<br>Directi<br>on<br>Ch#1<br>3 | Count<br>Directi<br>on<br>Ch#1<br>2 | Count<br>Directio<br>n<br>Ch#11 | Count<br>Directio<br>n<br>Ch#10 | Count<br>Directio<br>n<br>Ch#9 | Count<br>Directio<br>n<br>Ch#8 |
|-----------|---------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|---------------------------------|---------------------------------|--------------------------------|--------------------------------|
|-----------|---------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|---------------------------------|---------------------------------|--------------------------------|--------------------------------|

Data description:

**32Bit Data Format:** Byte transfer order of Channel count value (Default: 0)

0: AB-CD

1: BA-DC

2: CD-AB

3: DC-BA

**Storage Function:** Storage Function is supported or not, read only attribute, and this value is the actual value of the module when uploading device parameters.

0: storage is not supported

1: storage is supported

**Storage Enable:** Storage enable, when the Storage Function enables, the IO module will save the count value in real time to non-volatile memory, and load the last saved count value on the next power on. (Default: 1)

0: Disabled

1: Enable

**Count Mode Ch# (0-15):** Count mode of the input channel. (Default: 0)

0: rising edge count

1: falling edge count

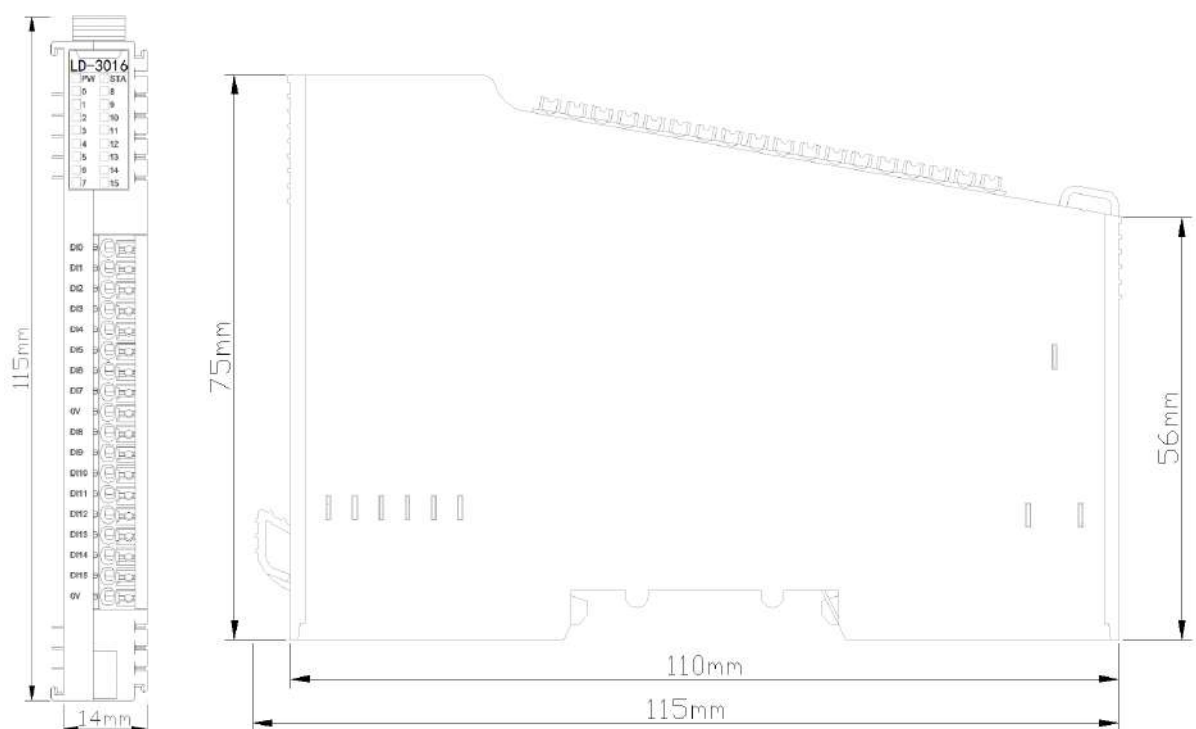
2: double edge count

**Count Direction Ch# (0-15):** The counting direction of the input channel. (Default: 0)

0: count up

1: count down

## A Dimension drawing



## **LD-5032 32 channels digital input/24VDC/PNP or NPN**

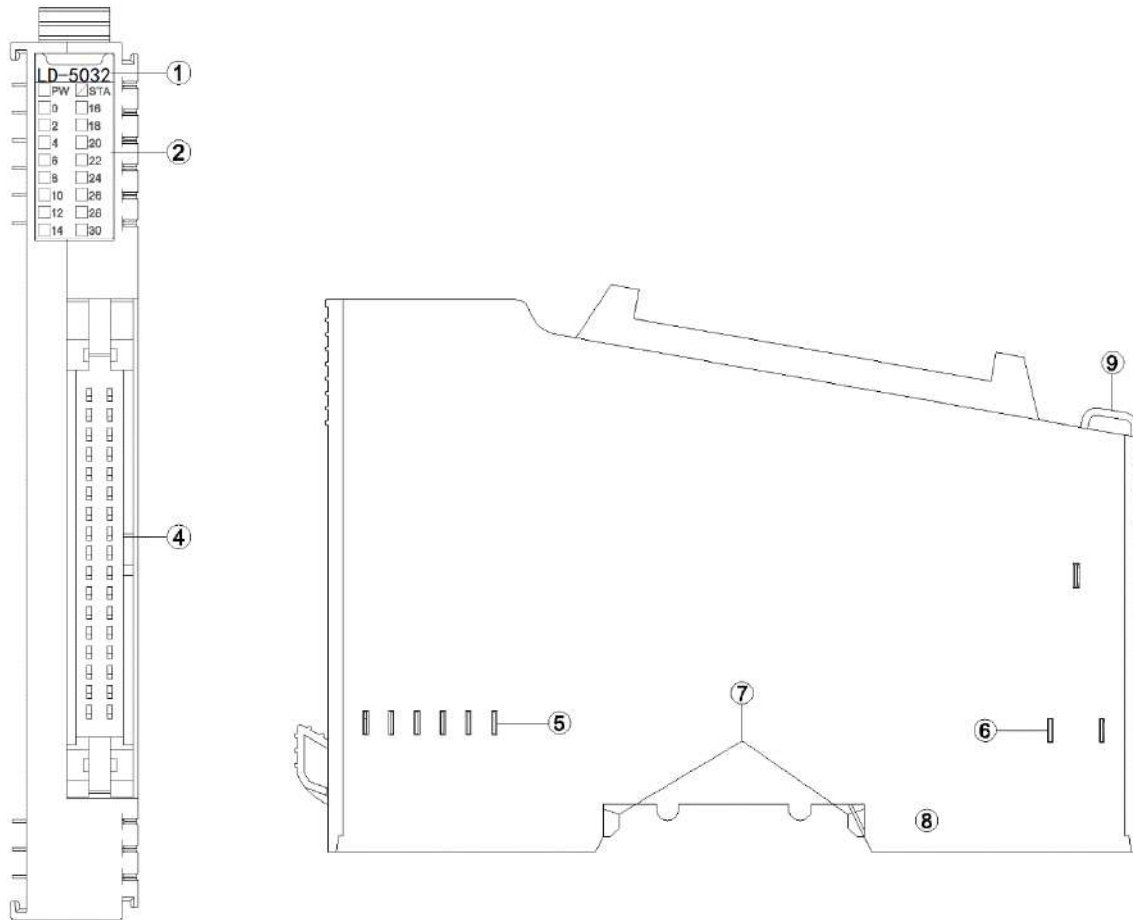
### **1 Module features**

- ◆ the module supports 32 channels digital input, it supports sink input and the input high level is valid as it could support PNP sensor; it also supports source input and the input low level is valid as it could support NPN sensor.
- ◆ the module could collect the digital output signal of field equipment (dry contact or active output).
- ◆ the module could be connected to 2-wire or 3-wire digital sensor.
- ◆ the internal bus of the module and field input are isolated by optocoupler.
- ◆ the module supports input signal holding function, holding time can be set.
- ◆ after adding counting submodule, the counting function is effective.
- ◆ each input channel of the module supports 32-bit counter with counting frequency <200Hz.
- ◆ the module could be set the digital signal input filter time and counter byte transmission sequence.
- ◆ each channel of the module could be set the counting mode and counting direction independently.

## 2 Technical parameters

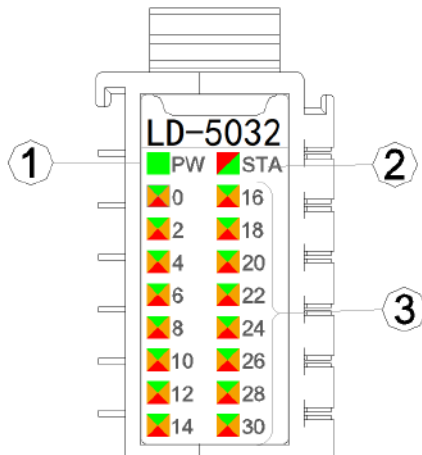
| General parameters        |                                                                                                                       |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Power Consumption         | Max.60mA@5.0Vdc                                                                                                       |
| Isolation                 | I/O to internal bus: opto-couple isolation (3KVrms)                                                                   |
| Field Power               | Nominal:24Vdc, Range:22-28Vdc                                                                                         |
| Wiring                    | 34P male connector 2.54mm Pin header                                                                                  |
| Mounting Type             | 35mm DIN-Rail                                                                                                         |
| Size                      | 115*14*75mm                                                                                                           |
| Weight                    | 65g                                                                                                                   |
| Environment Specification |                                                                                                                       |
| Operational Temperature   | -40~85°C                                                                                                              |
| Operational Humidity      | 5%-95% (No Condensation)                                                                                              |
| Ingress Protection Rating | IP20                                                                                                                  |
| Input parameters          |                                                                                                                       |
| Channel Number            | 32 channels input                                                                                                     |
| LED Indicator             | 32 channels input LED indicator                                                                                       |
| Turn-on voltage           | High input: Min.10Vdc to Max.28Vdc (Common Terminal:0Vdc)<br>Low input: Min.0Vdc to Max.14Vdc (Common Terminal:24Vdc) |
| Turn-off voltage          | High input:Max.5Vdc (Common Terminal:0Vdc)<br>Low input: Min.19Vdc (Common Terminal:24Vdc)                            |
| Turn-on current           | Max.5mA/channel@28V                                                                                                   |
| Input impedance           | >7.5kΩ                                                                                                                |
| Input delay               | OFF to ON: Max.3ms<br>ON to OFF: Max.2ms                                                                              |
| Filter time               | Default 10ms                                                                                                          |
| Sample frequency          | 500Hz                                                                                                                 |
| Counter frequency         | <200Hz                                                                                                                |

### 3 Hardware interfaces



- ① Module Type
- ② State indicator
- ④ 34P male connector
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicator definition



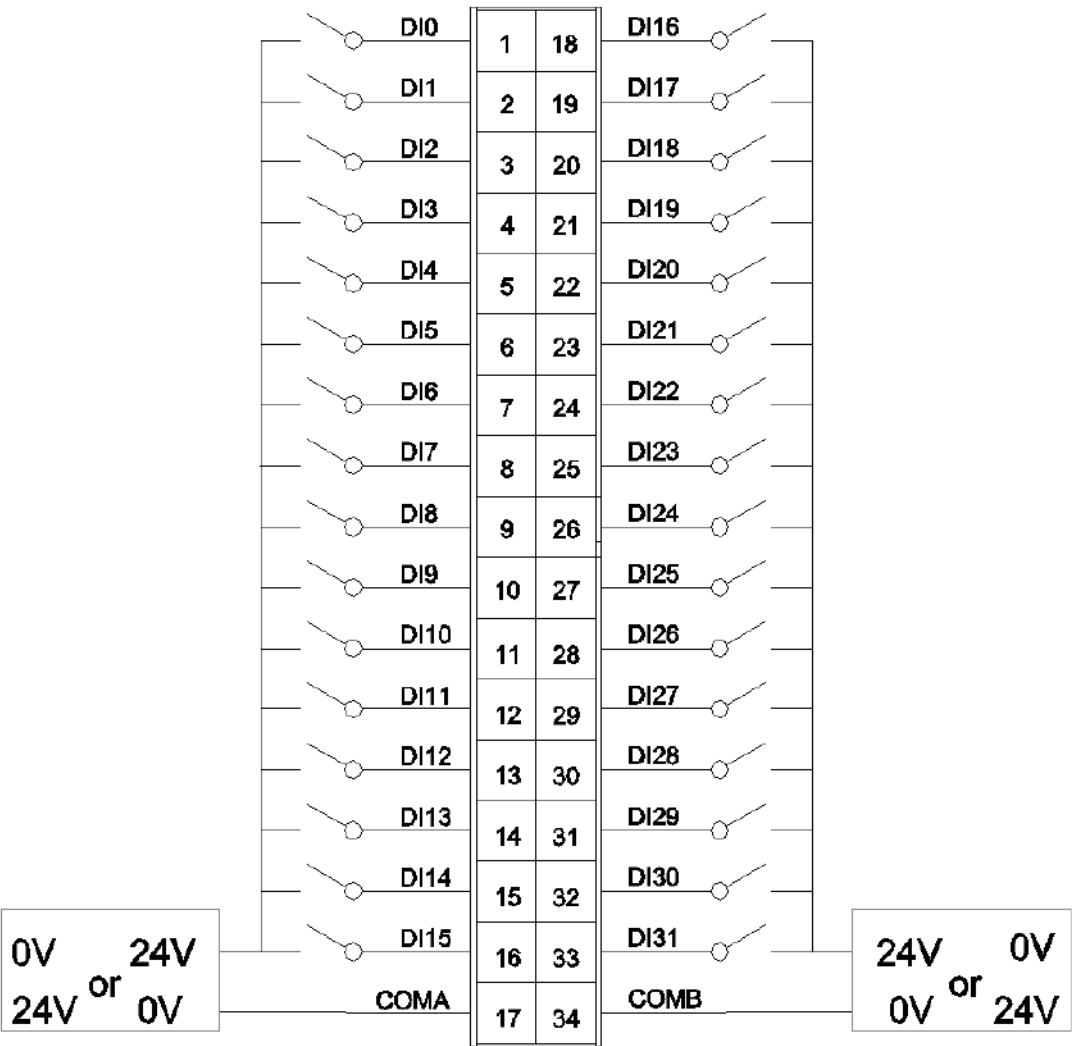
- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Input channel LED indicator (green/red/orange)

| PW Power State               | Definition                                                       |
|------------------------------|------------------------------------------------------------------|
| ON                           | Internal bus Power Normal                                        |
| OFF                          | Internal bus Power Failure                                       |
| STA Module State Indicator   | Definition                                                       |
| Green slow flash (2.5Hz)     | Module internal bus is not started                               |
| Red slow flash (2.5Hz)       | Module internal bus offline                                      |
| ON (GREEN)                   | Operation normal                                                 |
| Flash(2.5Hz)(RED/GREEN)      | Upgrading mode                                                   |
| Flash(10Hz) (RED/GREEN)      | Firmware Update                                                  |
| Double Flash (RED)           | Module Exception has been soft-restarted                         |
| 0-31 channel indicator light | Definition                                                       |
| ON (GREEN)                   | Indicates that the input channel signal is valid                 |
| ON (RED)                     | Indicates that the input channel +1 signal is valid              |
| ON (ORANGE)                  | Indicates that the input channel and channel +1 signal are valid |
| OFF                          | Input signal is invalid                                          |

**3.2 Terminal definition**

| Description  | Symbol | Terminal Number | Terminal Number | Symbol | Description  |
|--------------|--------|-----------------|-----------------|--------|--------------|
| Signal input | DI0    | 1               | 18              | DI16   | Signal input |
|              | DI1    | 2               | 19              | DI17   |              |
|              | DI2    | 3               | 20              | DI18   |              |
|              | DI3    | 4               | 21              | DI19   |              |
|              | DI4    | 5               | 22              | DI20   |              |
|              | DI5    | 6               | 23              | DI21   |              |
|              | DI6    | 7               | 24              | DI22   |              |
|              | DI7    | 8               | 25              | DI23   |              |
|              | DI8    | 9               | 26              | DI24   |              |
|              | DI9    | 10              | 27              | DI25   |              |
|              | DI10   | 11              | 28              | DI26   |              |
|              | DI11   | 12              | 29              | DI27   |              |
|              | DI12   | 13              | 30              | DI28   |              |
|              | DI13   | 14              | 31              | DI29   |              |
|              | DI14   | 15              | 32              | DI30   |              |
|              | DI15   | 16              | 33              | DI31   |              |
| 0V or 24V    | COMA   | 17              | 34              | COMB   | 0V or 24V    |

**4 Wiring**



### <32DI Input Status> Submodule process data definition

Data description:

0: Input signal invalid

1: Input signal valid

| Input data |                    |       |       |       |       |       |       |       |
|------------|--------------------|-------|-------|-------|-------|-------|-------|-------|
| Bit No     | Bit 7              | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0     | Counter Value Ch#0 |       |       |       |       |       |       |       |
| Byte 1     |                    |       |       |       |       |       |       |       |
| Byte 2     |                    |       |       |       |       |       |       |       |
| Byte 3     |                    |       |       |       |       |       |       |       |
| Byte 4     | Counter Value Ch#1 |       |       |       |       |       |       |       |
| Byte 5     |                    |       |       |       |       |       |       |       |
| Byte 6     |                    |       |       |       |       |       |       |       |
| Byte 7     |                    |       |       |       |       |       |       |       |
| Byte 8     | Counter Value Ch#2 |       |       |       |       |       |       |       |
| Byte 9     |                    |       |       |       |       |       |       |       |
| Byte 10    |                    |       |       |       |       |       |       |       |
| Byte 11    |                    |       |       |       |       |       |       |       |
| Byte 12    | Counter Value Ch#3 |       |       |       |       |       |       |       |
| Byte 13    |                    |       |       |       |       |       |       |       |
| Byte 14    |                    |       |       |       |       |       |       |       |
| Byte 15    |                    |       |       |       |       |       |       |       |
| Byte 16    | Counter Value Ch#4 |       |       |       |       |       |       |       |

|          |                     |
|----------|---------------------|
| Byte 17  |                     |
| Byte 18  |                     |
| Byte 19  |                     |
| Byte 20  | Counter Value Ch#5  |
| Byte 21  |                     |
| Byte 22  |                     |
| Byte 23  |                     |
| Byte 24  | Counter Value Ch#6  |
| Byte 25  |                     |
| Byte 26  |                     |
| Byte 27  |                     |
| Byte 28  | Counter Value Ch#7  |
| Byte 29  |                     |
| Byte 30  |                     |
| Byte 31  |                     |
| ...      | ...                 |
| ...      |                     |
| ...      |                     |
| ...      |                     |
| ...      | ...                 |
| ...      |                     |
| ...      |                     |
| ...      |                     |
| Byte 116 | Counter Value Ch#29 |
| Byte 117 |                     |
| Byte 118 |                     |
| Byte 119 |                     |
| Byte 120 | Counter Value Ch#30 |
| Byte 121 |                     |

|             |                     |                     |                     |                     |                     |                     |                     |                     |
|-------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Byte 122    | Counter Value Ch#31 |                     |                     |                     |                     |                     |                     |                     |
| Byte 123    |                     |                     |                     |                     |                     |                     |                     |                     |
| Byte 124    |                     |                     |                     |                     |                     |                     |                     |                     |
| Byte 125    |                     |                     |                     |                     |                     |                     |                     |                     |
| Byte 126    |                     |                     |                     |                     |                     |                     |                     |                     |
| Byte 127    |                     |                     |                     |                     |                     |                     |                     |                     |
| Output data |                     |                     |                     |                     |                     |                     |                     |                     |
| Bit No      | Bit 7               | Bit 6               | Bit 5               | Bit 4               | Bit 3               | Bit 2               | Bit 1               | Bit 0               |
| Byte 0      | Counter Reset Ch#7  | Counter Reset Ch#6  | Counter Reset Ch#5  | Counter Reset Ch#4  | Counter Reset Ch#3  | Counter Reset Ch#2  | Counter Reset Ch#1  | Counter Reset Ch#0  |
| Byte 1      | Counter Reset Ch#15 | Counter Reset Ch#14 | Counter Reset Ch#13 | Counter Reset Ch#12 | Counter Reset Ch#11 | Counter Reset Ch#10 | Counter Reset Ch#9  | Counter Reset Ch#8  |
| Byte 2      | Counter Reset Ch#23 | Counter Reset Ch#22 | Counter Reset Ch#21 | Counter Reset Ch#20 | Counter Reset Ch#19 | Counter Reset Ch#18 | Counter Reset Ch#17 | Counter Reset Ch#16 |
| Byte 3      | Counter Reset Ch#31 | Counter Reset Ch#30 | Counter Reset Ch#29 | Counter Reset Ch#28 | Counter Reset Ch#27 | Counter Reset Ch#26 | Counter Reset Ch#25 | Counter Reset Ch#24 |

Data description:

**Counter Value Ch#(0-31):** Count value, 32-bit unsigned integer, automatically zeroing after overflow.

**Counter Reset Ch#(0-31):** When the data bit changes from 0 to 1 (rising edge), the input counter of the corresponding channel is cleared.

**Note:** the maximum counting frequency of the input channel is 200Hz. When the input signal exceeds this frequency, the counting result may be inconsistent with the actual value.

## 6 Configuration parameter definitions

| Configuration parameters |                          |       |       |       |       |                        |       |       |
|--------------------------|--------------------------|-------|-------|-------|-------|------------------------|-------|-------|
| Bit No                   | Bit 7                    | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2                  | Bit 1 | Bit 0 |
| Byte 0                   | Input Filtering Time(ms) |       |       |       |       |                        |       |       |
| Byte 1                   |                          |       |       |       |       |                        |       |       |
| Byte 2                   | Reserved                 |       |       |       |       | Input Holding Time(ms) |       |       |

Data description:

**Input Filtering Time(ms):** Input filter time of Channel (ms) (Default: 10)

**Input Holding Time(ms):** Signal input holding time of Channel (ms) (Default:0)

0: Disable

1: 200ms

2: 500ms

3: 1000ms

4: 1500ms

5: 2000ms

6: 3000ms

7: 5000ms

### <32DI Counter Submodule>Submodule configuration parameter definition

| Configuration parameters |                      |                      |                      |                      |                       |                       |                      |                      |
|--------------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|----------------------|----------------------|
| Bit No                   | Bit 7                | Bit 6                | Bit 5                | Bit 4                | Bit 3                 | Bit 2                 | Bit 1                | Bit 0                |
| Byte 0                   | Reserved             |                      |                      |                      | Storage Enable        | Storage Function      | 32Bit Data Format    |                      |
| Byte 1                   | Count Mode Ch#3      |                      | Count Mode Ch#2      |                      | Count Mode Ch#1       |                       | Count Mode Ch#0      |                      |
| Byte 2                   | Count Mode Ch#7      |                      | Count Mode Ch#6      |                      | Count Mode Ch#5       |                       | Count Mode Ch#4      |                      |
| Byte 3                   | Count Mode Ch#11     |                      | Count Mode Ch#10     |                      | Count Mode Ch#9       |                       | Count Mode Ch#8      |                      |
| Byte 4                   | Count Mode Ch#15     |                      | Count Mode Ch#14     |                      | Count Mode Ch#13      |                       | Count Mode Ch#12     |                      |
| Byte 5                   | Count Mode Ch#19     |                      | Count Mode Ch#18     |                      | Count Mode Ch#17      |                       | Count Mode Ch#16     |                      |
| Byte 6                   | Count Mode Ch#23     |                      | Count Mode Ch#22     |                      | Count Mode Ch#21      |                       | Count Mode Ch#20     |                      |
| Byte 7                   | Count Mode Ch#27     |                      | Count Mode Ch#26     |                      | Count Mode Ch#25      |                       | Count Mode Ch#24     |                      |
| Byte 8                   | Count Mode Ch#31     |                      | Count Mode Ch#30     |                      | Count Mode Ch#29      |                       | Count Mode Ch#28     |                      |
| Byte 9                   | Count Direction Ch#7 | Count Direction Ch#6 | Count Direction Ch#5 | Count Direction Ch#4 | Count Direction Ch#3  | Count Direction Ch#2  | Count Direction Ch#1 | Count Direction Ch#0 |
| Byte 10                  | Count Direction Ch#1 | Count Direction Ch#1 | Count Direction Ch#1 | Count Direction Ch#1 | Count Direction Ch#11 | Count Direction Ch#10 | Count Direction Ch#9 | Count Direction Ch#8 |

|         |                       |                       |                       |                       |                       |                       |                       |                       |
|---------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|         | 5                     | 4                     | 3                     | 2                     |                       |                       |                       |                       |
| Byte 11 | Count Direction Ch#23 | Count Direction Ch#22 | Count Direction Ch#21 | Count Direction Ch#20 | Count Direction Ch#19 | Count Direction Ch#18 | Count Direction Ch#17 | Count Direction Ch#16 |
| Byte 12 | Count Direction Ch#31 | Count Direction Ch#30 | Count Direction Ch#29 | Count Direction Ch#28 | Count Direction Ch#27 | Count Direction Ch#26 | Count Direction Ch#25 | Count Direction Ch#24 |

Data description:

**32Bit Data Format: Byte transfer order of Channel count value (Default: 0)**

**0: AB-CD**

1: BA-DC

2: CD-AB

**3DC-BASStorage Function:** Storage Function is supported or not, read only attribute, and this value is the actual value of the module when uploading device parameters.

0: storage is not supported

1: storage is supported

**Storage Enable:** Storage enable, when the Storage Function enables, the IO module will save the count value in real time to non-volatile memory, and load the last saved count value on the next power on. (Default: 1)

0: Disabled

1: Enable

**Count Mode Ch# (0- Count Direction Ch# (0-31): 31):** Count mode of the input channel. (Default: 0)

0: rising edge count

1: falling edge count

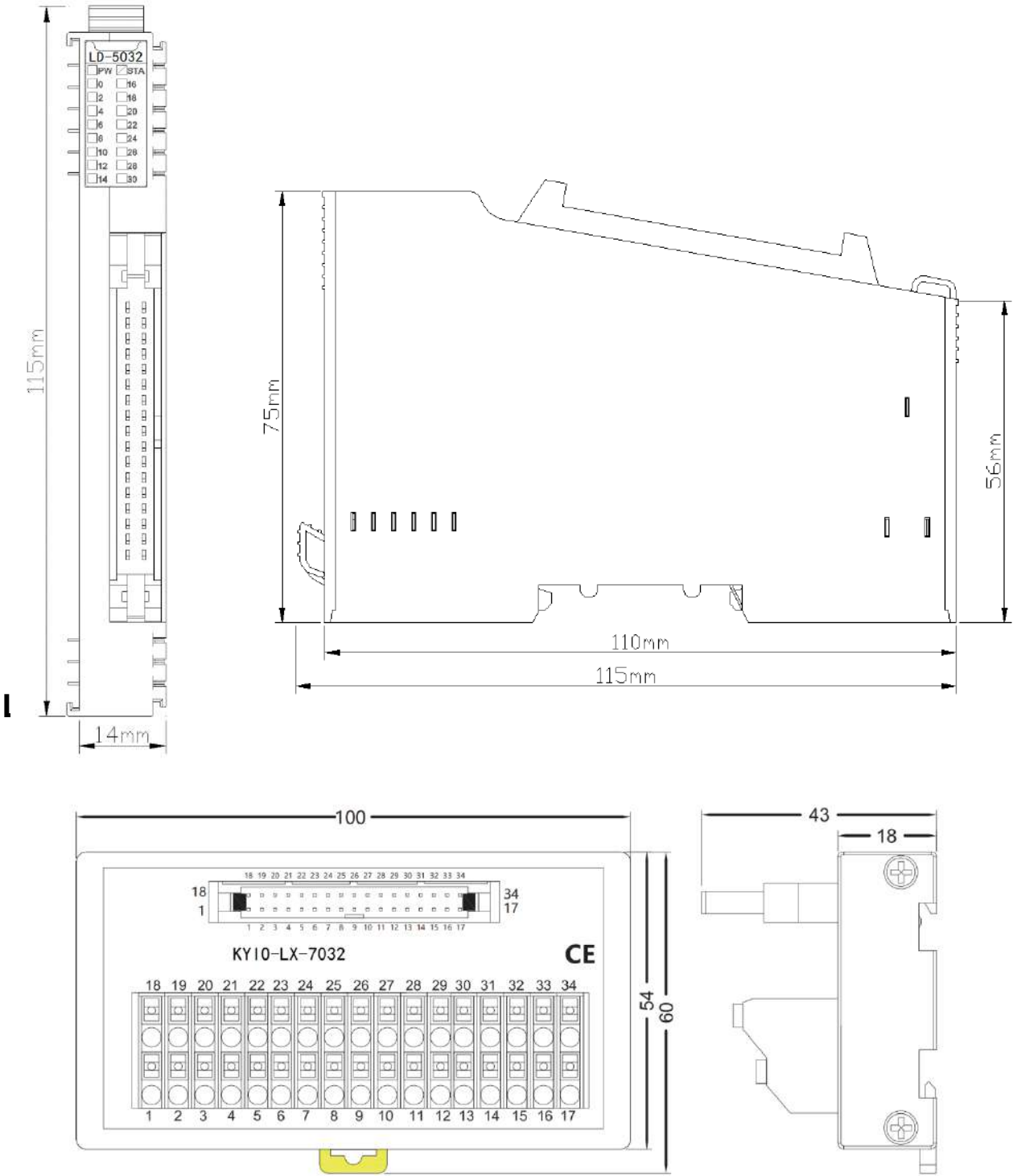
2: double edge count

The counting direction of the input channel. (Default: 0)

0: count up

1: count down

**A Dimension drawing**



## **LD-2104: 4 channels digital output/24VDC/ PNP**

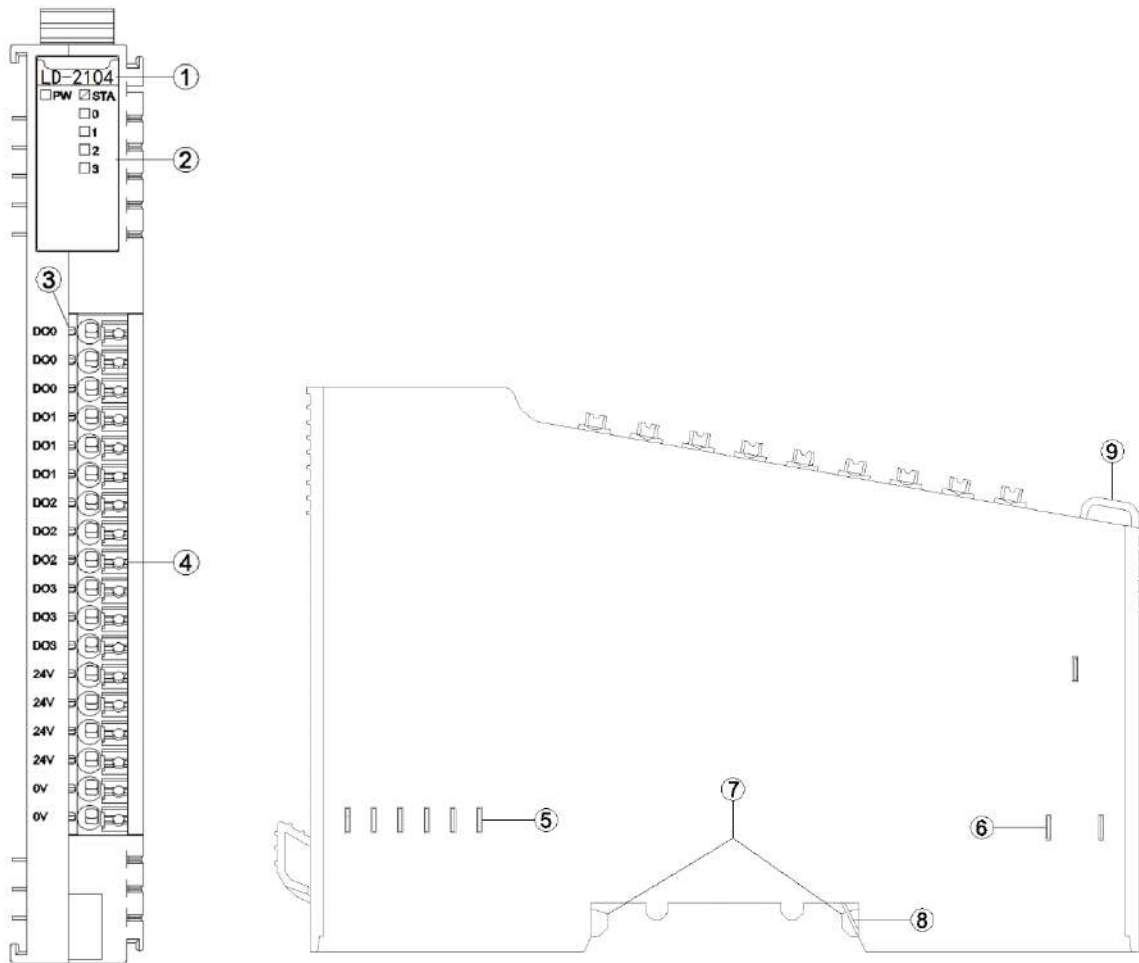
### **1 Module features**

- ◆the module supports 4-channel digital output, the output voltage is 24VDC and the output high level is valid.
- ◆the max output current of DO single channel is 3.3 A.
- ◆the module could drive field equipment (relay, solenoid valve, etc.)
- ◆the module internal bus and field output are isolated by optocoupler
- ◆the module carries with 4 digital output channel LED indicator
- ◆the module has the functions of thermal shutdown and overcurrent protection
- ◆the module supports short circuit protection and overload protection

## 2 Technical Parameters

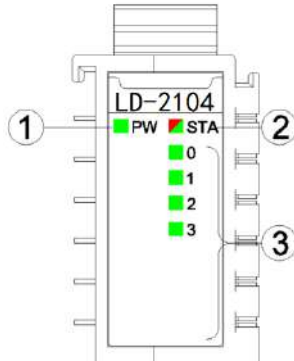
| General parameters        |                                                                                             |
|---------------------------|---------------------------------------------------------------------------------------------|
| Power Consumption         | Max.30mA@5.0Vdc                                                                             |
| Isolation                 | I/O to internal bus: opto-couple isolation (3KVrms)                                         |
| Field Power               | Nominal:24Vdc, Range: 12~30Vdc                                                              |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                                                             |
| Mounting Type             | 35mm DIN-Rail                                                                               |
| Size                      | 115*14*75mm                                                                                 |
| Weight                    | 65g                                                                                         |
| Environment Specification |                                                                                             |
| Operational Temperature   | -40~85°C                                                                                    |
| Operational Humidity      | 5%~95% RH(No Condensation)                                                                  |
| Ingress Protection Rating | IP20                                                                                        |
| Output parameters         |                                                                                             |
| Channel Number            | 4 Channels                                                                                  |
| LED Indicator             | 4 Channels output LED Indicator                                                             |
| Rated Current             | Typical value: 2.2A                                                                         |
| Leak Current              | Max. value: 10uA                                                                            |
| Output Impedance          | <90mΩ                                                                                       |
| Output Delay              | OFF to ON:Max.5us<br>ON to OFF:Max.200us                                                    |
| Protection Function       | Over temperature turn-off: typical value 150°C<br>Overcurrent protection: typical value 12A |

### 3 Hardware Interface



- ① Module Type
- ② State indicator
- ③ Channel indicator
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

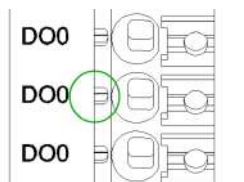
### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Output channel LED indicator (green)

| PW Power State (GREEN)            | Definition                               |
|-----------------------------------|------------------------------------------|
| ON                                | Internal bus Power Normal                |
| OFF                               | Internal bus Power Failure               |
| STA Module State (RED/GREEN)      | Definition                               |
| Green slow flash (2.5Hz)          | Module internal bus is not started       |
| Red slow flash (2.5Hz)            | Module internal bus offline              |
| ON (GREEN)                        | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)          | Upgrading mode                           |
| Flash(10Hz) (RED/GREEN)           | Firmware Update                          |
| Double Flash (RED)                | Module Exception has been soft-restarted |
| 0-3 channel LED indicator (GREEN) | Definition                               |
| ON                                | Output signal valid                      |
| OFF                               | Output signal invalid                    |

### 3.2 Field channel LED indicator (Green)



When the output signal of the output channel is valid, the corresponding field channel LED indicator is lit.

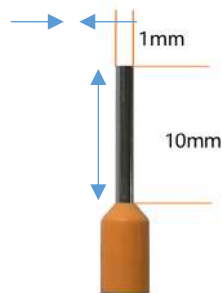
### 3.3 Terminal definition

| Terminal Number | Symbol | Description         |
|-----------------|--------|---------------------|
| 1               | DO0    | Signal output       |
| 2               | DO0    |                     |
| 3               | DO0    |                     |
| 4               | DO1    |                     |
| 5               | DO1    |                     |
| 6               | DO1    |                     |
| 7               | DO2    |                     |
| 8               | DO2    |                     |
| 9               | DO2    |                     |
| 10              | DO3    |                     |
| 11              | DO3    |                     |
| 12              | DO3    |                     |
| 13              | 24V    | Power input (Note1) |
| 14              | 24V    |                     |
| 15              | 24V    |                     |
| 16              | 24V    |                     |
| 17              | 0V     |                     |
| 18              | 0V     |                     |

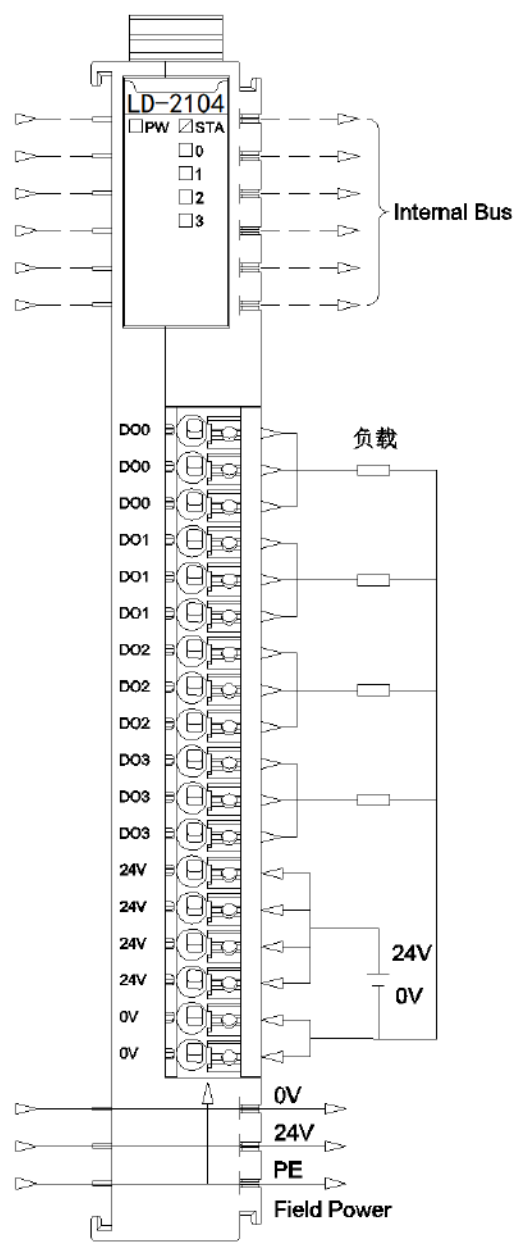
Note 1: The module must be connected to a 24V power supply. Otherwise, the module cannot work properly. The input power of the power supply must be greater than that of all channel loads.

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



4 Wiring



## 5 Process data definition

| Output Data |         |       |       |       |         |         |         |         |
|-------------|---------|-------|-------|-------|---------|---------|---------|---------|
| Bit No      | Bit 7   | Bit 6 | Bit 5 | Bit 4 | Bit 3   | Bit 2   | Bit 1   | Bit 0   |
| Byte 0      | Reserve |       |       |       | DO Ch#3 | DO Ch#2 | DO Ch#1 | DO Ch#0 |

Data declaration:

**DO Ch#(0-3):** When the bit is 1, the output signal of the corresponding channel is effective, the output is high level, and the output is invalid when it is 0.

0: The output signal is invalid

1: The output signal is valid

## 6 Configuration parameters definition

| Configured Parameter |         |       |       |       |                              |                              |                              |                              |
|----------------------|---------|-------|-------|-------|------------------------------|------------------------------|------------------------------|------------------------------|
| Bit No               | Bit 7   | Bit 6 | Bit 5 | Bit 4 | Bit 3                        | Bit 2                        | Bit 1                        | Bit 0                        |
| Byte 0               | Reserve |       |       |       | Fault Action for Output Ch#3 | Fault Action for Output Ch#2 | Fault Action for Output Ch#1 | Fault Action for Output Ch#0 |
| Byte 1               | Reserve |       |       |       | Fault Value for Output Ch#3  | Fault Value for Output Ch#2  | Fault Value for Output Ch#1  | Fault Value for Output Ch#0  |

Data description:

**Fault Action for Output Ch#(0-3):** When IO module detects the internal bus communication is abnormal and enters offline mode, and output data will be processed in this mode. (Default: 0)

0: Hold Last Output State

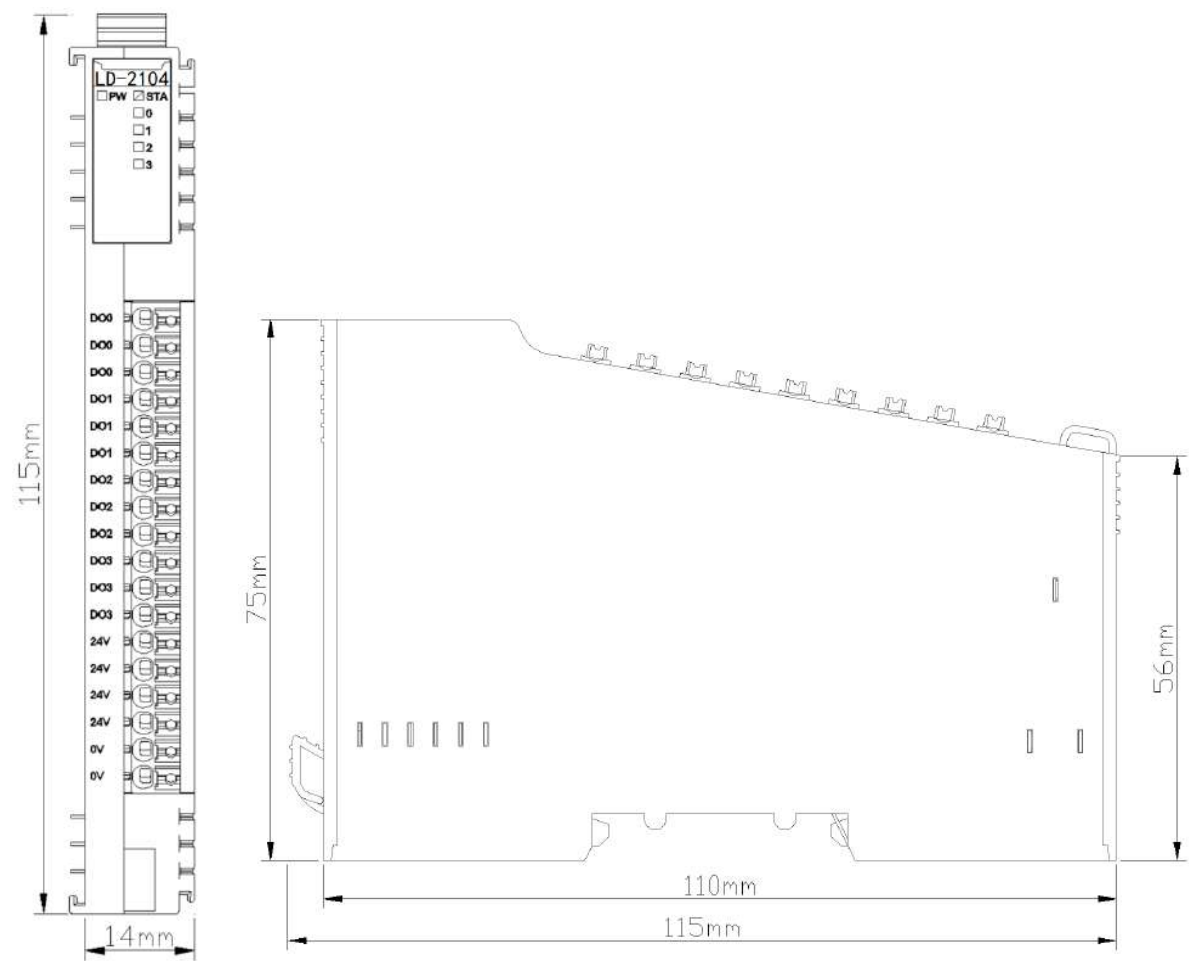
1: Output Fault Value

**Fault Value for Output Ch#(0-3):** When the fault output mode is 1, this bit sets the fault output value, and when the internal bus of IO module is offline, this setting value will be output.(Default: 0)

0: Output low level.

1: Output high level.

A Dimension drawing



## LD-2008: 8 channels digital output/24VDC/ PNP

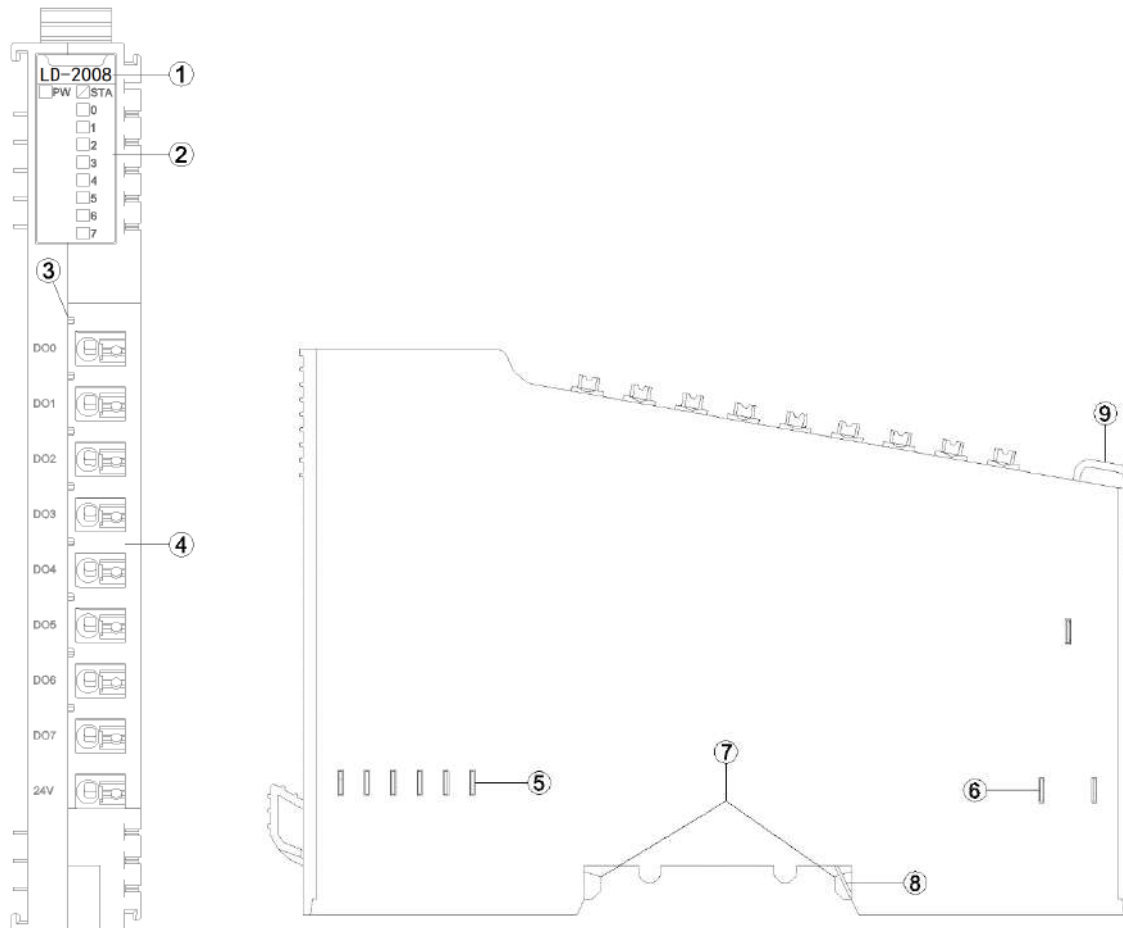
### 1 Module features

- ◆the module supports 8-channel digital output, the output voltage is 24VDC and the output high level is valid.
- ◆the module could drive field equipment (relay, solenoid valve, etc.)
- ◆the module internal bus and field output are isolated by optocoupler
- ◆the module carries with 8 digital output channel LED indicator
- ◆the module has the functions of thermal shutdown and overcurrent protection
- ◆the module supports short circuit protection and overload protection

### 2 Technical Parameters

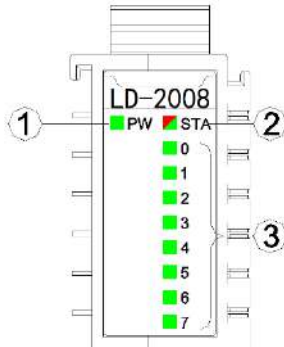
| General parameters        |                                                                                        |
|---------------------------|----------------------------------------------------------------------------------------|
| Power Consumption         | Max.80mA@5.0Vdc                                                                        |
| Isolation                 | I/O to internal bus: opto-couple isolation (3KVrms)                                    |
| Field Power               | Nominal:24Vdc, Range:22-28Vd                                                           |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                                                        |
| Mounting Type             | 35mm DIN-Rail                                                                          |
| Size                      | 115*14*75mm                                                                            |
| Weight                    | 65g                                                                                    |
| Environment Specification |                                                                                        |
| Operational Temperature   | -40~85°C                                                                               |
| Operational Humidity      | 5%~95% RH(No Condensation)                                                             |
| Ingress Protection Rating | IP20                                                                                   |
| Output parameters         |                                                                                        |
| Channel Number            | 8 Channels                                                                             |
| LED Indicator             | 8 Channels output LED Indicator                                                        |
| Rated Current             | Typical value: 500mA                                                                   |
| Leak Current              | Max. value: 100uA                                                                      |
| Output Impedance          | <280mΩ                                                                                 |
| Output Delay              | OFF to ON:Max.100us<br>ON to OFF:Max.150us                                             |
| Protection Function       | Over temperature turn-off: typical 135°C<br>Overcurrent protection: typical value 1.1A |

### 3 Hardware Interface



- ① Module Type
- ② State indicator
- ③ Channel indicator
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

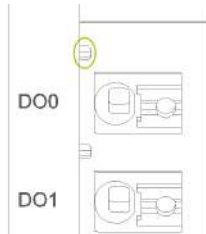
### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Output channel LED indicator (green)

| PW Power State (GREEN)            | Definition                               |
|-----------------------------------|------------------------------------------|
| ON                                | Internal bus Power Normal                |
| OFF                               | Internal bus Power Failure               |
| STA Module State (RED/GREEN)      | Definition                               |
| Green slow flash (2.5Hz)          | Module internal bus is not started       |
| Red slow flash (2.5Hz)            | Module internal bus offline              |
| ON (GREEN)                        | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)          | Upgrading mode                           |
| Flash(10Hz) (RED/GREEN)           | Firmware Update                          |
| Double Flash (RED)                | Module Exception has been soft-restarted |
| 0-7 channel LED indicator (GREEN) | Definition                               |
| ON                                | Output signal valid                      |
| OFF                               | Output signal invalid                    |

### 3.2 Field channel LED indicator (Green)



When the output signal of the output channel is valid, the corresponding field channel LED indicator is lit.

### 3.3 Terminal definition

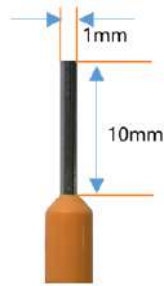
| Terminal Number | Symbol | Description         |
|-----------------|--------|---------------------|
| 1               | DO0    | Signal output       |
| 2               | DO1    |                     |
| 3               | DO2    |                     |
| 4               | DO3    |                     |
| 5               | DO4    |                     |
| 6               | DO5    |                     |
| 7               | DO6    |                     |
| 8               | DO7    |                     |
| 9               | 24V    | Power input (Note1) |

Note 1: When the red LED indicator beside the 24V terminals lights up, this is indicating that the module output has passed the field bus, so the 24V terminals could be disconnected. The max.output current of each channel is 500mA, and the max. sum of the current of all the output channels is 4A. When the total current exceeds 2A, and it is suggested to connect the power in the 24V terminal at the same time to avoid the on-site power current exceeding its limit.

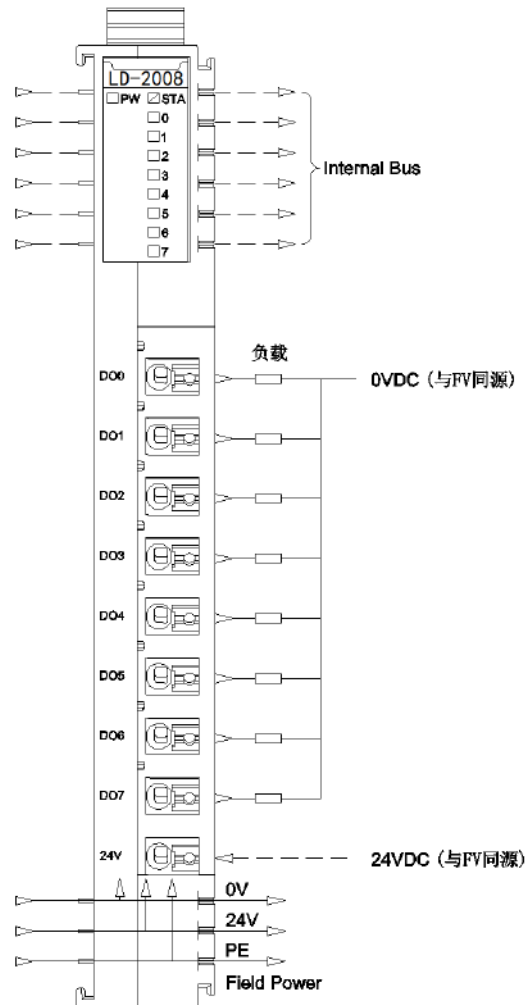
When the red LED indicator beside the 24V terminal goes off, it means that the module output is not powered. In this case, the power supply needs to be connected in the 24V terminal. At this point, the max. output current of each channel is 500mA, and the sum of all output channel currents is 4A.

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



## 4 Wiring



## 5 Process data definition

| Output Data |         |         |         |         |         |         |         |         |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Bit No      | Bit 7   | Bit 6   | Bit 5   | Bit 4   | Bit 3   | Bit 2   | Bit 1   | Bit 0   |
| Byte 0      | DO Ch#7 | DO Ch#6 | DO Ch#5 | DO Ch#4 | DO Ch#3 | DO Ch#2 | DO Ch#1 | DO Ch#0 |

Data declaration:

**DO Ch#(0-7):** When the bit is 1, the output signal of the corresponding channel is effective, the output is high level, and the output is invalid when it is 0.

0: The output signal is invalid

1: The output signal is valid

## 6 Configuration parameters definition

| Configured Parameter |                              |                              |                              |                              |                              |                              |                              |                              |
|----------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Bit No               | Bit 7                        | Bit 6                        | Bit 5                        | Bit 4                        | Bit 3                        | Bit 2                        | Bit 1                        | Bit 0                        |
| Byte 0               | Fault Action for Output Ch#7 | Fault Action for Output Ch#6 | Fault Action for Output Ch#5 | Fault Action for Output Ch#4 | Fault Action for Output Ch#3 | Fault Action for Output Ch#2 | Fault Action for Output Ch#1 | Fault Action for Output Ch#0 |
| Byte 1               | Fault Value for Output Ch#7  | Fault Value for Output Ch#6  | Fault Value for Output Ch#5  | Fault Value for Output Ch#4  | Fault Value for Output Ch#3  | Fault Value for Output Ch#2  | Fault Value for Output Ch#1  | Fault Value for Output Ch#0  |

Data description:

**Fault Action for Output Ch#(0-7):** When IO module detects the internal bus communication is abnormal and enters offline mode, and output data will be processed in this mode. (Default: 0)

0: Hold Last Output State

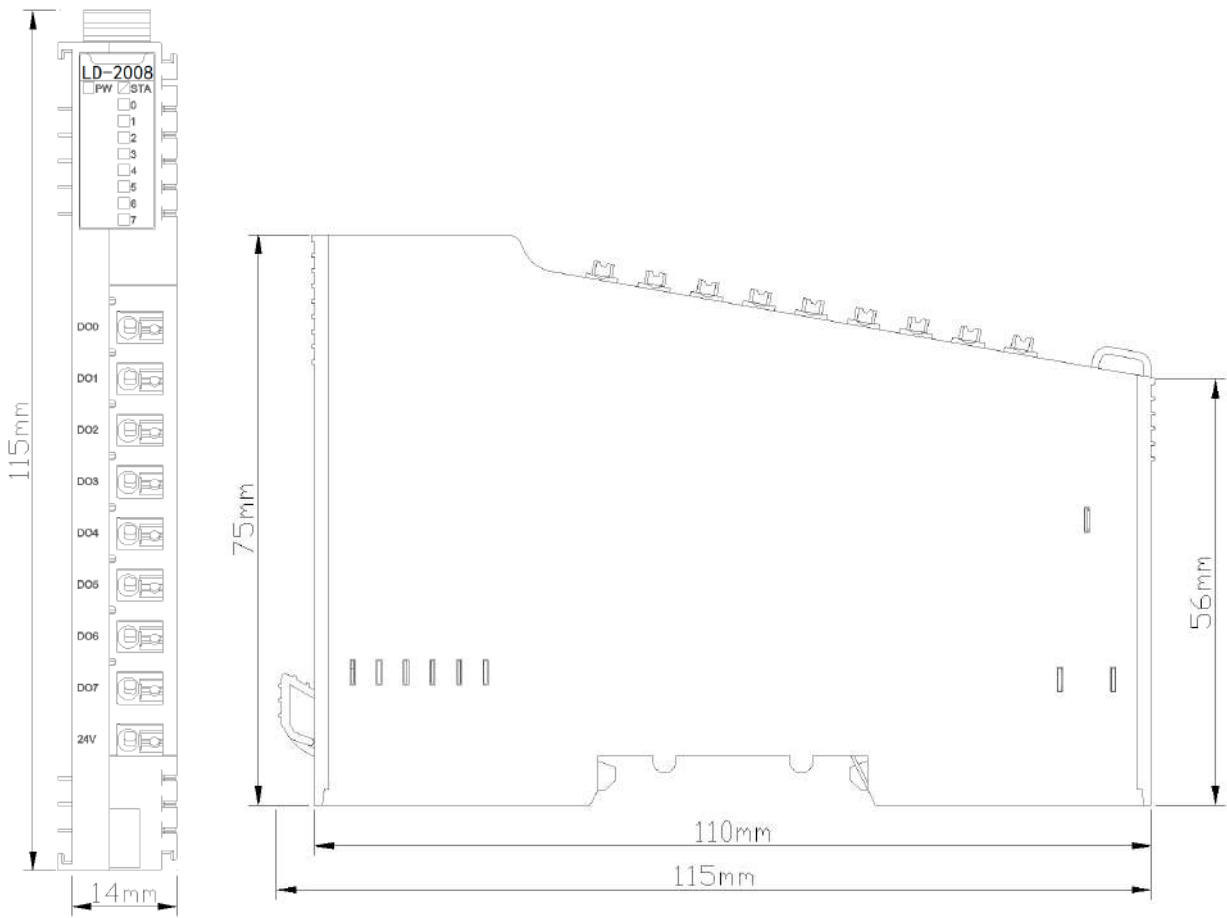
1: Output Fault Value

**Fault Value for Output Ch#(0-7):** When the fault output mode is 1, this bit sets the fault output value, and when the internal bus of IO module is offline, this setting value will be output.(Default: 0)

0: Output low level.

1: Output high level.

**A Dimension drawing**



## LD-2016 16 channels digital output/24VDC/PNP

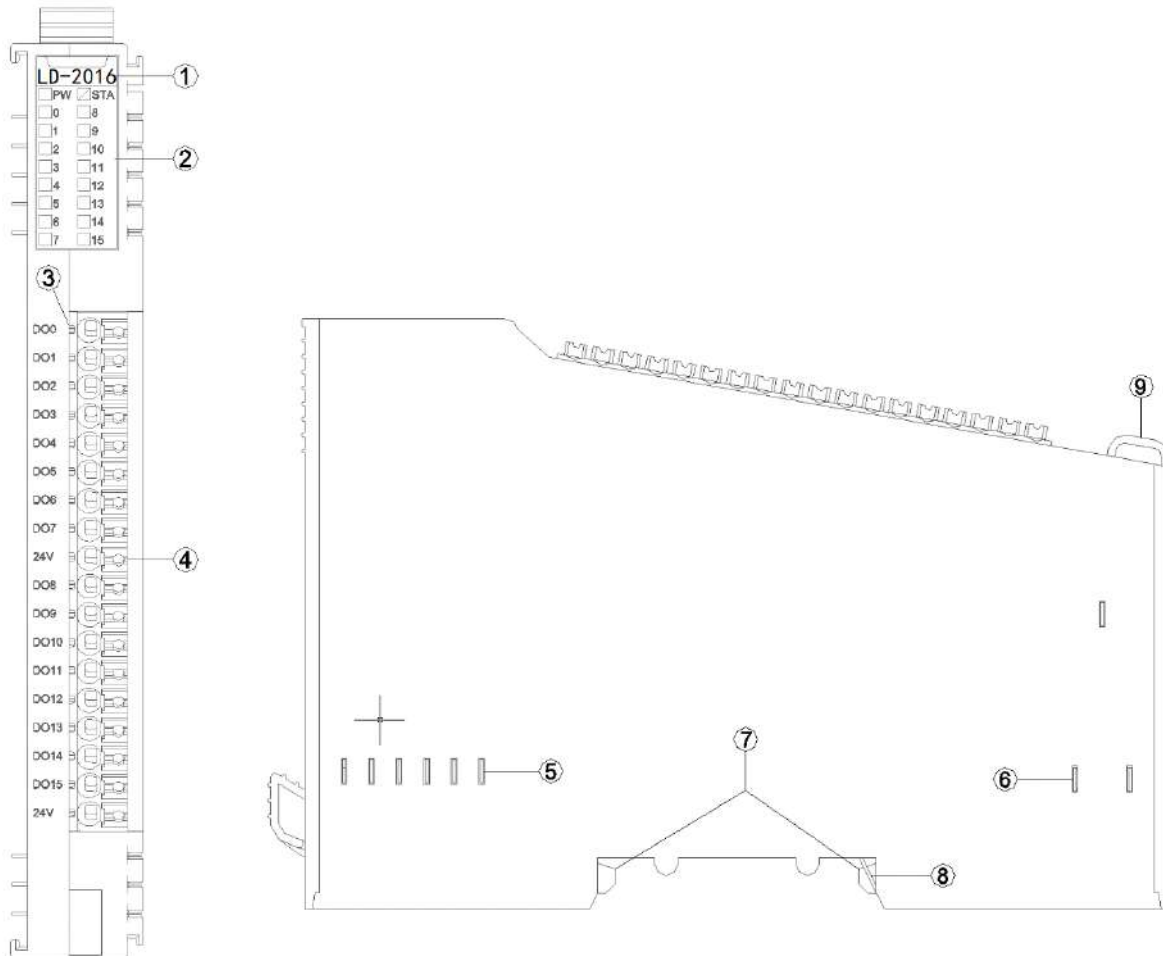
### 1 Module features

- ◆ the module supports 16 channels digital output, the output voltage is 24VDC and the output high level is valid.
- ◆ module can drive field equipment. (relay, solenoid valve, etc.)
- ◆ the internal bus of the module and field output are using opto-coupler.
- ◆ the module carries 16 digital output channel LED indicator light.
- ◆ the module has the functions of thermal shutdown and overcurrent protection.
- ◆ the module supports short circuit protection and overload protection.

### 2 Technical parameters

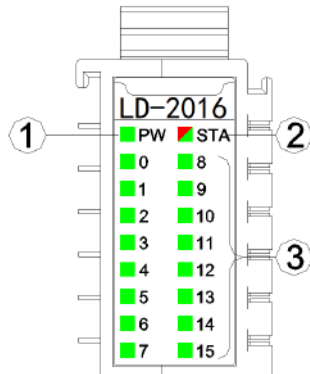
| General Parameters        |                                                                                                                                    |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Power                     | Max.175mA@5.0Vdc                                                                                                                   |
| Isolation                 | I/O to internal bus: opto-couple isolation (3KVrms)                                                                                |
| Field Power               | Nominal:24Vdc, Range:22-28Vdc                                                                                                      |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                                                                                                    |
| Mounting Type             | 35mm DIN-Rail                                                                                                                      |
| Size                      | 115*14*75mm                                                                                                                        |
| Weight                    | 65g                                                                                                                                |
| Environment Specification |                                                                                                                                    |
| Operational Temperature   | -40~85°C                                                                                                                           |
| Operational Humidity      | 5%-95% (No Condensation)                                                                                                           |
| Ingress Protection Rating | IP20                                                                                                                               |
| Output Parameters         |                                                                                                                                    |
| Channel Number            | 16 channel source type output                                                                                                      |
| LED Indicator             | 16 channel output LED indicator                                                                                                    |
| Rated Current             | Typical value: 500mA                                                                                                               |
| Leakage Current           | Max: 10uA                                                                                                                          |
| Output Impedance          | <200mΩ                                                                                                                             |
| Output Delay              | OFF to ON: Max.100us<br>ON to OFF: Max.150us                                                                                       |
| Protection                | Overtemperature shutdown: typical value is 135°C<br>Overcurrent protection: typical value 1.1A<br>Short circuit protection support |

### 3 Hardware interfaces



- ① Module Type
- ② State indicator
- ③ Channel indicator
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

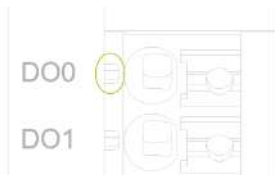
### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State indicator LED (red/green)
- ③ Output channel indicator LED (green)

| PW Power State               | Definition                               |
|------------------------------|------------------------------------------|
| ON                           | Internal bus power supply normal         |
| OFF                          | Internal bus power supply failure        |
| STA Module State (RED/GREEN) | Definition                               |
| Green slow flash (2.5 Hz)    | Module internal bus is not started       |
| Red slow flash (2.5 Hz)      | Module internal bus offline              |
| ON (GREEN)                   | Operation normal                         |
| Flash (2.5 Hz) (RED/GREEN)   | updating mode                            |
| Flash (10 Hz) (RED/GREEN)    | firmware update                          |
| Double Flash (RED)           | Module exception has been soft-restarted |
| 0-15 channel indicator LED   | Definition                               |
| ON                           | Output signal valid                      |
| OFF                          | Output signal invalid                    |

### 3.2 Field channel LED indicator (Green)



When output signal of output channel is valid, the corresponding field channel LED indicator is on.

### 3.3 Terminal definition

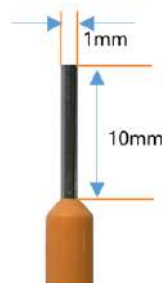
| Terminal Number | Symbol | The Description     |
|-----------------|--------|---------------------|
| 1               | DO0    | Signal output       |
| 2               | DO1    |                     |
| 3               | DO2    |                     |
| 4               | DO3    |                     |
| 5               | DO4    |                     |
| 6               | DO5    |                     |
| 7               | DO6    |                     |
| 8               | DO7    |                     |
| 9               | 24V    | Power input (note1) |
| 10              | DO8    | Signal output       |
| 11              | DO9    |                     |
| 12              | DO10   |                     |
| 13              | DO11   |                     |
| 14              | DO12   |                     |
| 15              | DO13   |                     |
| 16              | DO14   |                     |
| 17              | DO15   |                     |
| 18              | 24V    | Power input(note1)  |

Note 1: when the red LED indicator beside the 24V wiring terminal is on, it indicates that the fieldbus is powered on, then the maximum output current of each channel is 500mA, and the maximum sum of all output channel currents is 4A.

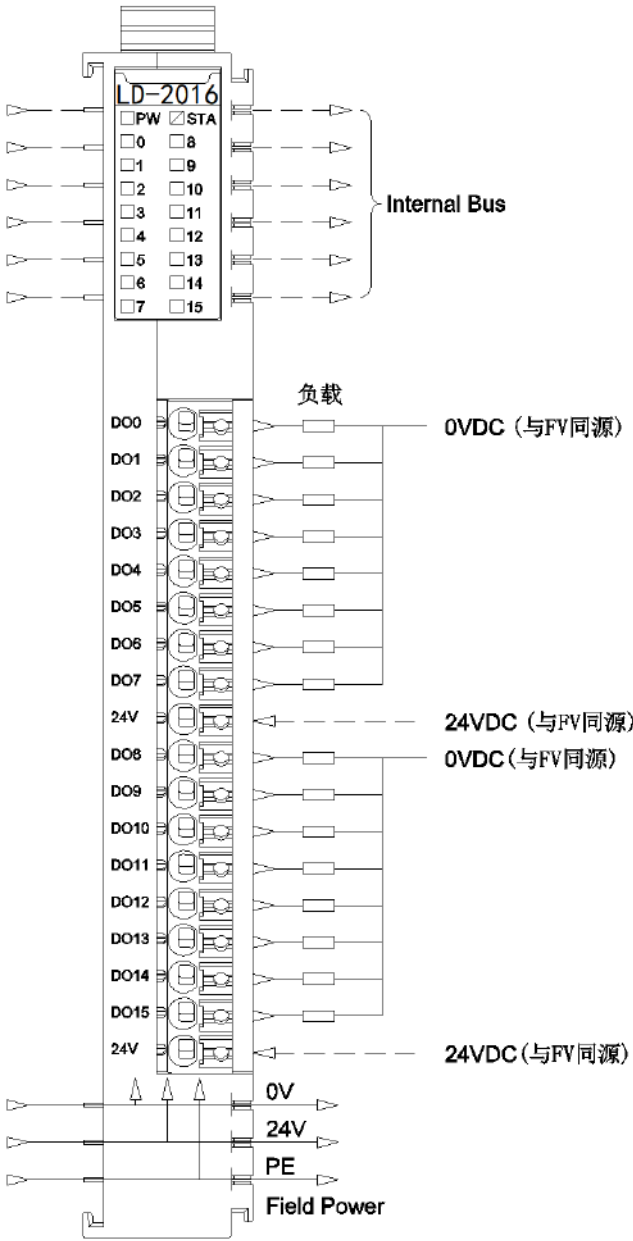
When the 24VDC power is supplied to the 24V wiring terminal separately, the maximum sum of all the output channel currents is 8A (Regardless of whether the fieldbus is powered or not, 24V wiring terminals can be connected to 24VDC power supply).

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



4 Wiring



## 5 Process data definition

| Output data |          |          |          |          |          |          |         |         |
|-------------|----------|----------|----------|----------|----------|----------|---------|---------|
| Bit No      | Bit 7    | Bit 6    | Bit 5    | Bit 4    | Bit 3    | Bit 2    | Bit 1   | Bit 0   |
| Byte 0      | DO Ch#7  | DO Ch#6  | DO Ch#5  | DO Ch#4  | DO Ch#3  | DO Ch#2  | DO Ch#1 | DO Ch#0 |
| Byte 1      | DO Ch#15 | DO Ch#14 | DO Ch#13 | DO Ch#12 | DO Ch#11 | DO Ch#10 | DO Ch#9 | DO Ch#8 |

Data declaration:

**DO Ch#(0-15):** when this bit is 1, the corresponding channel output signal is valid, the output is high level, and the output is invalid when it is 0.

0: Output signal is invalid

1: Output signal is valid

## 6 Configuration parameter definitions

| Configuration parameters |                               |                               |                               |                               |                               |                               |                              |                              |
|--------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|------------------------------|
| Bit No                   | Bit 7                         | Bit 6                         | Bit 5                         | Bit 4                         | Bit 3                         | Bit 2                         | Bit 1                        | Bit 0                        |
| Byte 0                   | Fault Action for Output Ch#7  | Fault Action for Output Ch#6  | Fault Action for Output Ch#5  | Fault Action for Output Ch#4  | Fault Action for Output Ch#3  | Fault Action for Output Ch#2  | Fault Action for Output Ch#1 | Fault Action for Output Ch#0 |
| Byte 1                   | Fault Action for Output Ch#15 | Fault Action for Output Ch#14 | Fault Action for Output Ch#13 | Fault Action for Output Ch#12 | Fault Action for Output Ch#11 | Fault Action for Output Ch#10 | Fault Action for Output Ch#9 | Fault Action for Output Ch#8 |
| Byte 2                   | Fault Value for Output Ch#7   | Fault Value for Output Ch#6   | Fault Value for Output Ch#5   | Fault Value for Output Ch#4   | Fault Value for Output Ch#3   | Fault Value for Output Ch#2   | Fault Value for Output Ch#1  | Fault Value for Output Ch#0  |
| Byte 3                   | Fault Value for Output Ch#15  | Fault Value for Output Ch#14  | Fault Value for Output Ch#13  | Fault Value for Output Ch#12  | Fault Value for Output Ch#11  | Fault Value for Output Ch#10  | Fault Value for Output Ch#9  | Fault Value for Output Ch#8  |

Data description:

**Fault Action for Output Ch#(0-15):** Fault Output mode. When the IO module detects an internal bus exception and fails to communicate with the adapter. And the module will turn to offline mode, so the output data is processed in this way. (default: 0)

0: keep the last time output State.

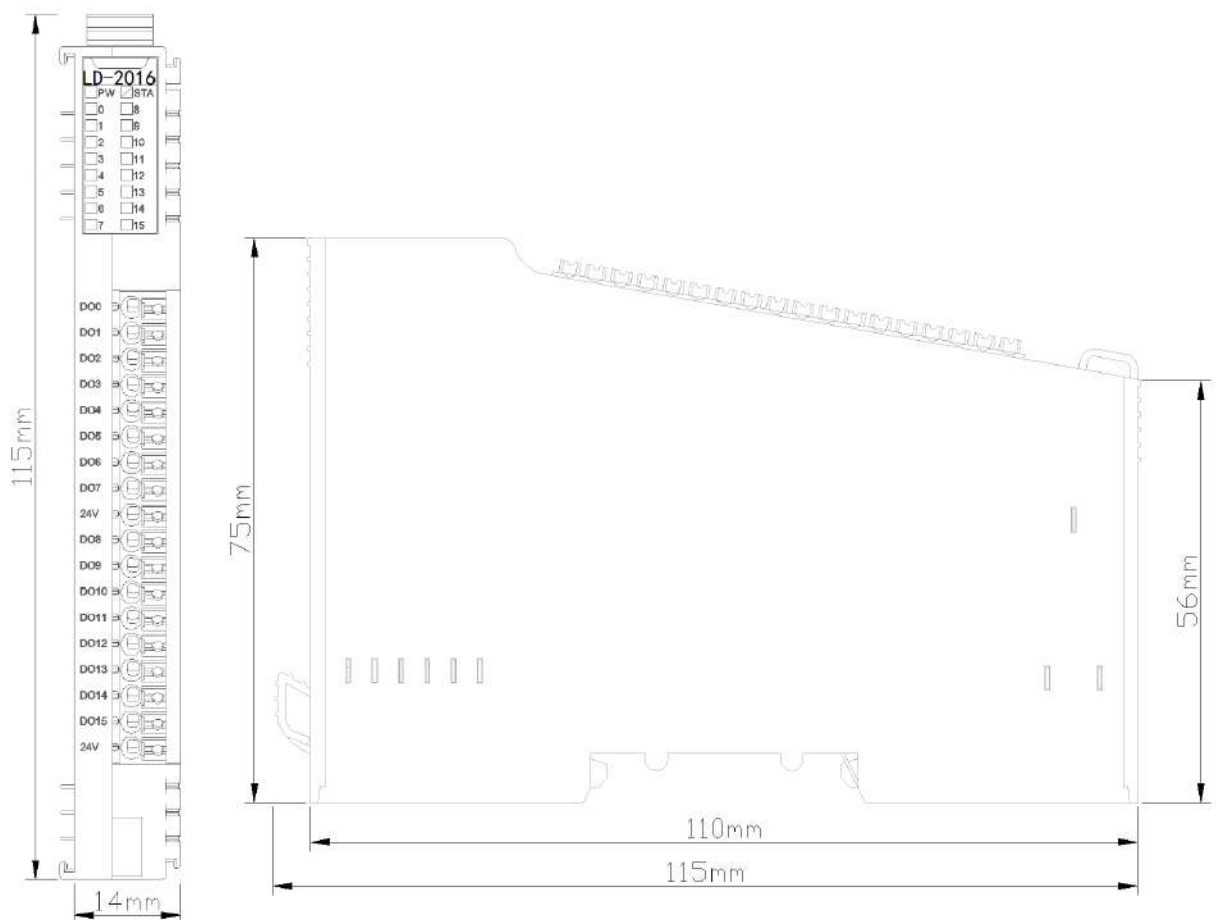
1: output fault value.

**Fault Value for Output Ch#(0-15):** when the Fault Output mode is 1, this bit sets the Fault Output Value, and this setting value will be outputted when the internal bus of IO module is offline. (default: 0)

0: Output low level.

1: Output high level.

## A Dimension drawing



# LD-2116 16-Channel Digital Output/24VDC/PNP

## 1 Module Features

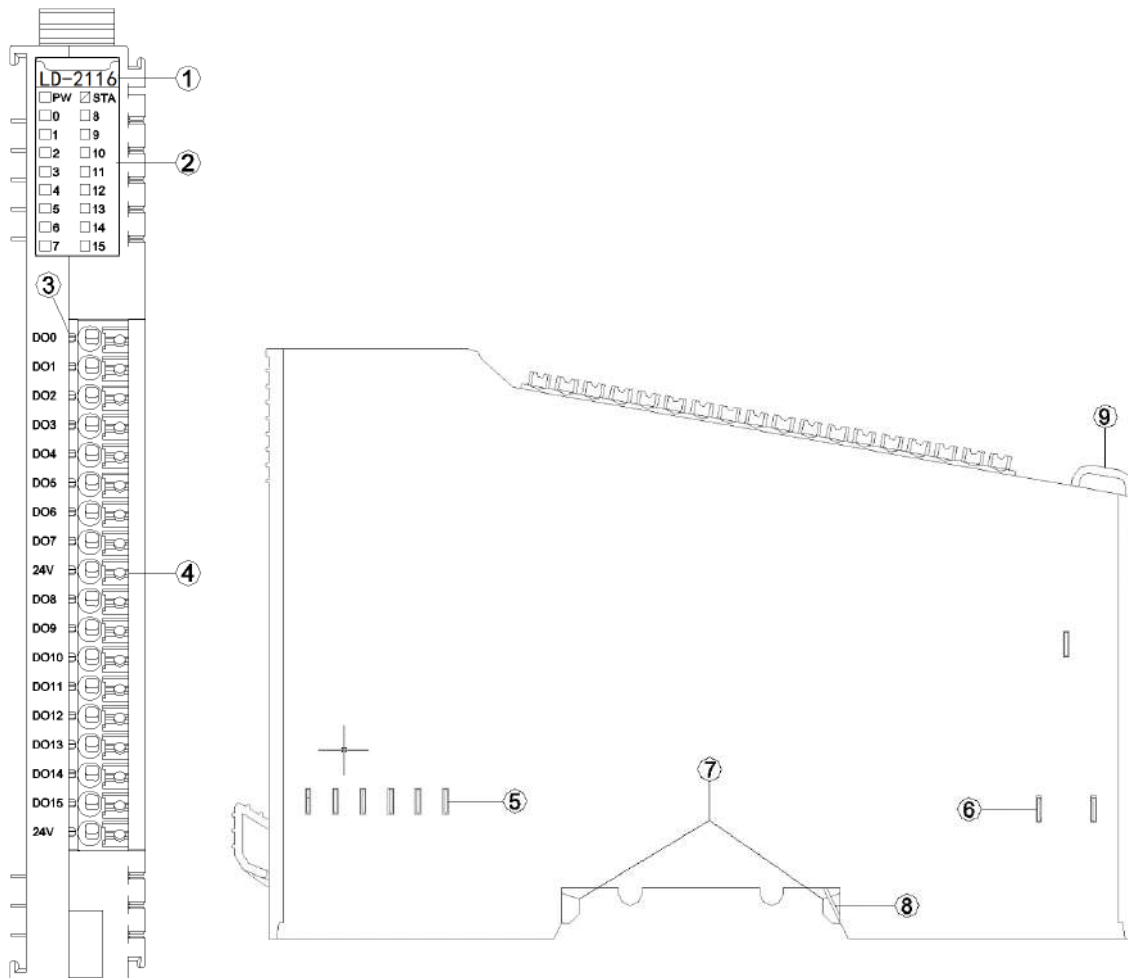
- ◆ The module supports 16 channels of digital output, with high-level output effective, outputting 24VDC.
- ◆ The module can drive field equipment (such as relays, solenoid valves, etc.).
- ◆ The module's internal bus and field outputs use optocoupler isolation.
- ◆ The module is equipped with 16 digital output channel LED indicators.
- ◆ The module has thermal shutdown and overcurrent protection functions.
- ◆ The module supports short-circuit and overload protection functions.
- ◆ The module's output channel loop power supply requires an external 24Vdc power supply."

## 2 Technical parameters

| General parameters        |                                                     |
|---------------------------|-----------------------------------------------------|
| Power Consumption         | Max.175mA@5.0Vdc                                    |
| Isolation                 | I/O to internal bus: opto-couple isolation (3KVrms) |
| Field Power               | Nominal:24Vdc, Range:22-28Vdc                       |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                     |
| Mounting Type             | 35mm DIN-Rail                                       |
| Size                      | 115*14*75mm                                         |
| Weight                    | 65g                                                 |
| Environment Specification |                                                     |
| Operational Temperature   | -40~85°C                                            |
|                           | 5%-95% (No Condensation)                            |
| Operational Humidity      | IP20                                                |
| Output parameters         |                                                     |
| Channel Number            | 16 channel output PNP                               |
| LED Indicator             | 16 channel input LED indicator                      |
| Rated current             | Typical value:0.5A                                  |
| Rated current             | Maximum value: 10uA                                 |
| Rated current             | <200mΩ                                              |
| Rated current             | OFF to ON :Max.100us<br>ON to OFF :Max.150us        |

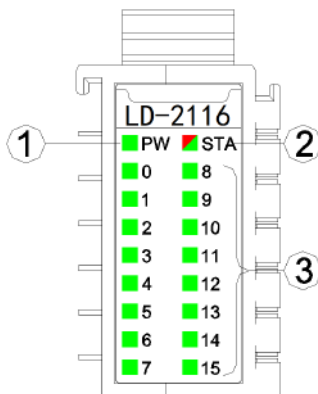
|                     |                                                                                                                                          |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Protection function | <p>Temperature protection: typical value 135°C</p> <p>Protection current: typical value 1.1A</p> <p>Short circuit protection support</p> |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------|

### 3 Hardware interfaces



- ① Module Type
- ② State indicators
- ③ Channel indicators
- ④ Wiring Terminal and Marking
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

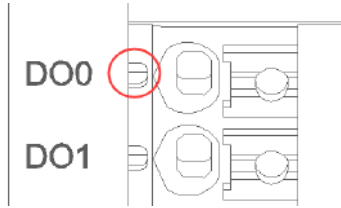
### 3.1 LED indicators Definition



- ① Power indicator (green)
- ② Module state indicator (red/green)
- ③ Input/output channel indicators (green)

| PW power indicator          | Definition                                    |
|-----------------------------|-----------------------------------------------|
| ON                          | Internal bus power supply normal              |
| OFF                         | Internal bus power supply failure             |
| STA module state indicator  | Definition                                    |
| Green slow flash (2.5hz)    | The internal bus of the module is not started |
| Red slow flash (2.5hz)      | Module internal bus offline                   |
| Green normally on           | Module works normally                         |
| Flash(2.5Hz)<br>(RED/GREEN) | Operating mode                                |
| Flash(10Hz) (RED/GREEN)     | Firmware upgrading                            |
| Red flashes twice           | Module exception has been soft-restarted      |
| 0-15 channel indicators     | Definition                                    |
| ON                          | input signal valid                            |
| OFF                         | input signal invalid                          |

### 3.2 Field input channel LED indicator (green)



When the output signal of the output channel is valid, the corresponding field channel indicator light is illuminated.

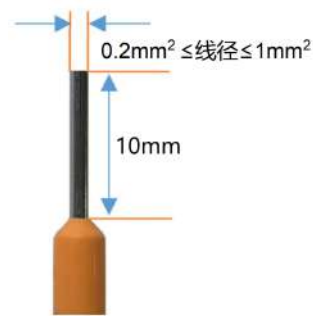
### 3.3 Terminal definition

| Terminal Number | Symbol | Instruction         |
|-----------------|--------|---------------------|
| 1               | DO0    | Signal output       |
| 2               | DO1    |                     |
| 3               | DO2    |                     |
| 4               | DO3    |                     |
| 5               | DO4    |                     |
| 6               | DO5    |                     |
| 7               | DO6    |                     |
| 8               | DO7    |                     |
| 9               | 24V    | Power input (Note1) |
| 10              | DO8    | Signal output       |
| 11              | DO9    |                     |
| 12              | DO10   |                     |
| 13              | DO11   |                     |
| 14              | DO12   |                     |
| 15              | DO13   |                     |
| 16              | DO14   |                     |
| 17              | DO15   |                     |
| 18              | 24V    | Power input (Note1) |

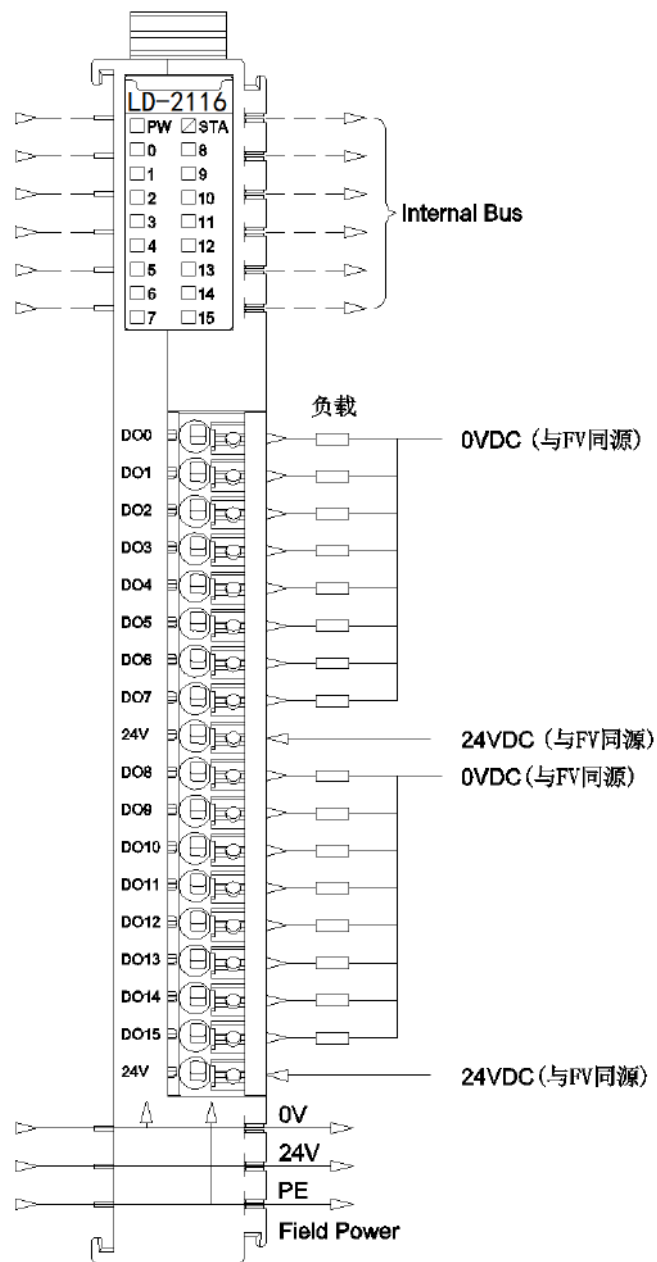
Note 1: When power is supplied separately to the 24V terminal, the total current of all output channels should not exceed 8A.

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



## 4 Wiring



## 5 Process data definition

| Output data |          |          |          |          |          |          |         |         |
|-------------|----------|----------|----------|----------|----------|----------|---------|---------|
| Bit No      | Bit 7    | Bit 6    | Bit 5    | Bit 4    | Bit 3    | Bit 2    | Bit 1   | Bit 0   |
| Byte 0      | DO Ch#7  | DO Ch#6  | DO Ch#5  | DO Ch#4  | DO Ch#3  | DO Ch#2  | DO Ch#1 | DO Ch#0 |
| Byte 1      | DO Ch#15 | DO Ch#14 | DO Ch#13 | DO Ch#12 | DO Ch#11 | DO Ch#10 | DO Ch#9 | DO Ch#8 |

Data Description:

**DO Ch#(0-15):** When this bit is 1, the corresponding channel outputs a valid signal at high level; when it is 0, the output is invalid.

0: Output signal is invalid

1: Output signal is valid

## 6 Configuration parameter definition

| Configuration parameter |                               |                               |                               |                               |                               |                               |                              |                              |
|-------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|------------------------------|
| Bit No                  | Bit 7                         | Bit 6                         | Bit 5                         | Bit 4                         | Bit 3                         | Bit 2                         | Bit 1                        | Bit 0                        |
| Byte 0                  | Fault Action for Output Ch#7  | Fault Action for Output Ch#6  | Fault Action for Output Ch#5  | Fault Action for Output Ch#4  | Fault Action for Output Ch#3  | Fault Action for Output Ch#2  | Fault Action for Output Ch#1 | Fault Action for Output Ch#0 |
| Byte 1                  | Fault Action for Output Ch#15 | Fault Action for Output Ch#14 | Fault Action for Output Ch#13 | Fault Action for Output Ch#12 | Fault Action for Output Ch#11 | Fault Action for Output Ch#10 | Fault Action for Output Ch#9 | Fault Action for Output Ch#8 |
| Byte 2                  | Fault Value for Output Ch#7   | Fault Value for Output Ch#6   | Fault Value for Output Ch#5   | Fault Value for Output Ch#4   | Fault Value for Output Ch#3   | Fault Value for Output Ch#2   | Fault Value for Output Ch#1  | Fault Value for Output Ch#0  |
| Byte 3                  | Fault Value for Output Ch#15  | Fault Value for Output Ch#14  | Fault Value for Output Ch#13  | Fault Value for Output Ch#12  | Fault Value for Output Ch#11  | Fault Value for Output Ch#10  | Fault Value for Output Ch#9  | Fault Value for Output Ch#8  |

|  |   |   |   |   |   |   |  |  |
|--|---|---|---|---|---|---|--|--|
|  | 5 | 4 | 3 | 2 | 1 | 0 |  |  |
|--|---|---|---|---|---|---|--|--|

Data Description:

**Fault Action for Output Ch#(0-15):** Fault output mode, when the IO module detects an internal bus anomaly and communication failure with the coupler, entering offline mode, the output data is processed in this way. (Default value: 0)

0: Maintain the last output state.

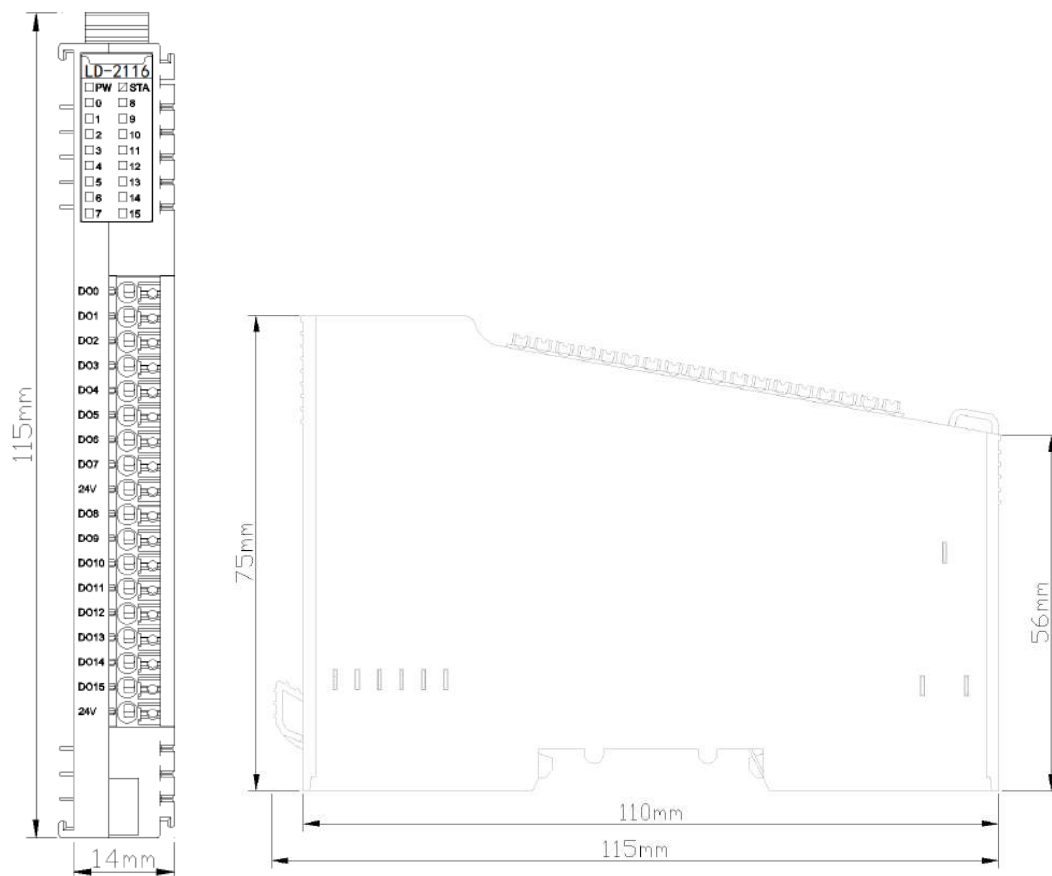
1: Output the fault value.

**Fault Value for Output Ch#(0-15):** When the fault output mode is set to 1, this bit sets the fault output value. When the IO module's internal bus goes offline, this set value is output. (Default value: 0)

0: Output low level.

1: Output high level.

## A Dimension drawing



## LD-2032 32 channels digital output/24VDC/PNP

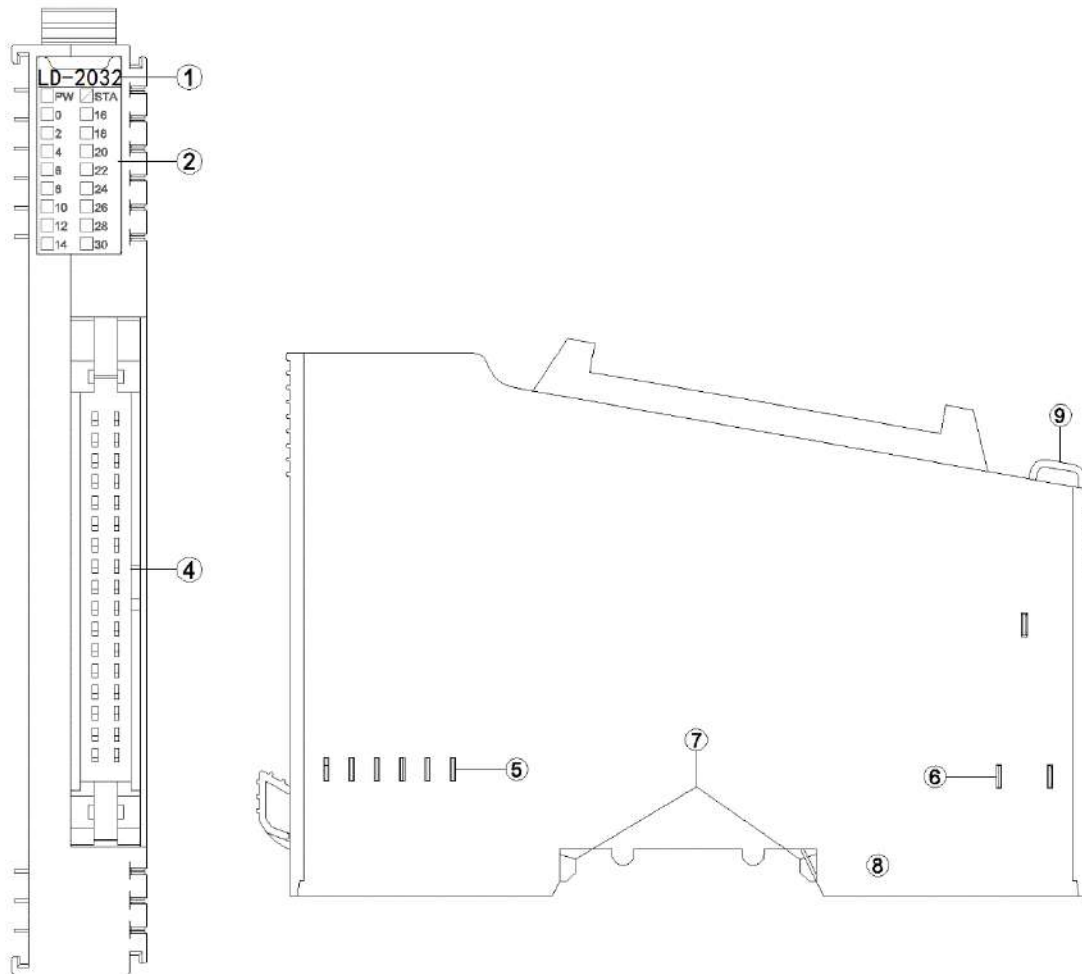
### 1 Module features

- ◆ the module supports 32 channels digital output; the output voltage is 24VDC and the output high level is valid.
- ◆ module can drive field equipment. (relay, solenoid valve, etc.)
- ◆ the internal bus of the module and field output are using opto-coupler.
- ◆ the module carries 32 digital output channel LED indicator light.
- ◆ the module has the functions of thermal shutdown and overcurrent protection.
- ◆ the module supports short circuit protection and overload protection.

### 2 Technical parameters

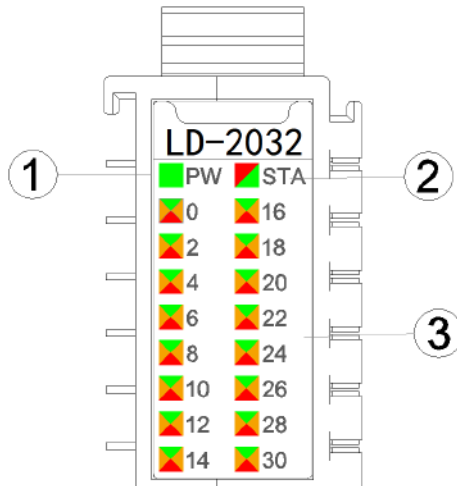
| General Parameters        |                                                                                                                                    |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Power                     | Max.175mA@5.0Vdc                                                                                                                   |
| Isolation                 | I/O to internal bus: opto-couple isolation (3KVrms)                                                                                |
| Field Power               | Nominal:24Vdc, Range:22-28Vdc                                                                                                      |
| Wiring                    | 34P male connector 2.54mm Pin header                                                                                               |
| Mounting Type             | 35mm DIN-Rail                                                                                                                      |
| Size                      | 115*14*75mm                                                                                                                        |
| Weight                    | 65g                                                                                                                                |
| Environment Specification |                                                                                                                                    |
| Operational Temperature   | -40~85°C                                                                                                                           |
| Operational Humidity      | 5%-95% (No Condensation)                                                                                                           |
| Ingress Protection Rating | IP20                                                                                                                               |
| Output Parameters         |                                                                                                                                    |
| Channel Number            | 32 channels source type output                                                                                                     |
| LED Indicator             | 32 channel output LED indicator                                                                                                    |
| Rated Current             | Typical value: 300mA                                                                                                               |
| Leakage Current           | Max: 10uA                                                                                                                          |
| Output Impedance          | <200mΩ                                                                                                                             |
| Output Delay              | OFF to ON: Max.100us<br>ON to OFF: Max.150us                                                                                       |
| Protection                | Overtemperature shutdown: typical value is 135°C<br>Overcurrent protection: typical value 1.1A<br>Short circuit protection support |

### 3 Hardware interfaces



- ① Module Type
- ② State indicator
- ④ 34P male connector
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Output channel LED indicator (green/red/orange)

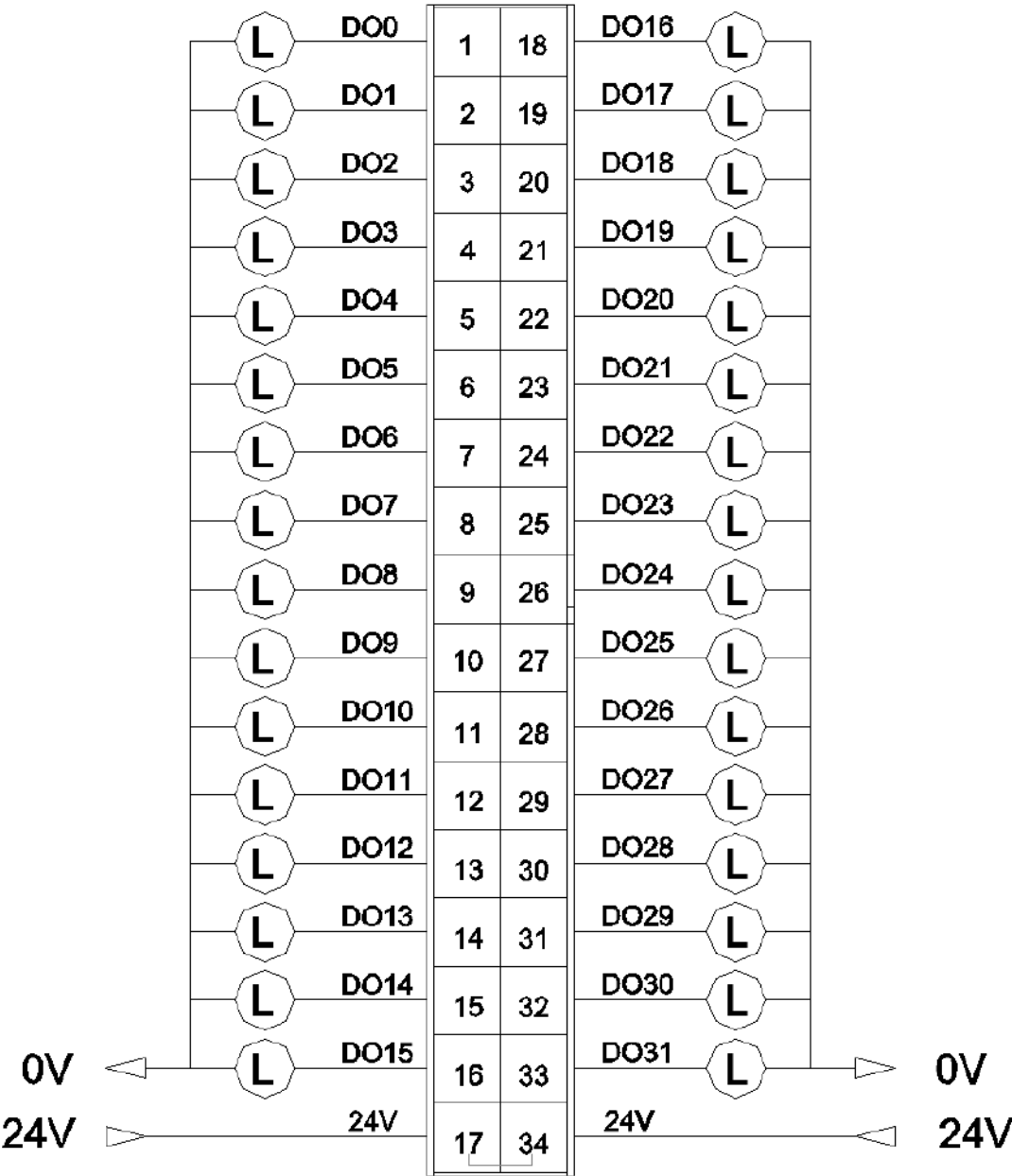
| PW Power State                | Definition                                                        |
|-------------------------------|-------------------------------------------------------------------|
| ON                            | Internal bus power supply normal                                  |
| OFF                           | Internal bus power supply failure                                 |
| STA Module State              | Definition                                                        |
| Green slow flash (2.5 Hz)     | Module internal bus is not started                                |
| Red slow flash (2.5 Hz)       | Module internal bus offline                                       |
| ON (GREEN)                    | Operation normal                                                  |
| Flash (2.5 Hz)<br>(RED/GREEN) | updating mode                                                     |
| Flash (10 Hz)<br>(RED/GREEN)  | firmware update                                                   |
| Double Flash (RED)            | Module exception has been soft-restarted                          |
| 0-31 channel indicator LED    | Definition                                                        |
| ON (GREEN)                    | Indicates that the output channel signal is valid                 |
| ON (RED)                      | Indicates that the output channel +1 signal is valid              |
| ON (ORANGE)                   | Indicates that the output channel and channel +1 signal are valid |
| OFF                           | Output signal is invalid                                          |

### 3.2 Terminal definition

| Description   | Symbol | Terminal Number | Terminal Number | Symbol | Description   |
|---------------|--------|-----------------|-----------------|--------|---------------|
| Signal Output | DO0    | 1               | 18              | DO16   | Signal Output |
|               | DO1    | 2               | 19              | DO17   |               |
|               | DO2    | 3               | 20              | DO18   |               |
|               | DO3    | 4               | 21              | DO19   |               |
|               | DO4    | 5               | 22              | DO20   |               |
|               | DO5    | 6               | 23              | DO21   |               |
|               | DO6    | 7               | 24              | DO22   |               |
|               | DO7    | 8               | 25              | DO23   |               |
|               | DO8    | 9               | 26              | DO24   |               |
|               | DO9    | 10              | 27              | DO25   |               |
|               | DO10   | 11              | 28              | DO26   |               |
|               | DO11   | 12              | 29              | DO27   |               |
|               | DO12   | 13              | 30              | DO28   |               |
|               | DO13   | 14              | 31              | DO29   |               |
|               | DO14   | 15              | 32              | DO30   |               |
|               | DO15   | 16              | 33              | DO31   |               |
| 24V           | 24V    | 17              | 34              | 24V    | 24V           |

Pins 17 and 34 are internally short-circuited.

**4 Wiring**



Terminals 17 and 34 are internally short-circuited

| Configuration parameters |                               |                               |                               |                               |                               |                               |                               |                               |
|--------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Bit No                   | Bit 7                         | Bit 6                         | Bit 5                         | Bit 4                         | Bit 3                         | Bit 2                         | Bit 1                         | Bit 0                         |
| Byte 0                   | Fault Action for Output Ch#7  | Fault Action for Output Ch#6  | Fault Action for Output Ch#5  | Fault Action for Output Ch#4  | Fault Action for Output Ch#3  | Fault Action for Output Ch#2  | Fault Action for Output Ch#1  | Fault Action for Output Ch#0  |
| Byte 1                   | Fault Action for Output Ch#15 | Fault Action for Output Ch#14 | Fault Action for Output Ch#13 | Fault Action for Output Ch#12 | Fault Action for Output Ch#11 | Fault Action for Output Ch#10 | Fault Action for Output Ch#9  | Fault Action for Output Ch#8  |
| Byte 2                   | Fault Action for Output Ch#23 | Fault Action for Output Ch#22 | Fault Action for Output Ch#21 | Fault Action for Output Ch#20 | Fault Action for Output Ch#19 | Fault Action for Output Ch#18 | Fault Action for Output Ch#17 | Fault Action for Output Ch#16 |
| Byte 3                   | Fault Action for Output Ch#31 | Fault Action for Output Ch#30 | Fault Action for Output Ch#29 | Fault Action for Output Ch#28 | Fault Action for Output Ch#27 | Fault Action for Output Ch#26 | Fault Action for Output Ch#25 | Fault Action for Output Ch#24 |

|        | 1                            | 0                            | 9                            | 8                            | 7                            | 6                            | 5                            | 4                            |
|--------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Byte 4 | Fault Value for Output Ch#7  | Fault Value for Output Ch#6  | Fault Value for Output Ch#5  | Fault Value for Output Ch#4  | Fault Value for Output Ch#3  | Fault Value for Output Ch#2  | Fault Value for Output Ch#1  | Fault Value for Output Ch#0  |
| Byte 5 | Fault Value for Output Ch#15 | Fault Value for Output Ch#14 | Fault Value for Output Ch#13 | Fault Value for Output Ch#12 | Fault Value for Output Ch#11 | Fault Value for Output Ch#10 | Fault Value for Output Ch#9  | Fault Value for Output Ch#8  |
| Byte 6 | Fault Value for Output Ch#23 | Fault Value for Output Ch#22 | Fault Value for Output Ch#21 | Fault Value for Output Ch#20 | Fault Value for Output Ch#19 | Fault Value for Output Ch#18 | Fault Value for Output Ch#17 | Fault Value for Output Ch#16 |
| Byte 7 | Fault Value for Output Ch#31 | Fault Value for Output Ch#30 | Fault Value for Output Ch#29 | Fault Value for Output Ch#28 | Fault Value for Output Ch#27 | Fault Value for Output Ch#26 | Fault Value for Output Ch#25 | Fault Value for Output Ch#24 |

Data description:

**Fault Action for Output Ch#(0-31):** Fault Output mode. When the IO module detects an internal bus exception and fails to communicate with the adapter. And the module will turn to offline mode, so the output data is processed in this way. (default: 0)

0: keep the last time output State.

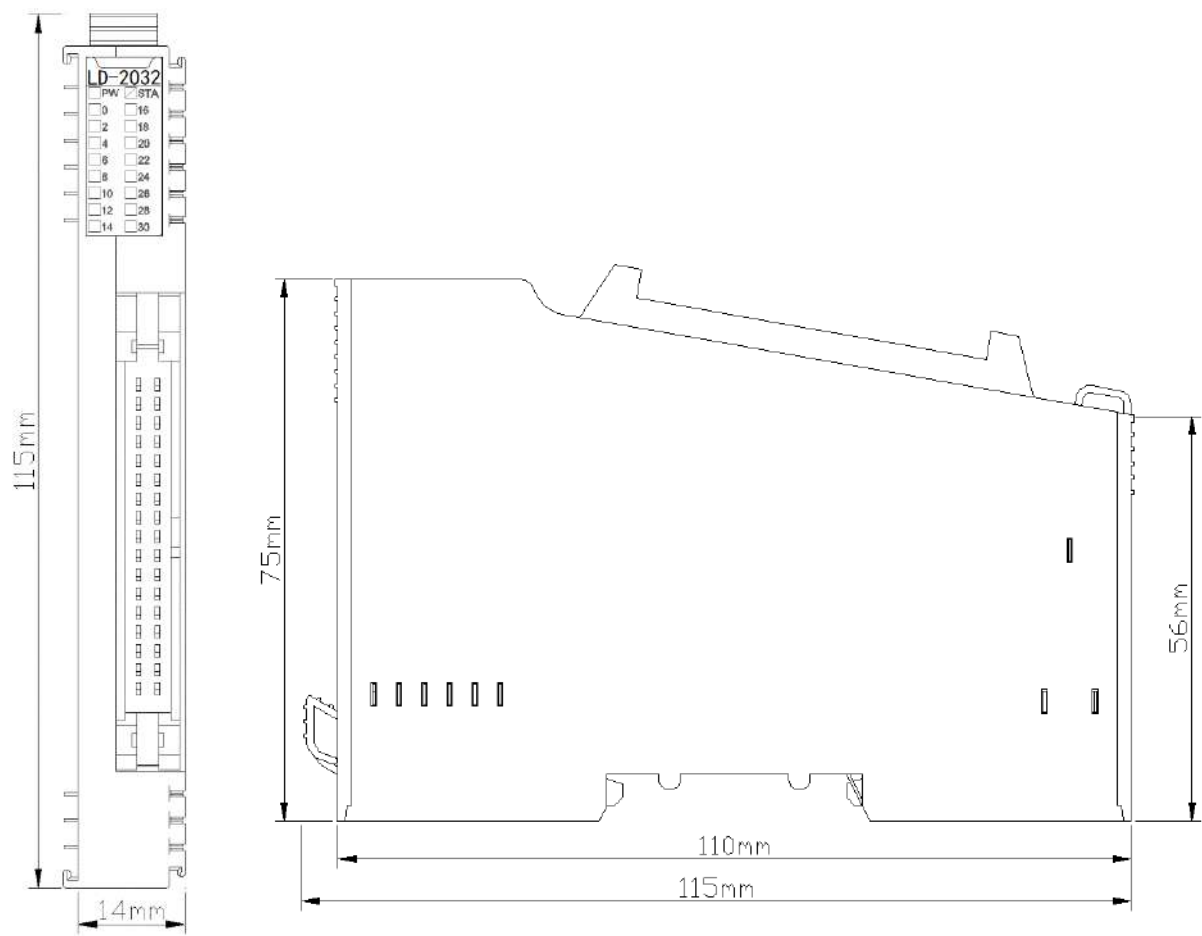
1: output fault value.

**Fault Value for Output Ch#(0-31):** when the Fault Output mode is 1, this bit sets the Fault Output Value, and this setting value will be outputted when the internal bus of IO module is offline. (default: 0)

0: Output low level.

1: Output high level.

**A Dimension drawing**



## LD-4016 16 channels digital output/24VDC/NPN

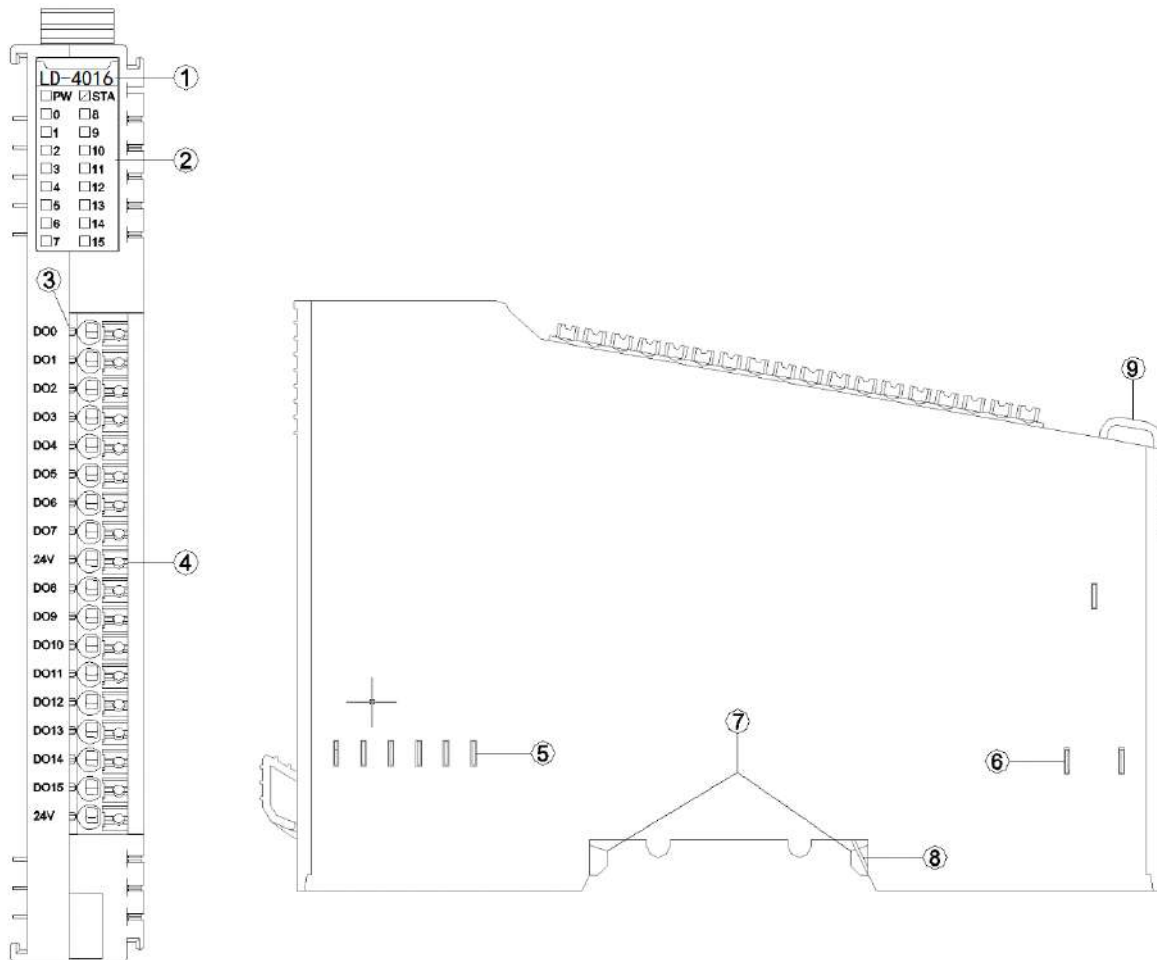
### 1 Module features

- ◆ the module supports 16 channels digital output, the output voltage is 0V and the output low level is valid.
- ◆ the module can drive field equipment (relay, solenoid valve, etc.)
- ◆ the internal bus and field output of the module both adopt electromagnetic isolation
- ◆ the module carries 16 digital output channel LED indicator
- ◆ the module has the function of thermal shutdown and over current protection

### 2 Technical parameters

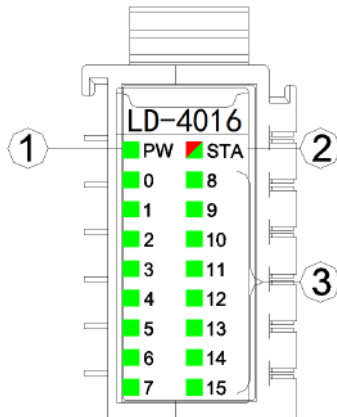
| General Parameters        |                                                                                                                                      |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Power                     | Max.140mA@5.0Vdc                                                                                                                     |
| Isolation                 | I/O to internal bus: opto-couple isolation (3KVrms)                                                                                  |
| Field Power               | Nominal:24Vdc, Range:22-28Vdc                                                                                                        |
| VCLAMP Voltage            | Nominal:24Vdc, Input range:12-36Vdc                                                                                                  |
| Wiring                    | I/O wiring: Max.1.0mm <sup>2</sup> (AWG 17)                                                                                          |
| Mounting Type             | 35mm DIN-Rail                                                                                                                        |
| Size                      | 115*14*75mm                                                                                                                          |
| Weight                    | 65g                                                                                                                                  |
| Environment Specification |                                                                                                                                      |
| Operational Temperature   | -40~85°C                                                                                                                             |
| Operational Humidity      | 5%-95% (No Condensation)                                                                                                             |
| Ingress Protection Rating | IP20                                                                                                                                 |
| Output Parameters         |                                                                                                                                      |
| Channel Number            | 16 channel sink type output                                                                                                          |
| LED Indicator             | 16 channel output LED indicator                                                                                                      |
| Rated Current             | single channel output: Max.1000mA<br>simultaneously output: Max.500mA                                                                |
| Leakage Current           | Max. 10uA                                                                                                                            |
| On Resistance             | Typical value: 500mΩ                                                                                                                 |
| Output Delay              | OFF to ON: Max.100us<br>ON to OFF: Max.150us                                                                                         |
| Protection Function       | Over-temperature shut down: typical value 160°C<br>Overcurrent protection: typical value 1.8A<br>Short circuit protection: supported |

### 3 Hardware interfaces



- ① Module Type
- ② State indicator
- ③ Channel indicator
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

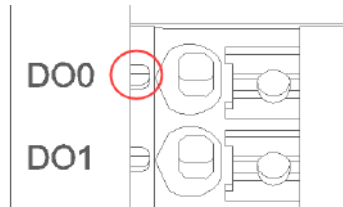
### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State indicator LED (red/green)
- ③ Output channel indicator LED (green)

| PW Power State               | Definition                               |
|------------------------------|------------------------------------------|
| ON                           | Internal bus power supply normal         |
| OFF                          | Internal bus power supply failure        |
| STA Module State (RED/GREEN) | Definition                               |
| Green slow flash (2.5 Hz)    | Module internal bus is not started       |
| Red slow flash (2.5 Hz)      | Module internal bus offline              |
| ON (GREEN)                   | Operation normal                         |
| Flash (2.5 Hz) (RED/GREEN)   | updating mode                            |
| Flash (10 Hz) (RED/GREEN)    | firmware update                          |
| Double Flash (RED)           | Module exception has been soft-restarted |
| 0-15 channel indicator LED   | Definition                               |
| ON                           | Output signal valid                      |
| OFF                          | Output signal invalid                    |

### 3.2 Field channel LED indicator (Green)



When output signal of output channel is valid, the corresponding field channel LED indicator is on.

### 3.3 Terminal definition

| Terminal Number | Symbol | The Description     |
|-----------------|--------|---------------------|
| 1               | DO0    | Signal output       |
| 2               | DO1    |                     |
| 3               | DO2    |                     |
| 4               | DO3    |                     |
| 5               | DO4    |                     |
| 6               | DO5    |                     |
| 7               | DO6    |                     |
| 8               | DO7    |                     |
| 9               | 24V    | Power input (note1) |
| 10              | DO8    | Signal output       |
| 11              | DO9    |                     |
| 12              | DO10   |                     |
| 13              | DO11   |                     |
| 14              | DO12   |                     |
| 15              | DO13   |                     |
| 16              | DO14   |                     |
| 17              | DO15   |                     |
| 18              | 24V    | Power input (note1) |

Note 1: There are two access methods for this power input port depending on the type of load.

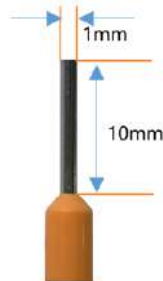
A: When the load is ordinary resistive load, this port is the selected port. When the 24V power supply is connected, the output channel can output 0V normally, meanwhile the terminal channel indicator LED will be on. When the 24V power supply is not connected, the output channel can output 0V normally, but the terminal channel indicator LED will be off.

B: When the load is inductive loads such as coils, this port is the VCLAMP voltage clamp port. This port must be connected to the positive pole of the inductive load

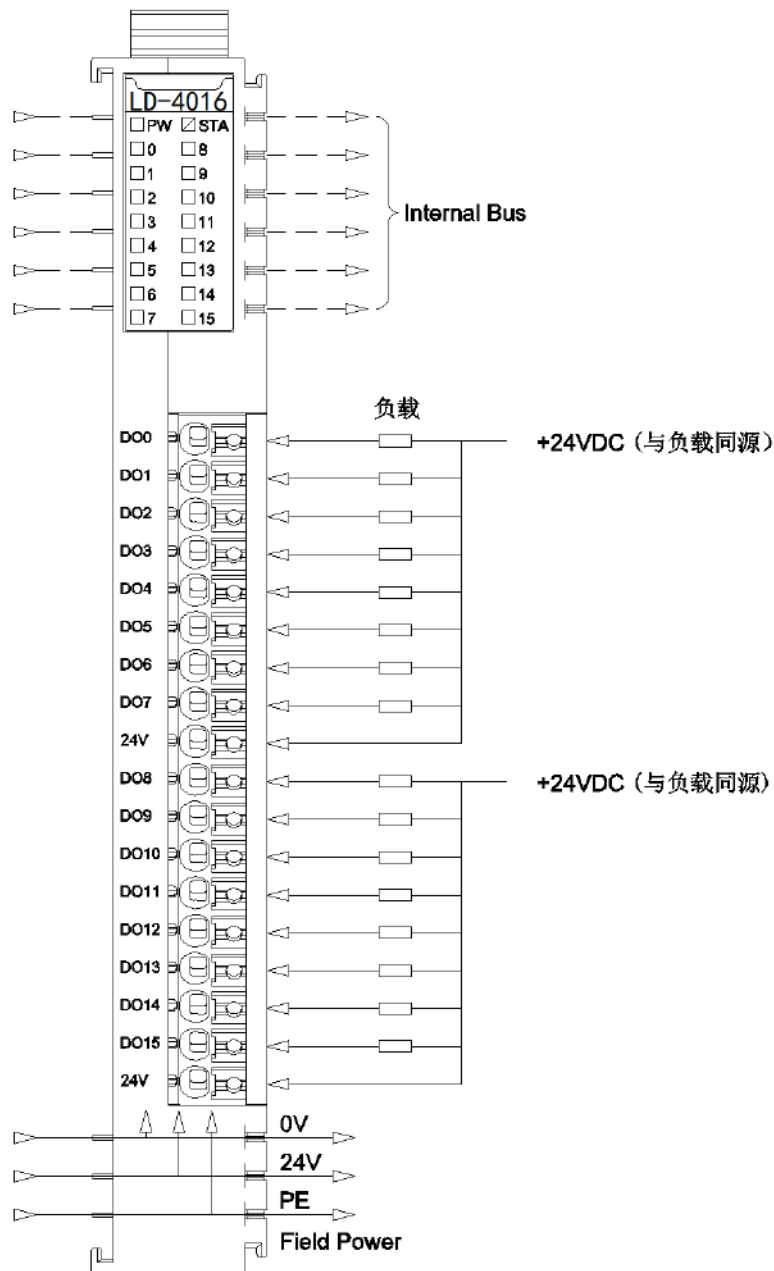
power supply; it could provide a continuous current circuit when the inductive load disconnects.

It is recommended to use cables with cores smaller than  $1\text{mm}^2$ .

The cold-pressed terminal parameters are as follows:



## 4 Wiring



## 5 Process data definition

| Output data |          |          |          |          |          |          |         |         |
|-------------|----------|----------|----------|----------|----------|----------|---------|---------|
| Bit No      | Bit 7    | Bit 6    | Bit 5    | Bit 4    | Bit 3    | Bit 2    | Bit 1   | Bit 0   |
| Byte 0      | DO Ch#7  | DO Ch#6  | DO Ch#5  | DO Ch#4  | DO Ch#3  | DO Ch#2  | DO Ch#1 | DO Ch#0 |
| Byte 1      | DO Ch#15 | DO Ch#14 | DO Ch#13 | DO Ch#12 | DO Ch#11 | DO Ch#10 | DO Ch#9 | DO Ch#8 |

Data declaration:

**DO Ch#(0-15):** when this bit is 1, the corresponding channel output signal is valid, the output is low level, and the output is invalid when it is 0.

0: Output signal is invalid

1: Output signal is valid

## 6 Configuration parameter definitions

| Configuration parameters |                               |                               |                               |                               |                               |                               |                              |                              |
|--------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|------------------------------|
| Bit No                   | Bit 7                         | Bit 6                         | Bit 5                         | Bit 4                         | Bit 3                         | Bit 2                         | Bit 1                        | Bit 0                        |
| Byte 0                   | Fault Action for Output Ch#7  | Fault Action for Output Ch#6  | Fault Action for Output Ch#5  | Fault Action for Output Ch#4  | Fault Action for Output Ch#3  | Fault Action for Output Ch#2  | Fault Action for Output Ch#1 | Fault Action for Output Ch#0 |
| Byte 1                   | Fault Action for Output Ch#15 | Fault Action for Output Ch#14 | Fault Action for Output Ch#13 | Fault Action for Output Ch#12 | Fault Action for Output Ch#11 | Fault Action for Output Ch#10 | Fault Action for Output Ch#9 | Fault Action for Output Ch#8 |
| Byte 2                   | Fault Value for Output Ch#7   | Fault Value for Output Ch#6   | Fault Value for Output Ch#5   | Fault Value for Output Ch#4   | Fault Value for Output Ch#3   | Fault Value for Output Ch#2   | Fault Value for Output Ch#1  | Fault Value for Output Ch#0  |
| Byte 3                   | Fault Value for Output Ch#15  | Fault Value for Output Ch#14  | Fault Value for Output Ch#13  | Fault Value for Output Ch#12  | Fault Value for Output Ch#11  | Fault Value for Output Ch#10  | Fault Value for Output Ch#9  | Fault Value for Output Ch#8  |

Data description:

**Fault Action for Output Ch#(0-15):** Fault Output mode. When the IO module detects an internal bus exception and fails to communicate with the adapter. And the module will turn to offline mode, so the output data is processed in this way. (default: 0)

0: keep the last time output State.

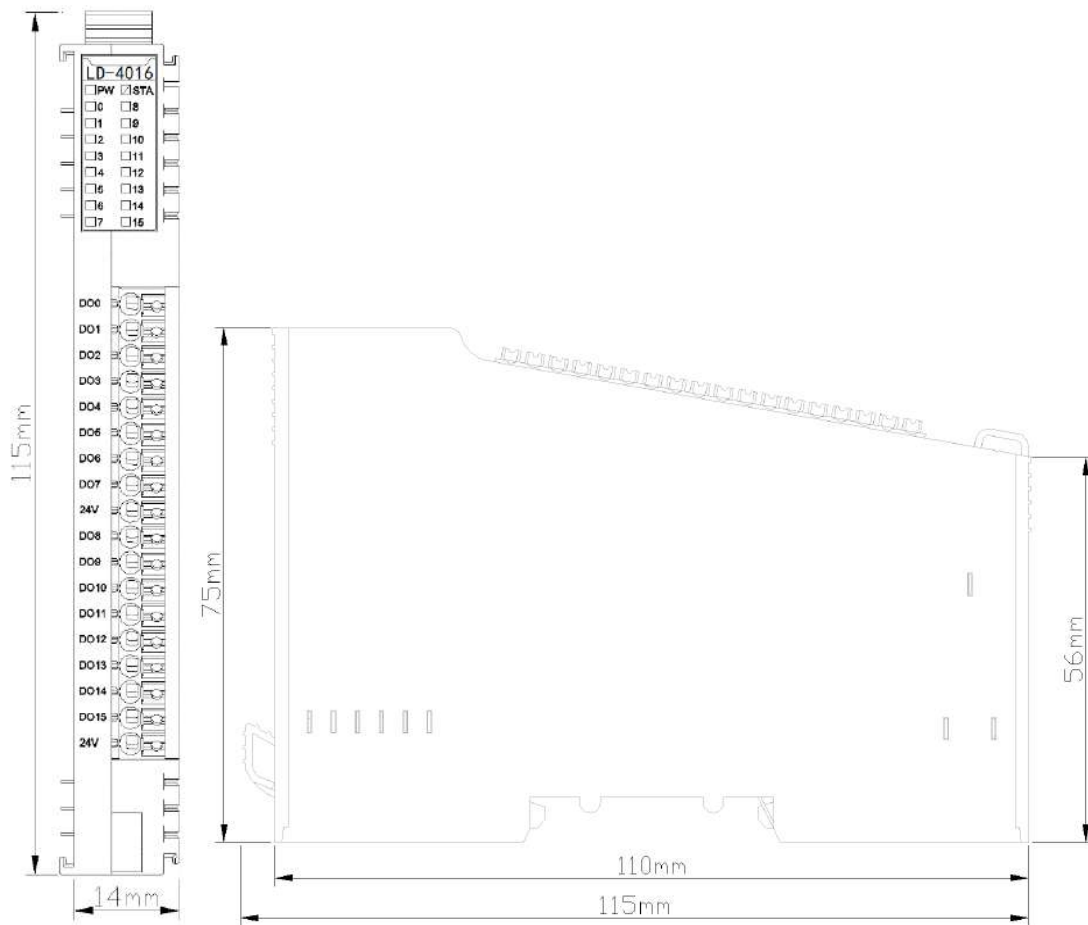
1: output fault value.

**Fault Value for Output Ch#(0-15):** when the Fault Output mode is 1, this bit sets the Fault Output Value, and this setting value will be outputted when the internal bus of IO module is offline. (default: 0)

0: Output low level.

1: Output high level.

## A Dimension drawing



## LD-4032 32-Channel Digital Output / 24VDC / NPN

### 1 Module Features

- ◆ The module supports 32 channels of digital output, with active low output, and output voltage of 0V
- ◆ The module can drive field equipment (relays, solenoid valves, etc.)
- ◆ The module's internal bus and field outputs use electromagnetic isolation
- ◆ The module comes with LED indicators for 32 digital output channels

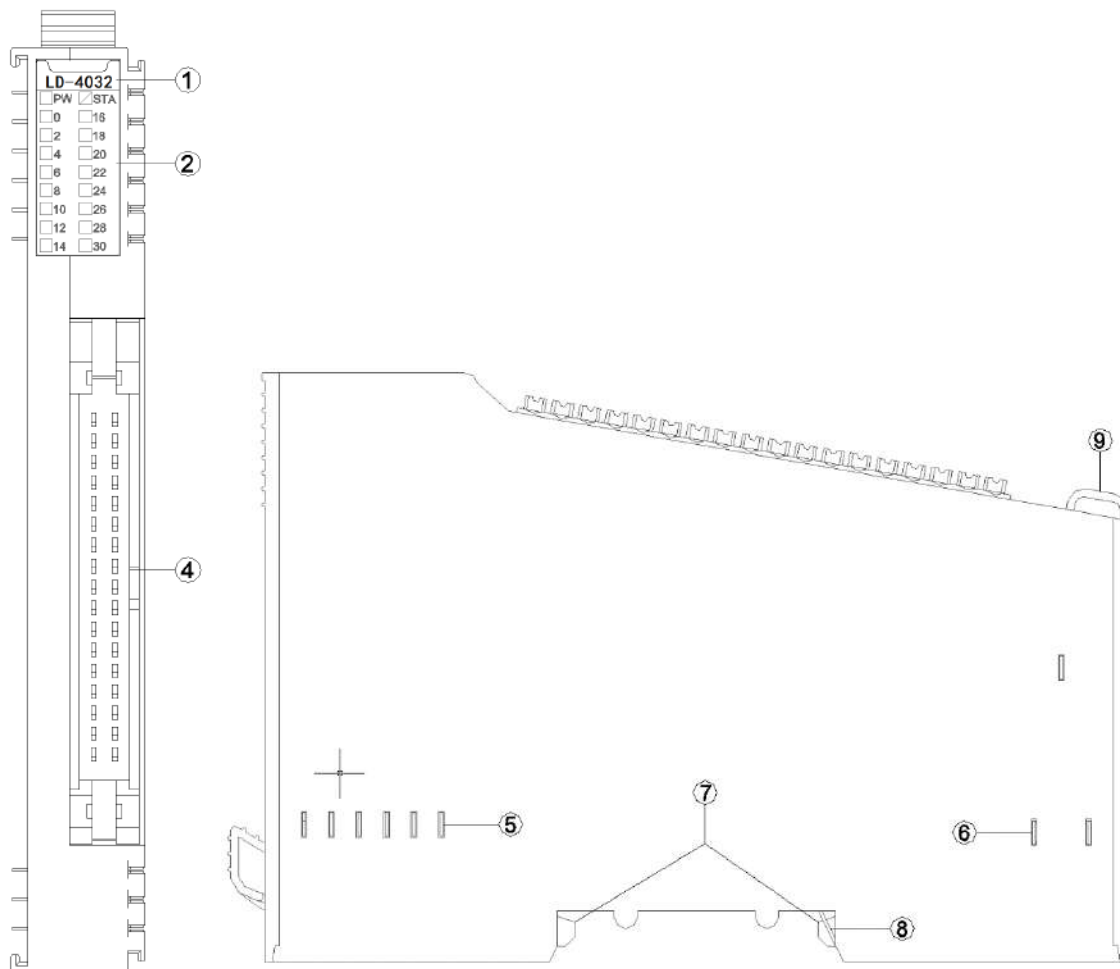
- ◆ The module has overcurrent protection and thermal shutdown functions

## 2 Technical Parameters

| General Parameters        |                                                                                                                                  |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| System Power              | Max.175mA@5.0Vdc                                                                                                                 |
| Isolation                 | I/O to internal bus: opto-coupler isolation (3KVrms)                                                                             |
| Field Power               | Nominal voltage: 24Vdc<br>Input range: 22~28Vdc                                                                                  |
| VCLAMP Power              | Nominal voltage : 24Vdc<br>Input range : 12~36V                                                                                  |
| Wiring                    | I/O wiring : Max.1.0mm <sup>2</sup> (AWG 17)                                                                                     |
| Mounting Type             | 35mm DIN-Rail                                                                                                                    |
| Size                      | 115*14*75mm                                                                                                                      |
| Weight                    | 65g                                                                                                                              |
| Environment Specification |                                                                                                                                  |
| Operation Temperature     | -40~85°C                                                                                                                         |
| Operation Humidity        | 5%-95%(No Condensation)                                                                                                          |
| Ingress Protection Rating | IP20                                                                                                                             |
| Output parameter          |                                                                                                                                  |
| Channel Number            | 32-channel output NPN                                                                                                            |
| Indicator                 | 32 channel output indicators                                                                                                     |
| Rated current             | Single-channel output : Max.1000mA<br>16 channels simultaneous output : Max.500mA<br>32 channels simultaneous output : Max.300mA |
| Leakage current           | Maximum value : 10uA                                                                                                             |
| Output impedance          | typical value : 500mΩ                                                                                                            |

|                     |                                                                                                                                                                                                 |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output delay        | <p>OFF to ON :Max.100us</p> <p>ON to OFF :Max.150us</p>                                                                                                                                         |
| Protection function | <p>Temperature protection : typical value 160°C</p> <p>Protection current : typical value 1.8A</p> <p>Short circuit protection : support</p> <p>Associated protection: 4 channels per group</p> |

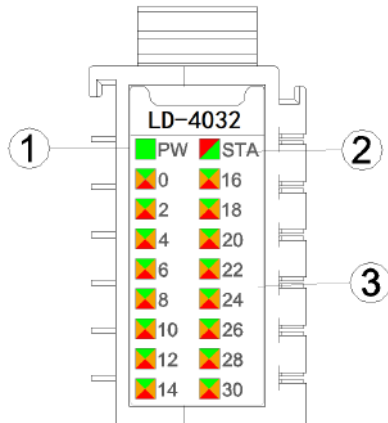
### 3 Hardware interfaces



- ① Module Type
- ② State indicators
- ③ -
- ④ Wiring Terminal and Marking
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle

- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicators Definition



- ④ Power indicator (green)
- ⑤ Module state indicator (red/green)
- ⑥ Input/output channel indicators (green)

| PW power indicator         | Definition                                          |
|----------------------------|-----------------------------------------------------|
| ON                         | Internal bus power supply normal                    |
| OFF                        | Internal bus power supply failure                   |
| STA module state indicator | Definition                                          |
| Green slow flash (2.5hz)   | The internal bus of the module is not started       |
| Red slow flash (2.5hz)     | Module internal bus offline                         |
| Green normally on          | Module works normally                               |
| Flash(2.5Hz) (RED/GREEN)   | Operating mode                                      |
| Flash(10Hz) (RED/GREEN)    | Firmware upgrading                                  |
| Red flashes twice          | Module exception has been soft-restarted            |
| 0-31 channel indicators    | Definition                                          |
| Green ON                   | Output signal valid                                 |
| Red ON                     | Indicate output channel +1 signal valid             |
| Orange ON                  | Indicate output channel and channel +1 signal valid |
| OFF                        | Output signal invalid                               |

### 3.2

#### Terminal definition

| Instruction | Symbol | Terminal Numb | Terminal Numb | Symbol | Instruction |
|-------------|--------|---------------|---------------|--------|-------------|
|-------------|--------|---------------|---------------|--------|-------------|

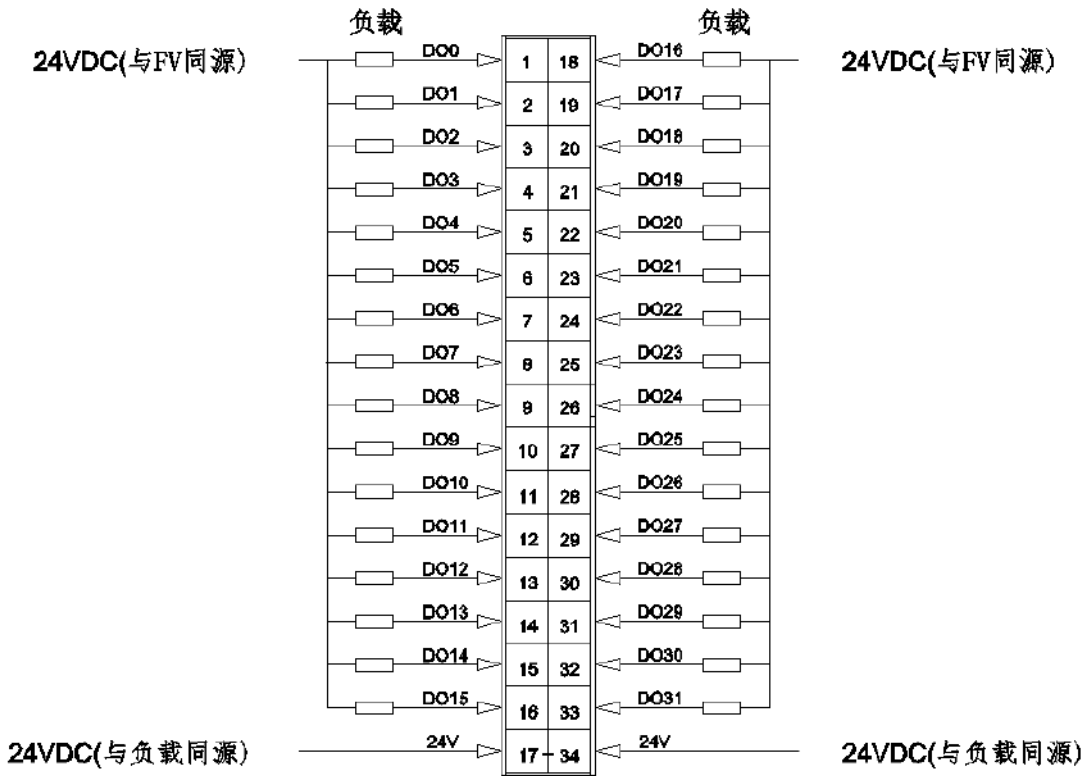
|               |      | er | er |      |              |
|---------------|------|----|----|------|--------------|
| Signal output | DO0  | 1  | 18 | DO16 | Signal input |
|               | DO1  | 2  | 19 | DO17 |              |
|               | DO2  | 3  | 20 | DO18 |              |
|               | DO3  | 4  | 21 | DO19 |              |
|               | DO4  | 5  | 22 | DO20 |              |
|               | DO5  | 6  | 23 | DO21 |              |
|               | DO6  | 7  | 24 | DO22 |              |
|               | DO7  | 8  | 25 | DO23 |              |
|               | DO8  | 9  | 26 | DO24 |              |
|               | DO9  | 10 | 27 | DO25 |              |
|               | DO10 | 11 | 28 | DO26 |              |
|               | DO11 | 12 | 29 | DO27 |              |
|               | DO12 | 13 | 30 | DO28 |              |
|               | DO13 | 14 | 31 | DO29 |              |
|               | DO14 | 15 | 32 | DO30 |              |
|               | DO15 | 16 | 33 | DO31 |              |
| 24VDC         | 24V  | 17 | 34 | 24V  | 24VDC        |

**Pin 17 and pin 34 are internally shorted**

### 3.3 External terminal block

|                       |                                 |
|-----------------------|---------------------------------|
| Model                 | LX-7032                         |
| Name                  | Spring-type terminal block      |
| Applicable cable wire | LX-8002                         |
| Rated current         | 1A                              |
| Rated Voltage         | DC24V                           |
| Wire                  | Below 1.0mm <sup>2</sup> /AWG16 |

## 4 Wiring



端子17和34内部短接

Pin 17 and pin 34 are internally shorted

## 5 Process data definition

| Output data |          |          |          |          |          |          |          |          |
|-------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Bit No      | Bit 7    | Bit 6    | Bit 5    | Bit 4    | Bit 3    | Bit 2    | Bit 1    | Bit 0    |
| Byte 0      | DO Ch#7  | DO Ch#6  | DO Ch#5  | DO Ch#4  | DO Ch#3  | DO Ch#2  | DO Ch#1  | DO Ch#0  |
| Byte 1      | DO Ch#15 | DO Ch#14 | DO Ch#13 | DO Ch#12 | DO Ch#11 | DO Ch#10 | DO Ch#9  | DO Ch#8  |
| Byte 2      | DO Ch#23 | DO Ch#22 | DO Ch#21 | DO Ch#20 | DO Ch#19 | DO Ch#18 | DO Ch#17 | DO Ch#16 |
| Byte 3      | DO Ch#31 | DO Ch#30 | DO Ch#29 | DO Ch#28 | DO Ch#27 | DO Ch#26 | DO Ch#25 | DO Ch#24 |

Data description:

When this bit is 1, the corresponding channel output signal is valid and outputs a low level; when it is 0, the output is invalid.

0: Output signal is invalid

1: Output signal is valid

## 6 Configuration parameter definition

| Configuration parameter |                               |                               |                               |                               |                               |                               |                               |                               |
|-------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Bit No                  | Bit 7                         | Bit 6                         | Bit 5                         | Bit 4                         | Bit 3                         | Bit 2                         | Bit 1                         | Bit 0                         |
| Byte 0                  | Fault Action for Output Ch#7  | Fault Action for Output Ch#6  | Fault Action for Output Ch#5  | Fault Action for Output Ch#4  | Fault Action for Output Ch#3  | Fault Action for Output Ch#2  | Fault Action for Output Ch#1  | Fault Action for Output Ch#0  |
| Byte 1                  | Fault Action for Output Ch#15 | Fault Action for Output Ch#14 | Fault Action for Output Ch#13 | Fault Action for Output Ch#12 | Fault Action for Output Ch#11 | Fault Action for Output Ch#10 | Fault Action for Output Ch#9  | Fault Action for Output Ch#8  |
| Byte 2                  | Fault Action for Output Ch#23 | Fault Action for Output Ch#22 | Fault Action for Output Ch#21 | Fault Action for Output Ch#20 | Fault Action for Output Ch#19 | Fault Action for Output Ch#18 | Fault Action for Output Ch#17 | Fault Action for Output Ch#16 |

|        | 3                             | 2                             | 1                             | 0                             | 9                             | 8                             | 7                             | 6                             |
|--------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Byte 3 | Fault Action for Output Ch#31 | Fault Action for Output Ch#30 | Fault Action for Output Ch#29 | Fault Action for Output Ch#28 | Fault Action for Output Ch#27 | Fault Action for Output Ch#26 | Fault Action for Output Ch#25 | Fault Action for Output Ch#24 |
| Byte 4 | Fault Value for Output Ch#7   | Fault Value for Output Ch#6   | Fault Value for Output Ch#5   | Fault Value for Output Ch#4   | Fault Value for Output Ch#3   | Fault Value for Output Ch#2   | Fault Value for Output Ch#1   | Fault Value for Output Ch#0   |
| Byte 5 | Fault Value for Output Ch#15  | Fault Value for Output Ch#14  | Fault Value for Output Ch#13  | Fault Value for Output Ch#12  | Fault Value for Output Ch#11  | Fault Value for Output Ch#10  | Fault Value for Output Ch#9   | Fault Value for Output Ch#8   |
| Byte 6 | Fault Value for Output Ch#23  | Fault Value for Output Ch#22  | Fault Value for Output Ch#21  | Fault Value for Output Ch#20  | Fault Value for Output Ch#19  | Fault Value for Output Ch#18  | Fault Value for Output Ch#17  | Fault Value for Output Ch#16  |
| Byte 7 | Fault Value for Output Ch#31  | Fault Value for Output Ch#30  | Fault Value for Output Ch#29  | Fault Value for Output Ch#28  | Fault Value for Output Ch#27  | Fault Value for Output Ch#26  | Fault Value for Output Ch#25  | Fault Value for Output Ch#24  |

Data description:

**Fault Action for Output Ch#(0-31):** Fault output mode, when the IO module detects an internal bus abnormality and communication failure with the coupler, entering offline mode, the output data is processed in this manner. (Default value: 0)

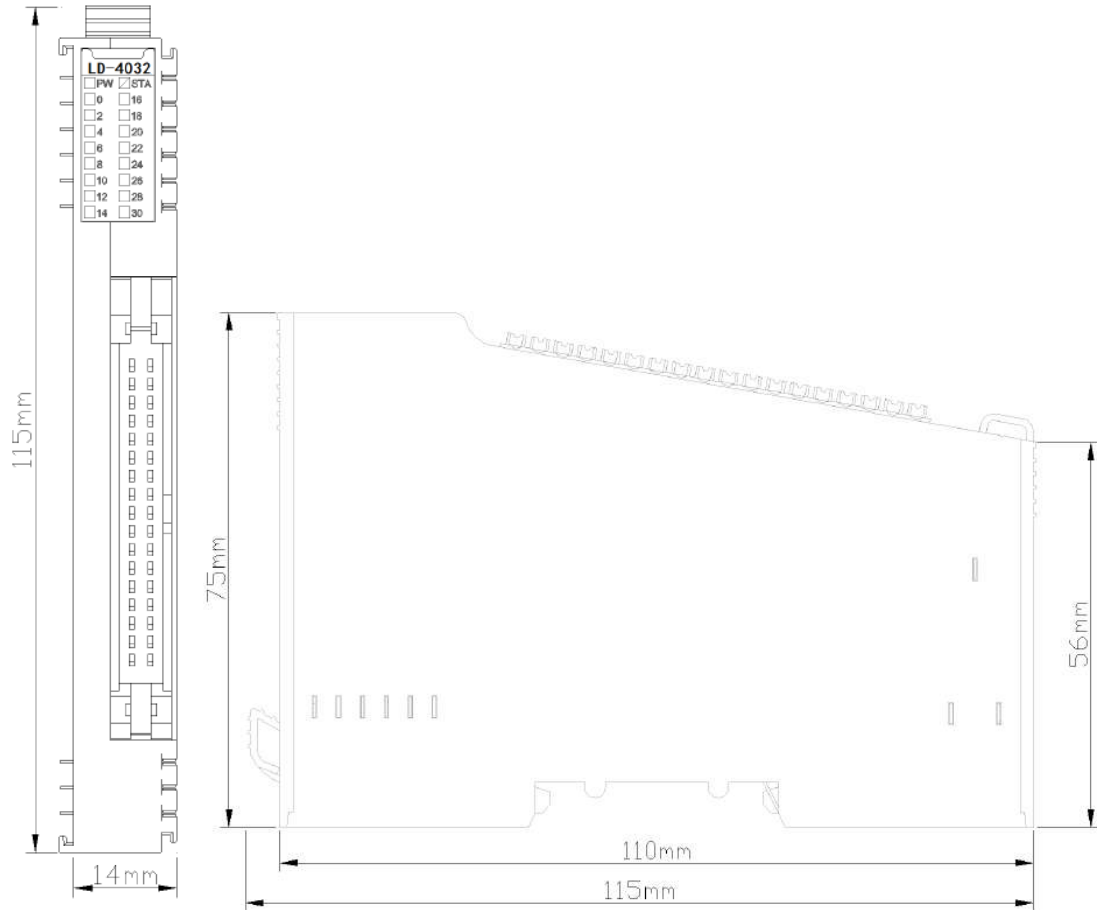
0: Maintain the last output state.

1: Output the fault value.

**Fault Value for Output Ch#(0-31):** When the fault output mode is set to 1, this bit sets the fault output value. When the IO module's internal bus goes offline, it outputs this set value. (Default value: 0)

- 0: Output low level.  
1: Output high level.

## A Dimension drawing



## LD-8008: 8 channels relay output 2A/30VDC/60W

### 1 Module features

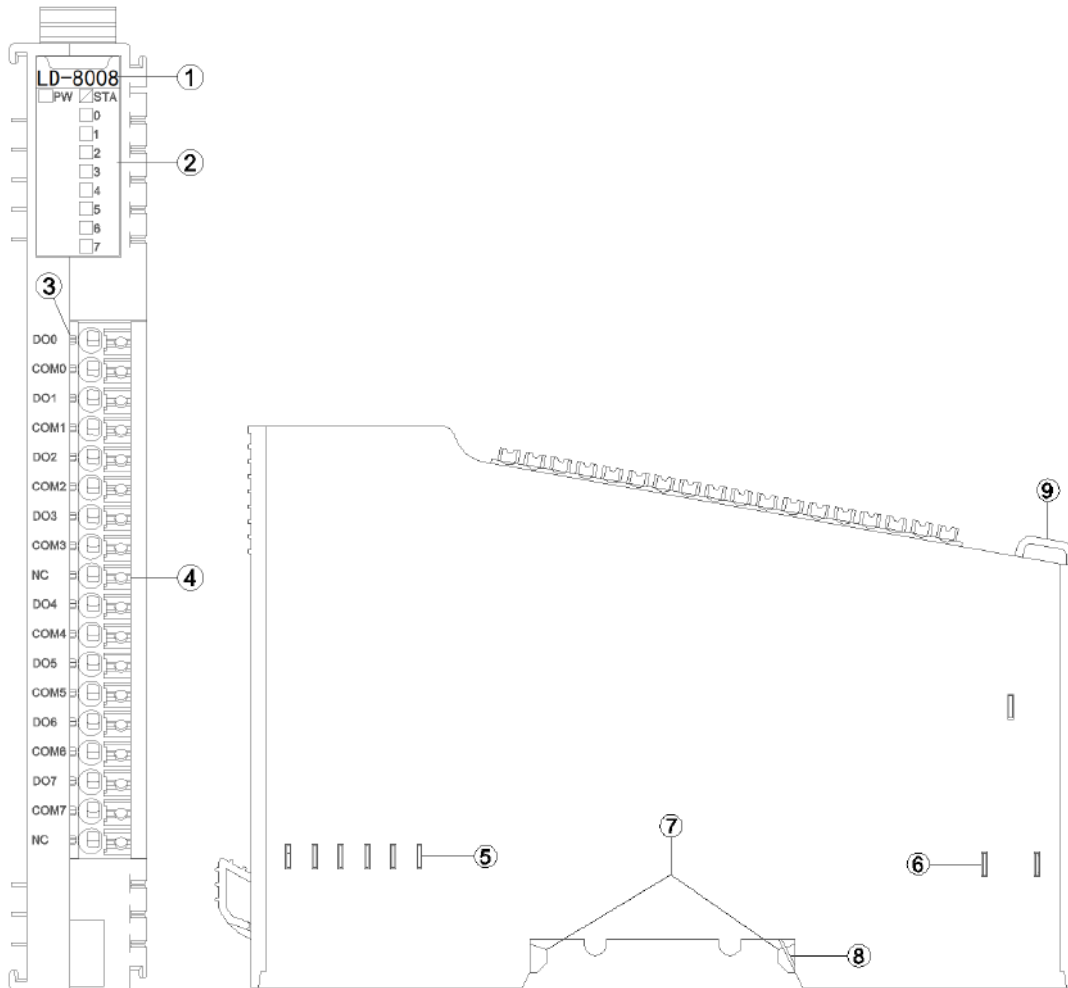
- ◆ 8-channel relay normally on output
- ◆ 8 LED channel indicators
- ◆ Low on resistance ( $\leq 100\text{m}\Omega$ )
- ◆ 250VAC/220VDC the max. switch voltage is 250VAC/220VDC

### 2 Technical Parameters

| General parameters        |                                              |
|---------------------------|----------------------------------------------|
| Power Consumption         | Max.280mA@5.0Vdc                             |
| Isolation                 | I/O to internal bus: coil isolation(1600VAC) |
| Field Power               | Not used                                     |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)              |
| Mounting Type             | 35mm DIN-Rail                                |
| Size                      | 115*14*75mm                                  |
| Weight                    | 65g                                          |
| Environment Specification |                                              |
| Operational Temperature   | -40~85°C                                     |
| Operational Humidity      | 5%~95%(No Condensation)                      |
| Ingress Protection Rating | IP20                                         |
| Output Parameter          |                                              |
| Channel Number            | 8 channel relay normally on output           |
| LED Indicator             | 8 channel output LED Indicator               |
| Max. Switching Current    | 2A                                           |
| Max. Switching Voltage    | 250VAC/220VDC                                |
| Max. Switching Power      | 62.5VA/60W                                   |
| Contact Resistance        | $\leq 100\text{m}\Omega$                     |
| Output Delay              | ON to OFF:Max.3ms<br>OFF to ON:Max.3ms       |
| Mechanical Endurance      | $1 \times 10^8$                              |
| Electricity Endurance     | $1 \times 10^5$                              |
| Vibration                 | 10Hz~55Hz 3.3mm Double vibration amplitude   |

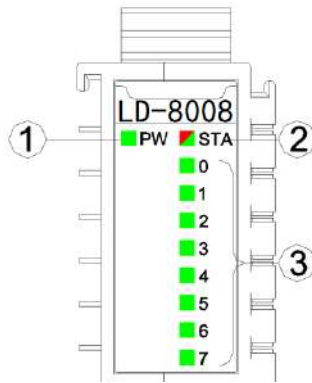
|        |                                                                 |
|--------|-----------------------------------------------------------------|
| Impact | Stability: 735m/s <sup>2</sup><br>Strength: 980m/s <sup>2</sup> |
|--------|-----------------------------------------------------------------|

### 3 Hardware Interface



- ① Module Type
- ② State indicator
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Output channel LED indicator (green)

| PW Power State (GREEN)            | Definition                               |
|-----------------------------------|------------------------------------------|
| ON                                | Internal bus Power Normal                |
| OFF                               | Internal bus Power Failure               |
| STA Module State (RED/GREEN)      | Definition                               |
| Green slow flash (2.5Hz)          | Module internal bus is not started       |
| Red slow flash (2.5Hz)            | Module internal bus offline              |
| ON (GREEN)                        | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)          | Upgrading mode                           |
| Flash(10Hz) (RED/GREEN)           | Firmware Update                          |
| Double Flash (RED)                | Module Exception has been soft-restarted |
| 0-7 channel LED indicator (GREEN) | Definition                               |
| ON                                | Output signal valid                      |
| OFF                               | Output signal invalid                    |

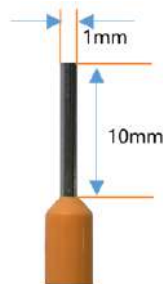
### 3.2 Terminal definition

| Terminal Number | Definition | Description           |
|-----------------|------------|-----------------------|
| 1               | DO0        | Channel 0 output      |
| 2               | COM0       | Channel 0 Common Port |
| 3               | DO1        | Channel 1 output      |
| 4               | COM1       | Channel 1 Common Port |
| 5               | DO2        | Channel 2 output      |
| 6               | COM2       | Channel 2 Common Port |

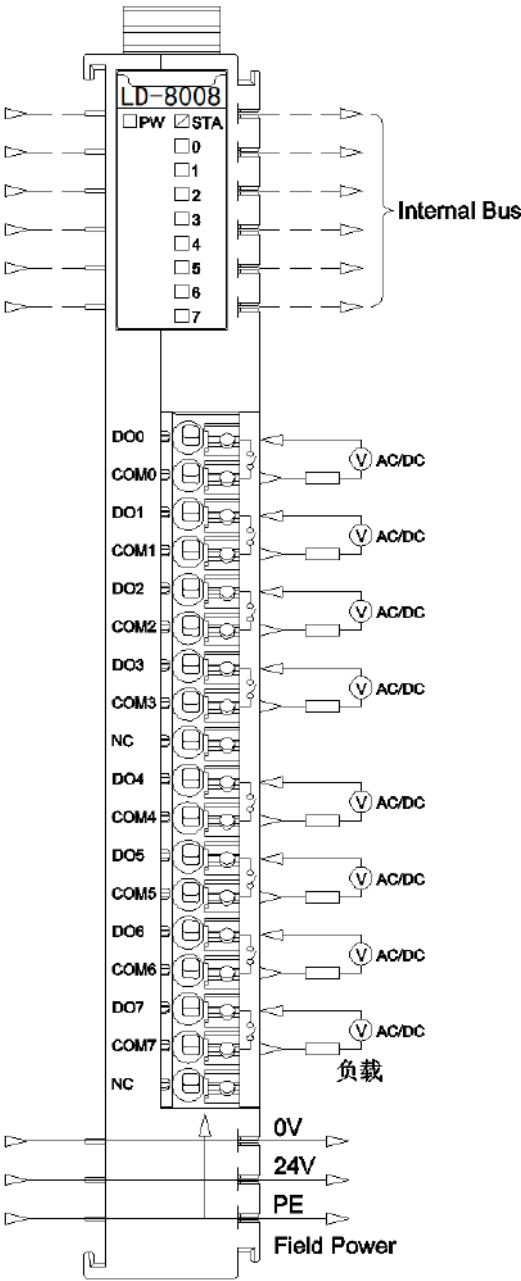
|    |      |                       |
|----|------|-----------------------|
| 7  | DO3  | Channel 3 output      |
| 8  | COM3 | Channel 3 Common Port |
| 9  | NC   | Not Connected         |
| 10 | DO4  | Channel 4 output      |
| 11 | COM4 | Channel 4 Common Port |
| 12 | DO5  | Channel 5 output      |
| 13 | COM5 | Channel 5 Common Port |
| 14 | DO6  | Channel 6 output      |
| 15 | COM6 | Channel 6 Common Port |
| 16 | DO7  | Channel 7 output      |
| 17 | COM7 | Channel 7 Common Port |
| 18 | NC   | Not Connected         |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



4 Wiring



## 5 Process data definition

| Output Data |         |         |         |         |         |         |         |         |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Bit No      | Bit 7   | Bit 6   | Bit 5   | Bit 4   | Bit 3   | Bit 2   | Bit 1   | Bit 0   |
| Byte 0      | DO Ch#7 | DO Ch#6 | DO Ch#5 | DO Ch#4 | DO Ch#3 | DO Ch#2 | DO Ch#1 | DO Ch#0 |

Data description:

**DO Ch#(0-7):** When the bit is 1, the output signal of corresponding channel is effective and the output contact of relay is closed. When the bit is 0, the output is invalid and the relay contact is disconnected.

0: The output signal is invalid

1: The output signal is valid

## 6 Configuration parameters definition

| Configuration parameters |                              |                              |                              |                              |                              |                              |                              |                              |
|--------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Bit No                   | Bit 7                        | Bit 6                        | Bit 5                        | Bit 4                        | Bit 3                        | Bit 2                        | Bit 1                        | Bit 0                        |
| Byte 0                   | Fault Action for Output Ch#7 | Fault Action for Output Ch#6 | Fault Action for Output Ch#5 | Fault Action for Output Ch#4 | Fault Action for Output Ch#3 | Fault Action for Output Ch#2 | Fault Action for Output Ch#1 | Fault Action for Output Ch#0 |
| Byte 1                   | Fault Value for Output Ch#7  | Fault Value for Output Ch#6  | Fault Value for Output Ch#5  | Fault Value for Output Ch#4  | Fault Value for Output Ch#3  | Fault Value for Output Ch#2  | Fault Value for Output Ch#1  | Fault Value for Output Ch#0  |

Data description:

**Fault Action for Output Ch#(0-7):** Fault output mode. When IO module detects that internal bus communication is failed and enters offline mode, the output data will be processed in this mode. (Default: 0)

0: Hold the last output state.

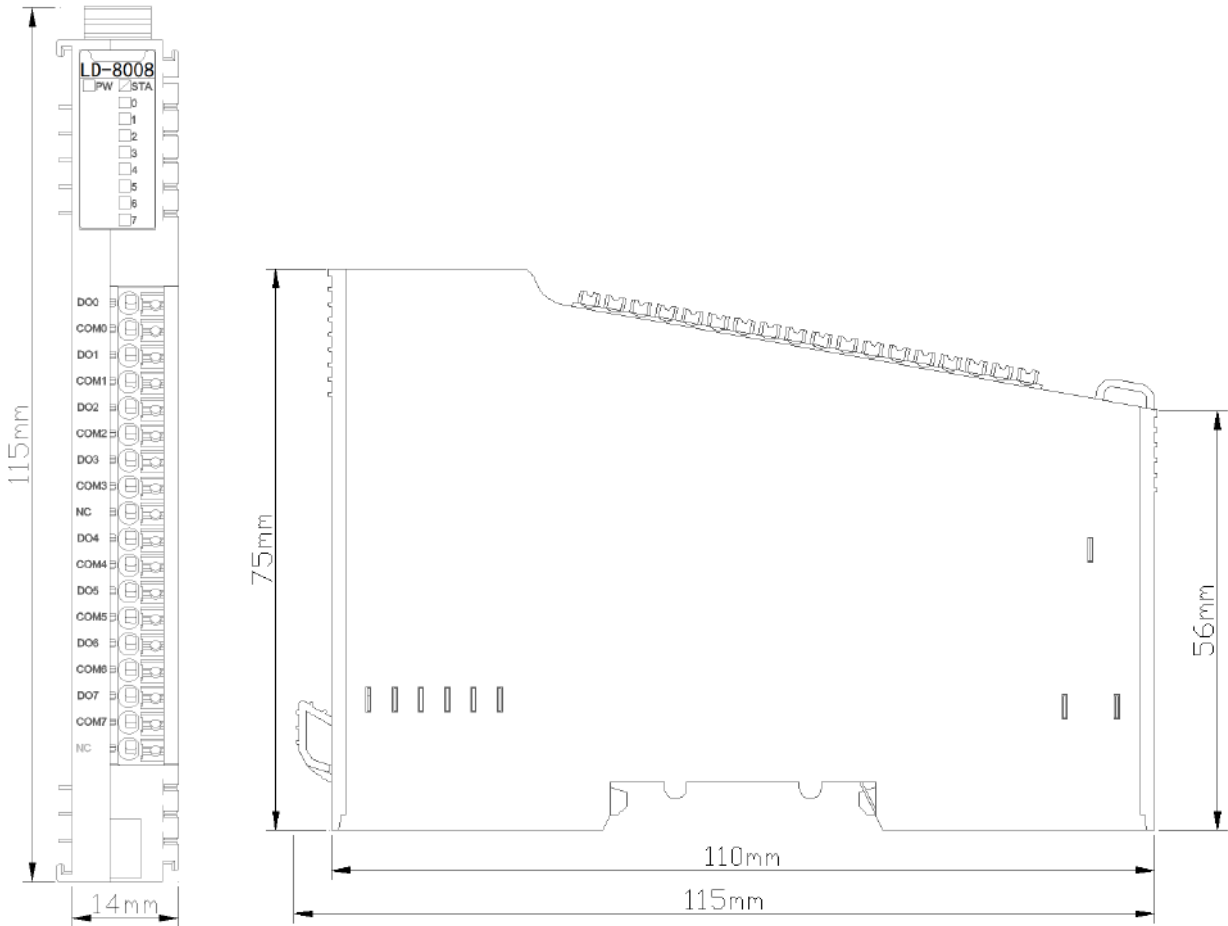
1: Output fault value

**Fault Value for Output Ch#(0-7):** When the fault output mode is 1, this bit would set the fault output value, and when the internal bus of IO module is offline, this setting value will be output. (Default: 0)

0: Output low level.

1: Output high level.

A Dimension drawing



## 4 Analog Input/Output Module

### LA-1004 4-Channel Analog Input

*0 & 4-20mA / 15-bit Single-Ended*

#### 1 Module Features

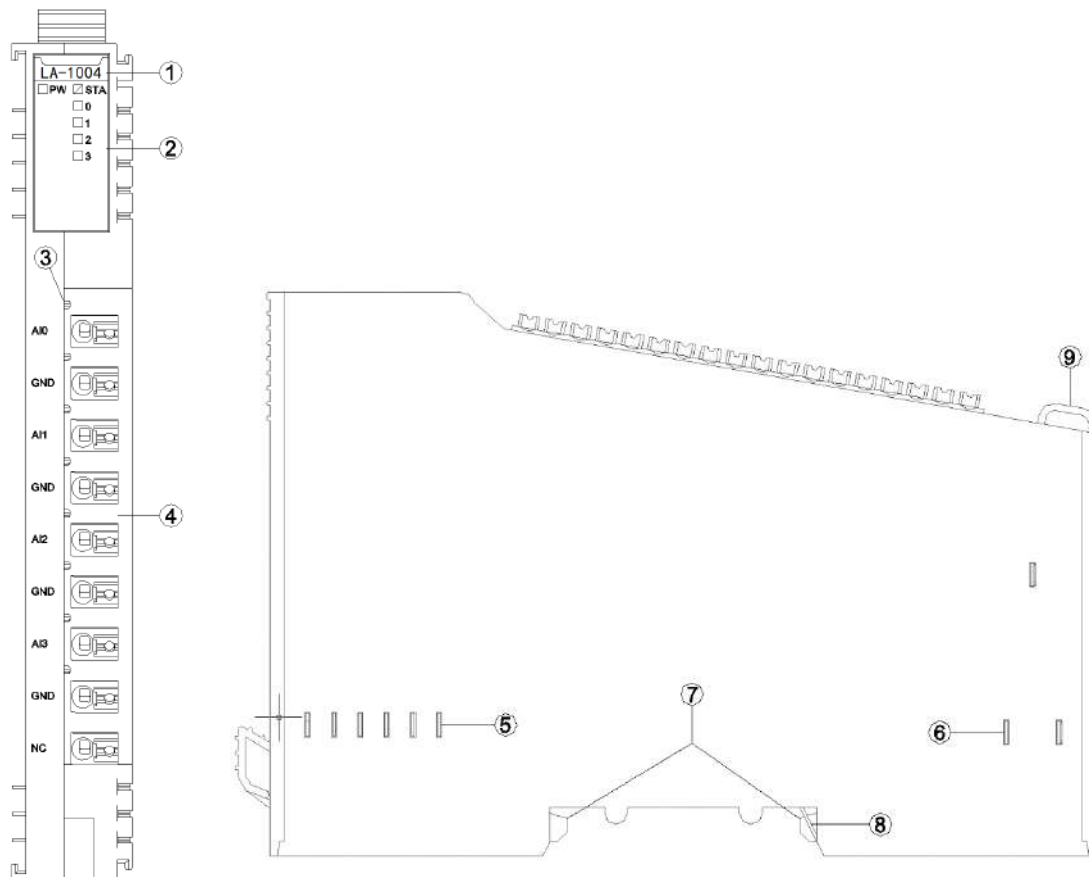
- ◆ The module supports the collection of 4-channel current signals.
- ◆ The module can be configured to collect either 0-20mA or 4-20mA current signals.
- ◆ The module supports 2-wire (non-loop output, external power required) or 4-wire current sensor input.
- ◆ The module's internal bus and field input use magnetic isolation.
- ◆ The module's input channels connect to field active-type analog signal current output sensors.
- ◆ The module channels are equipped with TVS overvoltage protection.

#### 2 Technical parameters

| General parameters        |                                                                                 |
|---------------------------|---------------------------------------------------------------------------------|
| Power Consumption         | Max.65mA@5.0Vdc                                                                 |
| Isolation                 | I/O to internal bus: opto-couple isolation (2.5KVrms)<br>Power Isolation: DC-DC |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                                                 |
| Mounting Type             | 35mm DIN-Rail                                                                   |
| Size                      | 115*14*75mm                                                                     |
| Weight                    | 65g                                                                             |
| Environment Specification |                                                                                 |
| Operational Temperature   | -40~85°C                                                                        |
| Operational Humidity      | 5%-95% (No Condensation)                                                        |
| IP Rating                 | IP20                                                                            |
| Input parameters          |                                                                                 |
| Channel                   | 4 Channel                                                                       |

|                  |                                   |
|------------------|-----------------------------------|
| Number           |                                   |
| LED Indicator    | 4 channel input LED indicator     |
| Rated input      | Range: 0~20mA, Maximum: 0~23.5mA  |
| Resolution       | 15 Bit                            |
| Accuracy         | $\pm 0.3\%$ Max, @25°C            |
|                  | $\pm 0.5\%$ Max, @-20~70°C        |
| Sample frequency | 6ms/4 channel (Filtering Level 0) |
| Data format      | 16-bit signed integer             |

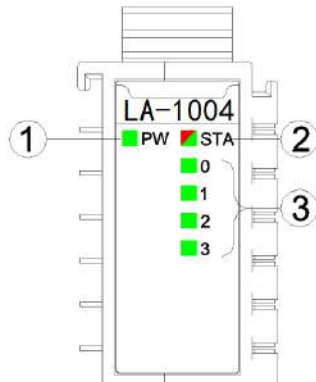
### 3 Hardware interfaces



- ① Module Type
- ② State indicator
- ③ Channel indicator
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle

- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)

| Power State (GREEN)          | Definition                               |
|------------------------------|------------------------------------------|
| ON                           | Internal bus Power Normal                |
| OFF                          | Internal bus Power Failure               |
| STA Module State (RED/GREEN) | Definition                               |
| Green slow flash (2.5Hz)     | Module internal bus is not started       |
| Red slow flash (2.5Hz)       | Module internal bus offline              |
| ON (GREEN)                   | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)     | Upgrading mode                           |
| Flash(10Hz) (RED/GREEN)      | Firmware Update                          |
| Double Flash (RED)           | Module Exception has been soft-restarted |
| 0-3 channel LED indicator    | Definition                               |
| ON                           | Input signal $\geq 1\%$ range            |
| OFF                          | Input signal $< 1\%$ range               |

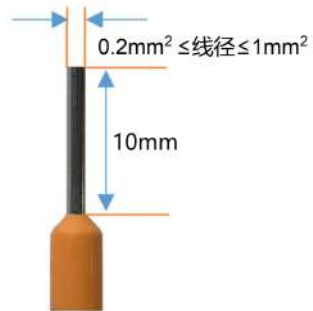
### 3.2 Terminal definition

| Terminal Number | Symbol | Description       |
|-----------------|--------|-------------------|
| 1               | AI0    | Current input CH0 |
| 2               | GND    |                   |
| 3               | AI1    | Current input CH1 |
| 4               | GND    |                   |
| 5               | AI2    | Current input CH2 |
| 6               | GND    |                   |

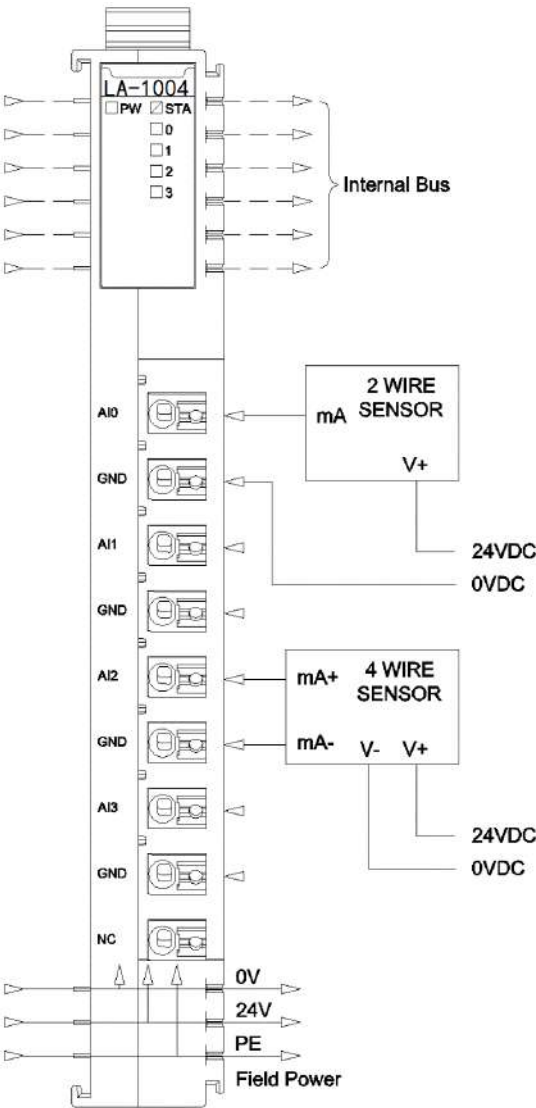
|   |     |                      |
|---|-----|----------------------|
| 7 | AI3 | Current input<br>CH3 |
| 8 | GND |                      |
| 9 | NC  | Not Connected        |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



## 4 Wiring



## 5 Process data definition

| Input data |                         |       |       |       |       |       |       |       |
|------------|-------------------------|-------|-------|-------|-------|-------|-------|-------|
| Bit No     | Bit 7                   | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0     | Analog Input Data(CH 0) |       |       |       |       |       |       |       |
| Byte 1     |                         |       |       |       |       |       |       |       |
| Byte 2     | Analog Input Data(CH 1) |       |       |       |       |       |       |       |
| Byte 3     |                         |       |       |       |       |       |       |       |
| Byte 4     | Analog Input Data(CH 2) |       |       |       |       |       |       |       |
| Byte 5     |                         |       |       |       |       |       |       |       |
| Byte 6     | Analog Input Data(CH 3) |       |       |       |       |       |       |       |
| Byte 7     |                         |       |       |       |       |       |       |       |

Data Description:

Analog Input Data (CH0-3): Corresponding channel's analog signal input value.

| Analog Input Data(LA-1008) |                  |         |             |                     |
|----------------------------|------------------|---------|-------------|---------------------|
| Current (0-20mA)           | Current (4-20mA) | Decimal | Hexadecimal | Position            |
| >23.515                    | >22.810          | 32767   | 7FFF        | Overflow            |
| 23.515                     | 22.81            | 32511   | 7EFF        | Exceeds Upper Limit |
| .                          | .                | .       | .           |                     |
| .                          | .                | .       | .           |                     |
| 20.0007                    | 20.0005          | 27649   | 6C01        |                     |
| 20                         | 20               | 27648   | 6C00        | Within Rated Range  |
| .                          | .                | .       | .           |                     |
| .                          | .                | .       | .           |                     |
| 0                          | 4                | 0       | 0000        |                     |
| <0.0                       | 3.9995           | -1      | FFFF        | Below Lower Limit   |
| .                          | .                | .       | .           |                     |
| .                          | .                | .       | .           |                     |
| .                          | 1.1852           | -4864   | ED00        |                     |
| .                          | <1.1852          | -32768  | 8000        | Underflow           |

Note: ADC chip fault process data is 32765, disabled channel upload process data is -32367

## 6 Configuration parameter definitions

| Configuration parameters |                   |       |       |       |                     |                     |                     |                     |
|--------------------------|-------------------|-------|-------|-------|---------------------|---------------------|---------------------|---------------------|
| Bit No                   | Bit 7             | Bit 6 | Bit 5 | Bit 4 | Bit 3               | Bit 2               | Bit 1               | Bit 0               |
| Byte 0                   | Reserved          |       |       |       |                     |                     |                     | 16Bit Data Format   |
| Byte 1                   | Reserved          |       |       |       | Channel Enable Ch#3 | Channel Enable Ch#2 | Channel Enable Ch#1 | Channel Enable Ch#0 |
| Byte 2                   | Reserved          |       |       |       | Current Type Ch#3   | Current Type Ch#2   | Current Type Ch#1   | Current Type Ch#0   |
| Byte 3                   | Ch#0 Filter Level |       |       |       |                     |                     |                     |                     |
| Byte 4                   | Ch#1 Filter Level |       |       |       |                     |                     |                     |                     |
| Byte 5                   | Ch#2 Filter Level |       |       |       |                     |                     |                     |                     |
| Byte 6                   | Ch#3 Filter Level |       |       |       |                     |                     |                     |                     |
| Byte 7<br>...<br>Byte 10 | Reserved          |       |       |       |                     |                     |                     |                     |

Data Description:

**16Bit Data Format:** Format for storing analog data. (Default value: 0)

0: A-B

1: B-A

**Channel Enable Ch#(0-3):** Channel enablement. (Default value: 1)

0: Disable

1: Enable

**Current Type Ch#(0-3):** Type of input signal. (Default value: 1)

0: 0-20mA

1: 4-20mA

**Filter Level Ch#(0-3):** Filtering level. (Default value: 0)

0: Level 0

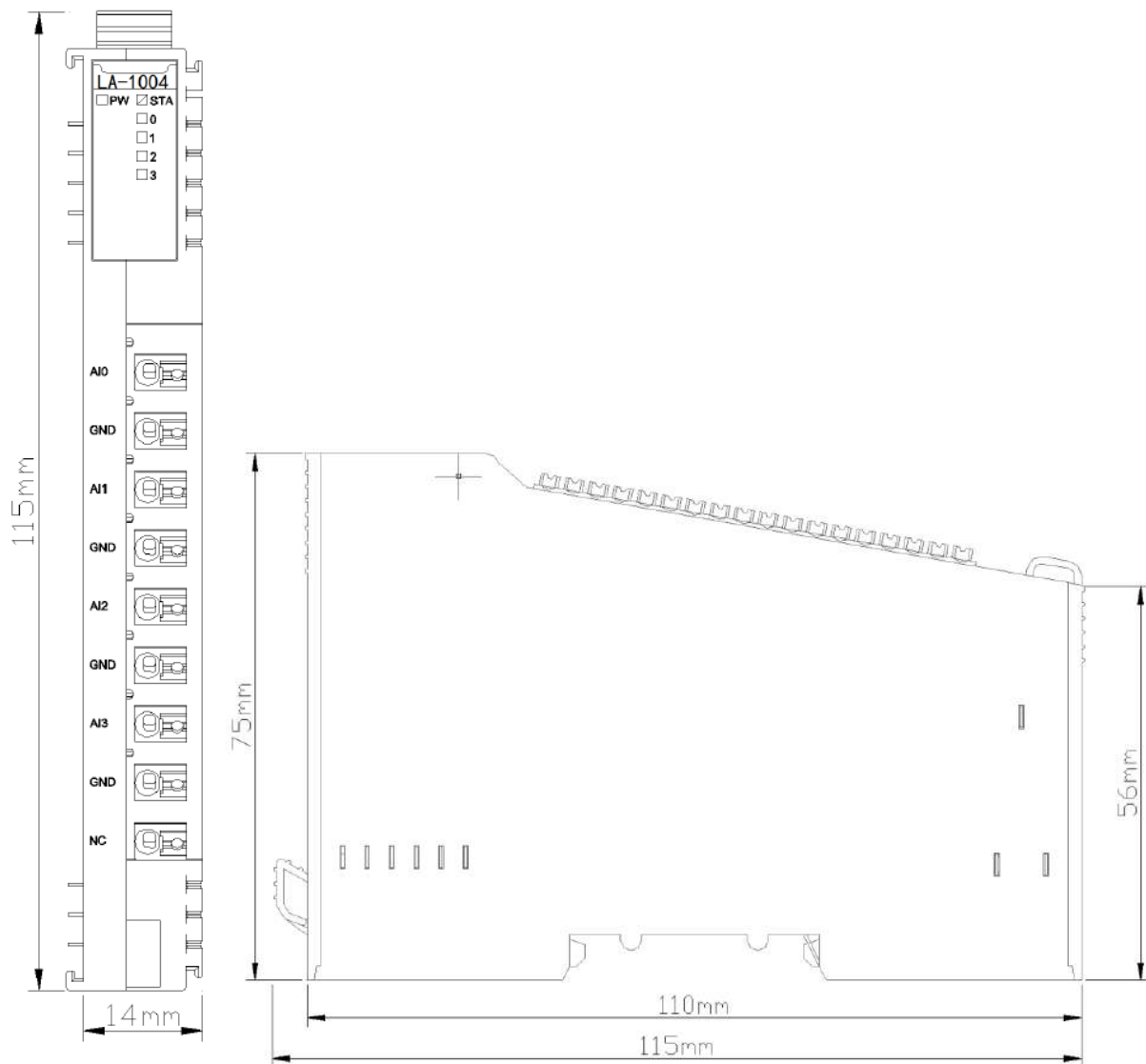
1: Level 1

2: Level 2

3: Level 3

- 4: Level 4
- 5: Level 5
- 6: Level 6
- 7: Level 7
- 8: Level 8
- 9: Level 9
- 10: Level 10

## A Dimension drawing



# LA-1008: 8 channels analog input /0&4-20mA/15-bit single-terminal

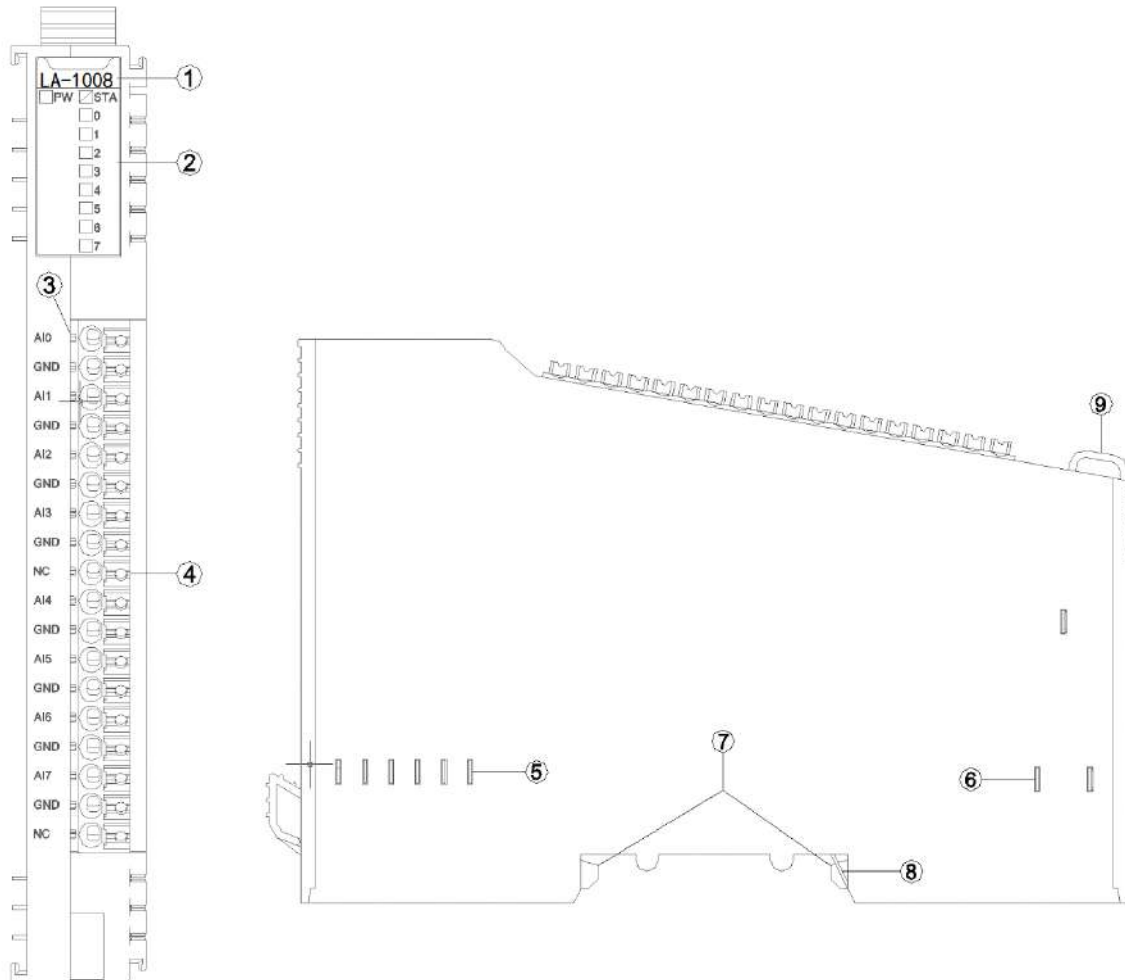
## 1 Module features

- ◆ the module supports 8-channel current signal acquisition.
- ◆ the module can be configured for 0-20mA or 4-20mA current signal acquisition.
- ◆ the module supports 2-wire (non-loop output, external power supply is required) or 4-wire current sensor input.
- ◆ the internal bus of the module and field input adopts magnetic insulation.
- ◆ the module input channel is connected to the field active analog signal current output sensor.
- ◆ the module channel equips with TVS overvoltage protection.

## 2 Technical parameters

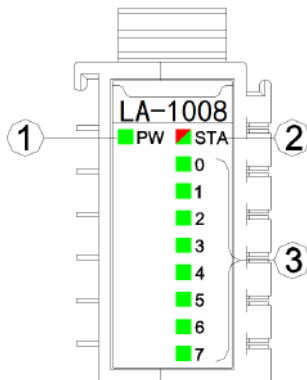
| General parameters        |                                                                              |
|---------------------------|------------------------------------------------------------------------------|
| Power                     | Max.65mA@5.0Vdc                                                              |
| Isolation                 | I/O to internal bus: magnetic isolation (2.5KVrms)<br>Power isolation: DC-DC |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                                              |
| Installation              | 35mm DIN-Rail                                                                |
| Size                      | 115*14*75mm                                                                  |
| Weight                    | 65g                                                                          |
| Environmental parameters  |                                                                              |
| Working temperature       | -40~85°C                                                                     |
| Environmental humidity    | 5%-95% (No Condensation)                                                     |
| Ingress Protection Rating | IP20                                                                         |
| Input parameters          |                                                                              |
| Channel Number            | 8 channels                                                                   |
| LED Indicator             | 8 LED channel state indicators                                               |
| Input range               | Maximum: 0 ~ 23.5 mA                                                         |
| Resolution ratio          | 15 Bit                                                                       |
| Acquisition precision     | ±0.3% full range, @25°C                                                      |
|                           | ±0.5% full range, @-20~70°C                                                  |
| Sampling rate             | 28 ms / 8 channels                                                           |
| Data format               | 16-bit signed integer                                                        |

### 3 Hardware interfaces



- ① Module Type
- ② State indicator
- ③ (no field channel indicator)
- ④ Wiring Terminal and marking
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicator lights



- ① Power indicator light (green)
- ② Module State indicator (red/green)
- ③ Input channel indicator light (green)

| PW power indicator          | Definition                                    |
|-----------------------------|-----------------------------------------------|
| ON                          | Internal bus power supply is normal           |
| OFF                         | Internal bus power supply is failure          |
| STA module State indicator  | Definition                                    |
| Green slow flash (2.5hz)    | The internal bus of the module is not started |
| Red slow flash (2.5hz)      | Module internal bus offline                   |
| Green on                    | Operation normal                              |
| Flash(2.5Hz) (RED/GREEN)    | Upgrading mode                                |
| Flash(10Hz) (RED/GREEN)     | Firmware upgrading                            |
| Red flashes twice           | Module exception has been soft-restarted      |
| 0-7 channel indicator light | Definition                                    |
| ON                          | Input signal $\geq 1\%$ range                 |
| OFF                         | Input signal $< 1\%$ range                    |

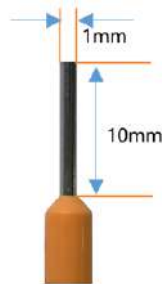
### 3.2 Terminal definition

| Terminal number | Definition | Description       |
|-----------------|------------|-------------------|
| 1               | AI0        | Current input CH0 |
| 2               | GND        |                   |
| 3               | AI1        | Current input CH1 |
| 4               | GND        |                   |
| 5               | AI2        | Current input CH2 |
| 6               | GND        |                   |
| 7               | AI3        | Current input CH3 |
| 8               | GND        |                   |
| 9               | NC         | Not connected     |
| 10              | AI4        | Current input     |

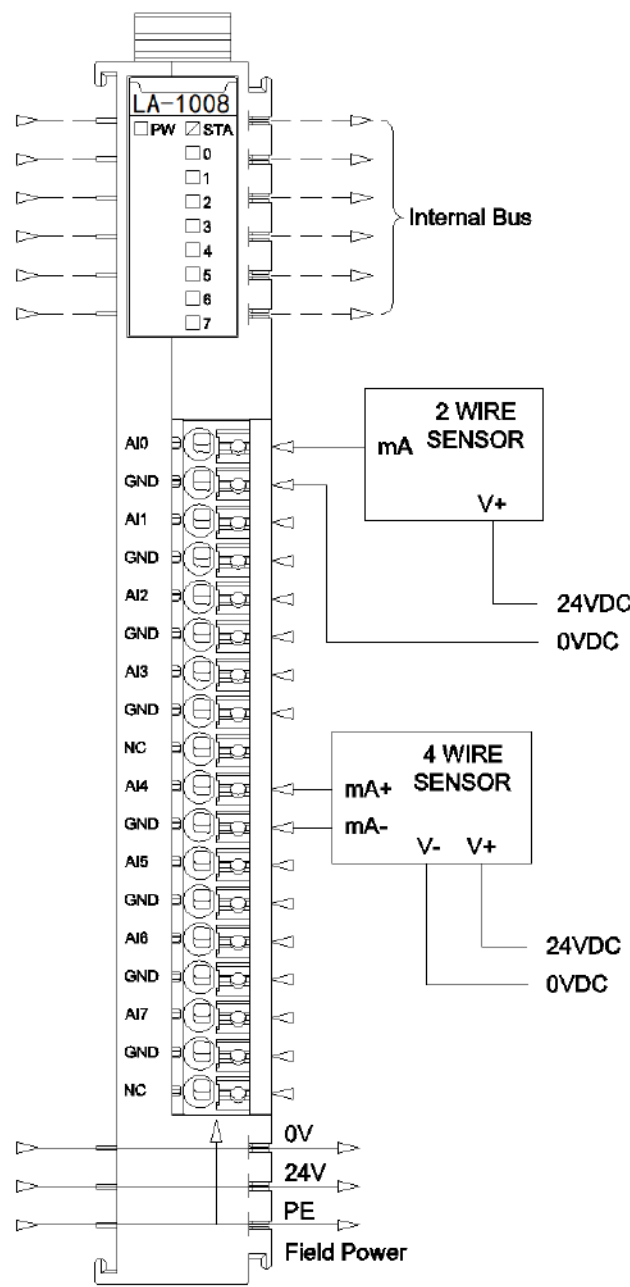
|    |     |                      |
|----|-----|----------------------|
| 11 | GND | CH4                  |
| 12 | AI5 | Current input<br>CH5 |
| 13 | GND |                      |
| 14 | AI6 | Current input<br>CH6 |
| 15 | GND |                      |
| 16 | AI7 | Current input<br>CH7 |
| 17 | GND |                      |
| 18 | NC  | Not connected        |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



4 Wiring



## 5 Process data definition

| Input data |                          |       |       |       |       |       |       |       |
|------------|--------------------------|-------|-------|-------|-------|-------|-------|-------|
| Bit No     | Bit 7                    | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0     | Analog Input Data (CH 0) |       |       |       |       |       |       |       |
| Byte 1     |                          |       |       |       |       |       |       |       |
| Byte 2     | Analog Input Data (CH 1) |       |       |       |       |       |       |       |
| Byte 3     |                          |       |       |       |       |       |       |       |
| Byte 4     | Analog Input Data (CH 2) |       |       |       |       |       |       |       |
| Byte 5     |                          |       |       |       |       |       |       |       |
| Byte 6     | Analog Input Data (CH 3) |       |       |       |       |       |       |       |
| Byte 7     |                          |       |       |       |       |       |       |       |
| Byte 8     | Analog Input Data (CH 4) |       |       |       |       |       |       |       |
| Byte 9     |                          |       |       |       |       |       |       |       |
| Byte 10    | Analog Input Data (CH 5) |       |       |       |       |       |       |       |
| Byte 11    |                          |       |       |       |       |       |       |       |
| Byte 12    | Analog Input Data (CH 6) |       |       |       |       |       |       |       |
| Byte 13    |                          |       |       |       |       |       |       |       |
| Byte 14    | Analog Input Data (CH 7) |       |       |       |       |       |       |       |
| Byte 15    |                          |       |       |       |       |       |       |       |

Data description:

**Analog Input Data (CH0-7):** Analog signal Input value of corresponding channel.

| Analog Input Data (LA-1008) |                  |         |             |                        |
|-----------------------------|------------------|---------|-------------|------------------------|
| Current (0-20mA)            | Current (4-20mA) | Decimal | Hexadecimal | Location               |
| >23.515                     | >22.810          | 32767   | 7FFF        | Overflow               |
| 23.515                      | 22.81            | 32511   | 7EFF        | Exceed the upper limit |
| .                           | .                | .       | .           |                        |
| .                           | .                | .       | .           |                        |
| 20.0007                     | 20.0005          | 27649   | 6C01        |                        |
| 20                          | 20               | 27648   | 6C00        | Rated range            |
| .                           | .                | .       | .           |                        |
| .                           | .                | .       | .           |                        |
| 0                           | 4                | 0       | 0000        |                        |
| <0.0                        | 3.9995           | -1      | FFFF        | Exceed the lower limit |
| .                           | .                | .       | .           |                        |
| .                           | .                | .       | .           |                        |
| .                           | 1.1852           | -4864   | ED00        |                        |
| .                           | <1.1852          | -32768  | 8000        | Underflow              |

For example: AI0 input monitoring value of the LA-1008 is 16#3126=12582, if it

chooses the range of 4-20mA, then the theoretical input value of AI0 is:  
 $12582/27648 \times 16 + 4 = 11.28125\text{mA}$ .

For example: AI0 input monitoring value of the LA-1008 is  $16\#3126 = 12582$ , if it chooses the range of 0-20mA, then the theoretical input value of AI0 is:  
 $12582/27648 \times 16 = 7.28125\text{mA}$

## 6 Configuration parameter definition

| Configuration parameters |                   |                   |                   |                   |                   |                   |                   |                   |
|--------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Bit No                   | Bit 7             | Bit 6             | Bit 5             | Bit 4             | Bit 3             | Bit 2             | Bit 1             | Bit 0             |
| Byte 0                   | 16Bit Data Format |                   |                   |                   |                   |                   |                   |                   |
| Byte 1                   | Current Type Ch#7 | Current Type Ch#6 | Current Type Ch#5 | Current Type Ch#4 | Current Type Ch#3 | Current Type Ch#2 | Current Type Ch#1 | Current Type Ch#0 |

Data description:

**16Bit Data Format:** Analog data storage format. (default: 0)

0: A-B

1: B-A

**Channel Enable Ch#(0-7):** (default: 1)

0: Disable

1: Enable

**Current Type Ch#(0-7):** Type of input signal. (default: 1)

0: 0-20mA

1: 4-20mA

**Filter Level Ch#(0-7):** Filter Level (default: 0)

0: level 0

1: level 1

2: level 2

.

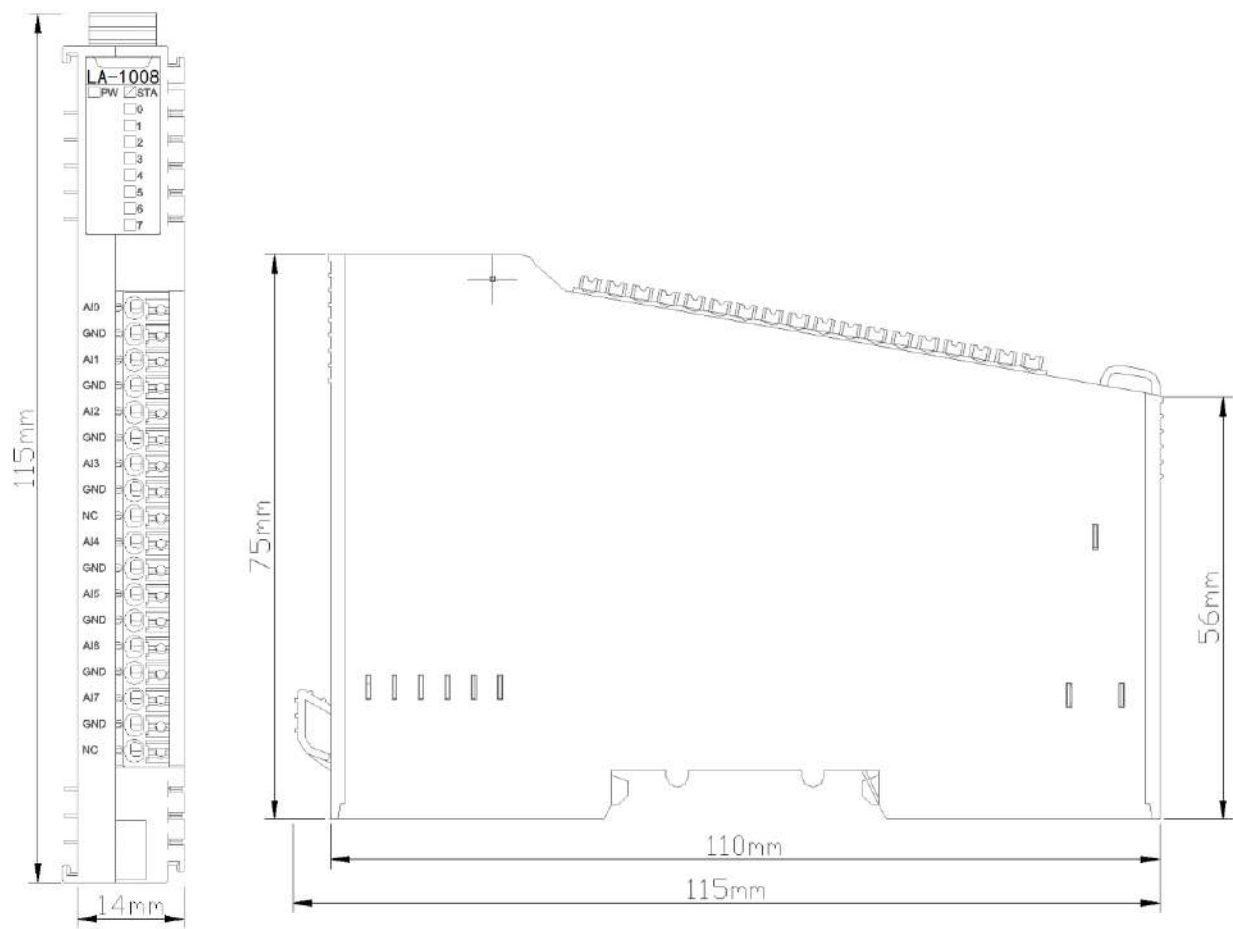
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.

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10: level 10

A Dimension drawing



## **LA-1108 8 channels analog input**

***0~20mA OR -20~0mA OR  $\pm 20$ mA /15bit Single-ended bipolar***

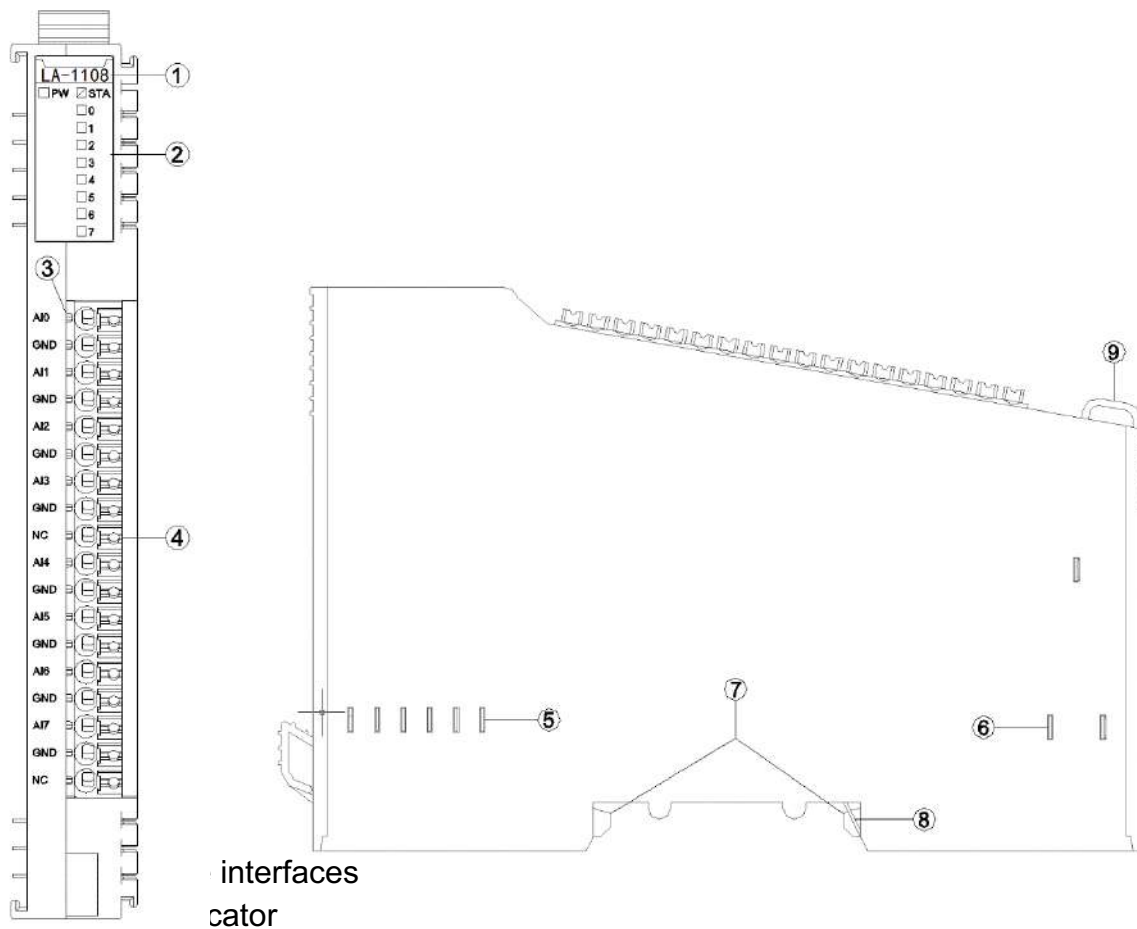
### **1 Module features**

- ◆ the module supports 8-channel current signal acquisition.
- ◆ the module can be configured for 0~20mA OR -20~0mA OR  $\pm 20$ mA current signal acquisition.
- ◆ the module supports 2-wire (non-loop output, external power supply is required)
- ◆ the internal bus of the module and field input adopts magnetic insulation.
- ◆ the module input channel is to be connected to the field active analog signal current output sensor.
- ◆ the module channel equips with TVS overvoltage protection.

## 2 Technical parameters

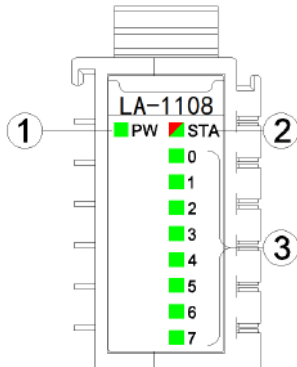
| General Parameters        |                                                                                              |
|---------------------------|----------------------------------------------------------------------------------------------|
| Power                     | Max.65mA@5.0Vdc                                                                              |
| Isolation                 | I/O to internal bus: magnetic isolation (2.5KVrms)<br>Power isolation: DC-DC                 |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                                                              |
| Installation              | 35mm DIN-Rail                                                                                |
| Size                      | 115*14*75mm                                                                                  |
| Weight                    | 65g                                                                                          |
| Environmental parameters  |                                                                                              |
| Working temperature       | -40~85°C                                                                                     |
| Environmental humidity    | 5%-95% (No Condensation)                                                                     |
| Ingress Protection Rating | IP20                                                                                         |
| Input parameters          |                                                                                              |
| Channel Number            | 8 channels                                                                                   |
| LED Indicator             | 8 LED channel state indicators                                                               |
| Input range               | Maximum: 0~24mA                                                                              |
| Resolution ratio          | 15 Bit                                                                                       |
| Acquisition precision     | ±0.3% full range, @25°C                                                                      |
|                           | ±0.5% full range, @-20~70°C                                                                  |
| Sampling rate             | 28ms/8 channels                                                                              |
| Data format               | 16-bit signed integer                                                                        |
| Diagnostic function       | Standard mode: Overflow 32767<br>Standard mode: Underflow -32768<br>Channel disabled: -32767 |

### 3 Hardware interfaces



- ③ (non field channel indicator)
- ④ Wiring Terminal and marking
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicator lights



- ① Power indicator light (green)
- ② Module State indicator (red/green)
- ③ Input channel indicator light (green)

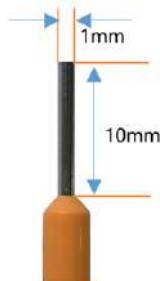
| PW power indicator          | Definition                                    |
|-----------------------------|-----------------------------------------------|
| ON                          | Internal bus power supply is normal           |
| OFF                         | Internal bus power supply is failure          |
| STA module State indicator  | Definition                                    |
| Green slow flash (2.5hz)    | The internal bus of the module is not started |
| Red slow flash (2.5hz)      | Module internal bus offline                   |
| Green on                    | Operation normal                              |
| Flash(2.5Hz)<br>(RED/GREEN) | Upgrading mode                                |
| Flash(10Hz)<br>(RED/GREEN)  | Firmware upgrading                            |
| Red flashes twice           | Module exception has been soft-restarted      |
| 0-7 channel indicator light | Definition                                    |
| ON                          | Input signal $\geq 1\%$ range                 |
| OFF                         | Input signal $< 1\%$ range                    |

### 3.2 Terminal definition

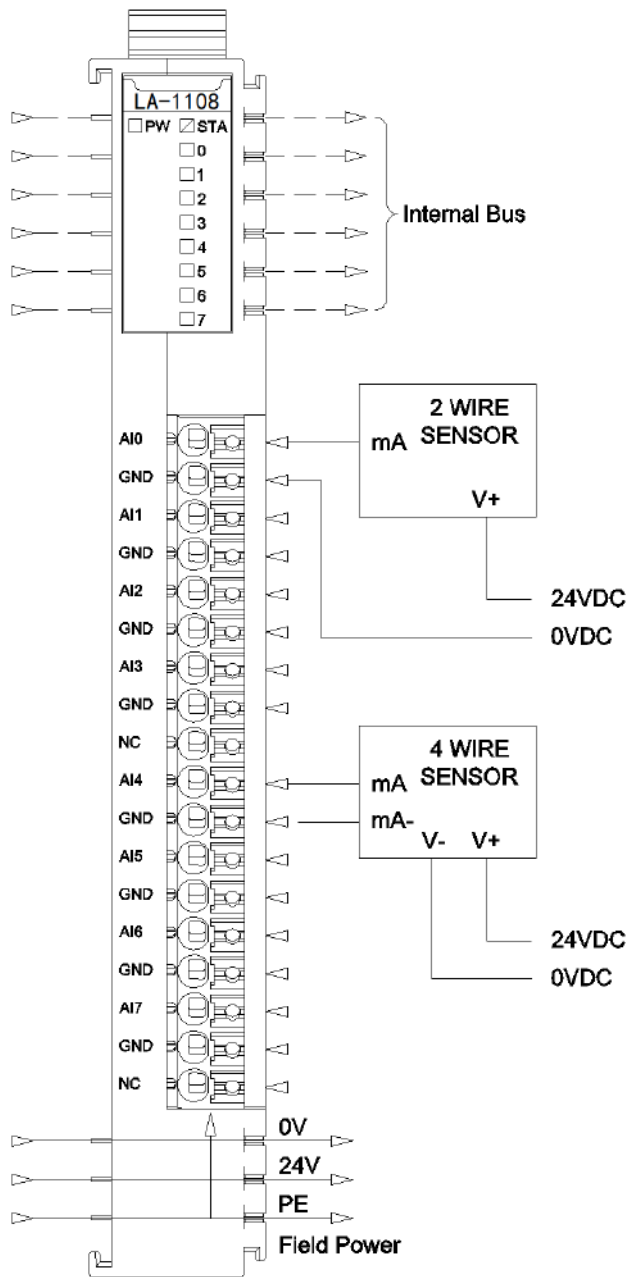
| Terminal number | Definition | Description       |
|-----------------|------------|-------------------|
| 1               | AI0        | Current input CH0 |
| 2               | GND        |                   |
| 3               | AI1        | Current input CH1 |
| 4               | GND        |                   |
| 5               | AI2        | Current input CH2 |
| 6               | GND        |                   |
| 7               | AI3        | Current input CH3 |
| 8               | GND        |                   |
| 9               | NC         | Not connected     |
| 10              | AI4        | Current input CH4 |
| 11              | GND        |                   |
| 12              | AI5        | Current input CH5 |
| 13              | GND        |                   |
| 14              | AI6        | Current input CH6 |
| 15              | GND        |                   |
| 16              | AI7        | Current input CH7 |
| 17              | GND        |                   |
| 18              | NC         | Not connected     |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



**4 Wiring**



## 5 Process data definition

| Input data |                         |       |       |       |       |       |       |       |
|------------|-------------------------|-------|-------|-------|-------|-------|-------|-------|
| Bit No     | Bit 7                   | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0     | Analog Input Data(CH 0) |       |       |       |       |       |       |       |
| Byte 1     |                         |       |       |       |       |       |       |       |
| Byte 2     | Analog Input Data(CH 1) |       |       |       |       |       |       |       |
| Byte 3     |                         |       |       |       |       |       |       |       |
| Byte 4     | Analog Input Data(CH 2) |       |       |       |       |       |       |       |
| Byte 5     |                         |       |       |       |       |       |       |       |
| Byte 6     | Analog Input Data(CH 3) |       |       |       |       |       |       |       |
| Byte 7     |                         |       |       |       |       |       |       |       |
| Byte 8     | Analog Input Data(CH 4) |       |       |       |       |       |       |       |
| Byte 9     |                         |       |       |       |       |       |       |       |
| Byte 10    | Analog Input Data(CH 5) |       |       |       |       |       |       |       |
| Byte 11    |                         |       |       |       |       |       |       |       |
| Byte 12    | Analog Input Data(CH 6) |       |       |       |       |       |       |       |
| Byte 13    |                         |       |       |       |       |       |       |       |
| Byte 14    | Analog Input Data(CH 7) |       |       |       |       |       |       |       |
| Byte 15    |                         |       |       |       |       |       |       |       |

### 5.1 Process data definition (standard mode)

Data description:

Analog Input Data (CH0-7): input value of the corresponding channel current signal.

| Analog Input Data (LA-1108) |         |             |                        |
|-----------------------------|---------|-------------|------------------------|
| Current (0-20mA)            | Decimal | Hexadecimal | Remark                 |
| >23.52                      | 32767   | 7FFF        | Overflow               |
| 23.52                       | 32511   | 7EFF        | Exceed the upper limit |
| .                           | .       | .           |                        |
| >20                         | 27649   | 6C01        |                        |
| 20                          | 27648   | 6C00        | Rated range            |
| .                           | .       | .           |                        |
| 10                          | 13824   | 3600        |                        |
| .                           | .       | .           |                        |
| 0                           | 0       | 0           |                        |
| <0                          | 0       | 0           | Exceed the lower limit |
| .                           | .       | .           |                        |
| -3.52                       | -4864   | ED00        |                        |
| <-3.52                      | -32768  | 8000        | Underflow              |

| Analog Input Data (LA-1108) |         |             |                        |
|-----------------------------|---------|-------------|------------------------|
| Current (0-20mA)            | Decimal | Hexadecimal | Remark                 |
| >3.52                       | 32767   | 7FFF        | Overflow               |
| 3.52                        | 4864    | 1300        | Exceed the upper limit |
| .                           | .       | .           |                        |
| >0                          | 0       | 0           |                        |
| 0                           | 0       | 0           | Rated range            |
| .                           | .       | .           |                        |
| -10                         | -13824  | CA00        |                        |
| .                           | .       | .           |                        |
| -20                         | -27648  | 9400        |                        |
| <-20                        | -27949  | 93FF        | Exceed the lower limit |
| .                           | .       | .           |                        |
| -23.52                      | -32511  | 8101        |                        |
| <-23.52                     | -32768  | 8000        | Underflow              |

| Analog Input Data (LA-1108) |         |             |                        |
|-----------------------------|---------|-------------|------------------------|
| Current (0-20mA)            | Decimal | Hexadecimal | Remark                 |
| >23.52                      | 32767   | 7FFF        | Overflow               |
| 23.52                       | 32511   | 7EFF        | Exceed the upper limit |
| .                           | .       | .           |                        |
| >20                         | 27649   | 6C01        |                        |
| 20                          | 27648   | 6C00        | Rated range            |
| .                           | .       | .           |                        |
| 10                          | 13824   | 3600        |                        |
| .                           | .       | .           |                        |
| 0                           | 0       | 0           |                        |
| .                           | .       | .           |                        |
| -10                         | -13824  | CA00        |                        |
| .                           | .       | .           |                        |
| -20                         | -27648  | 9400        |                        |
| <-20                        | -27949  | 93FF        | Exceed the lower limit |
| .                           | .       | .           |                        |
| -23.52                      | -32511  | 8101        |                        |
| <-23.52                     | -32768  | 8000        | Underflow              |

## 5.2 Process data definition (special mode)

Data description:

**Analog Input Data (CH0-7):** input value of the corresponding channel current signal.

| Analog Input Data (LA-1108) |                      |                    |         |             |                 |
|-----------------------------|----------------------|--------------------|---------|-------------|-----------------|
| Current<br>(0-20mA)         | Current<br>(-20-0mA) | Current<br>(±20mA) | Decimal | Hexadecimal | Remarks         |
| 20                          | .                    | 20                 | 32767   | 7FFF        | Normal<br>range |
| .                           | .                    | .                  | .       | .           |                 |
| 10                          | .                    | 10                 | 13824   | 3600        |                 |
| .                           | .                    | .                  | .       | .           |                 |
| 0                           | 0                    | 0                  | 0       | 0           |                 |
| <0                          | .                    | .                  | .       | .           |                 |
|                             | .-10                 | -10                | -13824  | CA00        |                 |
|                             | .                    | .                  | .       | .           |                 |
|                             | .-20                 | -20                | -32768  | 8000        |                 |

## 6 Configuration parameter definition

| Configuration parameters |                    |                   |                   |                   |                   |                   |                   |                   |
|--------------------------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Bit No                   | Bit 7              | Bit 6             | Bit 5             | Bit 4             | Bit 3             | Bit 2             | Bit 1             | Bit 0             |
| Byte 0                   | 16Bit Data Format  |                   |                   |                   |                   |                   |                   |                   |
| Byte 1                   | Current Type Ch# 7 | Current Type Ch#6 | Current Type Ch#5 | Current Type Ch#4 | Current Type Ch#3 | Current Type Ch#2 | Current Type Ch#1 | Current Type Ch#0 |

Data description:

**16Bit Data Format:** Analog data storage format. (default: 0)

0: A-B

1: B-A

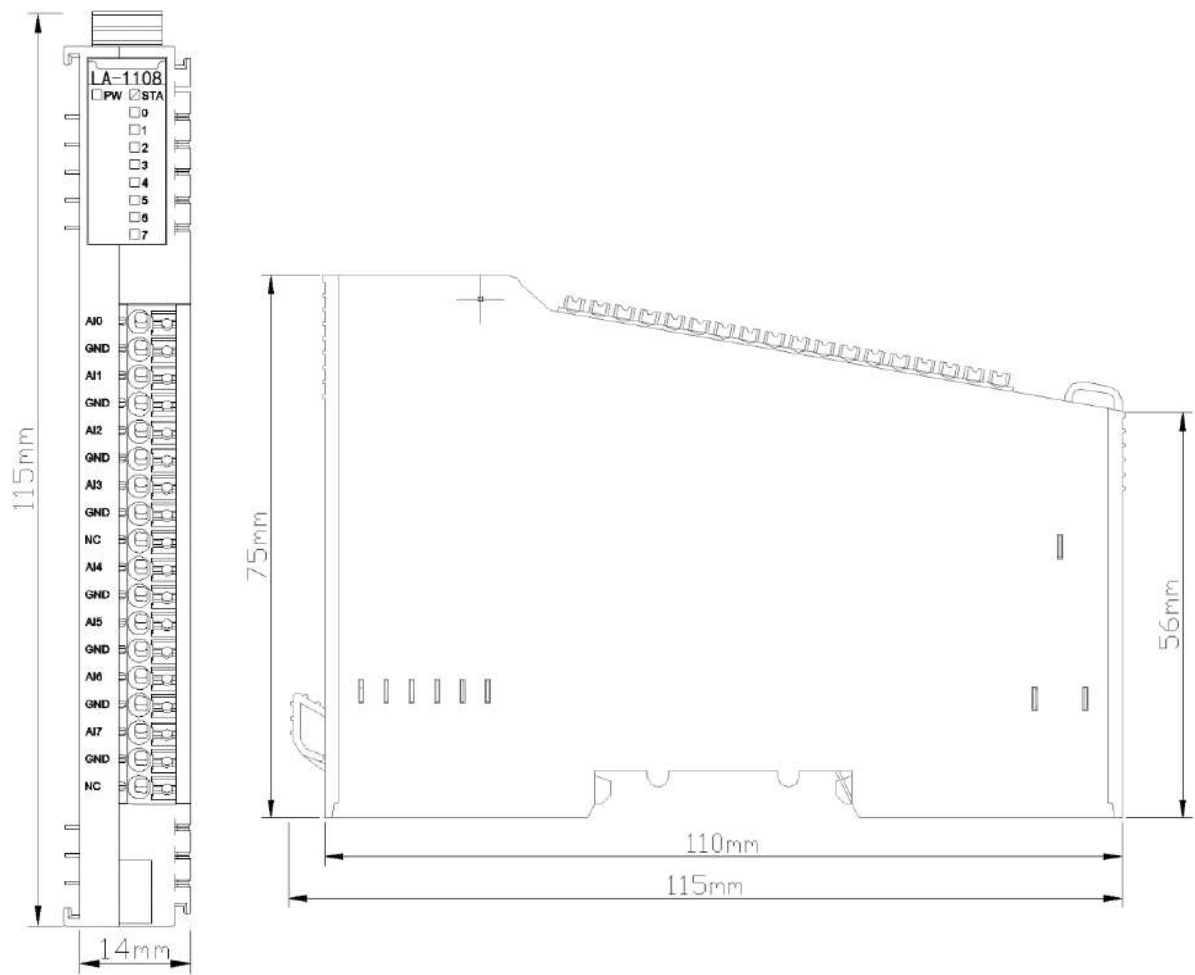
**Current Type Ch#(0-7):** Type of input signal. (default: 1)

0: -20~0mA

1: 0~20mA

2: -20~20mA

**A Dimension drawing**



## LA-3008 8 channels Voltage Input

0~5V/0~10V/±5V/±10VDC, 15Bit/16 Bit

### 1 Module features

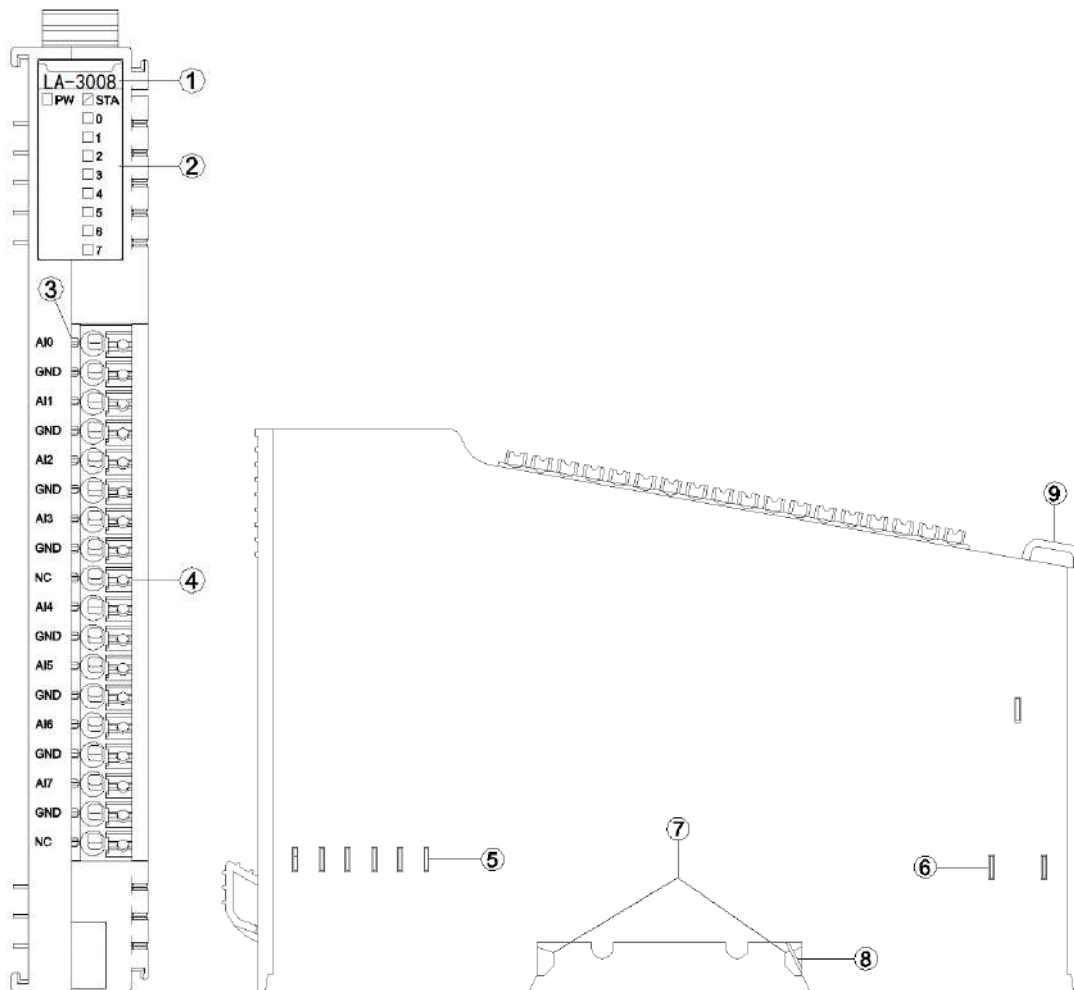
- ◆ the module supports 8 channels of voltage signal input
- ◆ the module could collect 0~5VDC, 0~10VDC, ±5VDC, ±10VDC, with a 15-bit or 16-bit resolution
- ◆ the module carries with 8 analog input channel LED indicator
- ◆ the module input signal is a single ended common grounding input
- ◆ filter time could be set
- ◆ channels could be disabled independently

### 2 Technical Parameters

| General parameters        |                                                     |
|---------------------------|-----------------------------------------------------|
| Power                     | Max.100mA@5.0Vdc                                    |
| Isolation                 | I/O to internal bus: opto-couple isolation (3KVrms) |
| Field Power               | Not used                                            |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                     |
| Mounting Type             | 35mmDIN-Rail                                        |
| Size                      | 115*14*75mm                                         |
| Weight                    | 65g                                                 |
| Environment Specification |                                                     |
| Operational Temperature   | -40~85°C                                            |
| Operational Humidity      | 5%~95% RH(No Condensation)                          |
| Ingress Protection Rating | IP20                                                |
| Input Parameter           |                                                     |
| Channel Number            | 8 channel voltage input                             |
| LED Indicator             | 8 channel input indicators                          |
| Input Voltage Range       | 0~5VDC、0~10VDC、±5VDC、±10VDC                         |
| Resolution                | 15Bit/16Bit                                         |
| Accuracy                  | ±0.3%@25°C<br>±0.5@-40~85°C                         |
| Sampling Speed            | 1ms/8 channels                                      |

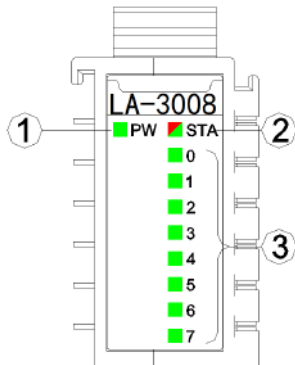
|                  |                        |
|------------------|------------------------|
| Output Impedance | 1MΩ                    |
| Common Terminal  | Common Grounding Input |

### 3 Hardware Interface



- ① Module Type
- ② State indicator
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicator definition



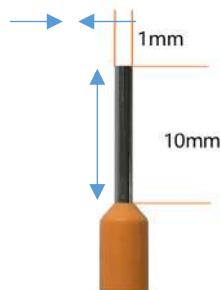
- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Input channel LED indicator (green)

| PW POWER STATE (GREEN)            | Definition                               |
|-----------------------------------|------------------------------------------|
| ON                                | Internal bus Power Normal                |
| OFF                               | Internal bus Power Failure               |
| STA MODULE STATE (RED/GREEN)      | Definition                               |
| Green slow flash (2.5Hz)          | Module internal bus is not started       |
| Red slow flash (2.5Hz)            | Module internal bus offline              |
| ON (GREEN)                        | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)          | Upgrading mode                           |
| Flash(10Hz) (RED/GREEN)           | Firmware Update                          |
| Double Flash (RED)                | Module Exception has been soft-restarted |
| 0-7 channel LED indicator (GREEN) | Definition                               |
| ON                                | Input signal exceeds 0.15V or -0.15V     |
| OFF                               | Invalid input signal                     |

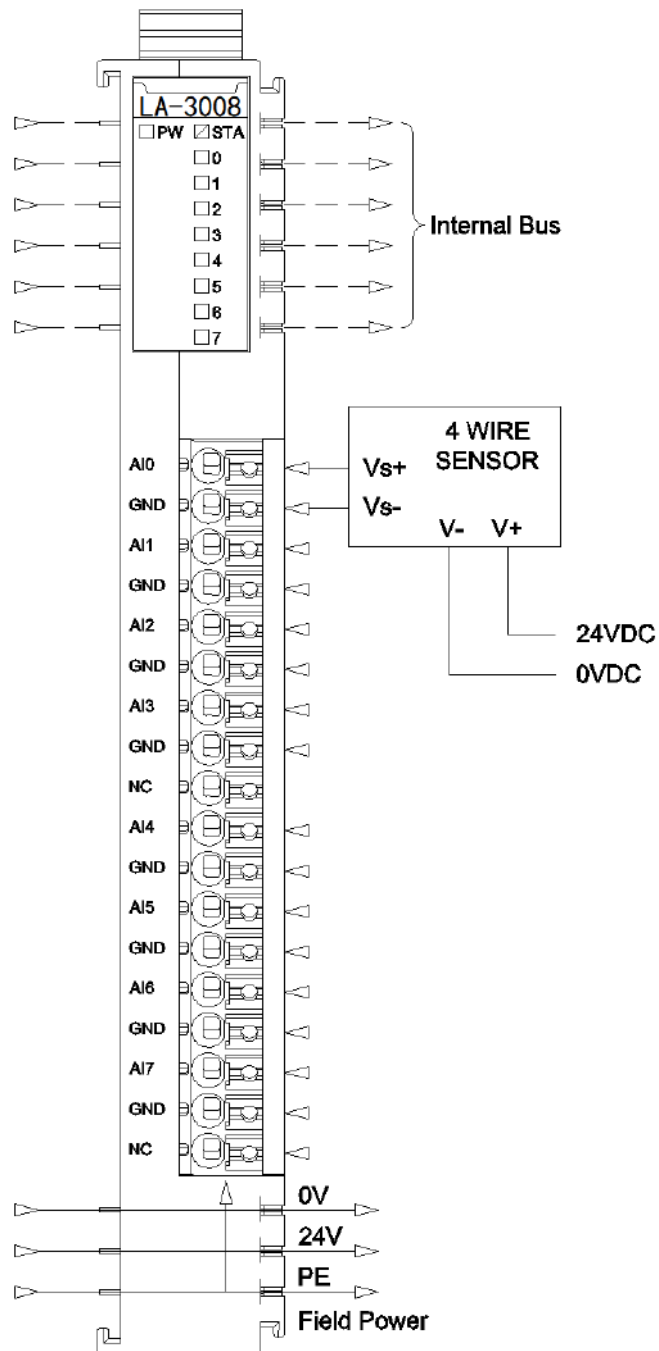
### 3.2 Terminal definition

| Terminal Number | Definition | Description      |
|-----------------|------------|------------------|
| 1               | AI0        | Signal Input CH0 |
| 2               | GND        |                  |
| 3               | AI1        | Signal Input CH1 |
| 4               | GND        |                  |
| 5               | AI2        | Signal Input CH2 |
| 6               | GND        |                  |
| 7               | AI3        | Signal Input CH3 |
| 8               | GND        |                  |
| 9               | NC         | Not Connected    |
| 10              | AI4        | Signal Input CH4 |
| 11              | GND        |                  |
| 12              | AI5        | Signal Input CH5 |
| 13              | GND        |                  |
| 14              | AI6        | Signal Input CH6 |
| 15              | GND        |                  |
| 16              | AI7        | Signal Input CH7 |
| 17              | GND        |                  |
| 18              | NC         | Not Connected    |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.  
The cold-pressed terminal parameters are as follows:



## 4 Wiring



## 5 Process data definition

| Input Data |                          |       |       |       |       |       |       |       |
|------------|--------------------------|-------|-------|-------|-------|-------|-------|-------|
| Bit No     | Bit 7                    | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0     | Analog Input Data (CH 0) |       |       |       |       |       |       |       |
| Byte 1     |                          |       |       |       |       |       |       |       |
| Byte 2     | Analog Input Data (CH 1) |       |       |       |       |       |       |       |
| Byte 3     |                          |       |       |       |       |       |       |       |
| Byte 4     | Analog Input Data (CH 2) |       |       |       |       |       |       |       |
| Byte 5     |                          |       |       |       |       |       |       |       |
| Byte 6     | Analog Input Data (CH 3) |       |       |       |       |       |       |       |
| Byte 7     |                          |       |       |       |       |       |       |       |
| Byte 8     | Analog Input Data (CH 4) |       |       |       |       |       |       |       |
| Byte 9     |                          |       |       |       |       |       |       |       |
| Byte 10    | Analog Input Data (CH 5) |       |       |       |       |       |       |       |
| Byte 11    |                          |       |       |       |       |       |       |       |
| Byte 12    | Analog Input Data (CH 6) |       |       |       |       |       |       |       |
| Byte 13    |                          |       |       |       |       |       |       |       |
| Byte 14    | Analog Input Data (CH 7) |       |       |       |       |       |       |       |
| Byte 15    |                          |       |       |       |       |       |       |       |

## 5.1 Process data definition (standard mode)

Data Declaration:

**Analog Input Data (CH0-7):** Voltage input data value

| Process data definition (8AI) |                 |               |                |         |        |                         |
|-------------------------------|-----------------|---------------|----------------|---------|--------|-------------------------|
| Voltage (0-5V)                | Voltage (0-10V) | Voltage (±5V) | Voltage (±10V) | Decimal | Hex    | Range                   |
| >5.06                         | >10.12          | >5.06         | >10.12         | 32767   | 0x7FFF | Overflow                |
| 5.06                          | 10.12           | 5.06          | 10.12          | 27979   | 0x6D4B | Exceeds the upper limit |
| 5V+0.1808mv                   | 10V+0.3617mv    | 5V+0.1808mv   | 10V+0.3617mv   | 27649   | 0x6C01 |                         |
| 5                             | 10              | 5             | 10             | 27648   | 0x6C00 | Rated range             |
| .                             | .               | .             | .              | .       | .      |                         |
| .                             | .               | .             | .              | .       | .      |                         |
| 2.5                           | 5               | 2.5           | 5              | 13824   | 0x3600 |                         |
| .                             | .               | .             | .              | .       | .      |                         |
| .                             | .               | .             | .              | .       | .      |                         |
| 0                             | 0               | 0             | 0              | 0       | 0x0000 |                         |
| /                             | /               | .             | .              | .       | .      |                         |
| /                             | /               | .             | .              | .       | .      |                         |
| /                             | /               | -2.5          | -5             | 13824   | 0XCA00 |                         |
| /                             | /               | .             | .              | .       | .      |                         |
| /                             | /               | .             | .              | .       | .      |                         |
| /                             | /               | -5            | -10            | 27648   | 0x9400 |                         |
| /                             | /               | -5V-0.1808mv  | -10V-0.3617mv  | 27649   | 0x93FF | Exceeds the lower limit |
| /                             | /               | -5.06         | -10.12         | 27979   | 0x92B5 |                         |
| /                             | /               | -5.06<        | -10.12<        | 32768   | 0x8000 | Underflow               |

## 5.2 Process data definition (special mode)

| Process data definition (8AI) |                    |                  |                   |         |        |
|-------------------------------|--------------------|------------------|-------------------|---------|--------|
| Voltage<br>(0-5V)             | Voltage<br>(0-10V) | Voltage<br>(±5V) | Voltage<br>(±10V) | Decimal | Hex    |
| 5                             | 10                 | 5                | 10                | 32767   | 0x7FFF |
| .                             | .                  | .                | .                 | .       | .      |
| .                             | .                  | .                | .                 | .       | .      |
| 2.5                           | 5                  | 2.5              | 5                 | 16383   | 0x3FFF |
| .                             | .                  | .                | .                 | .       | .      |
| .                             | .                  | .                | .                 | .       | .      |
| 0                             | 0                  | 0                | 0                 | 0       | 0x0000 |
| /                             | /                  | .                | .                 | .       | .      |
| /                             | /                  | .                | .                 | .       | .      |
| /                             | /                  | -2.5             | -5                | 16384   | 0xC000 |
| /                             | /                  | .                | .                 | .       | .      |
| /                             | /                  | .                | .                 | .       | .      |
| /                             | /                  | -5               | -10               | 32768   | 0x8000 |

## 6 Configuration parameters definition

| Configuration Parameters |                      |       |       |       |                     |       |            |                   |
|--------------------------|----------------------|-------|-------|-------|---------------------|-------|------------|-------------------|
| Bit No                   | Bit 7                | Bit 6 | Bit 5 | Bit 4 | Bit 3               | Bit 2 | Bit 1      | Bit 0             |
| Byte 0                   | Reserved             |       |       |       |                     |       | Range Mode | 16Bit Data Format |
| Byte 1                   | Voltage Type (CH 1)  |       |       |       | Voltage Type (CH 0) |       |            |                   |
| Byte 2                   | Voltage Type (CH 3)  |       |       |       | Voltage Type (CH 2) |       |            |                   |
| Byte 3                   | Voltage Type (CH 5)  |       |       |       | Voltage Type (CH 4) |       |            |                   |
| Byte 4                   | Voltage Type (CH 7)  |       |       |       | Voltage Type (CH 6) |       |            |                   |
| Byte 5                   | Filtering Time (CH0) |       |       |       |                     |       |            |                   |
| Byte 6                   |                      |       |       |       |                     |       |            |                   |
| Byte 7                   | Filtering Time (CH1) |       |       |       |                     |       |            |                   |
| Byte 8                   |                      |       |       |       |                     |       |            |                   |

|         |                      |
|---------|----------------------|
| Byte 9  | Filtering Time (CH2) |
| Byte 10 |                      |
| Byte 11 | Filtering Time (CH3) |
| Byte 12 |                      |
| Byte 13 | Filtering Time (CH4) |
| Byte 14 |                      |
| Byte 15 | Filtering Time (CH5) |
| Byte 16 |                      |
| Byte 17 | Filtering Time (CH6) |
| Byte 18 |                      |
| Byte 19 | Filtering Time (CH7) |
| Byte 20 |                      |
| Byte 21 | Reserved             |
| ...     |                      |
| Byte 29 |                      |

Data Declaration:

**16Bit Data Format:** Sequence of 16-bit data byte transmission (Default:0)

0: A\_B。

1: B\_A。

**Range\_Mode:** Process data mode (default: standard mode)

**Voltage Type(CH 0-7):** Input voltage type (Default:3)

0: disabled

1: 0~5Vdc

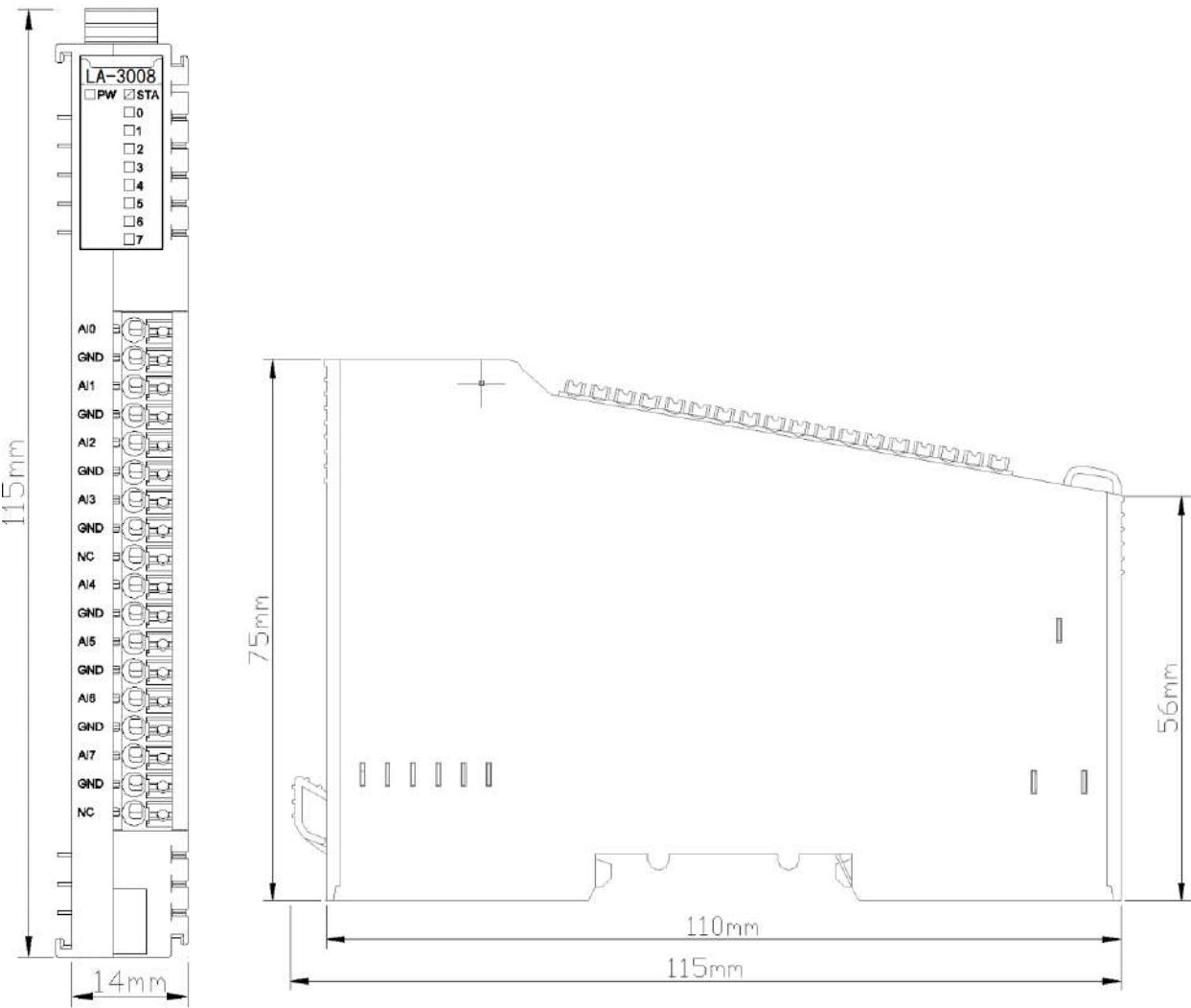
2: -5~5Vdc

3: 0~10Vdc

4: -10~10Vdc

**Filtering Time(CH0-CH7):** The input filtering time of the channel, in ms. (Default: 10)

A Dimension drawing



## LA-2004: 4 channels analog output

*0&4-20mA/16-bit single-terminal*

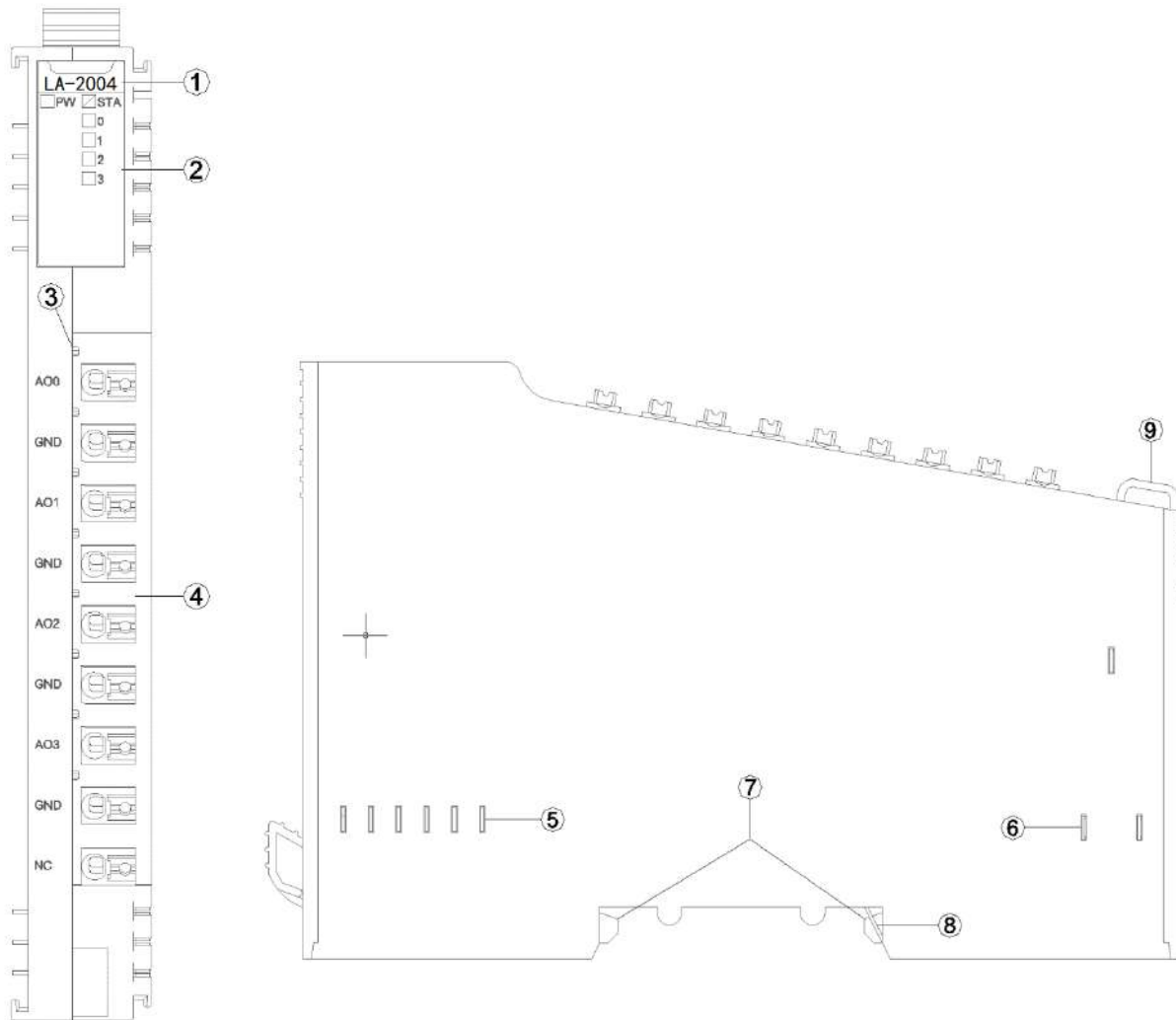
### 1 Module features

- ◆ 2 output ranges can be set(0-20mA、4-20mA)
- ◆ The module internal bus and field output adopts magnetic insulation
- ◆ Single-terminal grounded together output mode

### 2 Technical parameters

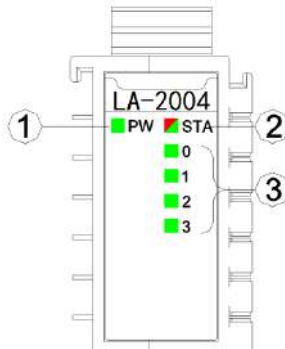
| General parameters        |                                                     |
|---------------------------|-----------------------------------------------------|
| Power                     | Max.25mA@5.0Vdc                                     |
| IO bus isolation          | I/O to internal bus: magnetic isolation (2.5KVrms)  |
| Wiring                    | I/O wiring: Max.1.0mm <sup>2</sup> (AWG 17)         |
| Installation              | 35mm DIN-Rail                                       |
| Size                      | 115*14*75mm                                         |
| Weight                    | 65g                                                 |
| Environmental parameters  |                                                     |
| Working temperature       | -40~85°C                                            |
| Environmental humidity    | 5%-95% (No Condensation)                            |
| Ingress Protection Rating | IP20                                                |
| Output parameters         |                                                     |
| Channel Number            | 4 channels                                          |
| Resolution ratio          | 16Bit                                               |
| Output range              | 0-20mA/4-20mA                                       |
| The output precision      | >0.3%                                               |
| Diagnostic function       | Disconnection or overload, field power supply error |
| The common terminal       | 0V grounded together, channels are not isolated     |
| Conversion time           | 2ms/ all channels                                   |
| Load                      | Max.1KΩ                                             |

### 3 Hardware interfaces



- ① Module Type
- ② State Indicator
- ③ (non field channel indicator)
- ④ Wiring Terminal and Marking
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicators definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Output channel LED indicator (green)

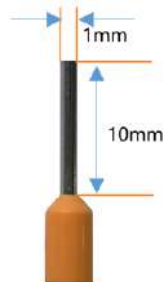
| PW Power Indicator(GREEN)             | Definition                                    |
|---------------------------------------|-----------------------------------------------|
| ON                                    | Internal bus power supply is normal           |
| OFF                                   | Internal bus power supply is failure          |
| STA Module State Indicator(Red/Green) | Definition                                    |
| Green Slow Flash (2.5hz)              | The internal bus of the module is not started |
| Red Slow Flash (2.5hz)                | Module internal bus offline                   |
| Green Normally On                     | Operation is normal                           |
| Flash(2.5Hz) (RED/GREEN)              | Upgrading mode                                |
| Flash(10Hz) (RED/GREEN)               | Firmware upgrading                            |
| Red Flashes Twice                     | Module exception has been soft-restarted      |
| 0-3 Channel Indicator Light           | Definition                                    |
| ON                                    | Output signal $\geq 1\%$ range                |
| OFF                                   | Output signal $< 1\%$ range                   |

### 3.2 Terminal definition

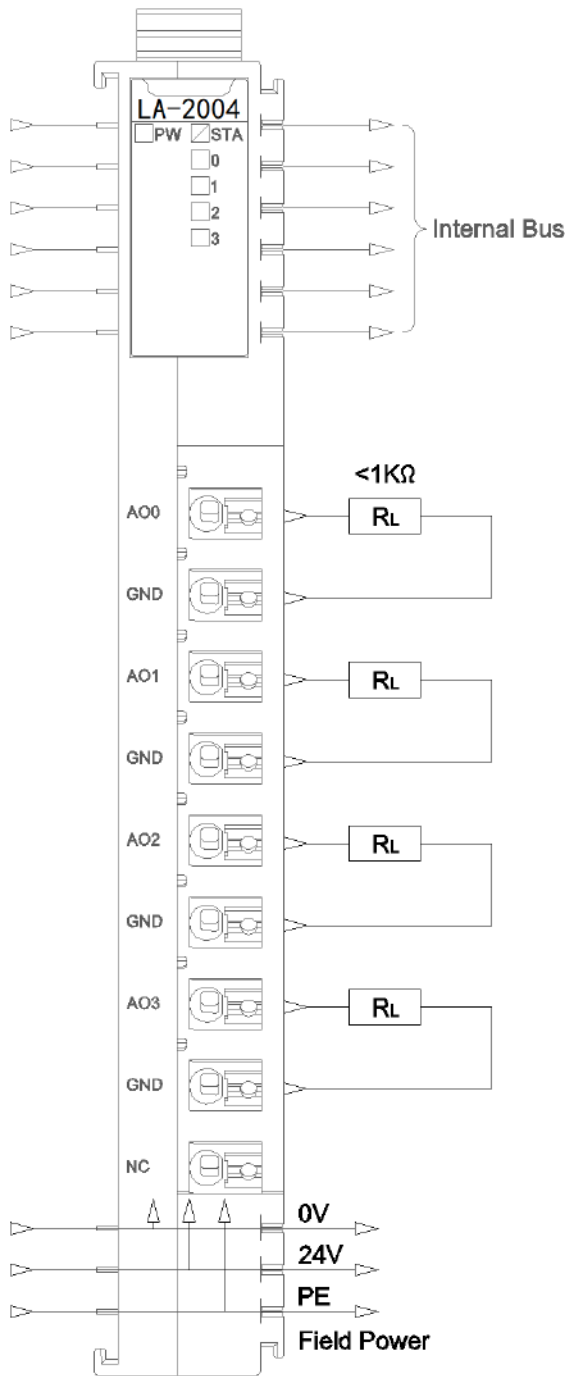
| Terminal number | Definition | Instructions       |
|-----------------|------------|--------------------|
| 1               | AO0        | Current output CH0 |
| 2               | GND        |                    |
| 3               | AO1        | Current output CH1 |
| 4               | GND        |                    |
| 5               | AO2        | Current output CH2 |
| 6               | GND        |                    |
| 7               | AO3        | Current output CH3 |
| 8               | GND        |                    |
| 9               | NC         | Disconnected       |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



4 Wiring



## 5 Progress data definition

| Input data  |                           |       |                           |                                 |                                  |                                  |                                  |                                  |
|-------------|---------------------------|-------|---------------------------|---------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| Bit No      | Bit 7                     | Bit 6 | Bit 5                     | Bit 4                           | Bit 3                            | Bit 2                            | Bit 1                            | Bit 0                            |
| Byte 0      | Reserved                  |       | Field Power Error (CH0-3) | DAC Communication Error (CH0-3) | Output Opening or Overload (CH3) | Output Opening or Overload (CH2) | Output Opening or Overload (CH1) | Output Opening or Overload (CH0) |
| Output data |                           |       |                           |                                 |                                  |                                  |                                  |                                  |
| Bit No      | Bit 7                     | Bit 6 | Bit 5                     | Bit 4                           | Bit 3                            | Bit 2                            | Bit 1                            | Bit 0                            |
| Byte 0      | Analog Output Data (CH 0) |       |                           |                                 |                                  |                                  |                                  |                                  |
| Byte 1      |                           |       |                           |                                 |                                  |                                  |                                  |                                  |
| Byte 2      | Analog Output Data (CH 1) |       |                           |                                 |                                  |                                  |                                  |                                  |
| Byte 3      |                           |       |                           |                                 |                                  |                                  |                                  |                                  |
| Byte 4      | Analog Output Data (CH 2) |       |                           |                                 |                                  |                                  |                                  |                                  |
| Byte 5      |                           |       |                           |                                 |                                  |                                  |                                  |                                  |
| Byte 6      | Analog Output Data (CH 3) |       |                           |                                 |                                  |                                  |                                  |                                  |
| Byte 7      |                           |       |                           |                                 |                                  |                                  |                                  |                                  |

Data description:

**Output Opening or Overload (CH0-3):** Current output diagnostic State, when the corresponding Output channel is open or overloaded, this bit is set to 1, and it will be automatically cleared when the load returns to normal.

0: normal is load

1: openload or overload

**DAC Communication Error(CH0-3):** DAC converter Communication is Error. This Error will occur when the field power supply is disconnected or the DAC and isolator are damaged.

0: DAC communication is normal

1: DAC conversion failed

**Field Power Error (CH0-3):** This Error will occur when the Field Power is not powered on.

0: field power access is normal

1: field power access is failure

**Hexadecimal:** Analog Output value, 16-bit unsigned integer.

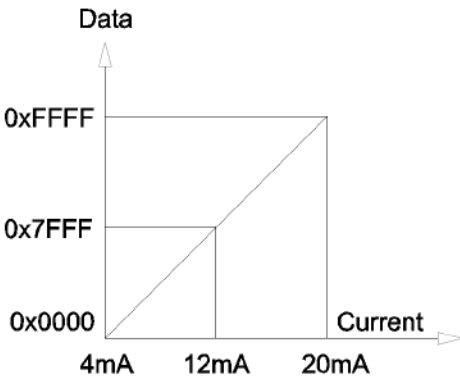
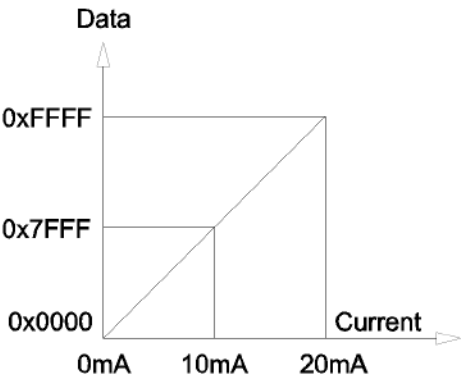
## 5.1 Process data definition (standard mode)

| Analog Output Data(LA-2004) (0-20mA) |         |      |                         |
|--------------------------------------|---------|------|-------------------------|
| Current (0-20mA)                     | Decimal | Hex  | Range                   |
| 21mA                                 | 32767   | 7FFF | Overflow                |
|                                      | 29031   | 7167 |                         |
| 21mA                                 | 29030   | 7166 | Exceeds the upper limit |
| 20mA+723.4nA                         | 27649   | 6C01 |                         |
| 20mA                                 | 27648   | 6C00 | Rated range             |
| 15mA                                 | 20736   | 5100 |                         |
| 723.4nA                              | 1       | 1    |                         |
| 0 mA                                 | 0       | 0    |                         |
| 0 mA                                 | -1      | FFFF | Underflow               |
|                                      | -32768  | 8000 |                         |

| Analog Output Data(LA-2004) (4-20mA) |         |      |                         |
|--------------------------------------|---------|------|-------------------------|
| Current (4-20mA)                     | Decimal | Hex  | Range                   |
| 21mA                                 | 32767   | 7FFF | Overflow                |
|                                      | 29377   | 72C1 |                         |
| 21mA                                 | 29376   | 72C0 | Exceeds the upper limit |
| 20mA+578.7nA                         | 27649   | 6C01 |                         |
| 20 mA                                | 27648   | 6C00 | Rated range             |
| 16 mA                                | 19008   | 4A40 |                         |
| 4mA +578.7nA                         | 1       | 1    |                         |
| 4mA                                  | 0       | 0    |                         |
| 3.9995mA                             | -1      | FFFF | Exceeds the lower limit |
| 3.6mA                                | -692    | FD4C |                         |
| 3.6mA                                | -693    | FD4B | Underflow               |
|                                      | -32768  | 8000 |                         |

5.2 Process data definition (special mode)

| Analog Output Data (LA-2004) |                   |                 |                     |
|------------------------------|-------------------|-----------------|---------------------|
| Current (0 to 20 mA)         | Current (4-20 mA) | Decimal 16 bits | Hexadecimal 16 bits |
| 20                           | 20                | 65535           | 0xFFFF              |
| .                            | .                 | .               | .                   |
| .                            | .                 | .               | .                   |
| .                            | .                 | .               | .                   |
| 10                           | 12                | 32767           | 0x7FFF              |
| .                            | .                 | .               | .                   |
| .                            | .                 | .               | .                   |
| .                            | .                 | .               | .                   |
| 0                            | 4                 | 0               | 0x0000              |



16Bit Data/Current

## 6 Configuration parameter definition

| Configuration parameter |          |       |       |       |                  |                  |                  |                   |
|-------------------------|----------|-------|-------|-------|------------------|------------------|------------------|-------------------|
| Bit No                  | Bit 7    | Bit 6 | Bit 5 | Bit 4 | Bit 3            | Bit 2            | Bit 1            | Bit 0             |
| Byte 0                  | Reserved |       |       |       |                  |                  |                  | 16Bit Data Format |
| Byte 1                  | Reserved |       |       |       | Current Type CH3 | Current Type CH2 | Current Type CH1 | Current Type CH0  |

Data description:

**16Bit Data Format:** Analog data storage format. (Default: 0)

0: A-B

1: B-A

**Range\_Mode:** Process data mode (default: standard mode)

Standard mode: same with Siemens process data definition

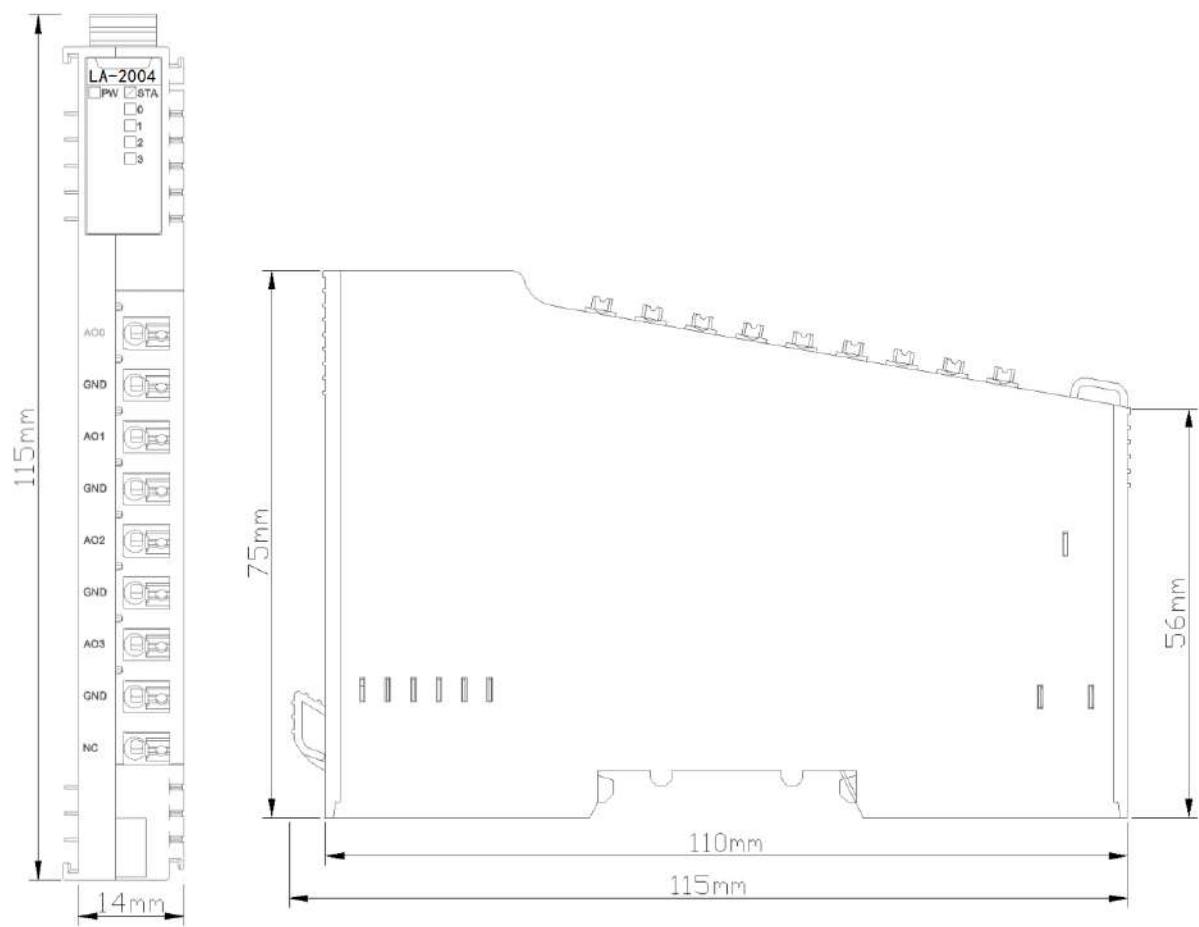
Special mode: max range of the hardware

**Current Type(CH0-3):** Type of output current. (Default: 1)

0: 0-20mA

1: 4-20mA

A Dimension drawing



# LA-4004 4 channels Voltage Output

0~5VDC/0~10VDC/±5VDC/±10VDC,16 bits

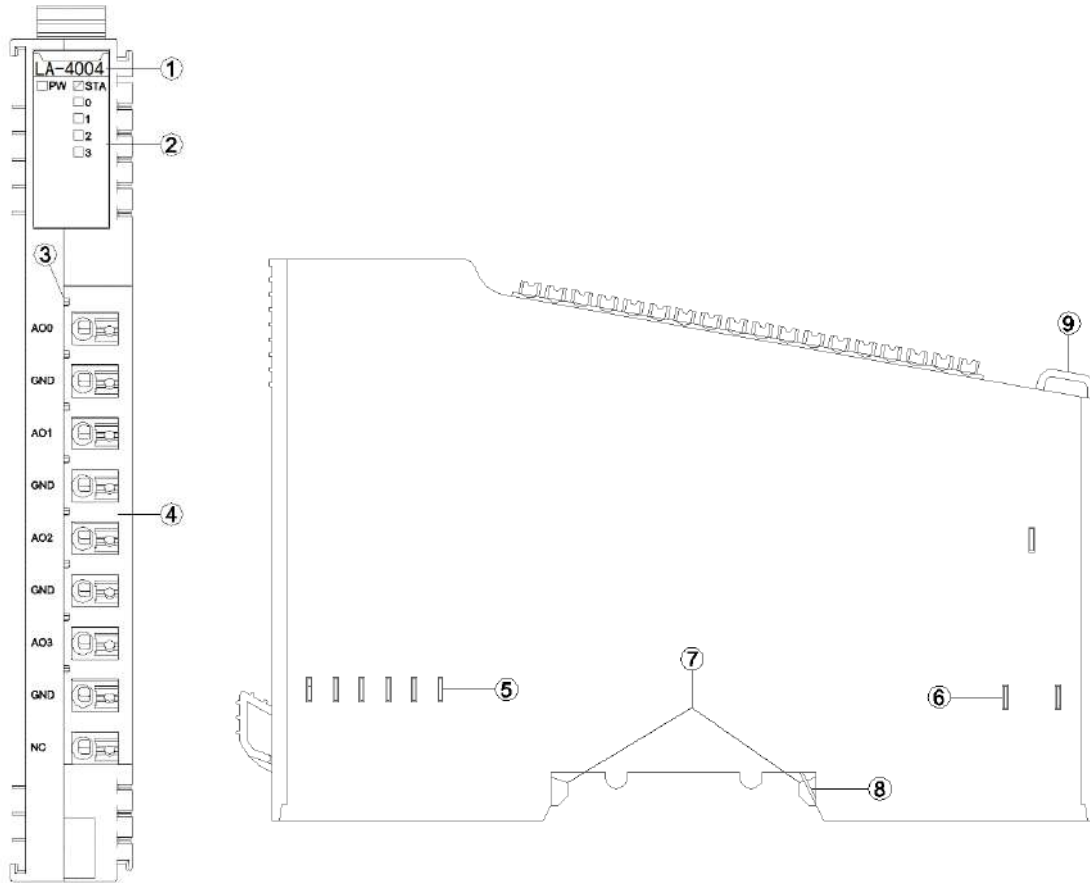
## 1 Module features

- ◆ The module supports 4 channels voltage signal output
- ◆ Output range: 0~5VDC, 0~10VDC, ±5VDC, ±10VDC, 16 bits
- ◆ The module carries with 4 analog output LED indicators
- ◆ Module output signal is single - ended common - grounded output

## 2 Technical Parameters

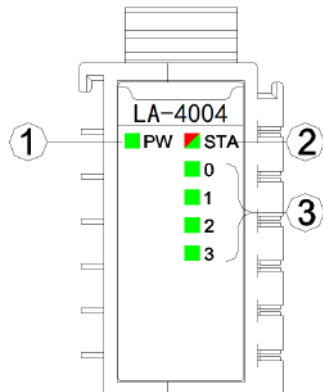
| General parameters        |                                                      |
|---------------------------|------------------------------------------------------|
| Power                     | Max.500mA@5.0Vdc                                     |
| Isolation                 | I/O to internal bus: magnetic isolation (3KVrms)     |
| Field Power               | Not used                                             |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                      |
| Mounting Type             | 35mmDIN-Rail                                         |
| Size                      | 115*14*75mm                                          |
| Weight                    | 65g                                                  |
| Environment Specification |                                                      |
| Operational Temperature   | -40~85°C                                             |
| Operational Humidity      | 5%~95% RH(No Condensation)                           |
| Ingress Protection Rating | IP20                                                 |
| Output Parameter          |                                                      |
| Channel Number            | 4 Channels voltage output                            |
| LED Indicator             | 4 Channels voltage output indicator                  |
| Output Voltage Range      | 0~5VDC、0~10VDC、±5VDC、±10VDC                          |
| Load Resistance           | Max.5kΩ                                              |
| Resolution                | 16 bits                                              |
| Acquisition Accuracy      | ±0.1%( Full Scale)@25°C<br>±0.3(Full Scale)@-40~85°C |
| Conversion Time           | 1 ms / all channels                                  |
| Diagnose                  | Overtemperature/overcurrent status monitoring        |
| Protection Current        | 20mA.                                                |
| Common Port               | Common grounded output                               |

### 3 Hardware Interface



- ① Module Type
- ② State indicator
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Output channel LED indicator (green)

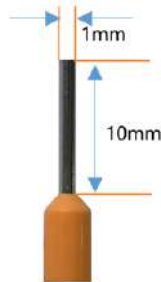
| PW POWER STATE<br>(GREEN)       | Definition                               |
|---------------------------------|------------------------------------------|
| ON                              | Internal bus Power Normal                |
| OFF                             | Internal bus Power Failure               |
| STA MODULE STATE<br>(RED/GREEN) | Definition                               |
| Green slow flash (2.5Hz)        | Module internal bus is not started       |
| Red slow flash (2.5Hz)          | Module internal bus offline              |
| ON (GREEN)                      | Operation normal                         |
| Flash(2.5Hz)<br>(RED/GREEN)     | Upgrading mode                           |
| Flash(10Hz)<br>(RED/GREEN)      | Firmware Update                          |
| Double Flash (RED)              | Module Exception has been soft-restarted |
| 0-3 Channel Indicator           | Definition                               |
| ON                              | The output value is not 0                |
| OFF                             | The output value is 0                    |

### 3.2 Terminal definition

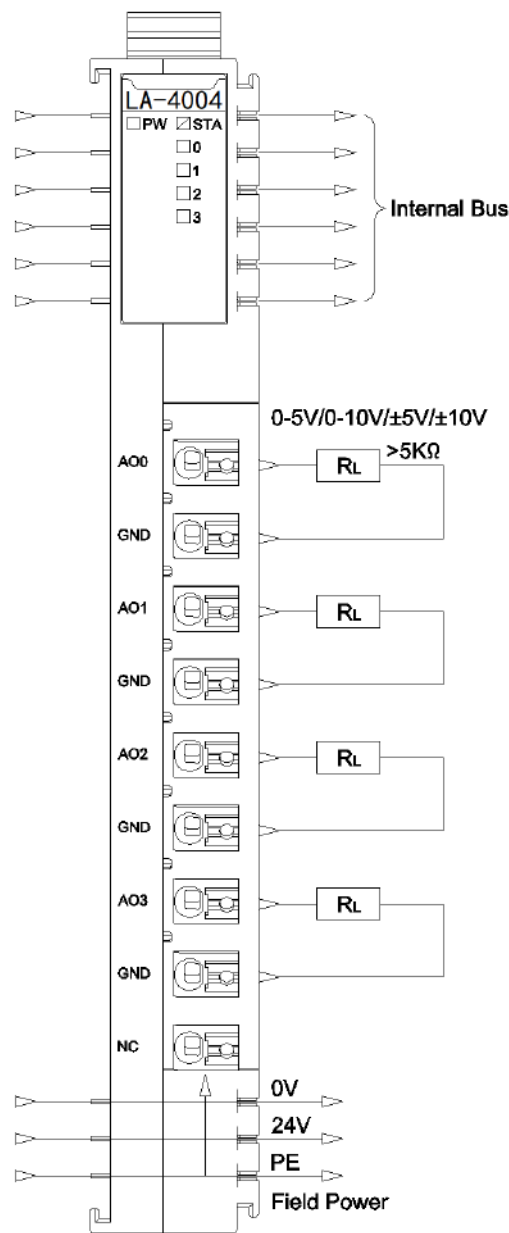
| Terminal Number | Definition | Description       |
|-----------------|------------|-------------------|
| 1               | AO0        | Signal Output CH0 |
| 2               | GND        |                   |
| 3               | AO1        | Signal Output CH1 |
| 4               | GND        |                   |
| 5               | AO2        | Signal Output CH2 |
| 6               | GND        |                   |
| 7               | AO3        | Signal Output CH3 |
| 8               | GND        |                   |
| NC              | NC         | Not Connected     |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



4 Wiring



## 5 Process data definition

| Input Data  |                           |       |       |                  |                   |                   |                   |                   |
|-------------|---------------------------|-------|-------|------------------|-------------------|-------------------|-------------------|-------------------|
| Bit No      | Bit 7                     | Bit 6 | Bit 5 | Bit 4            | Bit 3             | Bit 2             | Bit 1             | Bit 0             |
| Byte 0      | Reserved                  |       |       | Over temperature | Overcurrent (CH3) | Overcurrent (CH2) | Overcurrent (CH1) | Overcurrent (CH0) |
| Output Data |                           |       |       |                  |                   |                   |                   |                   |
| Bit No      | Bit 7                     | Bit 6 | Bit 5 | Bit 4            | Bit 3             | Bit 2             | Bit 1             | Bit 0             |
| Byte 0      | Analog Output Data (CH 0) |       |       |                  |                   |                   |                   |                   |
| Byte 1      |                           |       |       |                  |                   |                   |                   |                   |
| Byte 2      | Analog Output Data (CH 1) |       |       |                  |                   |                   |                   |                   |
| Byte 3      |                           |       |       |                  |                   |                   |                   |                   |
| Byte 4      | Analog Output Data (CH 2) |       |       |                  |                   |                   |                   |                   |
| Byte 5      |                           |       |       |                  |                   |                   |                   |                   |
| Byte 6      | Analog Output Data (CH 3) |       |       |                  |                   |                   |                   |                   |
| Byte 7      |                           |       |       |                  |                   |                   |                   |                   |

### 5.1 Process data definition (standard mode)

Data Declaration:

**Analog Output Data (CH0-3):** voltage output value

Unipolarity 0-5V/0-10V output value

| Analog Output Data (LA-4004) (0-5V/0-10V) |                 |         |        |
|-------------------------------------------|-----------------|---------|--------|
| Voltage (0-5V)                            | Voltage (0-10V) | Decimal | Hex    |
| 5                                         | 10              | 27648   | 0x6C00 |
| .                                         | .               | .       | .      |

|     |   |       |        |
|-----|---|-------|--------|
| .   | . | .     | .      |
| 2.5 | 5 | 13824 | 0x3600 |
| .   | . | .     | .      |
| .   | . | .     | .      |
| 0   | 0 | 0     | 0x0000 |

Bipolar  $\pm 5V/\pm 10V$  Output value

| Analog Output Data (LA-4004) ( $\pm 5V/\pm 10V$ ) |                       |         |        |
|---------------------------------------------------|-----------------------|---------|--------|
| Voltage ( $\pm 5V$ )                              | Voltage ( $\pm 10V$ ) | Decimal | Hex    |
| 5                                                 | 10                    | 27648   | 0x6C00 |
| .                                                 | .                     | .       | .      |
| .                                                 | .                     | .       | .      |
| 2.5                                               | 5                     | 13824   | 0x3600 |
| .                                                 | .                     | .       | .      |
| .                                                 | .                     | .       | .      |
| 0                                                 | 0                     | 0       | 0x0000 |
| .                                                 | .                     | .       | .      |
| .                                                 | .                     | .       | .      |
| -2.5                                              | -5                    | -13824  | 0xCA00 |
| .                                                 | .                     | .       | .      |
| .                                                 | .                     | .       | .      |
| -5                                                | -10                   | -27648  | 0x9400 |

## 5.2 Process data definition (special mode)

Data Declaration:

**Analog Output Data (CH0-3):** voltage output value

Unipolarity 0-5V/0-10V output value

| Analog Output Data (LA-4004) (0-5V/0-10V) |                 |         |        |
|-------------------------------------------|-----------------|---------|--------|
| Voltage (0-5V)                            | Voltage (0-10V) | Decimal | Hex    |
| 5                                         | 10              | 65535   | 0xFFFF |
| .                                         | .               | .       | .      |

|     |   |       |        |
|-----|---|-------|--------|
| .   | . | .     | .      |
| 2.5 | 5 | 32767 | 0x7FFF |
| .   | . | .     | .      |
| .   | . | .     | .      |
| 0   | 0 | 0     | 0x0000 |

### Bipolar $\pm 5V/\pm 10V$ Output value

| Analog Output Data (LA-4004) ( $\pm 5V/\pm 10V$ ) |                       |         |        |
|---------------------------------------------------|-----------------------|---------|--------|
| Voltage ( $\pm 5V$ )                              | Voltage ( $\pm 10V$ ) | Decimal | Hex    |
| 5                                                 | 10                    | 32767   | 0x7FFF |
| .                                                 | .                     | .       | .      |
| .                                                 | .                     | .       | .      |
| 2.5                                               | 5                     | 16383   | 0x3FFF |
| .                                                 | .                     | .       | .      |
| .                                                 | .                     | .       | .      |
| 0                                                 | 0                     | 0       | 0x0000 |
| .                                                 | .                     | .       | .      |
| .                                                 | .                     | .       | .      |
| -2.5                                              | -5                    | -16384  | 0xC000 |
| .                                                 | .                     | .       | .      |
| .                                                 | .                     | .       | .      |
| -5                                                | -10                   | -32768  | 0x8000 |

## 6 Configuration parameters definition

| Configuration Parameter |                     |       |       |       |                     |       |       |                   |
|-------------------------|---------------------|-------|-------|-------|---------------------|-------|-------|-------------------|
| Bit No                  | Bit 7               | Bit 6 | Bit 5 | Bit 4 | Bit 3               | Bit 2 | Bit 1 | Bit 0             |
| Byte 0                  | Reserved            |       |       |       |                     |       |       | 16Bit Data Format |
| Byte 1                  | Voltage Type (CH 1) |       |       |       | Voltage Type (CH 0) |       |       |                   |
| Byte 2                  | Voltage Type (CH 3) |       |       |       | Voltage Type (CH 2) |       |       |                   |

Data Declaration:

**16Bit Data Format:** 16 bits data byte transmission sequence (default value: A\_B)

A\_B: Big-endian format transmission

B\_A: Little-endian format transmission

**Range\_Mode:** Process data mode (default: standard mode)

**Standard mode:** same with Siemens process data definition

**Special mode:** max range of the hardware

**Voltage Type(CH 0-3):** Output voltage type (default value: 0~10Vdc)

**Disable:** Output disable

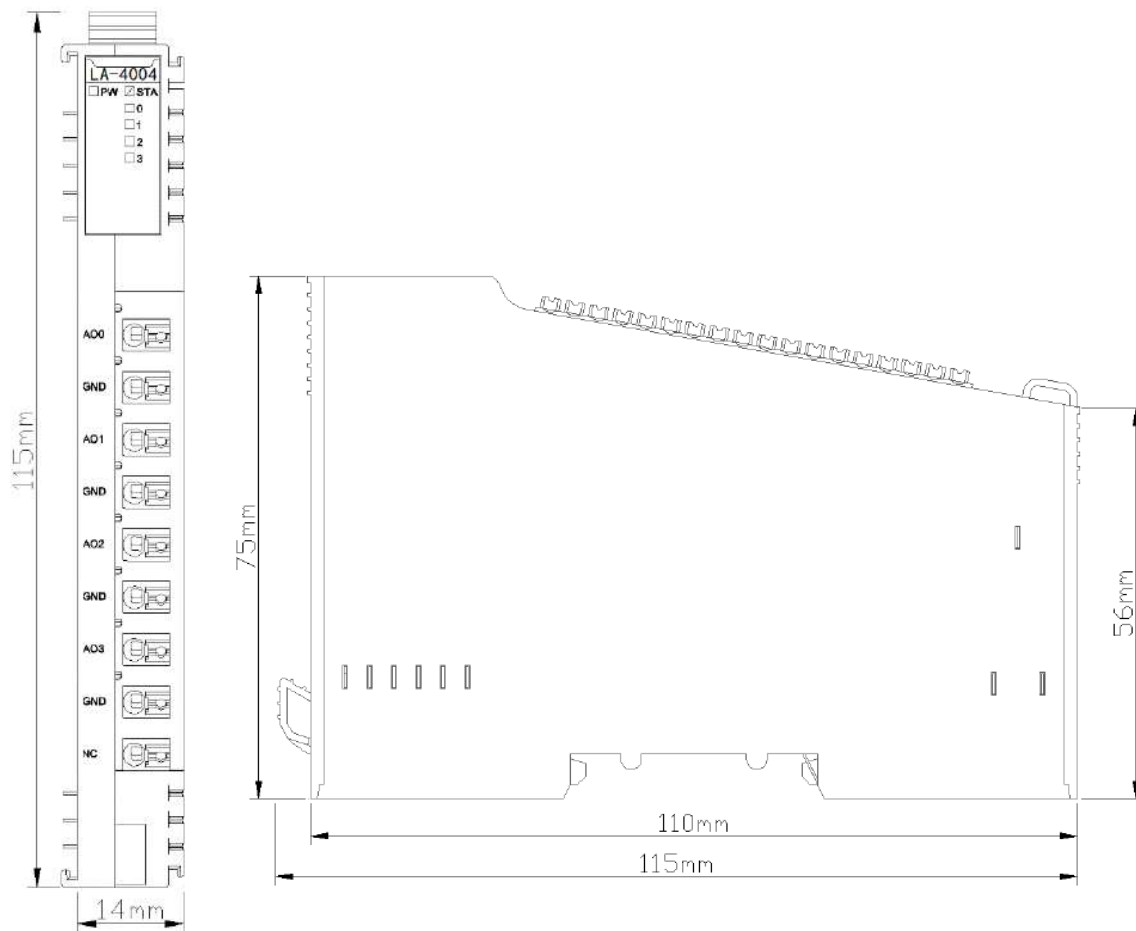
0~5Vdc: 0~5V Direct-current output

0~10Vdc: 0~10V Direct-current output

-5~5Vdc: -5~5V Direct-current output

-10~10Vdc: -10~10V Direct-current output

## A Dimension drawing



# LA-4008 8 channels Voltage Output

0~5VDC/0~10VDC/±5VDC/±10VDC,16bits

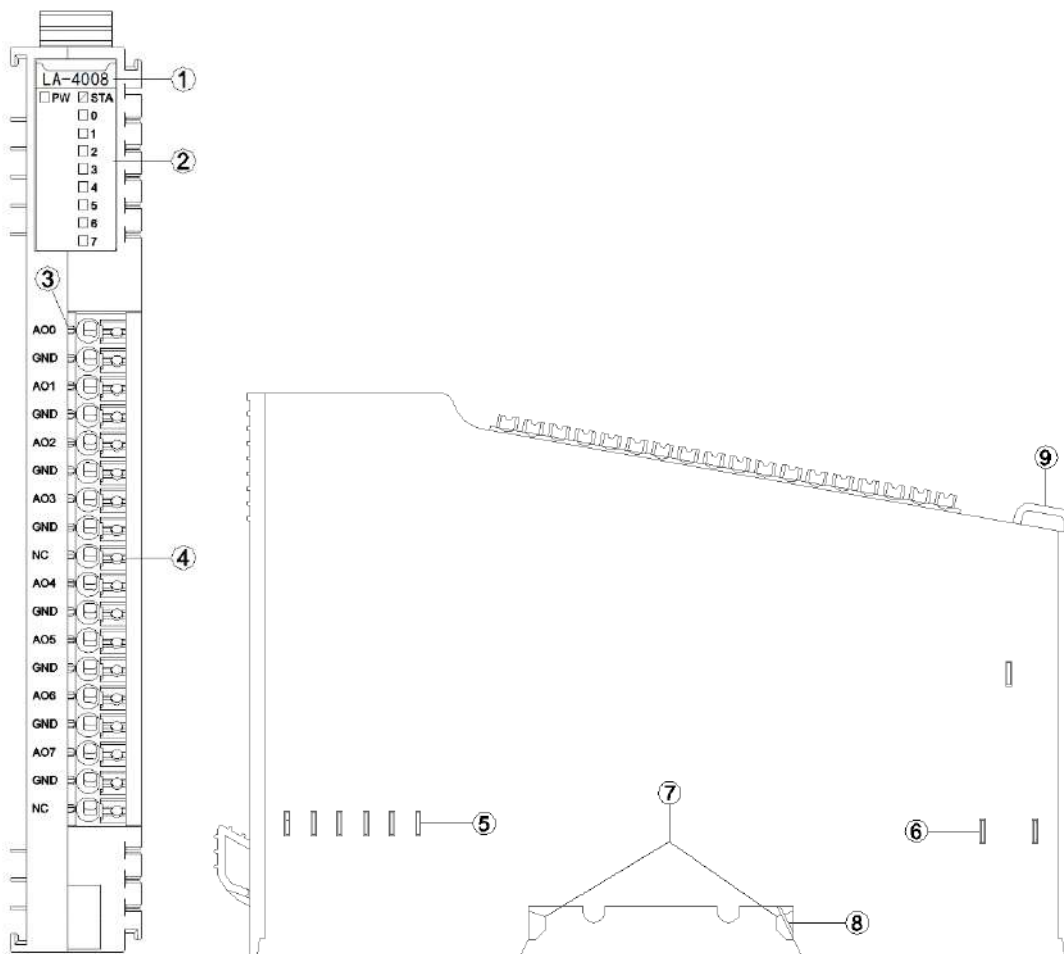
## 1 Module features

- ◆ The module supports 8 channels voltage signal output
- ◆ Output range: 0~5VDC, 0~10VDC, ±5VDC, ±10VDC, 16 bits
- ◆ The module carries with 8 analog output LED indicators
- ◆ Module output signal is single - ended common - grounded output

## 2 Technical Parameters

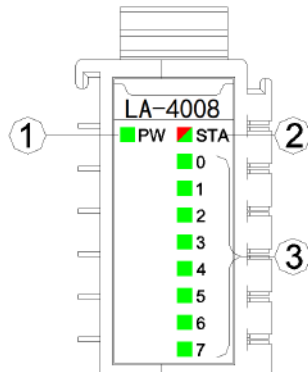
| General parameters        |                                                     |
|---------------------------|-----------------------------------------------------|
| Power                     | Max.500mA@5.0Vdc                                    |
| Isolation                 | I/O to internal bus: magnetic isolation (3KVrms)    |
| Field Power               | Not used                                            |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                     |
| Mounting Type             | 35mmDIN-Rail                                        |
| Size                      | 115*14*75mm                                         |
| Weight                    | 65g                                                 |
| Environment Specification |                                                     |
| Operational Temperature   | -40~85°C                                            |
| Operational Humidity      | 5%~95% RH(No Condensation)                          |
| Ingress Protection Rating | IP20                                                |
| Output Parameter          |                                                     |
| Channel Number            | 8Channels voltage output                            |
| LED Indicator             | 8 Channels voltage output indicator                 |
| Output Voltage Range      | 0~5VDC、0~10VDC、±5VDC、±10VDC                         |
| Load Resistance           | Max.5kΩ                                             |
| Resolution                | 16 bits                                             |
| Acquisition Accuracy      | ±0.1%(Full Scale)@25°C<br>±0.3(Full Scale)@-40~85°C |
| Conversion Time           | 1 ms / all channels                                 |
| Diagnose                  | Overtemperature/overcurrent status monitoring       |
| Protection Current        | 20mA.                                               |
| Common Port               | Common grounded output                              |

## 3 Hardware Interface



- ① Module Type
- ② State indicator
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Output channel LED indicator (green)

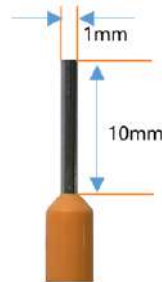
| PW POWER STATE<br>(GREEN)       | Definition                               |
|---------------------------------|------------------------------------------|
| ON                              | Internal bus Power Normal                |
| OFF                             | Internal bus Power Failure               |
| STA MODULE STATE<br>(RED/GREEN) | Definition                               |
| Green slow flash (2.5Hz)        | Module internal bus is not started       |
| Red slow flash (2.5Hz)          | Module internal bus offline              |
| ON (GREEN)                      | Operation normal                         |
| Flash(2.5Hz)<br>(RED/GREEN)     | Upgrading mode                           |
| Flash(10Hz)<br>(RED/GREEN)      | Firmware Update                          |
| Double Flash (RED)              | Module Exception has been soft-restarted |
| 0-3 Channel Indicator           | Definition                               |
| ON                              | The output value is not 0                |
| OFF                             | The output value is 0                    |

### 3.2 Terminal definition

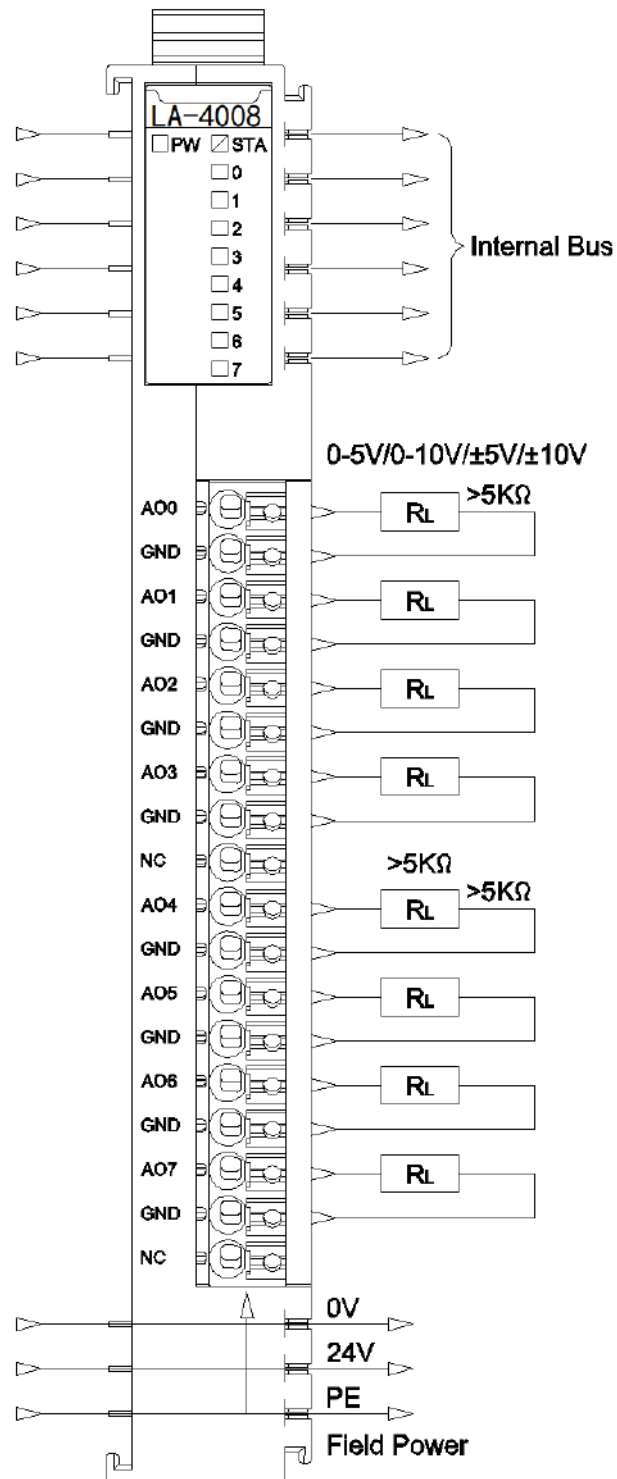
| Terminal Number | Definition | Description       |
|-----------------|------------|-------------------|
| 1               | AO0        | Signal Output CH0 |
| 2               | GND        |                   |
| 3               | AO1        | Signal Output CH1 |
| 4               | GND        |                   |
| 5               | AO2        | Signal Output CH2 |
| 6               | GND        |                   |
| 7               | AO3        | Signal Output CH3 |
| 8               | GND        |                   |
| 9               | NC         | Not Connected     |
| 10              | AO4        | Signal Output CH4 |
| 11              | GND        |                   |
| 12              | AO5        | Signal Output CH5 |
| 13              | GND        |                   |
| 14              | AO6        | Signal Output CH6 |
| 15              | GND        |                   |
| 16              | AO7        | Signal Output CH7 |
| 17              | GND        |                   |
| 18              | NC         | Not Connected     |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



## 4 Wiring



## 5 Process data definition

| Input Data  |                           |       |       |       |       |       |       |                  |
|-------------|---------------------------|-------|-------|-------|-------|-------|-------|------------------|
| Bit No      | Bit 7                     | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0            |
| Byte 0      | Reserved                  |       |       |       |       |       |       | Over temperature |
| Output Data |                           |       |       |       |       |       |       |                  |
| Bit No      | Bit 7                     | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0            |
| Byte 0      | Analog Output Data (CH 0) |       |       |       |       |       |       |                  |
| Byte 1      |                           |       |       |       |       |       |       |                  |
| Byte 2      | Analog Output Data (CH 1) |       |       |       |       |       |       |                  |
| Byte 3      |                           |       |       |       |       |       |       |                  |
| Byte 4      | Analog Output Data (CH 2) |       |       |       |       |       |       |                  |
| Byte 5      |                           |       |       |       |       |       |       |                  |
| Byte 6      | Analog Output Data (CH 3) |       |       |       |       |       |       |                  |
| Byte 7      |                           |       |       |       |       |       |       |                  |
| Byte 8      | Analog Output Data (CH 4) |       |       |       |       |       |       |                  |
| Byte 9      |                           |       |       |       |       |       |       |                  |
| Byte 10     | Analog Output Data (CH 5) |       |       |       |       |       |       |                  |
| Byte 11     |                           |       |       |       |       |       |       |                  |
| Byte 12     | Analog Output Data (CH 6) |       |       |       |       |       |       |                  |
| Byte 13     |                           |       |       |       |       |       |       |                  |
| Byte 14     | Analog Output Data (CH 7) |       |       |       |       |       |       |                  |
| Byte 15     |                           |       |       |       |       |       |       |                  |

Data Declaration:

Analog Output Data (CH0-7): voltage output value

Unipolarity 0-5V/0-10V output value

## 5.1 Process data definition (standard mode)

Data Declaration:

Analog Output Data (CH0-7): voltage output value

Unipolarity 0-5V/0-10V output value

| Analog Output Data (LA-4008) (0-5V/0-10V) |                    |         |        |
|-------------------------------------------|--------------------|---------|--------|
| Voltage<br>(0-5V)                         | Voltage<br>(0-10V) | Decimal | Hex    |
| 5                                         | 10                 | 27648   | 0x6C00 |
| .                                         | .                  | .       | .      |
| .                                         | .                  | .       | .      |
| 2.5                                       | 5                  | 13824   | 0x3600 |
| .                                         | .                  | .       | .      |
| .                                         | .                  | .       | .      |
| 0                                         | 0                  | 0       | 0x0000 |

Bipolar  $\pm 5V/\pm 10V$  Output value

| Analog Output Data (LA-4008) ( $\pm 5V/\pm 10V$ ) |                          |         |        |
|---------------------------------------------------|--------------------------|---------|--------|
| Voltage<br>( $\pm 5V$ )                           | Voltage<br>( $\pm 10V$ ) | Decimal | Hex    |
| 5                                                 | 10                       | 27648   | 0x6C00 |
| .                                                 | .                        | .       | .      |
| .                                                 | .                        | .       | .      |
| 2.5                                               | 5                        | 13824   | 0x3600 |
| .                                                 | .                        | .       | .      |
| .                                                 | .                        | .       | .      |
| 0                                                 | 0                        | 0       | 0x0000 |
| .                                                 | .                        | .       | .      |
| .                                                 | .                        | .       | .      |
| -2.5                                              | -5                       | -13824  | 0xCA00 |
| .                                                 | .                        | .       | .      |

|    |     |        |        |
|----|-----|--------|--------|
| .  | .   | .      | .      |
| -5 | -10 | -27648 | 0x9400 |

## 5.2 Process data definition (special mode)

Data Declaration:

Analog Output Data (CH0-7): voltage output value

Unipolarity 0-5V/0-10V output value

| Analog Output Data (LA-4008) (0-5V/0-10V) |                 |         |        |
|-------------------------------------------|-----------------|---------|--------|
| Voltage (0-5V)                            | Voltage (0-10V) | Decimal | Hex    |
| 5                                         | 10              | 65535   | 0xFFFF |
| .                                         | .               | .       | .      |
| .                                         | .               | .       | .      |
| 2.5                                       | 5               | 32767   | 0x7FFF |
| .                                         | .               | .       | .      |
| .                                         | .               | .       | .      |
| 0                                         | 0               | 0       | 0x0000 |

Bipolar  $\pm 5V/\pm 10V$  Output value

| Analog Output Data (LA-4008) ( $\pm 5V/\pm 10V$ ) |                       |         |        |
|---------------------------------------------------|-----------------------|---------|--------|
| Voltage ( $\pm 5V$ )                              | Voltage ( $\pm 10V$ ) | Decimal | Hex    |
| 5                                                 | 10                    | 32767   | 0x7FFF |
| .                                                 | .                     | .       | .      |
| .                                                 | .                     | .       | .      |
| 2.5                                               | 5                     | 16383   | 0x3FFF |
| .                                                 | .                     | .       | .      |
| .                                                 | .                     | .       | .      |
| 0                                                 | 0                     | 0       | 0x0000 |
| .                                                 | .                     | .       | .      |
| .                                                 | .                     | .       | .      |

|      |     |        |        |
|------|-----|--------|--------|
| -2.5 | -5  | -16384 | 0xC000 |
| .    | .   | .      | .      |
| .    | .   | .      | .      |
| -5   | -10 | -32768 | 0x8000 |

## 6 Configuration parameters definition

| Configuration Parameter |                     |       |       |       |                     |       |       |                   |
|-------------------------|---------------------|-------|-------|-------|---------------------|-------|-------|-------------------|
| Bit No                  | Bit 7               | Bit 6 | Bit 5 | Bit 4 | Bit 3               | Bit 2 | Bit 1 | Bit 0             |
| Byte 0                  | Reserved            |       |       |       |                     |       |       | 16Bit Data Format |
| Byte 1                  | Voltage Type (CH 1) |       |       |       | Voltage Type (CH 0) |       |       |                   |
| Byte 2                  | Voltage Type (CH 3) |       |       |       | Voltage Type (CH 2) |       |       |                   |
| Byte 3                  | Voltage Type (CH 5) |       |       |       | Voltage Type (CH 4) |       |       |                   |
| Byte 4                  | Voltage Type (CH 7) |       |       |       | Voltage Type (CH 6) |       |       |                   |

Data Declaration:

**16Bit Data Format:** 16 bits data byte transmission sequence (default value: A\_B)

A\_B: Big-endian format transmission

B\_A: Little-endian format transmission

**Range\_Mode:** Process data mode (default: standard mode)

Standard mode: same with Siemens process data definition

Special mode: max range of the hardware

**Voltage Type(CH 0-7):** Output voltage type (default value: 0~10Vdc)

Disable: Output disable

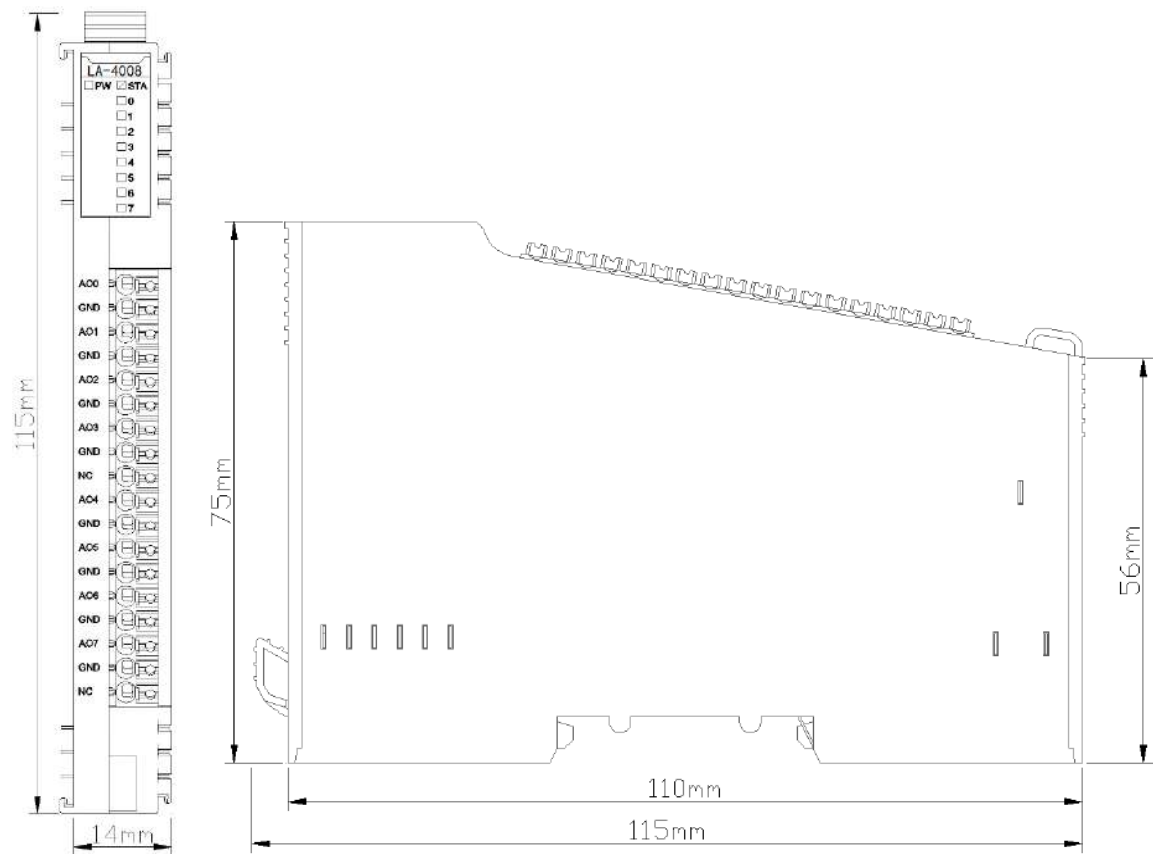
0~5Vdc: 0~5V Direct-current output

0~10Vdc: 0~10V Direct-current output

-5~5Vdc: -5~5V Direct-current output

-10~10Vdc: -10~10V Direct-current output

A Dimension drawing



## 5 Temperature Module

### LA-7003: 3 channels RTD

#### *PT100 temperature acquisition module*

#### 1 Module features

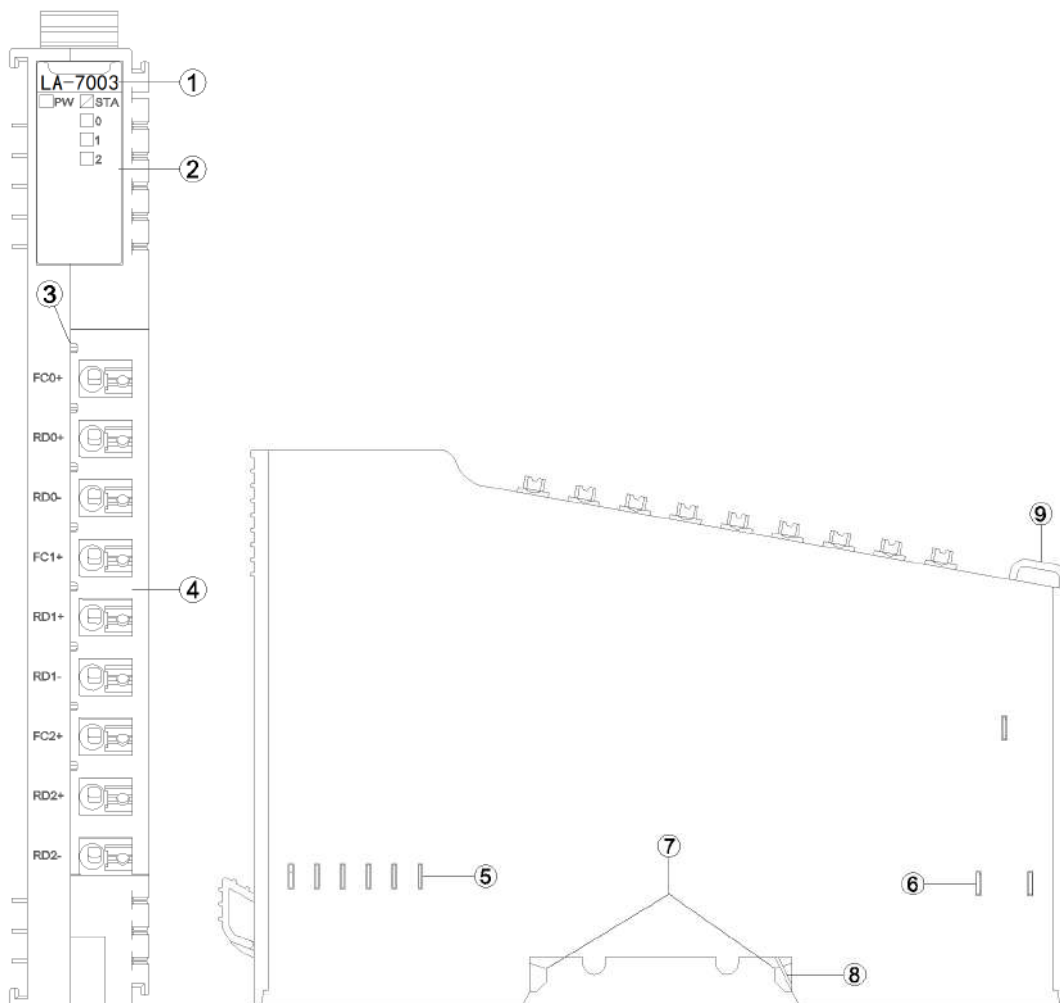
- ◆ The module supports 3-channel RTD thermal resistance (PT100) temperature acquisition
- ◆ The module could be connected to a 2-wire or 3-wire PT100 temperature sensor
- ◆ The internal bus of the module and field input adopts magnetic isolation
- ◆ The module carries with 3 analog input channel LED indicator
- ◆ 15-bit ADC resolution

#### 2 Technical Parameters

| General parameters        |                                                    |
|---------------------------|----------------------------------------------------|
| Power                     | Max.35mA@5.0Vdc                                    |
| Isolation                 | I/O to internal bus: magnetic isolation (2.5KVrms) |
| Field Power               | Not used                                           |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                    |
| Mounting Type             | 35mmDIN-Rail                                       |
| Size                      | 115*14*75mm                                        |
| Weight                    | 65g                                                |
| Environment Specification |                                                    |
| Operational Temperature   | -40~85°C                                           |
| Operational Humidity      | 5%~95% RH(No Condensation)                         |
| Ingress Protection Rating | IP20                                               |
| Input Parameter           |                                                    |
| Channel Number            | 3 Channels                                         |
| LED Indicator             | 3 Green LED                                        |
| Resolution                | 15 bit                                             |
| Sensor Type               | PT100                                              |

|                      |                                                                                                                                                                                         |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Measurement Range    | -240~880℃                                                                                                                                                                               |
| Measurement Accuracy | 0.5℃                                                                                                                                                                                    |
| Conversion Rate      | 400ms/3 channels                                                                                                                                                                        |
| Diagnostic Function  | 32766: Sensor is not connected or the cable is disconnected<br>-32766: Short circuit<br>32765: The chip is faulty<br>32767: Temperature overflows<br>-32768: The temperature underflows |

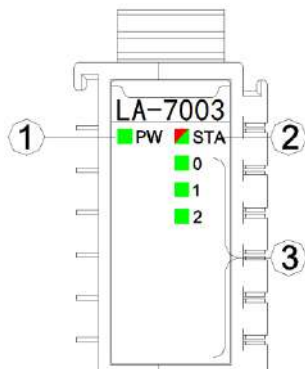
### 3 Hardware Interface



- ① Module Type
- ② State indicator
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus

- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Output channel LED indicator (green)

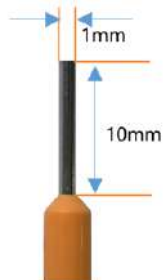
| PW POWER STATE (GREEN)       | Definition                               |
|------------------------------|------------------------------------------|
| ON                           | Internal bus Power Normal                |
| OFF                          | Internal bus Power Failure               |
| STA MODULE STATE (RED/GREEN) | Definition                               |
| Green slow flash (2.5Hz)     | Module internal bus is not started       |
| Red slow flash (2.5Hz)       | Module internal bus offline              |
| ON (GREEN)                   | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)     | Upgrading mode                           |
| Flash(10Hz)(RED/ GREEN)      | Firmware Update                          |
| Double Flash (RED)           | Module Exception has been soft-restarted |
| 0-2 Channel Indicator        | Definition                               |
| ON                           | The input signal exceeds 1% of the range |

|     |                      |
|-----|----------------------|
| OFF | Invalid input signal |
|-----|----------------------|

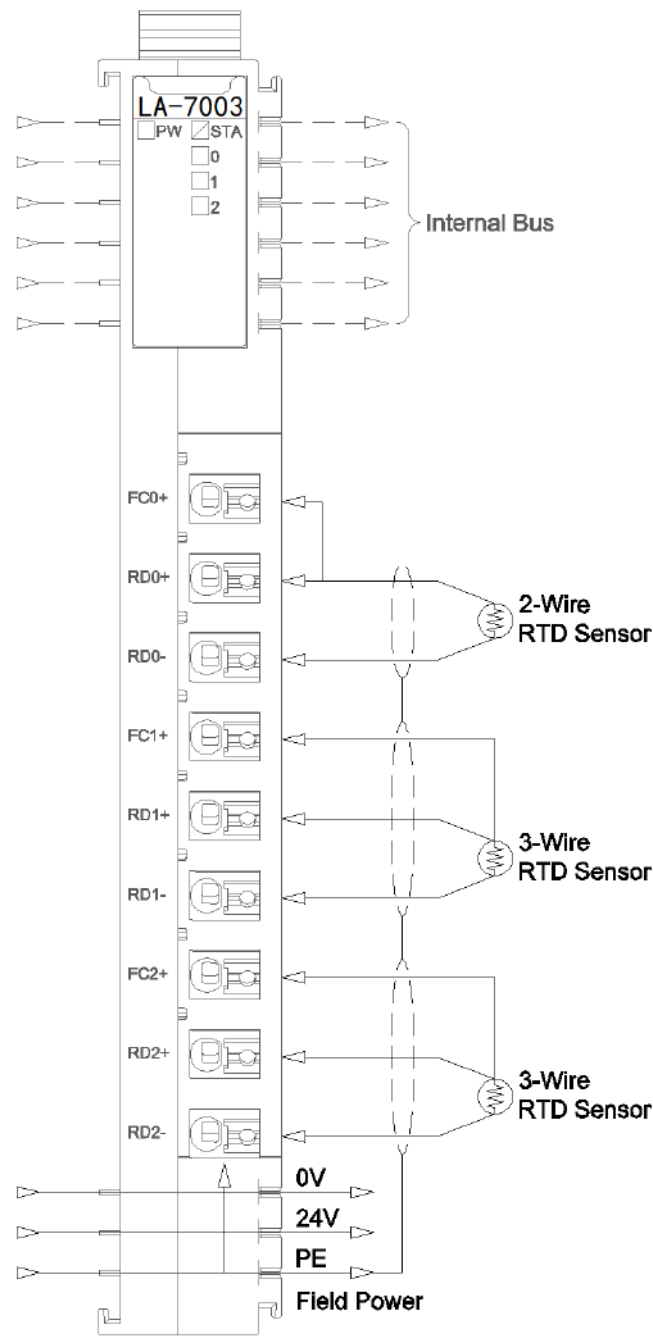
### 3.2 Terminal definition

| Terminal Number | Definition | Description      |
|-----------------|------------|------------------|
| 1               | FC0+       | Signal Input CH0 |
| 2               | RD0+       |                  |
| 3               | RD0-       |                  |
| 4               | FC1+       | Signal Input CH1 |
| 5               | RD1+       |                  |
| 6               | RD1-       |                  |
| 7               | FC2+       | Signal Input CH2 |
| 8               | RD2+       |                  |
| 9               | RD2-       |                  |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.  
The cold-pressed terminal parameters are as follows:



**4 Wiring**



## 5 Process data definition

| Input Data |                         |       |       |       |       |       |       |       |
|------------|-------------------------|-------|-------|-------|-------|-------|-------|-------|
| Bit No     | Bit 7                   | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0     | Analog Input Data(CH 0) |       |       |       |       |       |       |       |
| Byte 1     |                         |       |       |       |       |       |       |       |
| Byte 2     | Analog Input Data(CH 1) |       |       |       |       |       |       |       |
| Byte 3     |                         |       |       |       |       |       |       |       |
| Byte 4     | Analog Input Data(CH 2) |       |       |       |       |       |       |       |
| Byte 5     |                         |       |       |       |       |       |       |       |

Data Declaration:

Analog Input Data (CH0-2): Analog channel input data values

| Process Data Definition |         |      |                         |
|-------------------------|---------|------|-------------------------|
| Temperature             | Decimal | Hex  | Location                |
| >880.0                  | 32767   | 7FFF | Overflow                |
| 880.0                   | 8800    | 2260 | Exceeds the upper limit |
| .                       | .       | .    |                         |
| .                       | .       | .    |                         |
| 850.1                   | 8501    | 2135 |                         |
| 850.0                   | 8500    | 2134 | Rated range             |
| .                       | .       | .    |                         |
| .                       | .       | .    |                         |
| -200.0                  | -2000   | F830 |                         |
| -200.1                  | -2001   | F82F | Exceeds the lower limit |
| .                       | .       | .    |                         |
| .                       | .       | .    |                         |
| -240.0                  | -2400   | F6A0 |                         |
| <-240.0                 | -32768  | 8000 | Underflow               |

## 6 Configuration parameters definition

| Configuration Parameter |          |       |       |       |       |       |       |                   |
|-------------------------|----------|-------|-------|-------|-------|-------|-------|-------------------|
| Bit No                  | Bit 7    | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0             |
| Byte 0                  | Reserved |       |       |       |       |       |       | 16Bit Data Format |

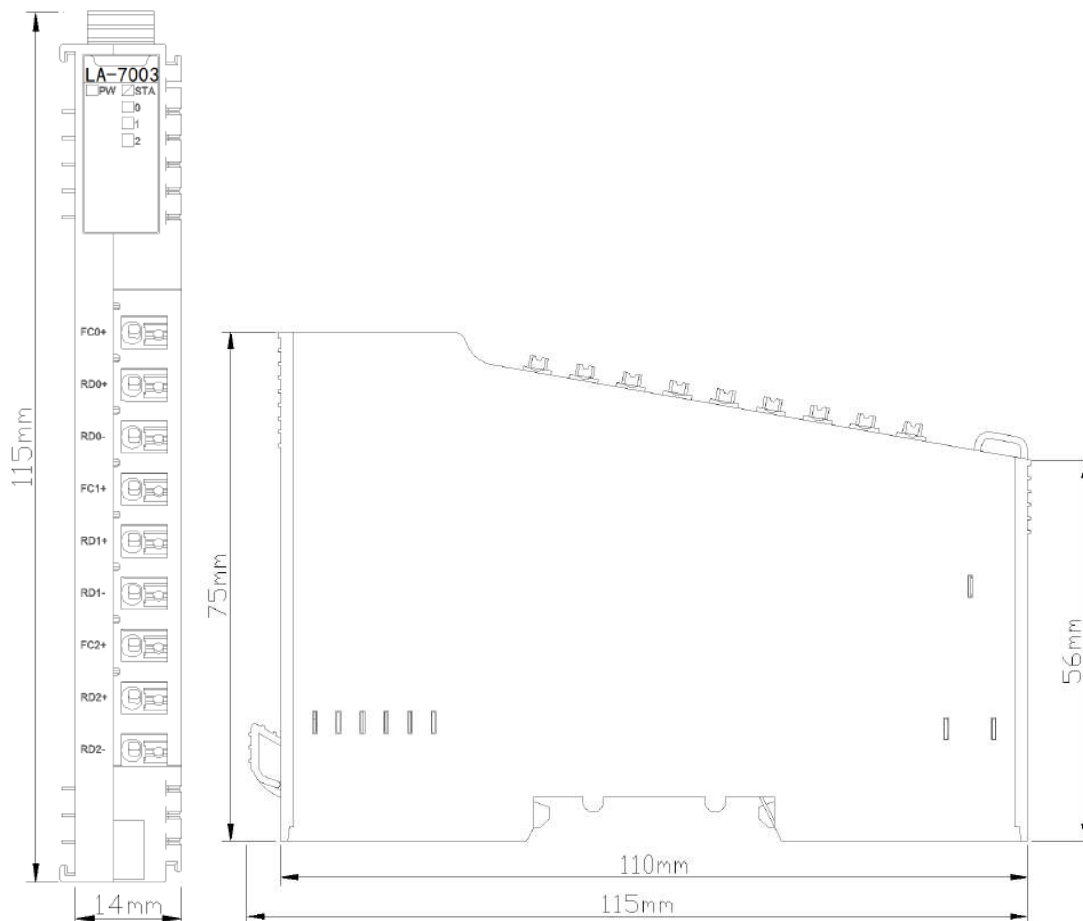
Data Declaration:

16Bit Data Format: Sequence of 16-bit data byte transmission (Default: 0)

0: A\_B

1: B\_A

## A Dimension drawing



# LA-7004 4 channels RTD-PT100 temperature acquisition module

## 1 Module features

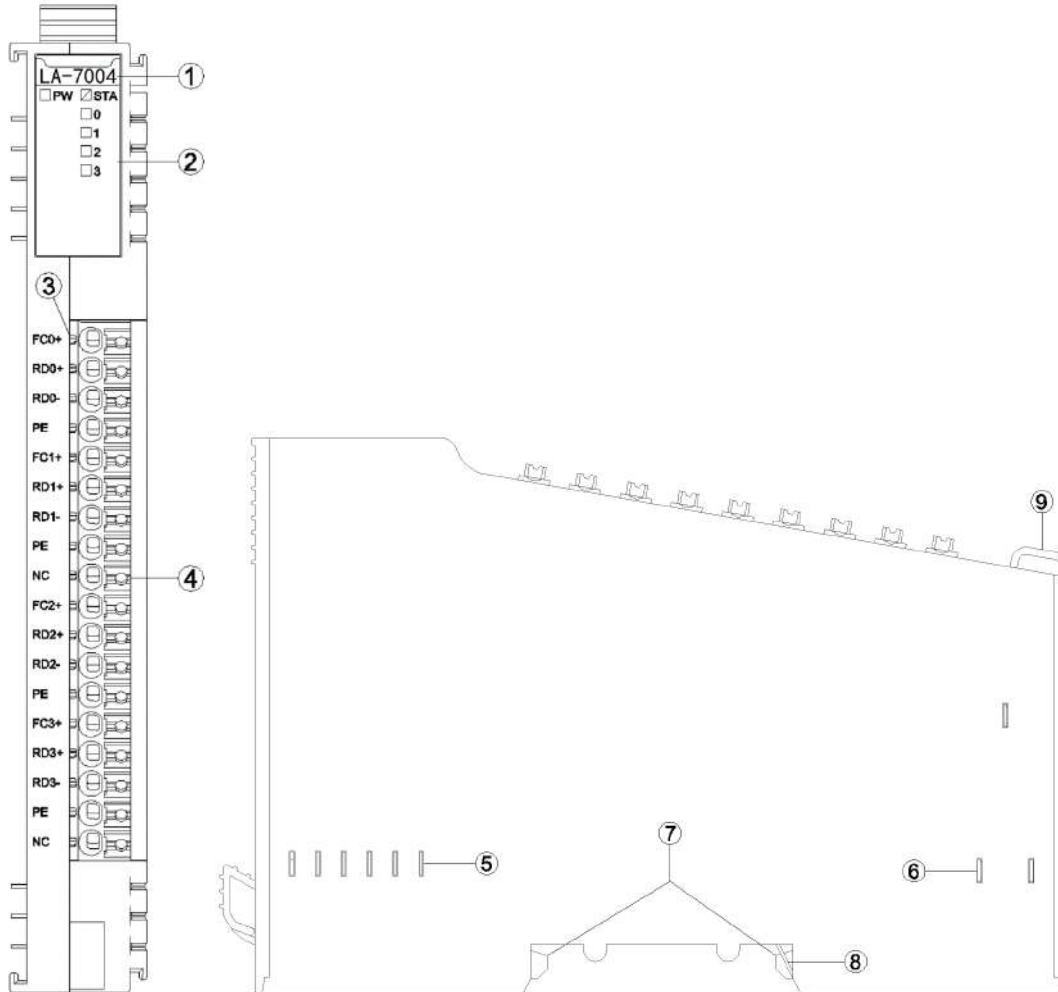
- ◆ The module supports 4-channel RTD (PT100) temperature data acquisition.
- ◆ Channels are isolated from each other, with an isolation voltage of 1500V.
- ◆ The module can connect to 2-wire or 3-wire PT100 temperature sensors.
- ◆ The module's internal bus and field input use magnetic isolation.
- ◆ The module is equipped with LED indicators for 4 analog input channels.
- ◆ 15-bit ADC resolution.

## 2 Technical Parameters

| Parameters                |                                                                                      |
|---------------------------|--------------------------------------------------------------------------------------|
| Power                     | Max.65mA@5.0Vdc                                                                      |
| Isolation                 | I/O to internal bus: magnetic isolation<br>(2.5KVrms)                                |
| Field Power               | Not used                                                                             |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                                                      |
| Mounting Type             | 35mmDIN-Rail                                                                         |
| Size                      | 115*14*75mm                                                                          |
| Weight                    | 65g                                                                                  |
| Environment Specification |                                                                                      |
| Operational Temperature   | -40~85°C                                                                             |
| Operational Humidity      | 5%~95% RH(No Condensation)                                                           |
| Ingress Protection Rating | IP20                                                                                 |
| Input Parameter           |                                                                                      |
| Channel Number            | 4 Channels                                                                           |
| LED Indicator             | 4 Green LED                                                                          |
| Resolution                | 15 bit                                                                               |
| Sensor Type               | PT100                                                                                |
| Measurement Range         | -240~880°C                                                                           |
| Measurement Accuracy      | 0.5°C                                                                                |
| Conversion Rate           | 400ms/3 channels                                                                     |
| Diagnostic Function       | 32766: Sensor is not connected or the cable is disconnected<br>-32766: Short circuit |

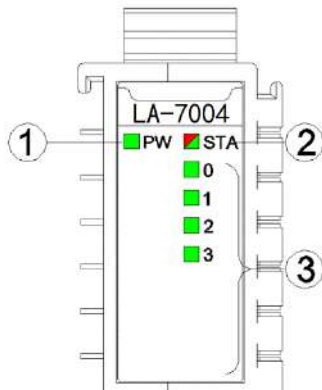
|  |                                                                                                 |
|--|-------------------------------------------------------------------------------------------------|
|  | 32765: The chip is faulty<br>32767: Temperature overflows<br>-32768: The temperature underflows |
|--|-------------------------------------------------------------------------------------------------|

### 3 Hardware Interface



- ① Module Type
- ② State indicator
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Output channel LED indicator (green)

| PW POWER STATE (GREEN)       | Definition                               |
|------------------------------|------------------------------------------|
| ON                           | Internal bus Power Normal                |
| OFF                          | Internal bus Power Failure               |
| STA MODULE STATE (RED/GREEN) | Definition                               |
| Green slow flash (2.5Hz)     | Module internal bus is not started       |
| Red slow flash (2.5Hz)       | Module internal bus offline              |
| ON (GREEN)                   | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)     | Upgrading mode                           |
| Flash(10Hz) (RED/GREEN)      | Firmware Update                          |
| Double Flash (RED)           | Module Exception has been soft-restarted |
| 0-3 Channel Indicator        | Definition                               |
| ON                           | The input signal exceeds 1% of the range |
| OFF                          | Invalid input signal                     |

### 3.2 Terminal definition

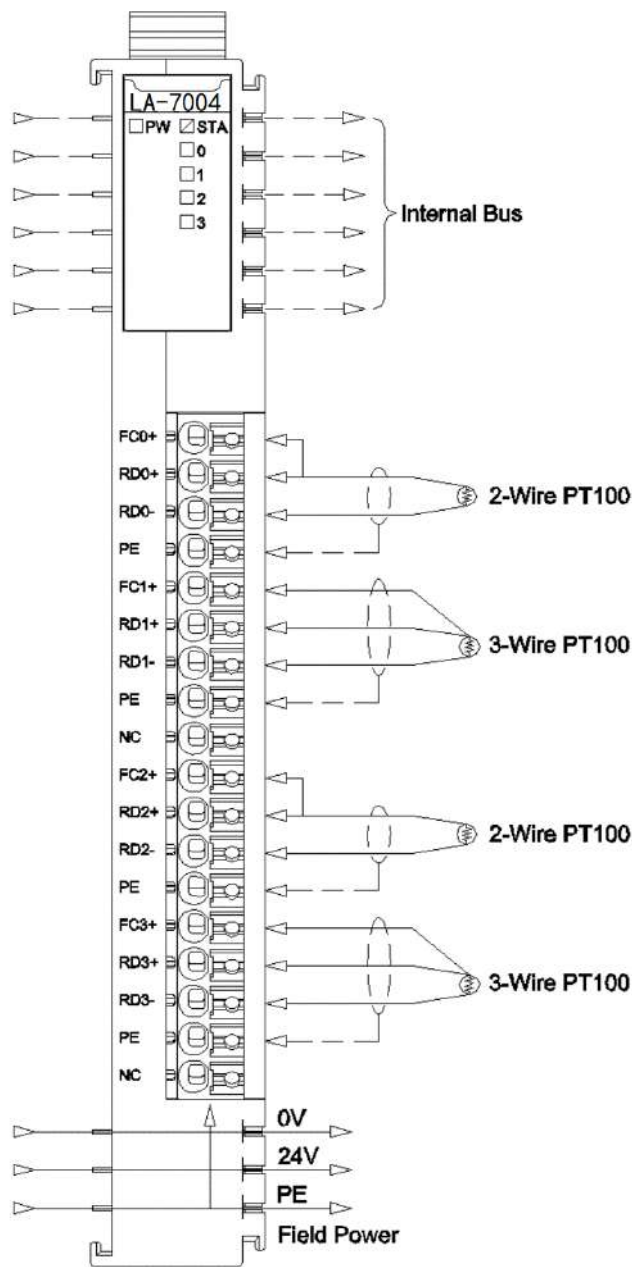
| Terminal Number | Definition | Description      |
|-----------------|------------|------------------|
| 1               | FC0+       | Signal Input CH0 |
| 2               | RD0+       |                  |
| 3               | RD0-       |                  |
| 4               | PE         |                  |
| 5               | FC1+       | Signal Input CH1 |
| 6               | RD1+       |                  |
| 7               | RD1-       |                  |
| 8               | PE         |                  |
| 9               | NC         | Not connected    |
| 10              | FC2+       | Signal Input CH2 |
| 11              | RD2+       |                  |
| 12              | RD2-       |                  |
| 13              | PE         |                  |
| 14              | FC3+       | Signal Input CH3 |
| 15              | RD3+       |                  |
| 16              | RD3-       |                  |
| 17              | PE         |                  |
| 18              | NC         | Not connected    |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



**4 Wiring**



## 5 Process data definition

| Input Data |                         |       |       |       |       |       |       |       |
|------------|-------------------------|-------|-------|-------|-------|-------|-------|-------|
| Bit No     | Bit 7                   | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0     | Analog Input Data(CH 0) |       |       |       |       |       |       |       |
| Byte 1     |                         |       |       |       |       |       |       |       |
| Byte 2     | Analog Input Data(CH 1) |       |       |       |       |       |       |       |
| Byte 3     |                         |       |       |       |       |       |       |       |
| Byte 4     | Analog Input Data(CH 2) |       |       |       |       |       |       |       |
| Byte 5     |                         |       |       |       |       |       |       |       |
| Byte 6     | Analog Input Data(CH 3) |       |       |       |       |       |       |       |
| Byte 7     |                         |       |       |       |       |       |       |       |

Data Declaration:

Analog Input Data (CH0-2): Analog channel input data values

| Process Data Definition |         |      |                         |
|-------------------------|---------|------|-------------------------|
| Temperature             | Decimal | Hex  | Location                |
| >880.0                  | 32767   | 7FFF | Overflow                |
| 880.0                   | 8800    | 2260 | Exceeds the upper limit |
| .                       | .       | .    |                         |
| .                       | .       | .    |                         |
| 850.1                   | 8501    | 2135 |                         |
| 850.0                   | 8500    | 2134 | Rated range             |
| .                       | .       | .    |                         |
| .                       | .       | .    |                         |
| -200.0                  | -2000   | F830 |                         |
| -200.1                  | -2001   | F82F | Exceeds the lower limit |
| .                       | .       | .    |                         |
| .                       | .       | .    |                         |
| -240.0                  | -2400   | F6A0 |                         |
| <-240.0                 | -32768  | 8000 | Underflow               |

## 6 Configuration parameters definition

| Configuration Parameter |          |        |        |        |        |        |        |                   |
|-------------------------|----------|--------|--------|--------|--------|--------|--------|-------------------|
| Bit No                  | Bi t 7   | Bi t 6 | Bi t 5 | Bi t 4 | Bi t 3 | Bi t 2 | Bi t 1 | Bi t 0            |
| Byte 0                  | Reserved |        |        |        |        |        |        | 16Bit Data Format |

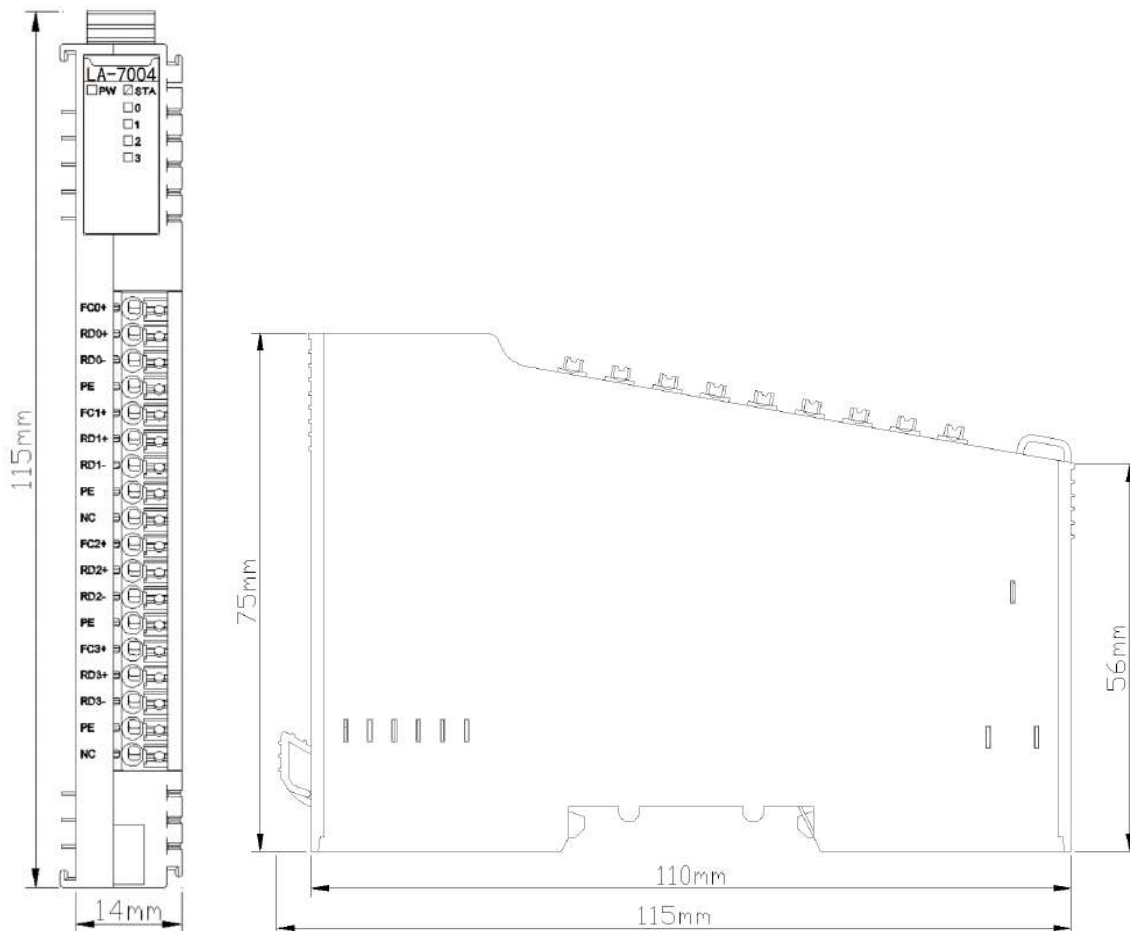
Data Declaration:

16Bit Data Format: Sequence of 16-bit data byte transmission (Default: 0)

0: A\_B

1: B\_A

## A Dimension drawing



# LA-9004: 4 channels Analog Input, Thermocouple

( J type, K type, E type, T type, S type, R type, B type, N type )

## 1 Module features

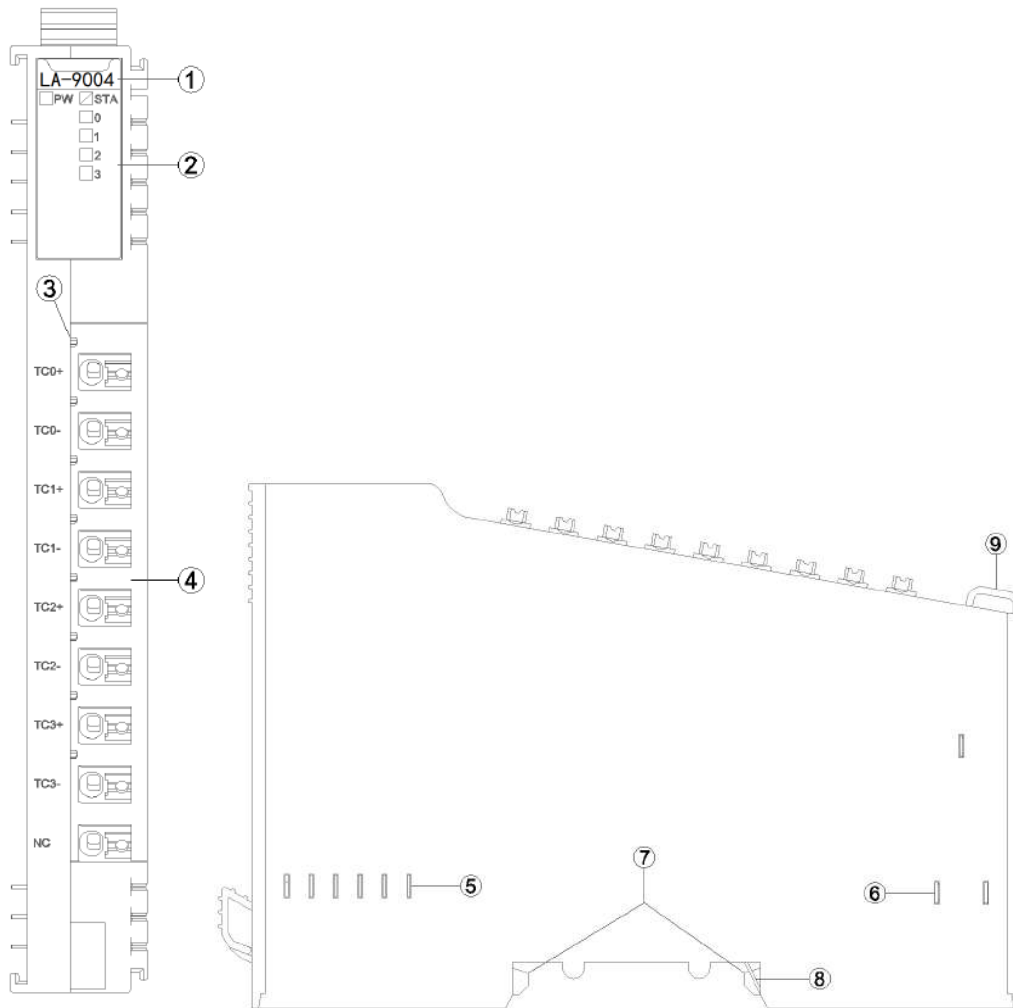
- ◆ The module supports 4-channel thermocouple signal acquisition
- ◆ The module carries with 4 analog LED indicators
- ◆ The module supports 9 kinds of conventional thermocouple temperature measurement type
- ◆ The internal bus of the module and field input adopts magnetic isolation
- ◆ The module input channel supports TVS overvoltage protection
- ◆ 24-bit ADC resolution ( $\Sigma\delta$  type)

## 2 Technical Parameters

| General parameters        |        |                                                      |
|---------------------------|--------|------------------------------------------------------|
| Power                     |        | Max.50mA@5.0Vdc                                      |
| Isolation                 |        | I/O to internal bus: magnetic isolation (2.5KVrms)   |
| Field Power               |        | Not used                                             |
| Wiring                    |        | Max.1.0mm <sup>2</sup> (AWG 17)                      |
| Mounting Type             |        | 35mmDIN-Rail                                         |
| Size                      |        | 115*14*75mm                                          |
| Weight                    |        | 65g                                                  |
| Environment Specification |        |                                                      |
| Operational Temperature   |        | -40~85℃                                              |
| Operational Humidity      |        | 5%~95% RH(No Condensation)                           |
| Ingress Protection Rating |        | IP20                                                 |
| Input Parameter           |        |                                                      |
| Channel Number            |        | 4 Channels                                           |
| LED Indicator             |        | 4 Input LED Indicators                               |
| Sensor Type               |        | J / K/ E / T / S / R / B / N type thermocouples      |
| Acquisition Accuracy      |        | ±0.3% Full Scale, @25℃<br>±0.5% Full Scale, @-40~85℃ |
| Sampling Rate             |        | 70ms/4 channels                                      |
| Measuring Range<br>℃      | J Type | -210~1200℃                                           |
|                           | K Type | -270~1370℃                                           |
|                           | E Type | -270~1000℃                                           |
|                           | T Type | -270~400℃                                            |
|                           | S Type | -50~1760℃                                            |
|                           | R Type | -50~1760℃                                            |
|                           | B Type | 0~1820℃                                              |

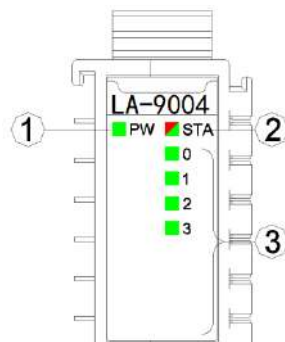
|                     |                                                                                                                                                                                                      |                          |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
|                     | N Type                                                                                                                                                                                               | -270~1300°C              |
|                     | C Type                                                                                                                                                                                               | 0~2320°C (not available) |
| Data Format         | 16-Bit Signed Integer (Integer)                                                                                                                                                                      |                          |
| Diagnostic Function | <p>-32767: No thermocouple model selected (that is, the channel is disabled)</p> <p>32766 : open circuit disconnection</p> <p>32767 : Temperature overflow</p> <p>-32768 : Temperature underflow</p> |                          |

### 3 Hardware Interface



- ① Module Type
- ② State indicator
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Output channel LED indicator (green)

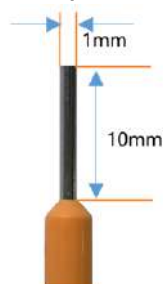
| PW POWER STATE<br>(GREEN)       | Definition                               |
|---------------------------------|------------------------------------------|
| ON                              | Internal bus Power Normal                |
| OFF                             | Internal bus Power Failure               |
| STA MODULE STATE<br>(RED/GREEN) | Definition                               |
| Green slow flash (2.5Hz)        | Module internal bus is not started       |
| Red slow flash (2.5Hz)          | Module internal bus offline              |
| ON (GREEN)                      | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)        | Upgrading mode                           |
| Flash(10Hz) (RED/GREEN)         | Firmware Update                          |
| Double Flash (RED)              | Module Exception has been soft-restarted |
| 0-3 Channel Indicator           | Definition                               |
| ON                              | The input signal exceeds 1% of the range |
| OFF                             | Invalid output signal                    |

### 3.2 Terminal definition

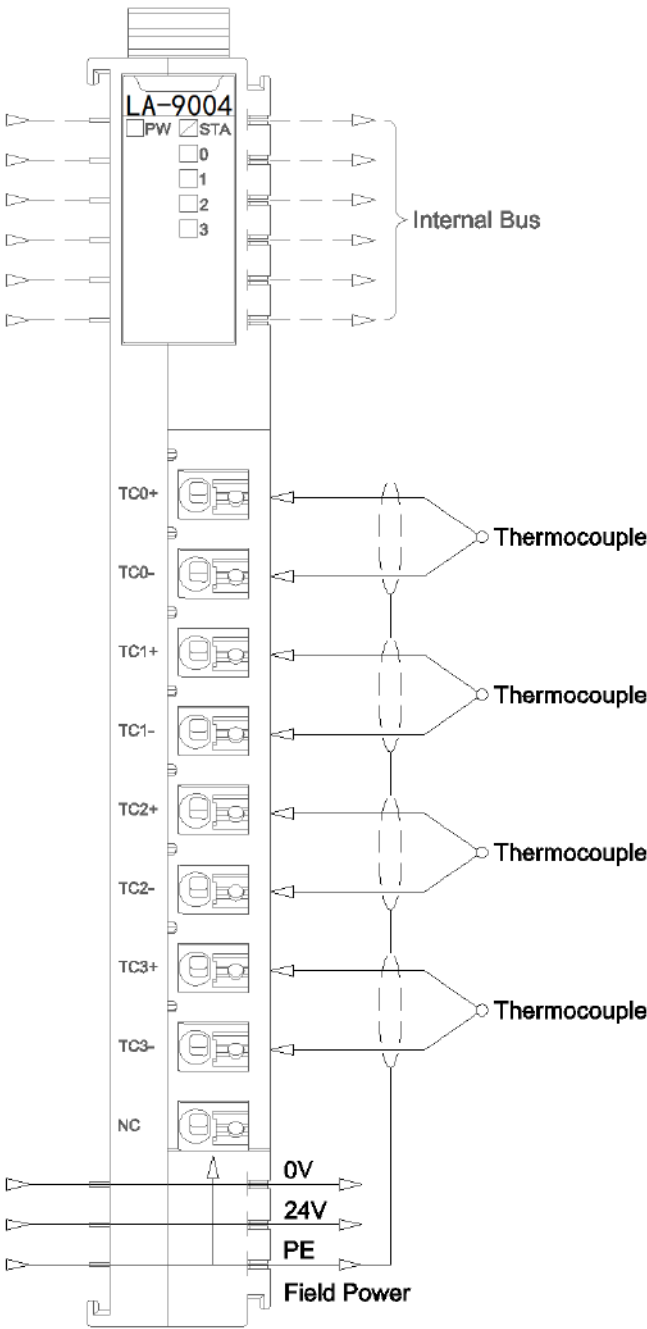
| Terminal Number | Definition | Description      |
|-----------------|------------|------------------|
| 1               | TC0+       | Signal Input CH0 |
| 2               | TC0-       |                  |
| 3               | TC1+       | Signal Input CH1 |
| 4               | TC1-       |                  |
| 5               | TC2+       | Signal Input CH2 |
| 6               | TC2-       |                  |
| 7               | TC3+       | Signal Input CH3 |
| 8               | TC3-       |                  |
| 9               | NC         | Not Connected    |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



**4 Wiring**



## 5 Process data definition

| Input Data |                         |       |       |       |       |       |       |       |
|------------|-------------------------|-------|-------|-------|-------|-------|-------|-------|
| Bit No     | Bit 7                   | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0     | Analog Input Data(CH 0) |       |       |       |       |       |       |       |
| Byte 1     |                         |       |       |       |       |       |       |       |
| Byte 2     | Analog Input Data(CH 1) |       |       |       |       |       |       |       |
| Byte 3     |                         |       |       |       |       |       |       |       |
| Byte 4     | Analog Input Data(CH 2) |       |       |       |       |       |       |       |
| Byte 5     |                         |       |       |       |       |       |       |       |
| Byte 6     | Analog Input Data(CH 3) |       |       |       |       |       |       |       |
| Byte 7     |                         |       |       |       |       |       |       |       |

Data Declaration:

Analog Input Data (CH0-3): The current temperature acquisition value of the corresponding channel

| Process Data Definition - J Type |         |      |                         |
|----------------------------------|---------|------|-------------------------|
| Temperature                      | Decimal | Hex  | Location                |
| >1360.0                          | 32767   | 7FFF | Overflow                |
| 1360.0                           | 13600   | 3520 | Exceeds the upper limit |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| 1200.1                           | 12001   | 2EE1 |                         |
| 1200.0                           | 12000   | 2EE0 | Rated range             |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| -210.0                           | -2100   | F7CC |                         |
| <-210.0                          | -32768  | 8000 | Underflow               |

| Process Data Definition - K Type |         |      |          |
|----------------------------------|---------|------|----------|
| Temperature                      | Decimal | Hex  | Location |
| >1622.0                          | 32767   | 7FFF | Overflow |
| 1622.0                           | 16220   | 3F5C |          |

|         |        |      |                         |
|---------|--------|------|-------------------------|
| .       | .      | .    | Exceeds the upper limit |
| .       | .      | .    |                         |
| 1372.1  | 13721  | 3599 |                         |
| 1372.0  | 13720  | 3598 | Rated range             |
| .       | .      | .    |                         |
| .       | .      | .    |                         |
| -270.0  | -2700  | F574 |                         |
| <-270.0 | -32768 | 8000 | Underflow               |

| Process Data Definition – E Type |         |      |                         |
|----------------------------------|---------|------|-------------------------|
| Temperature                      | Decimal | Hex  | Location                |
| >1200.0                          | 32767   | 7FFF | Overflow                |
| 1200.0                           | 12000   | 2EE0 | Exceeds the upper limit |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| 1000.1                           | 10001   | 2711 |                         |
| 1000.0                           | 10000   | 2710 | Rated range             |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| -270.0                           | -2700   | F574 |                         |
| <-270.0                          | -32768  | 8000 | Underflow               |

| Process Data Definition –T Type |         |      |                         |
|---------------------------------|---------|------|-------------------------|
| Temperature                     | Decimal | Hex  | Location                |
| >540.0                          | 32767   | 7FFF | Overflow                |
| 540.0                           | 5400    | 1518 | Exceeds the upper limit |
| .                               | .       | .    |                         |
| .                               | .       | .    |                         |
| 400.1                           | 4001    | FA1  |                         |
| 400.0                           | 4000    | FA0  | Rated range             |
| .                               | .       | .    |                         |
| .                               | .       | .    |                         |
| -270.0                          | -2700   | F574 |                         |
| <-270.0                         | -32768  | 8000 | Underflow               |

| Process Data Definition –S Type |         |      |                         |
|---------------------------------|---------|------|-------------------------|
| Temperature                     | Decimal | Hex  | Location                |
| >1850.0                         | 32767   | 7FFF | Overflow                |
| 1850.0                          | 18500   | 4844 | Exceeds the upper limit |
| .                               | .       | .    |                         |

|         |        |      |                         |
|---------|--------|------|-------------------------|
| .       | .      | .    |                         |
| 1769.1  | 17691  | 451B |                         |
| 1769.0  | 17690  | 451A | Rated range             |
| .       | .      | .    |                         |
| .       | .      | .    |                         |
| -50.0   | -500   | FE0C |                         |
| -50.1   | -501   | FE0B | Exceeds the lower limit |
| .       | .      | .    |                         |
| .       | .      | .    |                         |
| -170.0  | -1700  | F95C |                         |
| <-170.0 | -32768 | 8000 | Underflow               |

| Process Data Definition – R Type |         |      |                         |
|----------------------------------|---------|------|-------------------------|
| Temperature                      | Decimal | Hex  | Location                |
| >2019.0                          | 32767   | 7FFF | Overflow                |
| 2019.0                           | 20190   | 4EDE | Exceeds the upper limit |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| 1769.1                           | 17691   | 451B |                         |
| 1769.0                           | 17690   | 451A | Rated range             |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| -50.0                            | -500    | FE0C |                         |
| -50.1                            | -501    | FE0B | Exceeds the lower limit |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| -170.0                           | -1700   | F95C |                         |
| <-170.0                          | -32768  | 8000 | Underflow               |

| Process Data Definition - B Type |         |      |                         |
|----------------------------------|---------|------|-------------------------|
| Temperature                      | Decimal | Hex  | Location                |
| >2070.0                          | 32767   | 7FFF | Overflow                |
| 2070.0                           | 20700   | 50DC | Exceeds the upper limit |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| 1820.1                           | 18201   | 4719 |                         |
| 1820.0                           | 18200   | 4718 | Rated range             |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| 0.0                              | 0       | .    |                         |

|      |        |      |           |
|------|--------|------|-----------|
| <0.0 | -32768 | 8000 | Underflow |
|------|--------|------|-----------|

| Process Data Definition – N Type |         |      |                         |
|----------------------------------|---------|------|-------------------------|
| Temperature                      | Decimal | Hex  | Location                |
| >1550.0                          | 32767   | 7FFF | Overflow                |
| 1550.0                           | 15500   | 3C8C | Exceeds the upper limit |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| 1300.1                           | 13001   | 32C9 |                         |
| 1300.0                           | 13000   | 32C8 | Rated range             |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| -270.0                           | -2700   | F574 |                         |
| <-270.0                          | -32768  | 8000 | Underflow               |

| Process Data Definition – C Type |         |      |             |
|----------------------------------|---------|------|-------------|
| Temperature                      | Decimal | Hex  | Location    |
| >2320.0                          | 32767   | 7FFF | Overflow    |
| 2320.0                           | 23200   | 5AA0 | Rated range |
| .                                | .       | .    |             |
| .                                | .       | .    |             |
| 0.0                              | 0       | .    |             |
| <0.0                             | -32768  | 8000 | Underflow   |

## 6 Configuration parameters definition

| Configuration Parameter |                      |       |       |       |                      |       |       |                   |
|-------------------------|----------------------|-------|-------|-------|----------------------|-------|-------|-------------------|
| Bit No                  | Bit 7                | Bit 6 | Bit 5 | Bit 4 | Bit 3                | Bit 2 | Bit 1 | Bit 0             |
| Byte 0                  | Reserved             |       |       |       |                      |       |       | 16Bit Data Format |
| Byte 1                  | TC Input Type (CH 1) |       |       |       | TC Input Type (CH 0) |       |       |                   |
| Byte 1                  | TC Input Type (CH 3) |       |       |       | TC Input Type (CH 2) |       |       |                   |

Data Declaration:

**16Bit Data Format:** Big-endian and little-endian format of data upload:

0: A\_B

1: B\_A

**TC Input Type(CH 0-3):** Sensor type of the channel:

0: Channel is disabled

1: J Type

2: K Type

3: E Type

4: T Type

5: S Type

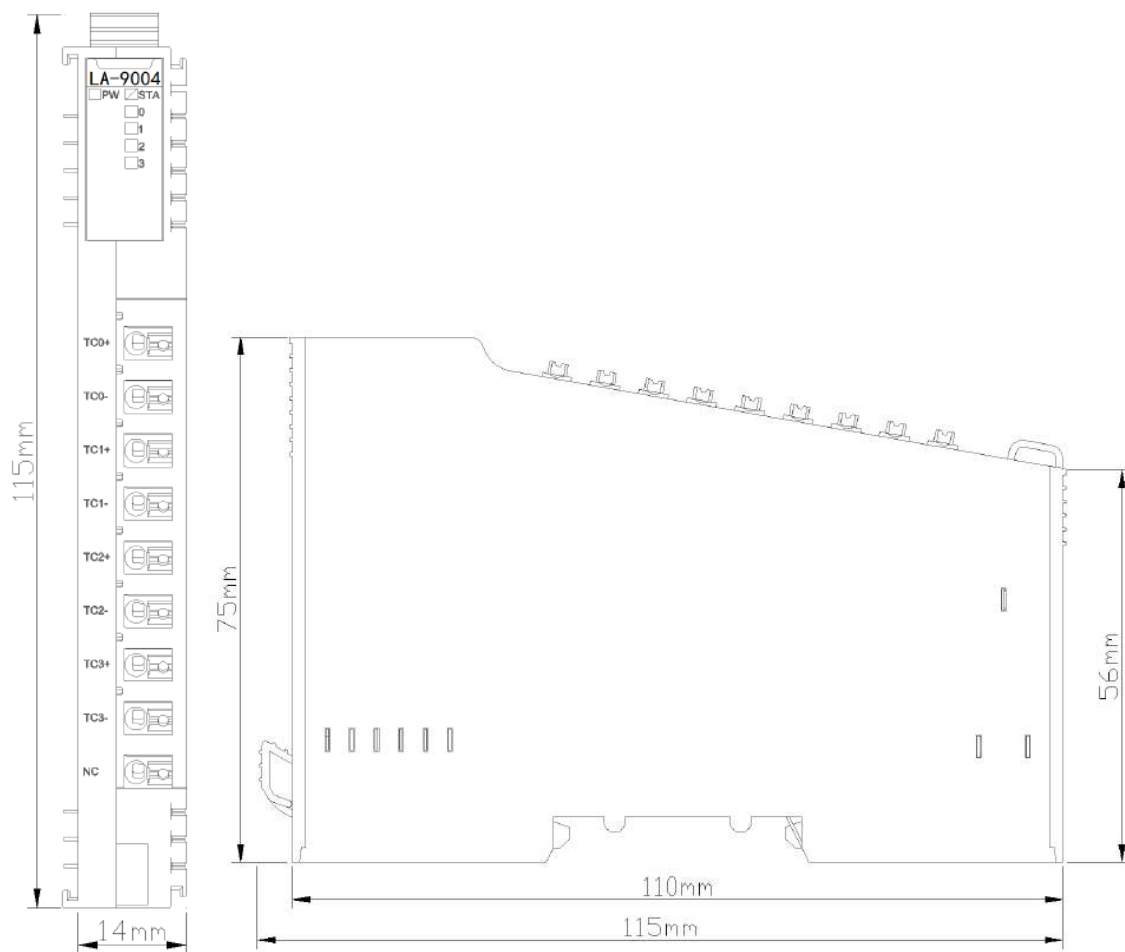
6: R Type

7: B Type

8: N Type

9: C Type

## A Dimension drawing



# LA-9008: 8 channels Analog Input

**Thermocouple ( J type, K type, E type, T type, S type, R type, B type, N type )**

## 1 Module features

- ◆ The module supports 8-channel thermocouple signal acquisition
- ◆ The module carries 8 analog LED indicators
- ◆ The module supports 9 kinds of conventional thermocouple temperature measurement type
- ◆ The internal bus of the module and field input adopts magnetic isolation
- ◆ The module input channel supports TVS overvoltage protection
- ◆ 24-bit ADC resolution ( $\Sigma\delta$  type)

## 2 Technical parameters

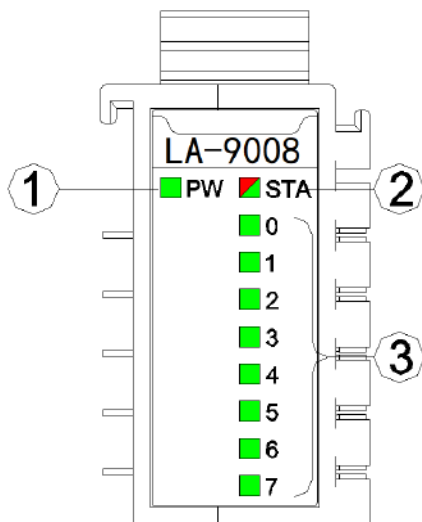
| General Parameters        |                                                      |            |
|---------------------------|------------------------------------------------------|------------|
| Power                     | Max.60mA@5.0Vdc                                      |            |
| Isolation                 | I/O to internal bus: magnetic isolation (2.5KVrms)   |            |
| Field Power               | Not used                                             |            |
| Wiring                    | I/O Wiring: Max.1.0mm <sup>2</sup> (AWG 17)          |            |
| Mounting Type             | 35mmDIN-Rail                                         |            |
| Size                      | 115*14*75mm                                          |            |
| Weight                    | 65g                                                  |            |
| Environment Specification |                                                      |            |
| Operational Temperature   | -40~85℃                                              |            |
| Operational Humidity      | 5%~95% RH(No Condensation)                           |            |
| Ingress Protection Rating | IP20                                                 |            |
| Input Parameter           |                                                      |            |
| Channel Number            | 8 Channels                                           |            |
| LED Indicator             | 8 Input LED Indicators                               |            |
| Sensor Type               | J / K/ E / T / S / R / B / N thermocouples           |            |
| Acquisition Accuracy      | ±0.3% Full Scale, @25℃<br>±0.5% Full Scale, @-40~85℃ |            |
| Sampling Rate             | 70ms/4 channel                                       |            |
| Measuring Range℃          | J Type                                               | -210~1200℃ |
|                           | K Type                                               | -270~1370℃ |

|                        |           |                                                                                                                                                                                      |
|------------------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        | E<br>Type | -270~1000°C                                                                                                                                                                          |
|                        | T<br>Type | -270~400°C                                                                                                                                                                           |
|                        | S<br>Type | -50~1760°C                                                                                                                                                                           |
|                        | R<br>Type | -50~1760°C                                                                                                                                                                           |
|                        | B<br>Type | 0~1820°C                                                                                                                                                                             |
|                        | N<br>Type | -270~1300°C                                                                                                                                                                          |
|                        | C<br>Type | 0~2320°C (not available)                                                                                                                                                             |
| Data Format            |           | 16-Bit Signed Integer (Integer)                                                                                                                                                      |
| Diagnostic<br>Function |           | -32767: No thermocouple model selected (that is, the<br>channel is disabled)<br>32766 : open circuit disconnection<br>32767 : Temperature overflow<br>-32768 : Temperature underflow |

The diagram illustrates the LA-9008 terminal block and its connection to a building structure. The terminal block is labeled "LA-9008" and includes a "PW" (Power) and "STA" (Station) section. The "STA" section has terminals for TC0+ through TC7- and NC. The "PW" section has terminals for 0 through 7. The terminal block is connected to a building structure via a cable. The building structure is labeled with numbers 1 through 9, indicating the connection points for the terminal block. The building structure is a large, rectangular structure with a sloped roof. The terminal block is connected to the building structure via a cable that runs along the roofline. The cable is labeled with numbers 1 through 9, indicating the connection points for the terminal block. The terminal block is connected to the building structure via a cable that runs along the roofline. The cable is labeled with numbers 1 through 9, indicating the connection points for the terminal block.

- ① Module Type
- ② State indicator
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicator definition



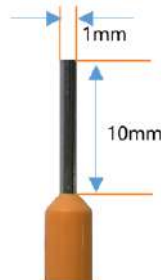
- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Output channel LED indicator (green)

| PW POWER STATE (GREEN)       | Definition                               |
|------------------------------|------------------------------------------|
| ON                           | Internal bus Power Normal                |
| OFF                          | Internal bus Power Failure               |
| STA MODULE STATE (RED/GREEN) | Definition                               |
| Green slow flash (2.5Hz)     | Module internal bus is not started       |
| Red slow flash (2.5Hz)       | Module internal bus offline              |
| ON (GREEN)                   | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)     | Upgrading mode                           |
| Flash(10Hz) (RED/GREEN)      | Firmware Update                          |
| Double Flash (RED)           | Module Exception has been soft-restarted |
| 0-7 Channel Indicator        | Definition                               |
| ON                           | The input signal exceeds 1% of the range |
| OFF                          | Invalid output signal                    |

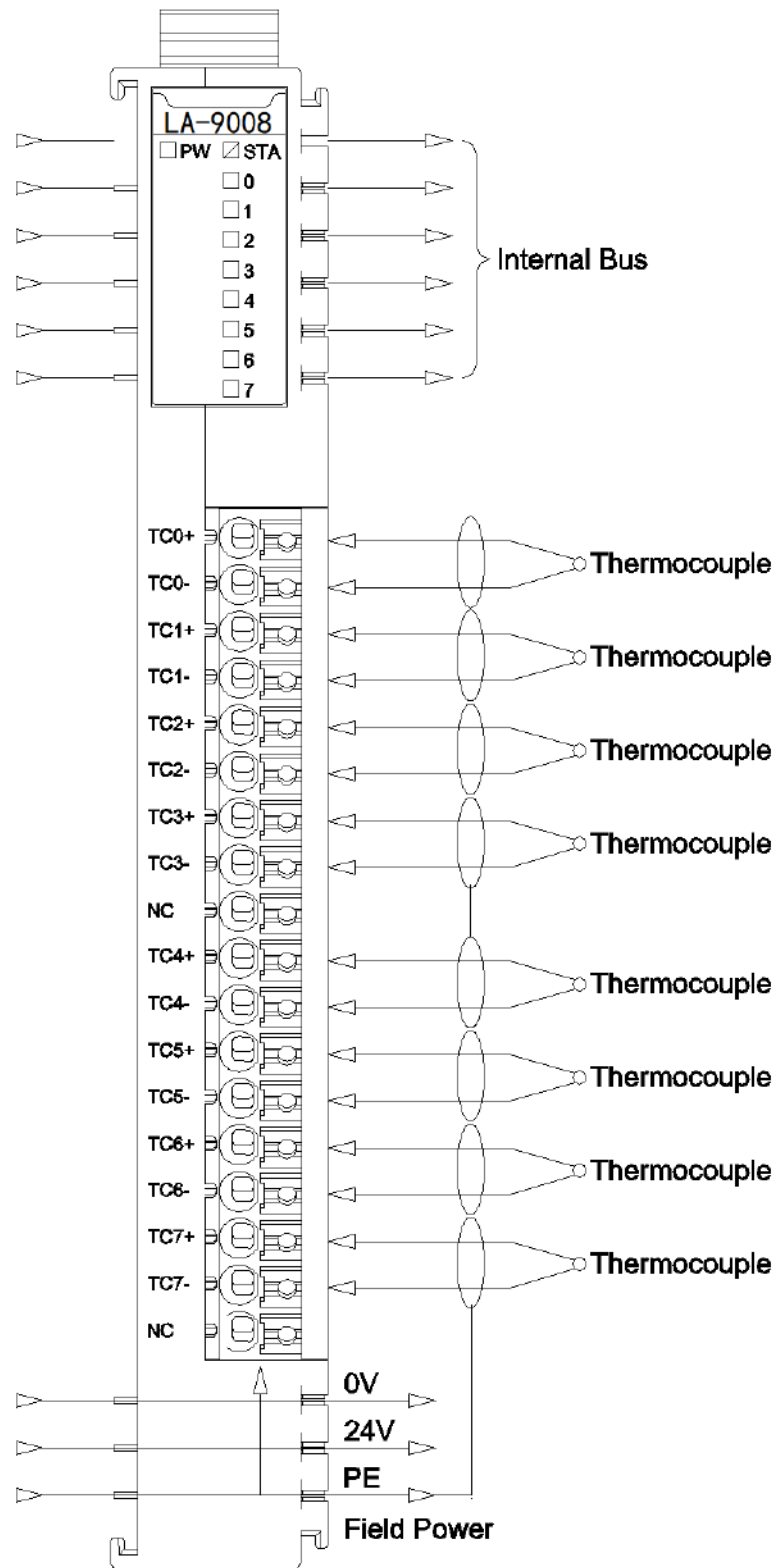
### 3.2 Terminal definition

| Terminal Number | Definition | Description      |
|-----------------|------------|------------------|
| 1               | TC0+       | Signal Input CH0 |
| 2               | TC0-       |                  |
| 3               | TC1+       | Signal Input CH1 |
| 4               | TC1-       |                  |
| 5               | TC2+       | Signal Input CH2 |
| 6               | TC2-       |                  |
| 7               | TC3+       | Signal Input CH3 |
| 8               | TC3-       |                  |
| 9               | NC         | Not Connected    |
| 10              | TC4+       | Signal Input CH4 |
| 11              | TC4-       |                  |
| 12              | TC5+       | Signal Input CH5 |
| 13              | TC5-       |                  |
| 14              | TC6+       | Signal Input CH6 |
| 15              | TC6-       |                  |
| 16              | TC7+       | Signal Input CH7 |
| 17              | TC7-       |                  |
| 18              | NC         | Not Connected    |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.  
The cold-pressed terminal parameters are as follows:



## 4 Wiring



## 5 Process data definition

| Input Data |                         |       |       |       |       |       |       |       |
|------------|-------------------------|-------|-------|-------|-------|-------|-------|-------|
| Bit No     | Bit 7                   | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0     | Analog Input Data(CH 0) |       |       |       |       |       |       |       |
| Byte 1     |                         |       |       |       |       |       |       |       |
| Byte 2     | Analog Input Data(CH 1) |       |       |       |       |       |       |       |
| Byte 3     |                         |       |       |       |       |       |       |       |
| Byte 4     | Analog Input Data(CH 2) |       |       |       |       |       |       |       |
| Byte 5     |                         |       |       |       |       |       |       |       |
| Byte 6     | Analog Input Data(CH 3) |       |       |       |       |       |       |       |
| Byte 7     |                         |       |       |       |       |       |       |       |
| Byte 8     | Analog Input Data(CH 4) |       |       |       |       |       |       |       |
| Byte 9     |                         |       |       |       |       |       |       |       |
| Byte 10    | Analog Input Data(CH 5) |       |       |       |       |       |       |       |
| Byte 11    |                         |       |       |       |       |       |       |       |
| Byte 12    | Analog Input Data(CH 6) |       |       |       |       |       |       |       |
| Byte 13    |                         |       |       |       |       |       |       |       |
| Byte 14    | Analog Input Data(CH 7) |       |       |       |       |       |       |       |
| Byte 15    |                         |       |       |       |       |       |       |       |

Data Declaration:

Analog Input Data (CH0-3): The current temperature acquisition value of the corresponding channel

| Process Data Definition - J Type |         |      |                         |
|----------------------------------|---------|------|-------------------------|
| Temperature                      | Decimal | Hex  | Location                |
| >1360.0                          | 32767   | 7FFF | Overflow                |
| 1360.0                           | 13600   | 3520 | Exceeds the upper limit |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| 1200.1                           | 12001   | 2EE1 |                         |
| 1200.0                           | 12000   | 2EE0 | Rated range             |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| -210.0                           | -2100   | F7CC |                         |
| <-210.0                          | -32768  | 8000 | Underflow               |
| Process Data Definition - K Type |         |      |                         |
| Temperature                      | Decimal | Hex  | Location                |

|         |        |      |                         |
|---------|--------|------|-------------------------|
| >1622.0 | 32767  | 7FFF | Overflow                |
| 1622.0  | 16220  | 3F5C | Exceeds the upper limit |
| .       | .      | .    |                         |
| .       | .      | .    |                         |
| 1372.1  | 13721  | 3599 |                         |
| 1372.0  | 13720  | 3598 | Rated range             |
| .       | .      | .    |                         |
| .       | .      | .    |                         |
| -270.0  | -2700  | F574 |                         |
| <-270.0 | -32768 | 8000 | Underflow               |

| Process Data Definition – E Type |         |      |                         |
|----------------------------------|---------|------|-------------------------|
| Temperature                      | Decimal | Hex  | Location                |
| >1200.0                          | 32767   | 7FFF | Overflow                |
| 1200.0                           | 12000   | 2EE0 | Exceeds the upper limit |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| 1000.1                           | 10001   | 2711 |                         |
| 1000.0                           | 10000   | 2710 | Rated range             |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| -270.0                           | -2700   | F574 |                         |
| <-270.0                          | -32768  | 8000 | Underflow               |

| Process Data Definition –T Type |         |      |                         |
|---------------------------------|---------|------|-------------------------|
| Temperature                     | Decimal | Hex  | Location                |
| >540.0                          | 32767   | 7FFF | Overflow                |
| 540.0                           | 5400    | 1518 | Exceeds the upper limit |
| .                               | .       | .    |                         |
| .                               | .       | .    |                         |
| 400.1                           | 4001    | FA1  |                         |
| 400.0                           | 4000    | FA0  | Rated range             |
| .                               | .       | .    |                         |
| .                               | .       | .    |                         |
| -270.0                          | -2700   | F574 |                         |
| <-270.0                         | -32768  | 8000 | Underflow               |

| Process Data Definition –S Type |
|---------------------------------|
|---------------------------------|

| Temperature | Decimal | Hex  | Location                |
|-------------|---------|------|-------------------------|
| >1850.0     | 32767   | 7FFF | Overflow                |
| 1850.0      | 18500   | 4844 | Exceeds the upper limit |
| .           | .       | .    |                         |
| .           | .       | .    |                         |
| 1769.1      | 17691   | 451B |                         |
| 1769.0      | 17690   | 451A | Rated range             |
| .           | .       | .    |                         |
| .           | .       | .    |                         |
| -50.0       | -500    | FE0C |                         |
| -50.1       | -501    | FE0B | Exceeds the lower limit |
| .           | .       | .    |                         |
| .           | .       | .    |                         |
| -170.0      | -1700   | F95C |                         |
| <-170.0     | -32768  | 8000 | Underflow               |

| Process Data Definition – R Type |         |      |                         |
|----------------------------------|---------|------|-------------------------|
| Temperature                      | Decimal | Hex  | Location                |
| >2019.0                          | 32767   | 7FFF | Overflow                |
| 2019.0                           | 20190   | 4EDE | Exceeds the upper limit |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| 1769.1                           | 17691   | 451B |                         |
| 1769.0                           | 17690   | 451A | Rated range             |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| -50.0                            | -500    | FE0C |                         |
| -50.1                            | -501    | FE0B | Exceeds the lower limit |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| -170.0                           | -1700   | F95C |                         |
| <-170.0                          | -32768  | 8000 | Underflow               |

| Process Data Definition - B Type |         |      |                         |
|----------------------------------|---------|------|-------------------------|
| Temperature                      | Decimal | Hex  | Location                |
| >2070.0                          | 32767   | 7FFF | Overflow                |
| 2070.0                           | 20700   | 50DC | Exceeds the upper limit |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |

|        |        |      |             |
|--------|--------|------|-------------|
| 1820.1 | 18201  | 4719 |             |
| 1820.0 | 18200  | 4718 | Rated range |
| .      | .      | .    |             |
| .      | .      | .    |             |
| 0.0    | 0      |      |             |
| <0.0   | -32768 | 8000 | Underflow   |

| Process Data Definition – N Type |         |      |                         |
|----------------------------------|---------|------|-------------------------|
| Temperature                      | Decimal | Hex  | Location                |
| >1550.0                          | 32767   | 7FFF | Overflow                |
| 1550.0                           | 15500   | 3C8C | Exceeds the upper limit |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| 1300.1                           | 13001   | 32C9 |                         |
| 1300.0                           | 13000   | 32C8 | Rated range             |
| .                                | .       | .    |                         |
| .                                | .       | .    |                         |
| -270.0                           | -2700   | F574 |                         |
| <-270.0                          | -32768  | 8000 | Underflow               |

| Process Data Definition – C Type |         |      |             |
|----------------------------------|---------|------|-------------|
| Temperature                      | Decimal | Hex  | Location    |
| >2320.0                          | 32767   | 7FFF | Overflow    |
| 2320.0                           | 23200   | 5AA0 | Rated range |
| .                                | .       | .    |             |
| .                                | .       | .    |             |
| 0.0                              | 0       |      |             |
| <0.0                             | -32768  | 8000 | Underflow   |

## 6 Configuration parameters definition

| Configuration Parameter |                      |       |       |       |                      |       |       |                   |
|-------------------------|----------------------|-------|-------|-------|----------------------|-------|-------|-------------------|
| Bit No                  | Bit 7                | Bit 6 | Bit 5 | Bit 4 | Bit 3                | Bit 2 | Bit 1 | Bit 0             |
| Byte 0                  | Reserved             |       |       |       |                      |       |       | 16Bit Data Format |
| Byte 1                  | TC Input Type (CH 1) |       |       |       | TC Input Type (CH 0) |       |       |                   |
| Byte 1                  | TC Input Type (CH 3) |       |       |       | TC Input Type (CH 2) |       |       |                   |

Data Declaration:

**16Bit Data Format:** Big-endian and little-endian format of data upload:

0: A\_B

1: B\_A

**TC Input Type(CH 0-3):** Sensor type of the channel:

0: Channel is disabled

1: J Type

2: K Type

3: E Type

4: T Type

5: S Type

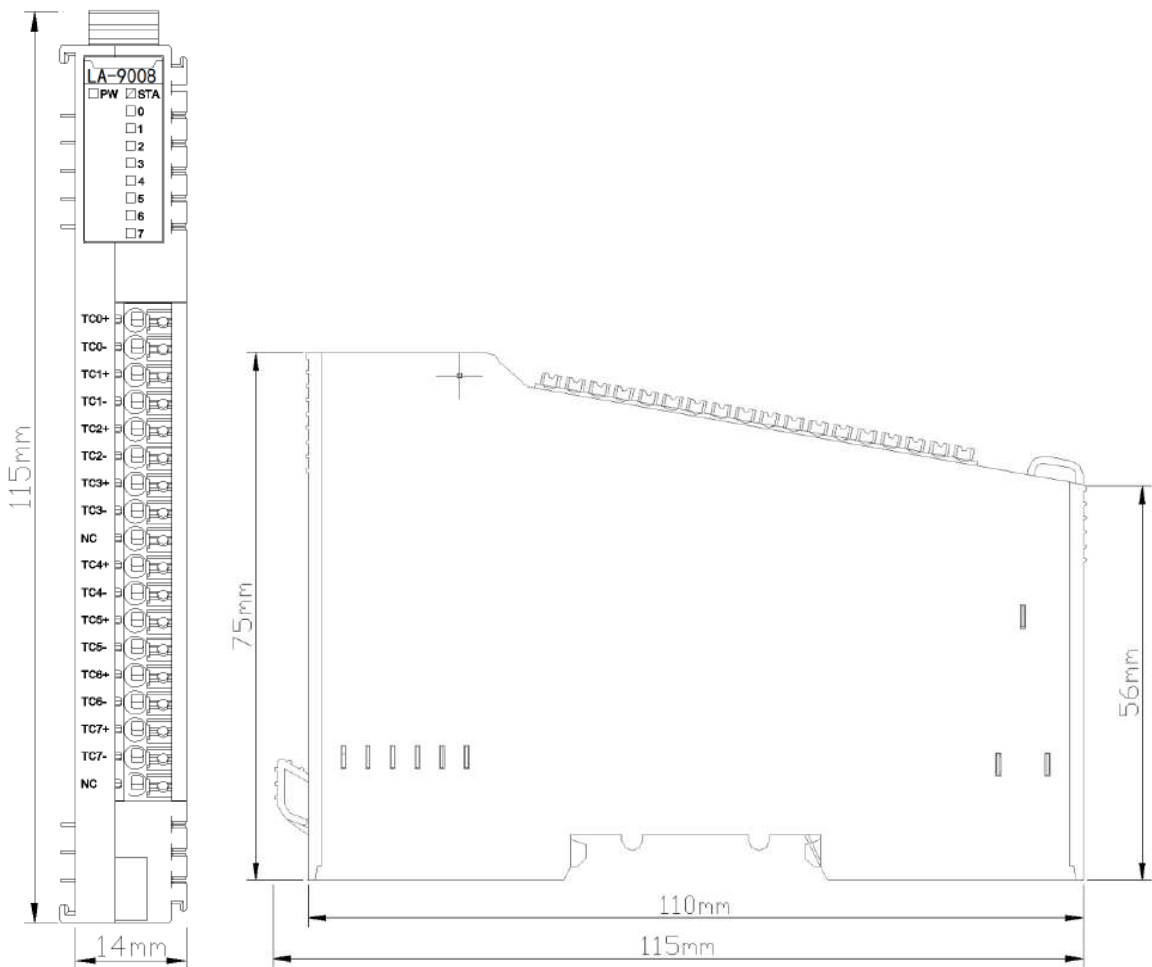
6: R Type

7: B Type

8: N Type

9: C Type

A Dimension drawing



## **6 Encoder Module**

### **LP-1002 2-channel encoder input /5VDC**

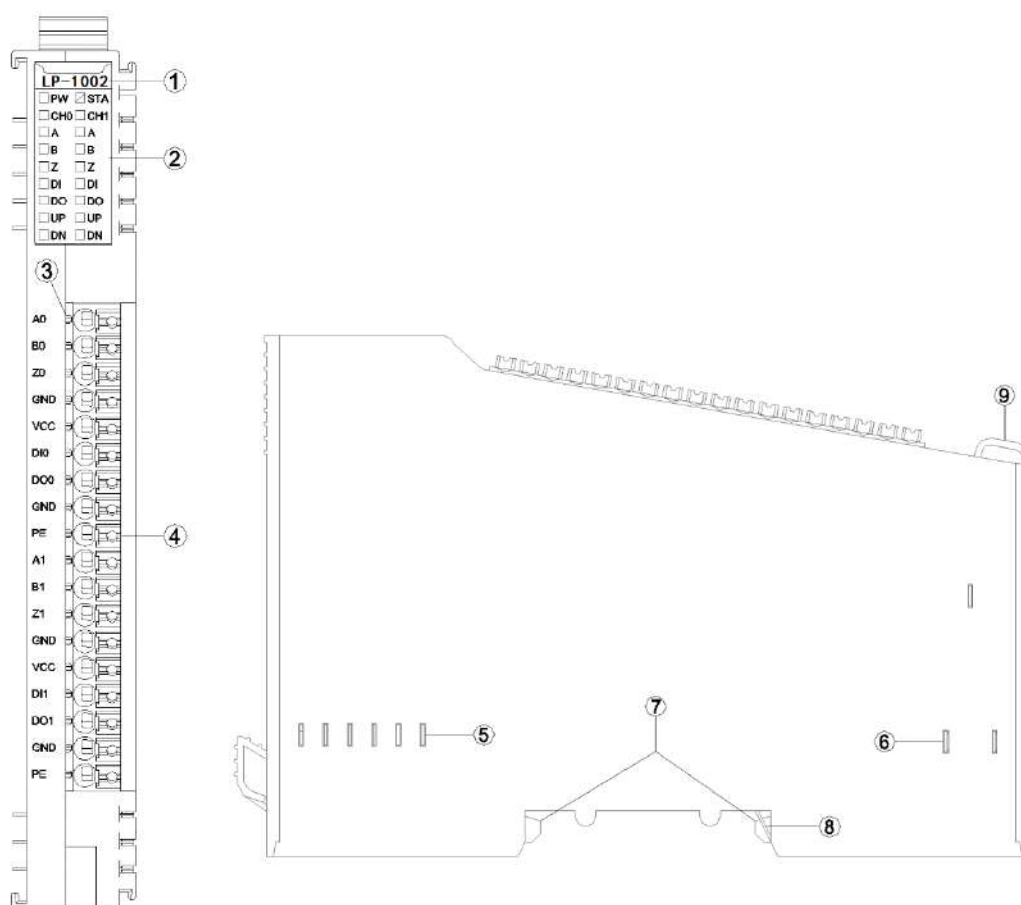
#### **1 Module features**

- ◆ the module supports two channels of encoder input.
- ◆ each encoder channel supports A/B incremental encoder or pulse-directional encoder input.
- ◆ each encoder channel supports orthogonal A/B signal input, input voltage 5V, and it supports source and sink input.
- ◆ the incremental encoder mode supports x1/ x2 / x4 frequency multiplication to be selectable.
- ◆ the pulse - direction mode supports nondirectional signal, pulse input only.
- ◆ each encoder channel supports 1 digital input signal with an input voltage of 5Vdc or 24Vdc.
- ◆ each encoder channel supports 1 digital output signal with an output voltage of 24Vdc.
- ◆ each encoder channel supports 1 way of 5V power output, which can be connected to the encoder for power supply.
- ◆ the module internal bus and field input adopt magnetic isolation.
- ◆ the module carries 16 LED indicators.
- ◆ the maximum input frequency of the encoder supported by the module is 1.5MHz.
- ◆ the module supports measurement function, it could detect the load speed or input signal frequency.

## 2 Technical parameters

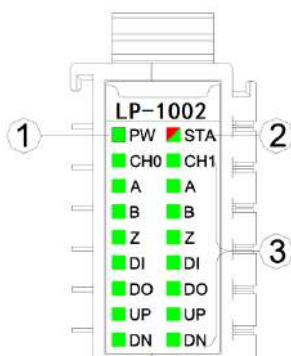
| General Parameters                    |                                                  |
|---------------------------------------|--------------------------------------------------|
| Power                                 | Max.60mA@5.0Vdc                                  |
| Isolation                             | I/O to internal bus: magnetic isolation (3KVrms) |
| Field Power                           | Nominal:24Vdc, Range:20-28Vdc                    |
| Wiring                                | Max.1.0mm <sup>2</sup> (AWG 17)                  |
| Mounting Type                         | 35mm DIN-Rail                                    |
| Size                                  | 115*14*75mm                                      |
| Weight                                | 65g                                              |
| Environment Specification             |                                                  |
| Operational Temperature               | -40~85°C                                         |
| Operational Humidity                  | 5%-95% (No Condensation)                         |
| Ingress Protection Rating             | IP20                                             |
| Input Parameters                      |                                                  |
| Channel Number                        | 2-channel encoder                                |
| LED Indicator                         | 16 channel input LED indicator                   |
| Encoder signal voltage range          | ABZ input standard 5Vdc, range $\pm 10\%$        |
| Encoder input impedance               | Internal pull-up or pull-down resistance<br>4.7K |
| Encoder filtering time                | Could be set, the default value is 0.5 us        |
| Encoder count frequency               | <1.5MHz                                          |
| Encoder frequency multiplication mode | x1/x2/x4                                         |
| Encoder measurement function          | Load speed or input signal frequency measurement |
| DI turn-on voltage                    | Min.5Vdc to Max.28Vdc                            |
| DI turn-off voltage                   | Max.2.7Vdc                                       |
| DI turn-on current                    | Max.5mA/channel@28V                              |
| DI input impedance                    | >10.0k $\Omega$                                  |
| DI input delay                        | OFF to ON: Max.3ms<br>ON to OFF: Max.2ms         |
| DO output voltage                     | 5V, range $\pm 10\%$                             |
| DO output current                     | Max.500mA                                        |
| DO output sink current                | Max.5uA                                          |

### 3 Hardware interfaces



- ① Module Type
- ② State indicator
- ③ Channel indicator
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

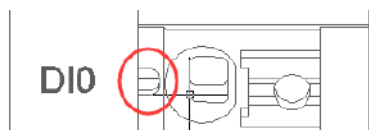
### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State indicator LED (red/green)
- ③ Input channel indicator LED (green)

| PW Power State                 | Definition                                    |
|--------------------------------|-----------------------------------------------|
| ON                             | Internal bus power supply normal              |
| OFF                            | Internal bus power supply failure             |
| STA Module State               | Definition                                    |
| Green slow flash (2.5 Hz)      | Module internal bus is not started            |
| Red slow flash (2.5 Hz)        | Module internal bus offline                   |
| ON (GREEN)                     | Operation normal                              |
| Flash (2.5 Hz) (RED/GREEN)     | updating mode                                 |
| Flash (10 Hz) (RED/GREEN)      | firmware update                               |
| Double Flash (RED)             | Module exception has been soft-restarted      |
| CH0 CH1 channel indicator LED  | Definition                                    |
| ON                             | Channel enable                                |
| A B Z Encoder signal indicator | Definition                                    |
| ON                             | Input signal valid                            |
| OFF                            | Input signal invalid                          |
| DI input indicator             | Definition                                    |
| ON                             | Input signal high level                       |
| OFF                            | Input signal invalid                          |
| DO output indicator            | Definition                                    |
| ON                             | Output signal high level                      |
| OFF                            | Output signal invalid                         |
| UP indicator                   | Definition                                    |
| ON                             | Encoder in positive rotation                  |
| OFF                            | Encoder is stationary or in contrarotation    |
| DN indicator                   | Definition                                    |
| ON                             | Encoder in contrarotation                     |
| OFF                            | Encoder is stationary or in positive rotation |

### 3.2 Field channel LED indicator (Green)



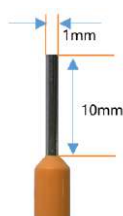
When the input signal of the input channel is valid, the corresponding field channel indicator is on (only the DI/DO/VCC wiring terminal of the encoder channel carries the indicator).

### 3.3 Terminal definition

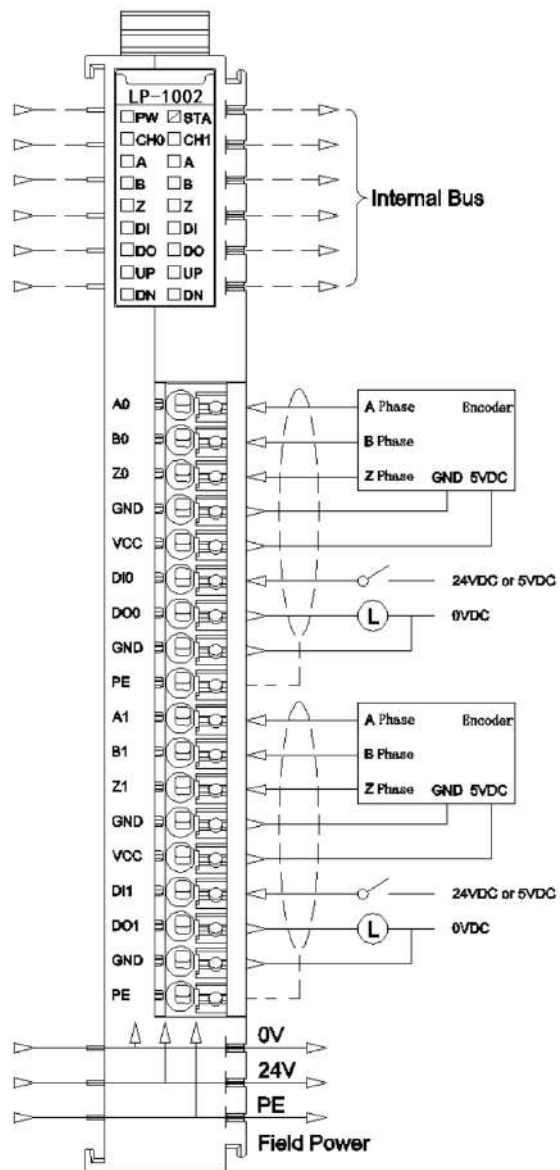
| Terminal Number | Symbol | Description               |
|-----------------|--------|---------------------------|
| 1               | A0     | CH0 encoder phase A input |
| 2               | B0     | CH0 encoder phase B input |
| 3               | Z0     | CH0 encoder phase Z input |
| 4               | GND    | Signal ground             |
| 5               | VCC    | 5V power output           |
| 6               | DI0    | CH0 digital signal input  |
| 7               | DO0    | CH0 digital signal output |
| 8               | GND    | Signal ground             |
| 9               | PE     | Shield earthing           |
| 10              | A1     | CH1 encoder phase A input |
| 11              | B1     | CH1 encoder phase B input |
| 12              | Z1     | CH1 encoder phase Z input |
| 13              | GND    | Signal ground             |
| 14              | VCC    | 5V power output           |
| 15              | DI1    | CH1 digital signal input  |
| 16              | DO1    | CH1 digital signal output |
| 17              | GND    | Signal ground             |
| 18              | PE     | Shield earthing           |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



## 4 Wiring



### < 2 Analog Input (5V Encoder) > Submodule process data definition

| Input Data |                     |                 |                        |                       |         |        |        |        |
|------------|---------------------|-----------------|------------------------|-----------------------|---------|--------|--------|--------|
| Bit No     | Bit 7               | Bit 6           | Bit 5                  | Bit 4                 | Bit 3   | Bit 2  | Bit 1  | Bit 0  |
| Byte 0     | Counter DOWN Ch#0   | Counter UP Ch#0 | Counter Underflow Ch#0 | Counter Overflow Ch#0 | DI Ch#0 | Z Ch#0 | B Ch#0 | A Ch#0 |
| Byte 1     | Reserved            |                 |                        |                       |         |        |        |        |
| Byte 2     | Counter DOWN Ch#1   | Counter UP Ch#1 | Counter Underflow Ch#1 | Counter Overflow Ch#1 | DI Ch#1 | Z Ch#1 | B Ch#1 | A Ch#1 |
| Byte 3     | Reserved            |                 |                        |                       |         |        |        |        |
| Byte 4     | Counter value Ch#0  |                 |                        |                       |         |        |        |        |
| Byte 5     |                     |                 |                        |                       |         |        |        |        |
| Byte 6     |                     |                 |                        |                       |         |        |        |        |
| Byte 7     |                     |                 |                        |                       |         |        |        |        |
| Byte 8     |                     |                 |                        |                       |         |        |        |        |
| Byte 9     | Capture value Ch#0  |                 |                        |                       |         |        |        |        |
| Byte 10    |                     |                 |                        |                       |         |        |        |        |
| Byte 11    |                     |                 |                        |                       |         |        |        |        |
| Byte 12    |                     |                 |                        |                       |         |        |        |        |
| Byte 13    |                     |                 |                        |                       |         |        |        |        |
| Byte 14    | Measurements 1 Ch#0 |                 |                        |                       |         |        |        |        |
| Byte 15    |                     |                 |                        |                       |         |        |        |        |
| Byte 16    |                     |                 |                        |                       |         |        |        |        |
| Byte 17    |                     |                 |                        |                       |         |        |        |        |
| Byte 18    |                     |                 |                        |                       |         |        |        |        |
| Byte 19    | Measurements 2 Ch#0 |                 |                        |                       |         |        |        |        |
| Byte 20    |                     |                 |                        |                       |         |        |        |        |
| Byte 21    |                     |                 |                        |                       |         |        |        |        |
| Byte 22    |                     |                 |                        |                       |         |        |        |        |
| Byte 23    |                     |                 |                        |                       |         |        |        |        |
| Byte 24    | Counter value Ch#1  |                 |                        |                       |         |        |        |        |
| Byte 25    |                     |                 |                        |                       |         |        |        |        |
| Byte 26    |                     |                 |                        |                       |         |        |        |        |
| Byte 27    |                     |                 |                        |                       |         |        |        |        |
| Byte 28    |                     |                 |                        |                       |         |        |        |        |
| Byte 29    | Capture value Ch#1  |                 |                        |                       |         |        |        |        |
| Byte 30    |                     |                 |                        |                       |         |        |        |        |
| Byte 31    |                     |                 |                        |                       |         |        |        |        |
| Byte 32    |                     |                 |                        |                       |         |        |        |        |
| Byte 33    |                     |                 |                        |                       |         |        |        |        |

|             |                            |       |       |       |       |                 |                          |         |
|-------------|----------------------------|-------|-------|-------|-------|-----------------|--------------------------|---------|
| Byte 25     |                            |       |       |       |       |                 |                          |         |
| Byte 26     |                            |       |       |       |       |                 |                          |         |
| Byte 27     |                            |       |       |       |       |                 |                          |         |
| Byte 28     | Measurements 1 Ch#1        |       |       |       |       |                 |                          |         |
| Byte 29     |                            |       |       |       |       |                 |                          |         |
| Byte 30     |                            |       |       |       |       |                 |                          |         |
| Byte 31     |                            |       |       |       |       |                 |                          |         |
| Byte 32     | Measurements 2 Ch#1        |       |       |       |       |                 |                          |         |
| Byte 33     |                            |       |       |       |       |                 |                          |         |
| Byte 34     |                            |       |       |       |       |                 |                          |         |
| Byte 35     |                            |       |       |       |       |                 |                          |         |
| Output Data |                            |       |       |       |       |                 |                          |         |
| Bit No      | Bit 7                      | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2           | Bit 1                    | Bit 0   |
| Byte 0      | Reserved                   |       |       |       |       | Flow Clear Ch#0 | Counter Set Trigger Ch#0 | DO Ch#0 |
| Byte 1      | Reserved                   |       |       |       |       |                 |                          |         |
| Byte 2      | Reserved                   |       |       |       |       | Flow Clear Ch#1 | Counter Set Trigger Ch#1 | DO Ch#1 |
| Byte 3      | Reserved                   |       |       |       |       |                 |                          |         |
| Byte 4      | Set Value for Counter Ch#0 |       |       |       |       |                 |                          |         |
| Byte 5      |                            |       |       |       |       |                 |                          |         |
| Byte 6      |                            |       |       |       |       |                 |                          |         |
| Byte 7      |                            |       |       |       |       |                 |                          |         |
| Byte 8      | Set Value for Counter Ch#1 |       |       |       |       |                 |                          |         |
| Byte 9      |                            |       |       |       |       |                 |                          |         |
| Byte 10     |                            |       |       |       |       |                 |                          |         |
| Byte 11     |                            |       |       |       |       |                 |                          |         |

Data Declaration:

Input data definition:

**A/B/Z Ch#(0-1):** The position is 1 when the corresponding channel A/B/Z input signal is valid, and 0 when the input is invalid.

**DI Ch#(0-1):** Digital input signal status.

**Counter Overflow Ch#(0-1):** Counter overflowed flag bit.

**Counter Underflow Ch#(0-1):** Counter underflows flag bit.

**Counter UP:** Encoder positive rotation, counter up counting sign.

**Counter DOWN:** Encoder contrarotation, counter down count flag.

**Counter Value Ch#(0-1):** Pulse count value, 32 - bit signed integer, automatically clear after overflow.

**Capture value Ch#(0-1):** Pulse capture value, 32-bit signed integer, and when DI is set to capture, the pulse count value will be captured to the capture value at the selected edge.

**Measurements 1 Ch#(0-1):** Measurement value 1, the measurement value will be output according to the measurement value type selected by the user (view the configuration parameter section of the module for optional measurement value)

**Measurements 2 Ch#(0-1):** Measurement value 2, the measurement value will be output according to the measurement value type selected by the user (view the configuration parameter section of the module for optional measurement value)

Output data definition:

**DO Ch#(0-1):** Digital output channel control.

**Counter Set Trigger CH#(0-1):** Counter set trigger bit, rising edge trigger counter set, the output value Set Value for Counter will be updated to Counter Value, this function can be used to set the initial value of the counter.

**Flow Clear CH#(0-1):** Overflow clear bit, the rising edge can clear the input Counter Overflow and Counter Underflow flag bits.

**Set Value for Counter Ch#(0-1):** Counter set value.

## <2 Analog Input(5V Encoder)> Submodule configuration parameter definition

| Configuration Parameter |                                |       |                          |                     |       |                             |                                |                            |
|-------------------------|--------------------------------|-------|--------------------------|---------------------|-------|-----------------------------|--------------------------------|----------------------------|
| Bit No                  | Bit 7                          | Bit 6 | Bit 5                    | Bit 4               | Bit 3 | Bit 2                       | Bit 1                          | Bit 0                      |
| Byte 0                  | Reserved                       |       |                          |                     |       | 16Bit Data Format           | 32Bit Data Format              |                            |
| Byte 1                  | Reserved                       |       |                          |                     |       | Work Mode Ch#0              |                                |                            |
| Byte 2                  | Reserved                       |       |                          |                     |       |                             | Frequency Multiplication Ch#0  |                            |
| Byte 3                  | Reserved                       |       |                          | Filtering Time Ch#0 |       |                             |                                |                            |
| Byte 4                  | Reserved                       |       |                          |                     |       |                             |                                | Counter Storage Ch#0       |
| Byte 5                  | Reserved                       |       |                          |                     |       |                             | Encode Output Signal Type Ch#0 |                            |
| Byte 6                  | Reserved                       |       |                          |                     |       |                             |                                | DI Function Selection Ch#0 |
| Byte 7                  | Reserved                       |       |                          |                     |       |                             | Capture Mode Ch#0              |                            |
| Byte 8<br>...           | Reserved                       |       |                          |                     |       |                             |                                |                            |
| Byte 17                 | Reserved                       |       |                          |                     |       | Speed Measurement Time Ch#0 |                                |                            |
| Byte 18                 | Reserved                       |       | Measurements 2 Type Ch#0 |                     |       | Measurements 1 Type Ch#0    |                                |                            |
| Byte 19                 | Reserved                       |       | Measurements 2 Type Ch#0 |                     |       | Measurements 1 Type Ch#0    |                                |                            |
| Byte 20                 | Encoder Resolution Ch#0        |       |                          |                     |       |                             |                                |                            |
| Byte 21                 |                                |       |                          |                     |       |                             |                                |                            |
| Byte 22                 | Transmission Ratio Active Ch#0 |       |                          |                     |       |                             |                                |                            |
| Byte 23                 |                                |       |                          |                     |       |                             |                                |                            |
| Byte 24                 | Transmission Ratio Slave Ch#0  |       |                          |                     |       |                             |                                |                            |
| Byte 25                 |                                |       |                          |                     |       |                             |                                |                            |

|                |                                |                          |                                |
|----------------|--------------------------------|--------------------------|--------------------------------|
| Byte 26<br>... | Reserved                       |                          |                                |
| Byte 33        |                                |                          |                                |
| Byte 34        | Reserved                       |                          | Work Mode Ch#1                 |
| Byte 35        | Reserved                       |                          | Frequency Multiplication Ch#1  |
| Byte 36        | Reserved                       | Filtering Time Ch#1      |                                |
| Byte 37        | Reserved                       |                          | Counter Storage Ch#1           |
| Byte 38        | Reserved                       |                          | Encode Output Signal Type Ch#1 |
| Byte 39        | Reserved                       |                          | DI Function Selection Ch#1     |
| Byte 40        | Reserved                       |                          | Capture Mode Ch#1              |
| Byte 41<br>... | Reserved                       |                          |                                |
| Byte 50        |                                |                          |                                |
| Byte 51        | Reserved                       |                          | Speed Measurement Time Ch#1    |
| Byte 52        | Reserved                       | Measurements 2 Type Ch#1 | Measurements 1 Type Ch#1       |
| Byte 53        | Encoder Resolution Ch#1        |                          |                                |
| Byte 54        |                                |                          |                                |
| Byte 55        | Transmission Ratio Active Ch#1 |                          |                                |
| Byte 56        |                                |                          |                                |
| Byte 57        | Transmission Ratio Slave Ch#1  |                          |                                |
| Byte 58        |                                |                          |                                |
| Byte 59<br>... | Reserved                       |                          |                                |

|            |  |
|------------|--|
| Byte<br>66 |  |
|------------|--|

Data Declaration:

**16Bit Data Format:** Byte transfer order of channel state. (Default: 0)

0: A-B

1: B-A

**32Bit Data Format:** The byte transfer order of a channel count value. (Default: 0)

0: AB-CD

1: BA-DC

2: CD-AB

3: DC-BA

**Work Mode Ch#(0-1):** Working mode of encoder. (Default: 0)

0: Incremental encoder mode.

1: Count direction mode.

2: Count up mode.

3: Count down mode.

**Frequency Multiplication Ch#(0-1):** Frequency multiplication number (available only in incremental encoder mode), according to this mode it could output pulse count value. (Default: 2)

0: frequency multiplication 1

1: frequency multiplication 2

2: frequency multiplication 4

**Filtering Time Ch#(0-1):** Encoder input filter time (default: 5)

0: no filter

1: 0.1uS

...

5: 0.5 uS

...

31: 3.1 uS

**Counter Storage Ch#(0-1):** Enable storage. When the storage function is enabled, the IO module will save the count value to the non-volatile memory in real time, and load the last saved count value at the next power-on. (Default: 1)

0: Disable

1: Enable

**Encoder Output Signal Type Ch#(0-1):** Encoder output type (default: 0)

0: Source

1: Sink

2: Push-pull

**DI Function Selection Ch#(0-1):** DI function selection (Default: 0)

0: Normal DI function

1: Pulse capture function

**Capture Mode Ch#(0-1):** Capture mode (default: 0)

- 0: Rising edge capture
- 1: Falling edge capture
- 2: Double edge capture

**Speed Measurement Time Ch#(0-1):** Speed measurement period (Default: 6)

- 0: 10mS
- 1: 20mS
- 2: 50mS
- 3: 100mS
- 4: 200mS
- 5: 500mS
- 6: 1000mS
- 7: 2000mS

**Measurements 1 Type Ch#(0-1):** Measurement value 1 Type selection (default: 0)

- 0: No measurements
- 1: Measuring speed (min/rotation)
- 2: Measuring frequency

**Measurements 2 Type Ch#(0-1):** Measurement value 2 Type selection (default: 0)

- 0: No measurements
- 1: Measuring speed (min/ rotation)
- 2: Measuring frequency

**Encoder Resolution Ch#(0-1):** Encoder resolution (default: 1)

Value range: 1-65535

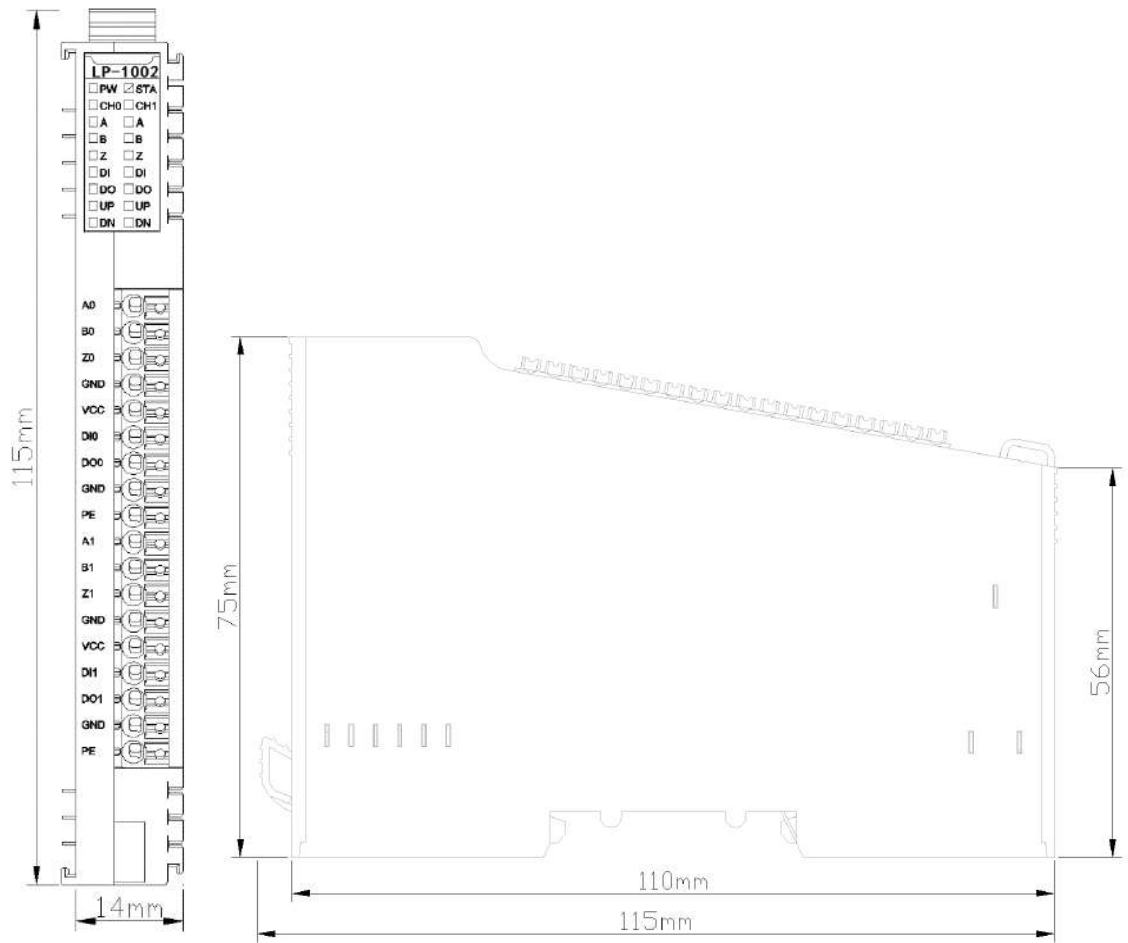
**Transmission Ratio Active Ch#(0-1):** 1) Transmission ratio (main) (Default: 1)

Value range: 1-65535

**Transmission Ratio Slave Ch#(0-1):** Transmission ratio (main) (Default: 1)

Value range: 1-65535

A Dimension drawing



## **LP-3002 2-channel encoder input/24VDC**

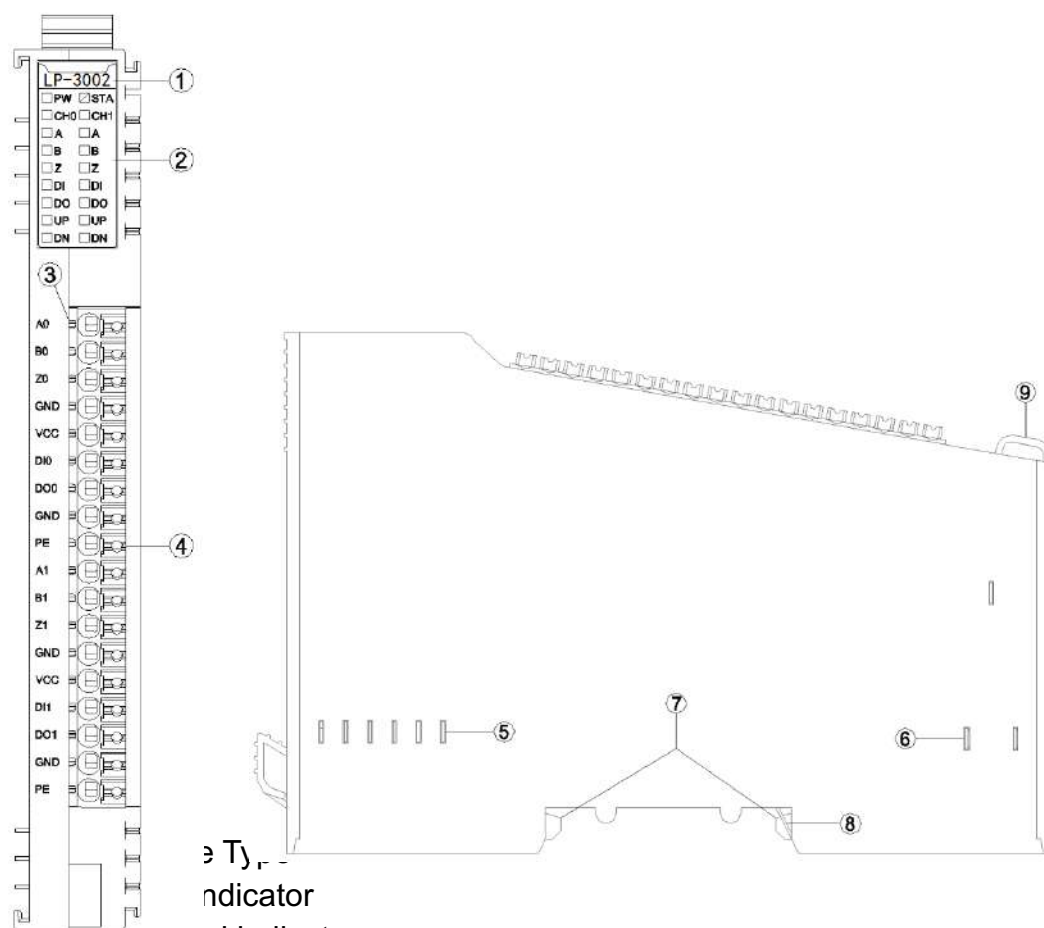
### **1 Module features**

- ◆ the module supports two channels of encoder input.
- ◆ each encoder channel supports A/B incremental encoder or pulse-directional encoder input.
- ◆ each encoder channel supports orthogonal A/B signal input, input voltage 24V, and it supports source and sink input.
- ◆ the incremental encoder mode supports x1/ x2 / x4 frequency multiplication mode.
- ◆ the pulse - direction mode supports nondirectional signal, pulse input only.
- ◆ each encoder channel supports 1 digital input signal with an input voltage of 5Vdc or 24Vdc.
- ◆ each encoder channel supports 1 digital output signal with an output voltage of 24Vdc.
- ◆ each encoder channel supports 1 way of 24V power output, which can be connected to the encoder for power supply.
- ◆ the module internal bus and field input adopt magnetic isolation.
- ◆ the module carries 16 LED indicators.
- ◆ the maximum input frequency of the encoder supported by the module is 1.5MHz.
- ◆ the module supports measurement function, it could detect the load speed or input signal frequency.

## 2 Technical parameters

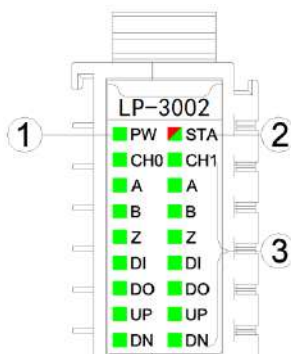
| General Parameters                    |                                                  |
|---------------------------------------|--------------------------------------------------|
| Power                                 | Max.60mA@5.0Vdc                                  |
| Isolation                             | I/O to internal bus: magnetic isolation (3KVrms) |
| Field Power                           | Nominal:24Vdc, Range:20-28Vdc                    |
| Wiring                                | Max.1.0mm <sup>2</sup> (AWG 17)                  |
| Mounting Type                         | 35mm DIN-Rail                                    |
| Size                                  | 115*14*75mm                                      |
| Weight                                | 65g                                              |
| Environment Specification             |                                                  |
| Operational Temperature               | -40~85°C                                         |
| Operational Humidity                  | 5%-95% (No Condensation)                         |
| Ingress Protection Rating             | IP20                                             |
| Input Parameters                      |                                                  |
| Channel Number                        | 2-channel encoder                                |
| LED Indicator                         | 16 channel input LED indicator                   |
| Encoder signal voltage range          | ABZ input standard 24Vdc, range $\pm 10\%$       |
| Encoder input impedance               | Internal pull-up or pull-down resistance 4.7K    |
| Encoder filtering time                | Could be set, the default value is 0.5 us        |
| Encoder count frequency               | <1.5MHz                                          |
| Encoder frequency multiplication mode | x1/x2/x4                                         |
| Encoder measurement function          | Load speed or input signal frequency measurement |
| DI turn-on voltage                    | Min.5Vdc to Max.28Vdc                            |
| DI turn-off voltage                   | Max.2.7Vdc                                       |
| DI turn-on current                    | Max.5mA/channel@28V                              |
| DI input impedance                    | >10.0k $\Omega$                                  |
| DI input delay                        | OFF to ON: Max.3ms<br>ON to OFF: Max.2ms         |
| DO output voltage                     | 24V, range $\pm 10\%$                            |
| DO output current                     | Max.500mA                                        |
| DO output sink current                | Max.5uA                                          |

### 3 Hardware interfaces



- ③ Channel indicator
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

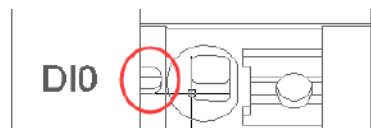
### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State indicator LED (red/green)
- ③ Input channel indicator LED (green)

| PW Power State                 | Definition                                    |
|--------------------------------|-----------------------------------------------|
| ON                             | Internal bus power supply normal              |
| OFF                            | Internal bus power supply failure             |
| STA Module State               | Definition                                    |
| Green slow flash (2.5 Hz)      | Module internal bus is not started            |
| Red slow flash (2.5 Hz)        | Module internal bus offline                   |
| ON (GREEN)                     | Operation normal                              |
| Flash (2.5 Hz) (RED/GREEN)     | updating mode                                 |
| Flash (10 Hz) (RED/GREEN)      | firmware update                               |
| Double Flash (RED)             | Module exception has been soft-restarted      |
| CH0 CH1 channel indicator LED  | Definition                                    |
| ON                             | Channel enable                                |
| A B Z Encoder signal indicator | Definition                                    |
| ON                             | Input signal valid                            |
| OFF                            | Input signal invalid                          |
| DI input indicator             | Definition                                    |
| ON                             | Input signal high level                       |
| OFF                            | Input signal invalid                          |
| DO output indicator            | Definition                                    |
| ON                             | Output signal high level                      |
| OFF                            | Output signal invalid                         |
| UP indicator                   | Definition                                    |
| ON                             | Encoder in positive rotation                  |
| OFF                            | Encoder is stationary or in contrarotation    |
| DN indicator                   | Definition                                    |
| ON                             | Encoder in contrarotation                     |
| OFF                            | Encoder is stationary or in positive rotation |

### 3.2 Field channel LED indicator (Green)

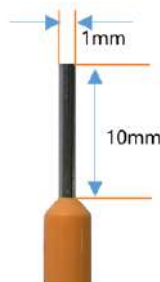


When the input signal of the input channel is valid, the corresponding field channel indicator is on (only the DI/DO/VCC wiring terminal of the encoder channel carries the indicator).

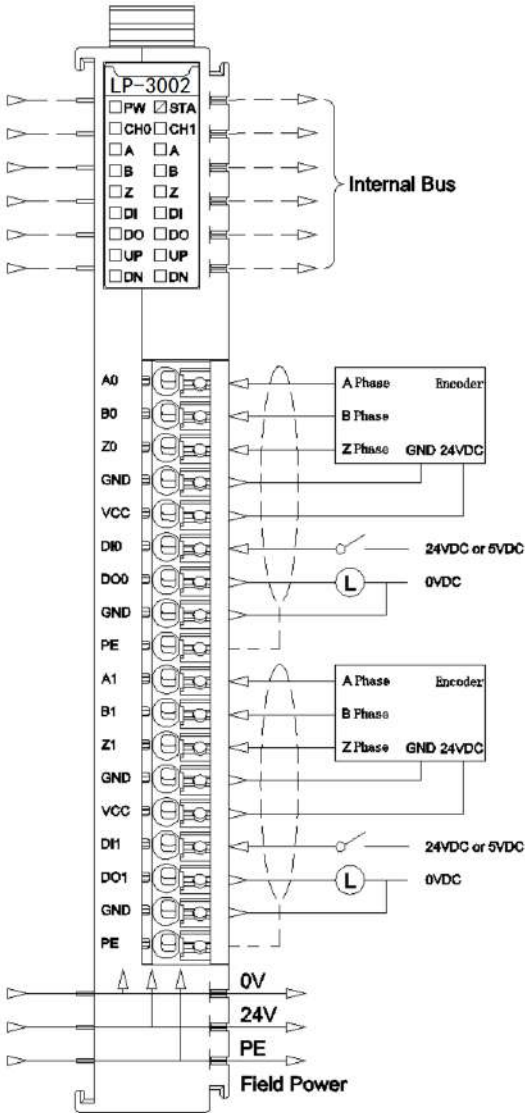
### 3.3 Terminal definition

| Terminal Number | Symbol | Description               |
|-----------------|--------|---------------------------|
| 1               | A0     | CH0 encoder phase A input |
| 2               | B0     | CH0 encoder phase B input |
| 3               | Z0     | CH0 encoder phase Z input |
| 4               | GND    | Signal ground             |
| 5               | VCC    | 24V power output          |
| 6               | DI0    | CH0 digital signal input  |
| 7               | DO0    | CH0 digital signal output |
| 8               | GND    | Signal ground             |
| 9               | PE     | Shield earthing           |
| 10              | A1     | CH1 encoder phase A input |
| 11              | B1     | CH1 encoder phase B input |
| 12              | Z1     | CH1 encoder phase Z input |
| 13              | GND    | Signal ground             |
| 14              | VCC    | 24V power output          |
| 15              | DI1    | CH1 digital signal input  |
| 16              | DO1    | CH1 digital signal output |
| 17              | GND    | Signal ground             |
| 18              | PE     | Shield earthing           |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.  
The cold-pressed terminal parameters are as follows:



4 Wiring



### < 2 Analog Input(24V Encoder) > Submodule process data definition

| Input Data |                     |                 |                        |                       |         |        |        |        |
|------------|---------------------|-----------------|------------------------|-----------------------|---------|--------|--------|--------|
| Bit No     | Bit 7               | Bit 6           | Bit 5                  | Bit 4                 | Bit 3   | Bit 2  | Bit 1  | Bit 0  |
| Byte 0     | Counter DOWN Ch#0   | Counter UP Ch#0 | Counter Underflow Ch#0 | Counter Overflow Ch#0 | DI Ch#0 | Z Ch#0 | B Ch#0 | A Ch#0 |
| Byte 1     | Reserved            |                 |                        |                       |         |        |        |        |
| Byte 2     | Counter DOWN Ch#1   | Counter UP Ch#1 | Counter Underflow Ch#1 | Counter Overflow Ch#1 | DI Ch#1 | Z Ch#1 | B Ch#1 | A Ch#1 |
| Byte 3     | Reserved            |                 |                        |                       |         |        |        |        |
| Byte 4     | Counter value Ch#0  |                 |                        |                       |         |        |        |        |
| Byte 5     |                     |                 |                        |                       |         |        |        |        |
| Byte 6     |                     |                 |                        |                       |         |        |        |        |
| Byte 7     |                     |                 |                        |                       |         |        |        |        |
| Byte 8     | Capture value Ch#0  |                 |                        |                       |         |        |        |        |
| Byte 9     |                     |                 |                        |                       |         |        |        |        |
| Byte 10    |                     |                 |                        |                       |         |        |        |        |
| Byte 11    |                     |                 |                        |                       |         |        |        |        |
| Byte 12    | Measurements 1 Ch#0 |                 |                        |                       |         |        |        |        |
| Byte 13    |                     |                 |                        |                       |         |        |        |        |
| Byte 14    |                     |                 |                        |                       |         |        |        |        |
| Byte 15    |                     |                 |                        |                       |         |        |        |        |
| Byte 16    | Measurements 2 Ch#0 |                 |                        |                       |         |        |        |        |
| Byte 17    |                     |                 |                        |                       |         |        |        |        |
| Byte 18    |                     |                 |                        |                       |         |        |        |        |
| Byte 19    |                     |                 |                        |                       |         |        |        |        |
| Byte 20    | Counter value Ch#1  |                 |                        |                       |         |        |        |        |
| Byte 21    |                     |                 |                        |                       |         |        |        |        |
| Byte 22    |                     |                 |                        |                       |         |        |        |        |
| Byte 23    |                     |                 |                        |                       |         |        |        |        |
| Byte 24    | Capture value Ch#1  |                 |                        |                       |         |        |        |        |

|             |                            |       |       |       |       |                 |                          |         |
|-------------|----------------------------|-------|-------|-------|-------|-----------------|--------------------------|---------|
| Byte 25     |                            |       |       |       |       |                 |                          |         |
| Byte 26     |                            |       |       |       |       |                 |                          |         |
| Byte 27     |                            |       |       |       |       |                 |                          |         |
| Byte 28     | Measurements 1 Ch#1        |       |       |       |       |                 |                          |         |
| Byte 29     |                            |       |       |       |       |                 |                          |         |
| Byte 30     |                            |       |       |       |       |                 |                          |         |
| Byte 31     |                            |       |       |       |       |                 |                          |         |
| Byte 32     | Measurements 2 Ch#1        |       |       |       |       |                 |                          |         |
| Byte 33     |                            |       |       |       |       |                 |                          |         |
| Byte 34     |                            |       |       |       |       |                 |                          |         |
| Byte 35     |                            |       |       |       |       |                 |                          |         |
| Output Data |                            |       |       |       |       |                 |                          |         |
| Bit No      | Bit 7                      | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2           | Bit 1                    | Bit 0   |
| Byte 0      | Reserved                   |       |       |       |       | Flow Clear Ch#0 | Counter Set Trigger Ch#0 | DO Ch#0 |
| Byte 1      | Reserved                   |       |       |       |       |                 |                          |         |
| Byte 2      | Reserved                   |       |       |       |       | Flow Clear Ch#1 | Counter Set Trigger Ch#1 | DO Ch#1 |
| Byte 3      | Reserved                   |       |       |       |       |                 |                          |         |
| Byte 4      | Set Value for Counter Ch#0 |       |       |       |       |                 |                          |         |
| Byte 5      |                            |       |       |       |       |                 |                          |         |
| Byte 6      |                            |       |       |       |       |                 |                          |         |
| Byte 7      |                            |       |       |       |       |                 |                          |         |
| Byte 8      | Set Value for Counter Ch#1 |       |       |       |       |                 |                          |         |
| Byte 9      |                            |       |       |       |       |                 |                          |         |
| Byte 10     |                            |       |       |       |       |                 |                          |         |
| Byte 11     |                            |       |       |       |       |                 |                          |         |

Data Declaration:

Input data definition:

**A/B/Z Ch#(0-1):** The position is 1 when the corresponding channel A/B/Z input signal is valid, and 0 when the input is invalid.

**DI Ch#(0-1):** Digital input signal status.

**Counter Overflow Ch#(0-1):** Counter overflowed flag bit.

**Counter Underflow Ch#(0-1):** Counter underflows flag bit.

**Counter UP:** Encoder positive rotation, counter up counting sign.

**Counter DOWN:** Encoder contrarotation, counter down count flag.

**Counter Value Ch#(0-1):** Pulse count value, 32 - bit signed integer, automatically clear after overflow.

**Capture value Ch#(0-1):** Pulse capture value, 32-bit signed integer, and when DI is set to capture, the pulse count value will be captured to the capture value at the selected edge.

**Measurements 1 Ch#(0-1):** Measurement value 1, the measurement value will be output according to the measurement value type selected by the user (view the configuration parameter section of the module for optional measurement value)

**Measurements 2 Ch#(0-1):** Measurement value 2, the measurement value will be output according to the measurement value type selected by the user (view the configuration parameter section of the module for optional measurement value)

Output data definition:

**DO Ch#(0-1):** Digital output channel control.

**Counter Set Trigger CH#(0-1):** Counter set trigger bit, rising edge trigger counter set, the output value Set Value for Counter will be updated to Counter Value, this function can be used to set the initial value of the counter.

**Flow Clear CH#(0-1):** Overflow clear bit, the rising edge can clear the input Counter Overflow and Counter Underflow flag bits.

**Set Value for Counter Ch#(0-1):** Counter set value.

## <2 Analog Input(24V Encoder)> Submodule configuration parameter definition

| Configuration Parameter  |                         |       |                          |                     |       |                             |                                |                            |
|--------------------------|-------------------------|-------|--------------------------|---------------------|-------|-----------------------------|--------------------------------|----------------------------|
| Bit No                   | Bit 7                   | Bit 6 | Bit 5                    | Bit 4               | Bit 3 | Bit 2                       | Bit 1                          | Bit 0                      |
| Byte 0                   | Reserved                |       |                          |                     |       | 16Bit Data Format           | 32Bit Data Format              |                            |
| Byte 1                   | Reserved                |       |                          |                     |       | Work Mode Ch#0              |                                |                            |
| Byte 2                   | Reserved                |       |                          |                     |       |                             | Frequency Multiplication Ch#0  |                            |
| Byte 3                   | Reserved                |       |                          | Filtering Time Ch#0 |       |                             |                                |                            |
| Byte 4                   | Reserved                |       |                          |                     |       |                             |                                | Counter Storage Ch#0       |
| Byte 5                   | Reserved                |       |                          |                     |       |                             | Encode Output Signal Type Ch#0 |                            |
| Byte 6                   | Reserved                |       |                          |                     |       |                             |                                | DI Function Selection Ch#0 |
| Byte 7                   | Reserved                |       |                          |                     |       |                             | Capture Mode Ch#0              |                            |
| Byte 8<br>...<br>Byte 17 | Reserved                |       |                          |                     |       |                             |                                |                            |
| Byte 18                  | Reserved                |       |                          |                     |       | Speed Measurement Time Ch#0 |                                |                            |
| Byte 19                  | Reserved                |       | Measurements 2 Type Ch#0 |                     |       | Measurements 1 Type Ch#0    |                                |                            |
| Byte                     | Encoder Resolution Ch#0 |       |                          |                     |       |                             |                                |                            |

|                |                                |                     |                                |
|----------------|--------------------------------|---------------------|--------------------------------|
| 20             |                                |                     |                                |
| Byte 21        |                                |                     |                                |
| Byte 22        | Transmission Ratio Active Ch#0 |                     |                                |
| Byte 23        |                                |                     |                                |
| Byte 24        | Transmission Ratio Slave Ch#0  |                     |                                |
| Byte 25        |                                |                     |                                |
| Byte 26<br>... | Reserved                       |                     |                                |
| Byte 33        |                                |                     |                                |
| Byte 34        | Reserved                       | Work Mode Ch#1      |                                |
| Byte 35        | Reserved                       |                     | Frequency Multiplication Ch#1  |
| Byte 36        | Reserved                       | Filtering Time Ch#1 |                                |
| Byte 37        | Reserved                       |                     | Counter Storage Ch#1           |
| Byte 38        | Reserved                       |                     | Encode Output Signal Type Ch#1 |
| Byte 39        | Reserved                       |                     | DI Function Selection Ch#1     |
| Byte 40        | Reserved                       |                     | Capture Mode Ch#1              |
| Byte 41<br>... | Reserved                       |                     |                                |
| Byte 50        |                                |                     |                                |

|                           |                                |                          |                             |
|---------------------------|--------------------------------|--------------------------|-----------------------------|
| Byte 51                   | Reserved                       |                          | Speed Measurement Time Ch#1 |
| Byte 52                   | Reserved                       | Measurements 2 Type Ch#1 | Measurements 1 Type Ch#1    |
| Byte 53                   | Encoder Resolution Ch#1        |                          |                             |
| Byte 54                   |                                |                          |                             |
| Byte 55                   | Transmission Ratio Active Ch#1 |                          |                             |
| Byte 56                   |                                |                          |                             |
| Byte 57                   | Transmission Ratio Slave Ch#1  |                          |                             |
| Byte 58                   |                                |                          |                             |
| Byte 59<br>...<br>Byte 66 | Reserved                       |                          |                             |

Data Declaration:

**16Bit Data Format:** Byte transfer order of channel state. (Default: 0)

0: A-B

1: B-A

**32Bit Data Format:** The byte transfer order of a channel count value. (Default: 0)

0: AB-CD

1: BA-DC

2: CD-AB

3: DC-BA

**Work Mode Ch#(0-1):** Working mode of encoder. (Default: 0)

0: Incremental encoder mode.

1: Count direction mode.

2: Count up mode.

3: Count down mode.

**Frequency Multiplication Ch#(0-1):** Frequency multiplication number (available only in incremental encoder mode), according to this mode it could output pulse count value. (Default: 2)

0: frequency multiplication 1

1: frequency multiplication 2

2: frequency multiplication 4

**Filtering Time Ch#(0-1):** Encoder input filter time (default: 5)

0: no filter

1: 0.1uS

...

5: 0.5 uS

...

31: 3.1 uS

**Counter Storage Ch#(0-1):** Enable storage. When the storage function is enabled, the IO module will save the count value to the non-volatile memory in real time, and load the last saved count value at the next power-on. (Default: 1)

0: Disable

1: Enable

**Encoder Output Signal Type Ch#(0-1):** Encoder output type (default: 0)

0: Source

1: Sink

2: Push-pull

**DI Function Selection Ch#(0-1):** DI function selection (Default: 0)

0: Normal DI function

1: Pulse capture function

**Capture Mode Ch#(0-1):** Capture mode (default: 0)

0: Rising edge capture

1: Falling edge capture

2: Double edge capture

**Speed Measurement Time Ch#(0-1):** Speed measurement period (Default: 6)

0: 10mS

1: 20mS

2: 50mS

3: 100mS

4: 200mS

5: 500mS

6: 1000mS

7: 2000mS

**Measurements 1 Type Ch#(0-1):** Measurement value 1 Type selection (default: 0)

0: No measurements

1: Measuring speed (min/rotation)

2: Measuring frequency

**Measurements 2 Type Ch#(0-1):** Measurement value 2 Type selection (default: 0)

0: No measurements

1: Measuring speed (min/ rotation)

2: Measuring frequency

**Encoder Resolution Ch#(0-1):** Encoder resolution (default: 1)

Value range: 1-65535

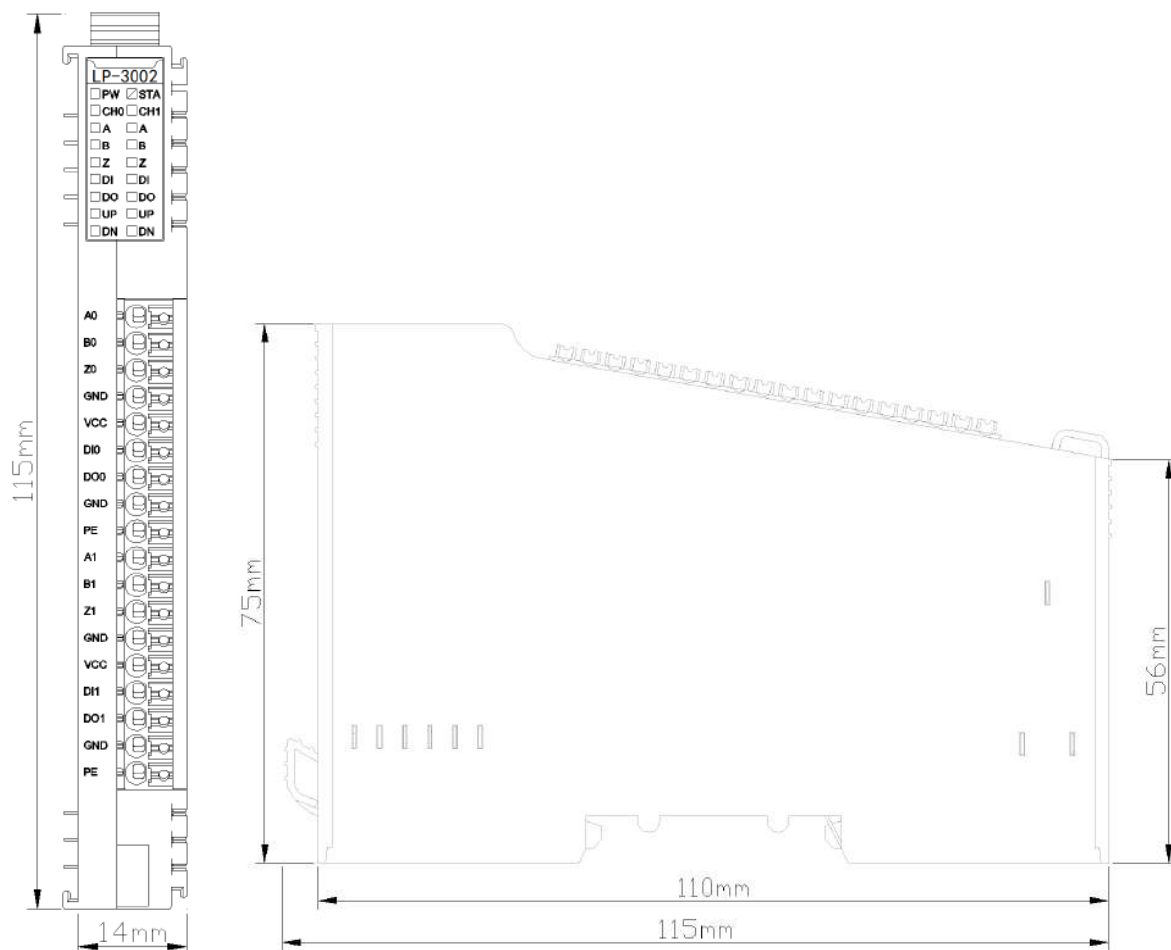
**Transmission Ratio Active Ch#(0-1):** 1) Transmission ratio (main) (Default: 1)Value

range: 1-65535

**Transmission Ratio Slave Ch#(0-1):** Transmission ratio (main) (Default: 1)

Value range: 1-65535

## A Dimension drawing



## **LP-5002 2-channel encoder/SSI input**

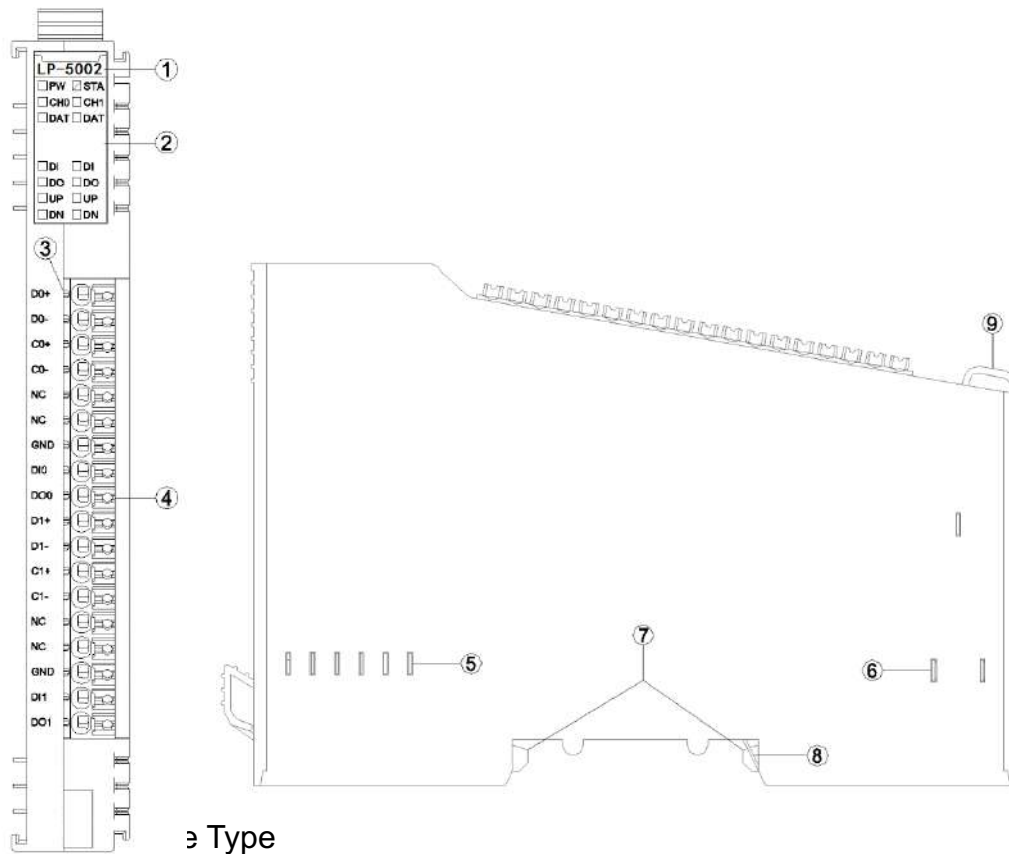
### **1 Module features**

- ◆ the module supports two channels of SSI encoder input.
- ◆ each encoder channel supports SSI absolute encoder signal input.
- ◆ each encoder channel supports 1 digital input signal with an input voltage of 5Vdc or 24Vdc.
- ◆ each encoder channel supports 1 digital output signal with an output voltage of 5Vdc.
- ◆ the module internal bus and field input adopt magnetic isolation
- ◆ the module carries 16 LED indicators.
- ◆ the module supports the maximum clock frequency of 2MHz.
- ◆ the encoder reading interval time could be set.
- ◆ The data bit length and the start and end bit positions could be set.

## 2 Technical parameters

| General Parameters          |                                                  |
|-----------------------------|--------------------------------------------------|
| Power                       | Max.60mA@5.0Vdc                                  |
| Isolation                   | I/O to internal bus: magnetic isolation (3KVrms) |
| Field Power                 | Nominal:24Vdc, Range:20-28Vdc                    |
| Wiring                      | Max.1.0mm <sup>2</sup> (AWG 17)                  |
| Mounting Type               | 35mm DIN-Rail                                    |
| Size                        | 115*14*75mm                                      |
| Weight                      | 65g                                              |
| Environment Specification   |                                                  |
| Operational Temperature     | -40~85°C                                         |
| Operational Humidity        | 5%-95% (No Condensation)                         |
| Ingress Protection Rating   | IP20                                             |
| Input Parameters            |                                                  |
| Channel Number              | 2-channel encoder                                |
| LED Indicator               | 16 channel input LED indicator                   |
| Encoder signal type         | Differential signal, 5V                          |
| Data frame length           | 10-40 bit                                        |
| Position value length       | Maximun of 32 bit                                |
| Position value format       | Supports gray code or binary                     |
| Location value LSB/MSB      | Settable                                         |
| SSI encoder clock frequency | ≤2MHz                                            |
| DI turn-on voltage          | Min.5Vdc to Max.28Vdc                            |
| DI turn-off voltage         | Max.2.7Vdc                                       |
| DI turn-on current          | Max.5mA/channel@28V                              |
| DI input impedance          | >10.0kΩ                                          |
| DI input delay              | OFF to ON: Max.3ms<br>ON to OFF: Max.2ms         |
| DO output voltage           | 5V, range ±10%                                   |
| DO output current           | Max.500mA                                        |
| DO output sink current      | Max.5uA                                          |

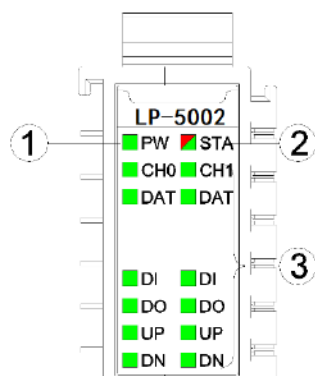
### 3 Hardware interfaces



≡ Type

- ② State indicator
- ③ Channel indicator
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

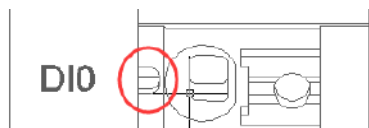
### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State indicator LED (red/green)
- ③ Input channel indicator LED (green)

| PW Power State                | Definition                                     |
|-------------------------------|------------------------------------------------|
| ON                            | Internal bus power supply normal               |
| OFF                           | Internal bus power supply failure              |
| STA Module State              | Definition                                     |
| Green slow flash (2.5 Hz)     | Module internal bus is not started             |
| Red slow flash (2.5 Hz)       | Module internal bus offline                    |
| ON (GREEN)                    | Operation normal                               |
| Flash (2.5 Hz) (RED/GREEN)    | updating mode                                  |
| Flash (10 Hz) (RED/GREEN)     | firmware update                                |
| Double Flash (RED)            | Module exception has been soft-restarted       |
| CH0 CH1 channel indicator LED | Definition                                     |
| ON                            | Channel enable                                 |
| DAT channel indicator LED     | Definition                                     |
| ON                            | The input data line is at high level when idle |
| OFF                           | The input data line is at low level when idle  |
| DI input indicator            | Definition                                     |
| ON                            | Input signal high level                        |
| OFF                           | Input signal invalid                           |
| DO output indicator           | Definition                                     |
| ON                            | Output signal high level                       |
| OFF                           | Output signal invalid                          |
| UP indicator                  | Definition                                     |
| ON                            | Encoder in positive rotation                   |
| OFF                           | Encoder is stationary or in contrarotation     |
| DN indicator                  | Definition                                     |
| ON                            | Encoder in contrarotation                      |
| OFF                           | Encoder is stationary or in positive rotation  |

### 3.2 Field channel LED indicator (Green)

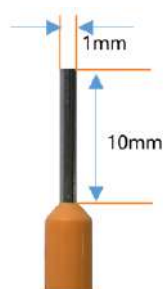


When the input signal of the input channel is valid, the corresponding field channel indicator is on (only the DI/DO wiring terminal of the encoder channel carries the indicator).

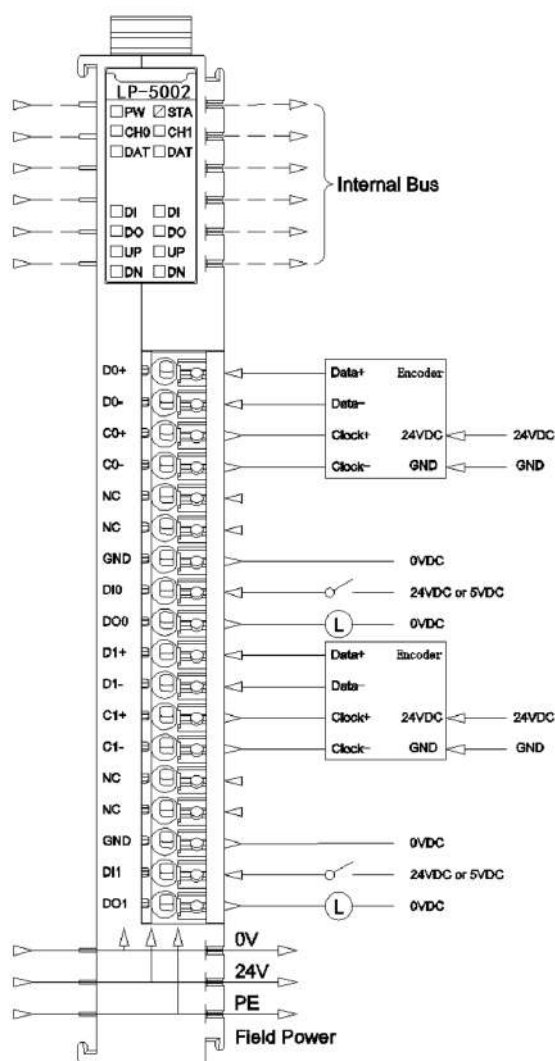
### 3.3 Terminal definition

| Terminal Number | Symbol | Description                |
|-----------------|--------|----------------------------|
| 1               | D0+    | CH0 encoder data input +   |
| 2               | D0-    | CH0 encoder data input -   |
| 3               | C0+    | CH0 encoder clock output + |
| 4               | C0-    | CH0 encoder clock output - |
| 5               | NC     | Not connected              |
| 6               | NC     | Not connected              |
| 7               | GND    | Signal ground              |
| 8               | DI0    | CH0 digital signal input   |
| 9               | DO0    | CH0 digital signal output  |
| 10              | D1+    | CH1 encoder input +        |
| 11              | D1-    | CH1 encoder data input -   |
| 12              | C1+    | CH1 encoder clock output + |
| 13              | C1-    | CH1 encoder clock output - |
| 14              | NC     | Not connected              |
| 15              | NC     | Not connected              |
| 16              | GND    | Signal ground              |
| 17              | DI1    | CH1 digital signal input   |
| 18              | DO1    | CH1 digital signal output  |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.  
The cold-pressed terminal parameters are as follows:



## 4 Wiring



## 5 Process data definition

< 2 Analog Input(SSl Encoder) > Submodule process data definition

| Input Data  |                    |       |       |       |                         |                       |         |                       |
|-------------|--------------------|-------|-------|-------|-------------------------|-----------------------|---------|-----------------------|
| Bit No      | Bit 7              | Bit 6 | Bit 5 | Bit 4 | Bit 3                   | Bit 2                 | Bit 1   | Bit 0                 |
| Byte 0      | Reserved           |       |       |       | Encoder Count DOWN Ch#0 | Encoder Count UP Ch#0 | DI Ch#0 | Data Line Status Ch#0 |
| Byte 1      | Reserved           |       |       |       |                         |                       |         |                       |
| Byte 2      | Reserved           |       |       |       | Encoder Count DOWN Ch#1 | Encoder Count UP Ch#1 | DI Ch#1 | Data Line Status Ch#1 |
| Byte 3      | Reserved           |       |       |       |                         |                       |         |                       |
| Byte 4      | Counter value Ch#0 |       |       |       |                         |                       |         |                       |
| Byte 5      |                    |       |       |       |                         |                       |         |                       |
| Byte 6      |                    |       |       |       |                         |                       |         |                       |
| Byte 7      |                    |       |       |       |                         |                       |         |                       |
| Byte 8      | Capture value Ch#0 |       |       |       |                         |                       |         |                       |
| Byte 9      |                    |       |       |       |                         |                       |         |                       |
| Byte 10     |                    |       |       |       |                         |                       |         |                       |
| Byte 11     |                    |       |       |       |                         |                       |         |                       |
| Byte 12     | Counter value Ch#1 |       |       |       |                         |                       |         |                       |
| Byte 13     |                    |       |       |       |                         |                       |         |                       |
| Byte 14     |                    |       |       |       |                         |                       |         |                       |
| Byte 15     |                    |       |       |       |                         |                       |         |                       |
| Byte 16     | Capture value Ch#1 |       |       |       |                         |                       |         |                       |
| Byte 17     |                    |       |       |       |                         |                       |         |                       |
| Byte 18     |                    |       |       |       |                         |                       |         |                       |
| Byte 19     |                    |       |       |       |                         |                       |         |                       |
| Output Data |                    |       |       |       |                         |                       |         |                       |
| Bit No      | Bit 7              | Bit 6 | Bit 5 | Bit 4 | Bit 3                   | Bit 2                 | Bit 1   | Bit 0                 |
| Byte 0      | Reserved           |       |       |       |                         |                       | DO Ch#0 |                       |
| Byte 1      | Reserved           |       |       |       |                         |                       |         |                       |
| Byte 2      | Reserved           |       |       |       |                         |                       | DO Ch#1 |                       |
| Byte 3      | Reserved           |       |       |       |                         |                       |         |                       |

Data Declaration:

**Data Line Status Ch#(0-1):** Indicates the idle status of the Data line of the corresponding channel (Normally, idle data is high level. If the value is 0, the polarity of the input signal is reversed, and the polarity of the input signal line needs to be switched) .

0: Data line level is low when idle

1: Data line level is high when idle

**DI Ch#(0-1):** The position is 1 when the corresponding channel input signal is valid,

and 0 when the input is invalid.

0: Input signal invalid

1: Input signal valid

**Encoder Count UP Ch#(0-1):** The encoder counts up and in positive rotation.

**Encoder Count DOWN Ch#(0-1):** The encoder counts down and in contrarotation.

**Counter Value Ch#(0-1):** Pulse count value, 32 - bit signed integer, automatically clear after overflow.

**Capture value Ch#(0-1):** Pulse capture value, 32-bit signed integer, and when DI is set to capture, the pulse count value will be captured to the capture value at the selected edge.

**DO Ch#(0-1):** The position is 1 when the corresponding channel output signal is valid, and 0 when the output is invalid.

0: Output signal invalid

1: Output signal valid

## 6 Configuration parameters definition

<2 Analog Input(SSl Encoder)> Submodule configuration parameter definition

| Configuration Parameter   |                        |       |                                |       |                           |                   |                   |                            |
|---------------------------|------------------------|-------|--------------------------------|-------|---------------------------|-------------------|-------------------|----------------------------|
| Bit No                    | Bit 7                  | Bit 6 | Bit 5                          | Bit 4 | Bit 3                     | Bit 2             | Bit 1             | Bit 0                      |
| Byte 0                    | Reserved               |       |                                |       |                           | 16Bit Data Format | 32Bit Data Format |                            |
| Byte 1                    | Reserved               |       | Frame Bit Length Ch#0          |       |                           |                   |                   |                            |
| Byte 2                    | Reserved               |       |                                |       | SSI CLK Frequency Ch#0    |                   |                   |                            |
| Byte 3                    | SSI Interval Time Ch#0 |       |                                |       |                           |                   |                   |                            |
| Byte 4                    |                        |       |                                |       |                           |                   |                   |                            |
| Byte 5                    | Reserved               |       |                                |       |                           |                   |                   | Gray Conversion Ch#0       |
| Byte 6                    | Reserved               |       | LSB Bit of Position Value Ch#0 |       |                           |                   |                   |                            |
| Byte 7                    | Reserved               |       | MSB Bit of Position Value Ch#0 |       |                           |                   |                   |                            |
| Byte 8                    | Reserved               |       |                                |       |                           |                   |                   | Counter Storage Ch#0       |
| Byte 9                    | Reserved               |       |                                |       |                           |                   |                   | DI Function Selection Ch#0 |
| Byte 10                   | Reserved               |       |                                |       |                           |                   | Capture Mode Ch#0 |                            |
| Byte 11<br>...<br>Byte 30 | Reserved               |       |                                |       |                           |                   |                   |                            |
| Byte 31                   | Reserved               |       | Frame Bit Length Ch#1          |       |                           |                   |                   |                            |
| Byte 32                   | Reserved               |       |                                |       | SSI CLK Frequency Ch Ch#1 |                   |                   |                            |
| Byte 33                   | SSI Interval Time Ch#1 |       |                                |       |                           |                   |                   |                            |
| Byte 34                   |                        |       |                                |       |                           |                   |                   |                            |
| Byte 35                   | Reserved               |       |                                |       |                           |                   |                   | Gray Conversion Ch#1       |

|                           |          |                                |                            |
|---------------------------|----------|--------------------------------|----------------------------|
| Byte 36                   | Reserved | LSB Bit of Position Value Ch#1 |                            |
| Byte 37                   | Reserved | MSB Bit of Position Value Ch#1 |                            |
| Byte 38                   | Reserved |                                | Counter Storage Ch#1       |
| Byte 39                   | Reserved |                                | DI Function Selection Ch#1 |
| Byte 40                   | Reserved |                                | Capture Mode Ch#1          |
| Byte 41<br>...<br>Byte 60 | Reserved |                                |                            |

Data Declaration:

**16Bit Data Format:** Byte transfer order of channel state. (Default: 0)

0: A-B

1: B-A

**32Bit Data Format:** The byte transfer order of a channel count value. (Default: 0)

0: AB-CD

1: BA-DC

2: CD-AB

3: DC-BA

**Frame Bit Length Ch#(0-1):** SSI frame length of encoder. (Default value: 13) The value ranges from 10 to 40.

**SSI CLK Frequency Ch#(0-1):** The clock frequency when data is read. (Default: 1)

0: 125KHz

1: 250KHz

2: 500KH

3: 1.0MHz

4: 1.5MHz

5: 2.0MHz

**SSI Interval Time Ch#(0-1):** Interval time (unit: 100us) the value range could be set 1 ~ 65535.

**Gray Conversion Ch#(0-1):** Gray Code Conversion enabled (default: 1)

0: Disable

1: Enable

**LSB Bit of Position Ch#(0-1):** LSB bit number of position value. The value range is 0 ~ 39 (default: 0)

**MSB Bit of Position Ch#(0-1):** The MSB bit number of the position value. The value range is 1 ~ 40 (default: 12)

**Counter Storage Ch#(0-1):** Enable storage. When the storage function is enabled, the IO module will save the count value to the non-volatile memory in real time, and load the last saved count value at the next power-on. (Default: 1)

0: Disable

1: Enable

**DI Function Selection Ch#(0-1):** DI function selection (Default: 0)

0: Normal DI function

1: Pulse capture function

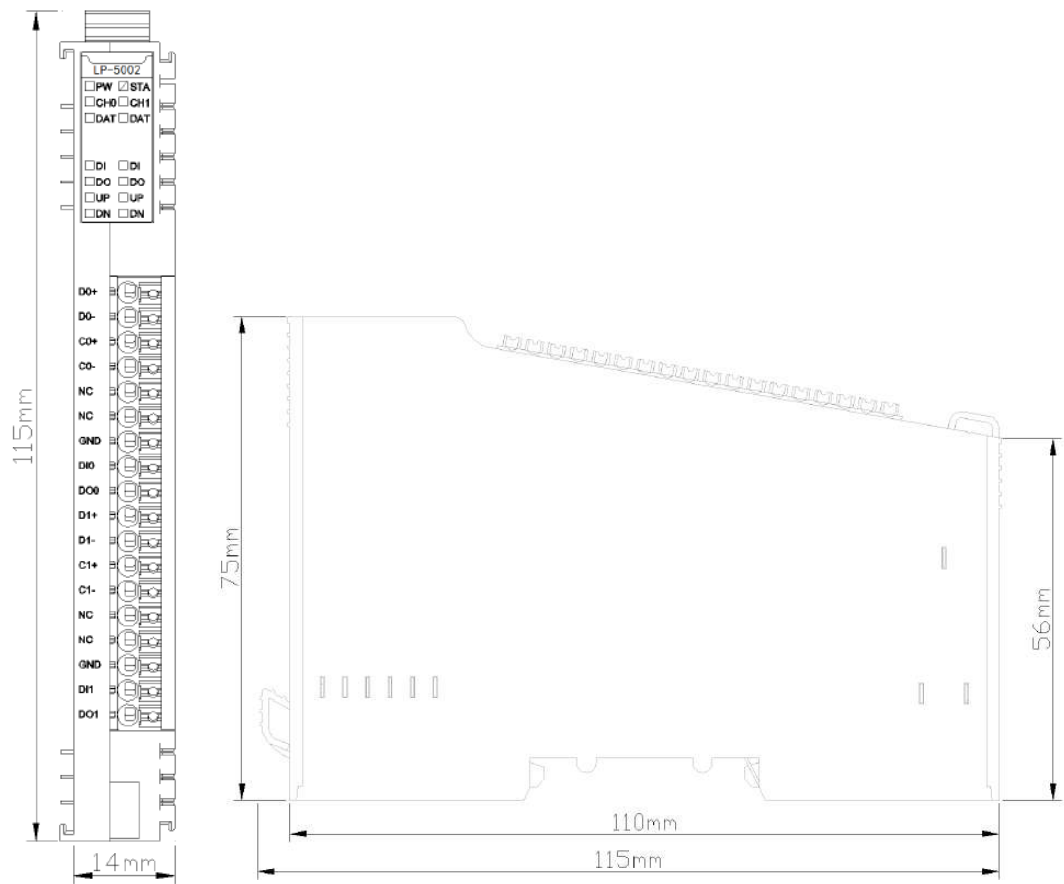
**Capture Mode Ch#(0-1):** Capture mode (default: 0)

0: Rising edge capture

1: Falling edge capture

2: Double edge capture

**A Dimension drawing**



## **LP-7002 2-channel encoder /differential input**

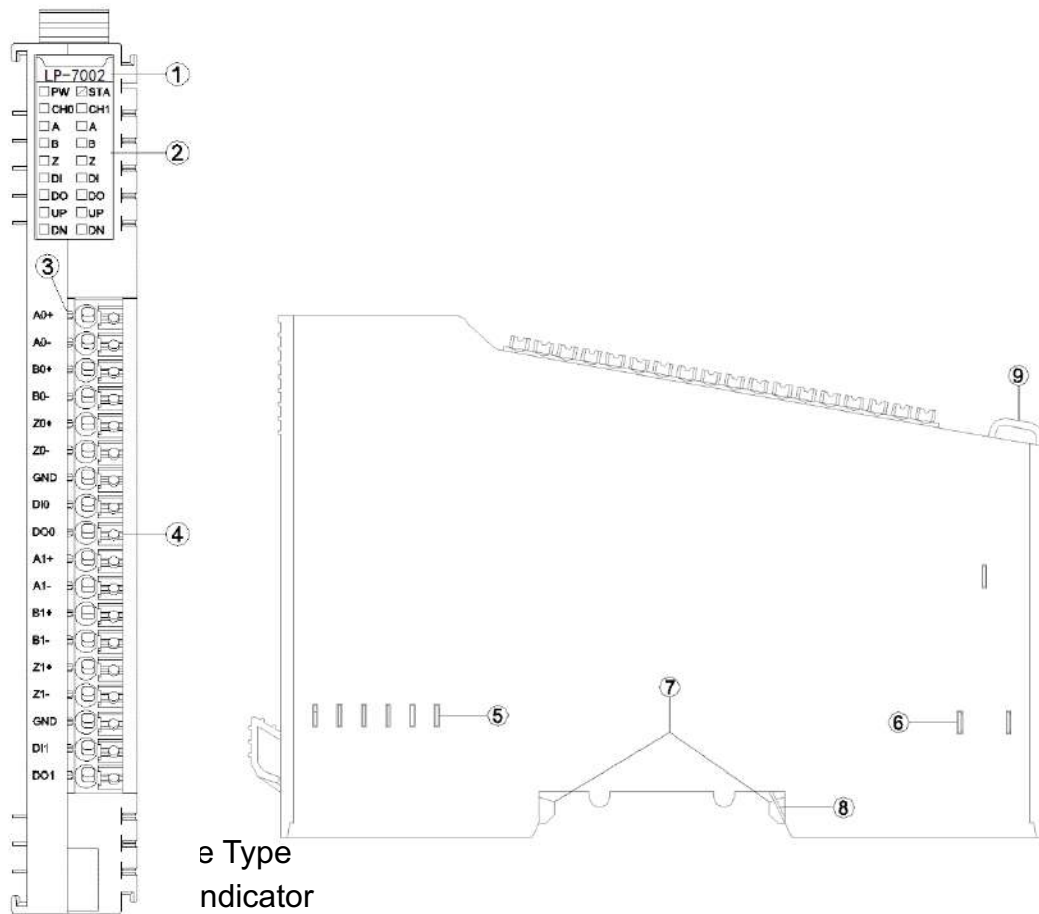
### **1 Module features**

- ◆ the module supports two channels of encoder input.
- ◆ each encoder channel supports A/B incremental encoder or pulse-directional encoder input.
- ◆ each encoder channel supports orthogonal A/B differential signal input, voltage output range 0-5V.
- ◆ the incremental encoder mode supports x1/ x2 / x4 frequency multiplication mode.
- ◆ the pulse - direction mode supports nondirectional signal, pulse input only.
- ◆ each encoder channel supports 1 digital input signal with an input voltage of 5Vdc or 24Vdc.
- ◆ each encoder channel supports 1 digital output signal with an output voltage of 5Vdc.
- ◆ the module internal bus and field input adopt magnetic isolation.
- ◆ the module carries 16 LED indicators.
- ◆ the maximum input frequency of the encoder supported by the module is 10MHz.
- ◆ the module supports measurement function, it could detect the load speed or input signal frequency.

## 2 Technical parameters

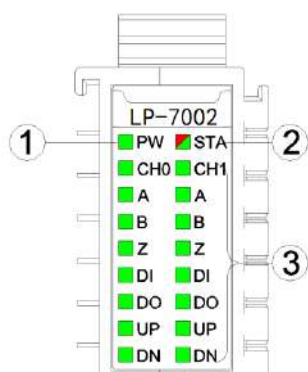
| General Parameters                    |                                                  |
|---------------------------------------|--------------------------------------------------|
| Power                                 | Max.60mA@5.0Vdc                                  |
| Isolation                             | I/O to internal bus: magnetic isolation (3KVrms) |
| Field Power                           | Nominal:24Vdc, Range:20-28Vdc                    |
| Wiring                                | Max.1.0mm <sup>2</sup> (AWG 17)                  |
| Mounting Type                         | 35mm DIN-Rail                                    |
| Size                                  | 115*14*75mm                                      |
| Weight                                | 65g                                              |
| Environment Specification             |                                                  |
| Operational Temperature               | -40~85°C                                         |
| Operational Humidity                  | 5%-95% (No Condensation)                         |
| Ingress Protection Rating             | IP20                                             |
| Input Parameters                      |                                                  |
| Channel Number                        | 2-channel encoder                                |
| LED Indicator                         | 16 channel input LED indicator                   |
| Encoder signal type                   | Differential input, voltage output range of 0-5V |
| Encoder filtering time                | Default 0.5us                                    |
| Encoder count frequency               | <10MHz                                           |
| Encoder frequency multiplication mode | x1/x2/x4                                         |
| Encoder measurement function          | Load speed or input signal frequency measurement |
| DI turn-on voltage                    | Min.5Vdc to Max.28Vdc                            |
| DI turn-off voltage                   | Max.2.7Vdc                                       |
| DI turn-on current                    | Max.5mA/ channel @28V                            |
| DI input impedance                    | >10.0kΩ                                          |
| DI input delay                        | OFF to ON: Max.3ms<br>ON to OFF: Max.2ms         |
| DO output voltage                     | 5V, range ±10%                                   |
| DO output current                     | Max.500mA                                        |
| DO output sink current                | Max.5uA                                          |

### 3 Hardware interfaces



- ③ Channel indicator
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

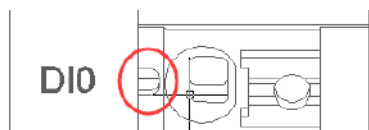
### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State indicator LED (red/green)
- ③ Input channel indicator LED (green)

| PW Power State                 | Definition                                    |
|--------------------------------|-----------------------------------------------|
| ON                             | Internal bus power supply normal              |
| OFF                            | Internal bus power supply failure             |
| STA Module State               | Definition                                    |
| Green slow flash (2.5 Hz)      | Module internal bus is not started            |
| Red slow flash (2.5 Hz)        | Module internal bus offline                   |
| ON (GREEN)                     | Operation normal                              |
| Flash (2.5 Hz) (RED/GREEN)     | updating mode                                 |
| Flash (10 Hz) (RED/GREEN)      | firmware update                               |
| Double Flash (RED)             | Module exception has been soft-restarted      |
| CH0 CH1 channel indicator LED  | Definition                                    |
| ON                             | Channel enable                                |
| A B Z Encoder signal indicator | Definition                                    |
| ON                             | Input signal valid                            |
| OFF                            | Input signal invalid                          |
| DI input indicator             | Definition                                    |
| ON                             | Input signal high level                       |
| OFF                            | Input signal invalid                          |
| DO output indicator            | Definition                                    |
| ON                             | Output signal high level                      |
| OFF                            | Output signal invalid                         |
| UP indicator                   | Definition                                    |
| ON                             | Encoder in positive rotation                  |
| OFF                            | Encoder is stationary or in contrarotation    |
| DN indicator                   | Definition                                    |
| ON                             | Encoder in contrarotation                     |
| OFF                            | Encoder is stationary or in positive rotation |

### 3.2 Field channel LED indicator (Green)



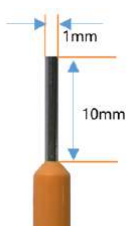
When the input signal of the input channel is valid, the corresponding field channel indicator is on (only the DI/DO wiring terminal of the encoder channel carries the indicator).

### 3.3 Terminal definition

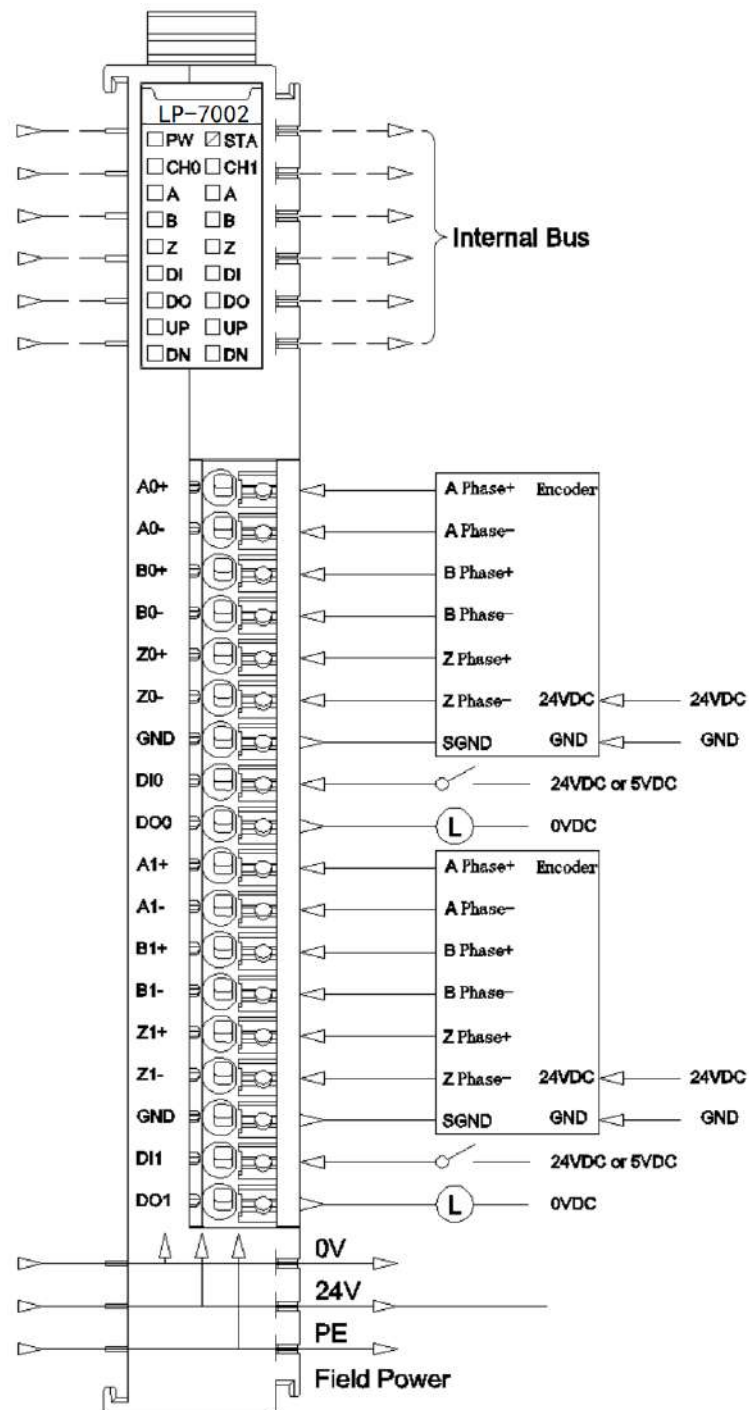
| Terminal Number | Symbol | Description                 |
|-----------------|--------|-----------------------------|
| 1               | A0+    | CH0 encoder phase A input + |
| 2               | A0-    | CH0 encoder phase A input - |
| 3               | B0+    | CH0 encoder phase B input + |
| 4               | B0-    | CH0 encoder phase B input - |
| 5               | Z0+    | CH0 encoder phase Z input + |
| 6               | Z0-    | CH0 encoder phase Z input - |
| 7               | GND    | Signal ground               |
| 8               | DI0    | CH0 digital signal input    |
| 9               | DO0    | CH0 digital signal output   |
| 10              | A1+    | CH1 encoder phase A input + |
| 11              | A1-    | CH1 encoder phase A input - |
| 12              | B1+    | CH1 encoder phase B input + |
| 13              | B1-    | CH1 encoder phase B input - |
| 14              | Z1+    | CH1 encoder phase Z input + |
| 15              | Z1-    | CH1 encoder phase Z input - |
| 16              | GND    | Signal ground               |
| 17              | DI1    | CH1 digital signal input    |
| 18              | DO1    | CH1 digital signal output   |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



## 4 Wiring



## < 2 Analog Input(Encoder) > Submodule process data definition

| Input Data |                     |                 |                        |                       |         |        |        |        |
|------------|---------------------|-----------------|------------------------|-----------------------|---------|--------|--------|--------|
| Bit No     | Bit 7               | Bit 6           | Bit 5                  | Bit 4                 | Bit 3   | Bit 2  | Bit 1  | Bit 0  |
| Byte 0     | Counter DOWN Ch#0   | Counter UP Ch#0 | Counter Underflow Ch#0 | Counter Overflow Ch#0 | DI Ch#0 | Z Ch#0 | B Ch#0 | A Ch#0 |
| Byte 1     | Reserved            |                 |                        |                       |         |        |        |        |
| Byte 2     | Counter DOWN Ch#1   | Counter UP Ch#1 | Counter Underflow Ch#1 | Counter Overflow Ch#1 | DI Ch#1 | Z Ch#1 | B Ch#1 | A Ch#1 |
| Byte 3     | Reserved            |                 |                        |                       |         |        |        |        |
| Byte 4     | Counter value Ch#0  |                 |                        |                       |         |        |        |        |
| Byte 5     |                     |                 |                        |                       |         |        |        |        |
| Byte 6     |                     |                 |                        |                       |         |        |        |        |
| Byte 7     |                     |                 |                        |                       |         |        |        |        |
| Byte 8     | Capture value Ch#0  |                 |                        |                       |         |        |        |        |
| Byte 9     |                     |                 |                        |                       |         |        |        |        |
| Byte 10    |                     |                 |                        |                       |         |        |        |        |
| Byte 11    |                     |                 |                        |                       |         |        |        |        |
| Byte 12    | Measurements 1 Ch#0 |                 |                        |                       |         |        |        |        |
| Byte 13    |                     |                 |                        |                       |         |        |        |        |
| Byte 14    |                     |                 |                        |                       |         |        |        |        |
| Byte 15    |                     |                 |                        |                       |         |        |        |        |
| Byte 16    | Measurements 2 Ch#0 |                 |                        |                       |         |        |        |        |
| Byte 17    |                     |                 |                        |                       |         |        |        |        |
| Byte 18    |                     |                 |                        |                       |         |        |        |        |
| Byte 19    |                     |                 |                        |                       |         |        |        |        |
| Byte 20    | Counter value Ch#1  |                 |                        |                       |         |        |        |        |
| Byte 21    |                     |                 |                        |                       |         |        |        |        |
| Byte 22    |                     |                 |                        |                       |         |        |        |        |
| Byte 23    |                     |                 |                        |                       |         |        |        |        |
| Byte 24    | Capture value Ch#1  |                 |                        |                       |         |        |        |        |

|             |                            |       |       |       |       |                 |                          |         |
|-------------|----------------------------|-------|-------|-------|-------|-----------------|--------------------------|---------|
| Byte 25     |                            |       |       |       |       |                 |                          |         |
| Byte 26     |                            |       |       |       |       |                 |                          |         |
| Byte 27     |                            |       |       |       |       |                 |                          |         |
| Byte 28     | Measurements 1 Ch#1        |       |       |       |       |                 |                          |         |
| Byte 29     |                            |       |       |       |       |                 |                          |         |
| Byte 30     |                            |       |       |       |       |                 |                          |         |
| Byte 31     |                            |       |       |       |       |                 |                          |         |
| Byte 32     | Measurements 2 Ch#1        |       |       |       |       |                 |                          |         |
| Byte 33     |                            |       |       |       |       |                 |                          |         |
| Byte 34     |                            |       |       |       |       |                 |                          |         |
| Byte 35     |                            |       |       |       |       |                 |                          |         |
| Output Data |                            |       |       |       |       |                 |                          |         |
| Bit No      | Bit 7                      | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2           | Bit 1                    | Bit 0   |
| Byte 0      | Reserved                   |       |       |       |       | Flow Clear Ch#0 | Counter Set Trigger Ch#0 | DO Ch#0 |
| Byte 1      | Reserved                   |       |       |       |       |                 |                          |         |
| Byte 2      | Reserved                   |       |       |       |       | Flow Clear Ch#1 | Counter Set Trigger Ch#1 | DO Ch#1 |
| Byte 3      | Reserved                   |       |       |       |       |                 |                          |         |
| Byte 4      | Set Value for Counter Ch#0 |       |       |       |       |                 |                          |         |
| Byte 5      |                            |       |       |       |       |                 |                          |         |
| Byte 6      |                            |       |       |       |       |                 |                          |         |
| Byte 7      |                            |       |       |       |       |                 |                          |         |
| Byte 8      | Set Value for Counter Ch#1 |       |       |       |       |                 |                          |         |
| Byte 9      |                            |       |       |       |       |                 |                          |         |
| Byte 10     |                            |       |       |       |       |                 |                          |         |
| Byte 11     |                            |       |       |       |       |                 |                          |         |

Data Declaration:

Input data definition:

**A/B/Z Ch#(0-1):** The position is 1 when the corresponding channel A/B/Z input signal is valid, and 0 when the input is invalid.

**DI Ch#(0-1):** Digital input signal status.

**Counter Overflow Ch#(0-1):** Counter overflowed flag bit.

**Counter Underflow Ch#(0-1):** Counter underflows flag bit.

Counter UP: Encoder positive rotation, counter up counting sign.

Counter DOWN: Encoder contrarotation, counter down count flag.

**Counter Value Ch#(0-1):** Pulse count value, 32 - bit signed integer, automatically clear after overflow.

**Capture value Ch#(0-1):** Pulse capture value, 32-bit signed integer, and when DI is set to capture, the pulse count value will be captured to the capture value at the selected edge.

**Measurements 1 Ch#(0-1):** Measurement value 1, the measurement value will be output according to the measurement value type selected by the user (view the configuration parameter section of the module for optional measurement value)

**Measurements 2 Ch#(0-1):** Measurement value 2, the measurement value will be output according to the measurement value type selected by the user (view the configuration parameter section of the module for optional measurement value)

Output data definition:

**DO Ch#(0-1):** Digital output channel control.

**Counter Set Trigger CH#(0-1):** Counter set trigger bit, rising edge trigger counter set, the output value Set Value for Counter will be updated to Counter Value, this function can be used to set the initial value of the counter.

**Flow Clear CH#(0-1):** Overflow clear bit, the rising edge can clear the input Counter Overflow and Counter Underflow flag bits.

Set Value for Counter Ch#(0-1): Counter set value.

## <2 Analog Input(Encoder) > Submodule configuration parameter definition

| Configuration Parameter  |                                |       |                          |                     |       |                             |                               |                            |
|--------------------------|--------------------------------|-------|--------------------------|---------------------|-------|-----------------------------|-------------------------------|----------------------------|
| Bit No                   | Bit 7                          | Bit 6 | Bit 5                    | Bit 4               | Bit 3 | Bit 2                       | Bit 1                         | Bit 0                      |
| Byte 0                   | Reserved                       |       |                          |                     |       | 16Bit Data Format           | 32Bit Data Format             |                            |
| Byte 1                   | Reserved                       |       |                          |                     |       | Work Mode Ch#0              |                               |                            |
| Byte 2                   | Reserved                       |       |                          |                     |       |                             | Frequency Multiplication Ch#0 |                            |
| Byte 3                   | Reserved                       |       |                          | Filtering Time Ch#0 |       |                             |                               |                            |
| Byte 4                   | Reserved                       |       |                          |                     |       |                             |                               | Counter Storage Ch#0       |
| Byte 5                   | Reserved                       |       |                          |                     |       |                             |                               | DI Function Selection Ch#0 |
| Byte 6                   | Reserved                       |       |                          |                     |       |                             | Capture Mode Ch#0             |                            |
| Byte 7<br>...<br>Byte 16 | Reserved                       |       |                          |                     |       |                             |                               |                            |
| Byte 17                  | Reserved                       |       |                          |                     |       | Speed Measurement Time Ch#0 |                               |                            |
| Byte 18                  | Reserved                       |       | Measurements 2 Type Ch#0 |                     |       | Measurements 1 Type Ch#0    |                               |                            |
| Byte 19                  | Encoder Resolution Ch#0        |       |                          |                     |       |                             |                               |                            |
| Byte 20                  |                                |       |                          |                     |       |                             |                               |                            |
| Byte 21                  | Transmission Ratio Active Ch#0 |       |                          |                     |       |                             |                               |                            |
| Byte 22                  |                                |       |                          |                     |       |                             |                               |                            |
| Byte 23                  | Transmission Ratio Slave Ch#0  |       |                          |                     |       |                             |                               |                            |
| Byte 24                  |                                |       |                          |                     |       |                             |                               |                            |
| Byte 25<br>...<br>Byte   | Reserved                       |       |                          |                     |       |                             |                               |                            |

|                           |                                |                          |                               |
|---------------------------|--------------------------------|--------------------------|-------------------------------|
| 32                        |                                |                          |                               |
| Byte 33                   | Reserved                       |                          | Work Mode Ch#1                |
| Byte 34                   | Reserved                       |                          | Frequency Multiplication Ch#1 |
| Byte 35                   | Reserved                       | Filtering Time Ch#1      |                               |
| Byte 36                   | Reserved                       |                          | Counter Storage Ch#1          |
| Byte 37                   | Reserved                       |                          | DI Function Selection Ch#1    |
| Byte 38                   | Reserved                       |                          | Capture Mode Ch#1             |
| Byte 39<br>...<br>Byte 48 | Reserved                       |                          |                               |
| Byte 49                   | Reserved                       |                          | Speed Measurement Time Ch#1   |
| Byte 50                   | Reserved                       | Measurements 2 Type Ch#1 | Measurements 1 Type Ch#1      |
| Byte 51                   | Encoder Resolution Ch#1        |                          |                               |
| Byte 52                   |                                |                          |                               |
| Byte 53                   | Transmission Ratio Active Ch#1 |                          |                               |
| Byte 54                   |                                |                          |                               |
| Byte 55                   | Transmission Ratio Slave Ch#1  |                          |                               |
| Byte 56                   |                                |                          |                               |
| Byte 57<br>...<br>Byte 64 | Reserved                       |                          |                               |

Data Declaration:

**16Bit Data Format:** Byte transfer order of channel state. (Default: 0)

0: A-B

1: B-A

**32Bit Data Format:** The byte transfer order of a channel count value. (Default: 0)

0: AB-CD

1: BA-DC

2: CD-AB

3: DC-BA

**Work Mode Ch#(0-1):** Working mode of encoder. (Default: 0)

0: Incremental encoder mode.

1: Count direction mode.

2: Count up mode.

3: Count down mode.

**Frequency Multiplication Ch#(0-1):** Frequency multiplication number (available only in incremental encoder mode), according to this mode it could output pulse count value. (Default: 2)

0: frequency multiplication 1

1: frequency multiplication 2

2: frequency multiplication 4

**Filtering Time Ch#(0-1):** Encoder input filter time (default: 5)

0: no filter

1: 0.1uS

...

5: 0.5 uS

...

31: 3.1 uS

**Counter Storage Ch#(0-1):** Enable storage. When the storage function is enabled, the IO module will save the count value to the non-volatile memory in real time, and load the last saved count value at the next power-on. (Default: 1)

0: Disable

1: Enable

**DI Function Selection Ch#(0-1):** DI function selection (Default: 0)

0: Normal DI function

1: Pulse capture function

**Capture Mode Ch#(0-1):** Capture mode (default: 0)

0: Rising edge capture

1: Falling edge capture

2: Double edge capture

**Speed Measurement Time Ch#(0-1):** Speed measurement period (Default: 6)

0: 10mS

1: 20mS

2: 50mS

3: 100mS

4: 200mS

5: 500mS

6: 1000mS

7: 2000mS

**Measurements 1 Type Ch#(0-1):** Measurement value 1 Type selection (default: 0)

0: No measurements

1: Measuring speed (min/rotation)

2: Measuring frequency

**Measurements 2 Type Ch#(0-1):** Measurement value 2 Type selection (default: 0)

0: No measurements

1: Measuring speed (min/ rotation)

2: Measuring frequency

**Encoder Resolution Ch#(0-1):** Encoder resolution (default: 1)

Value range: 1-65535

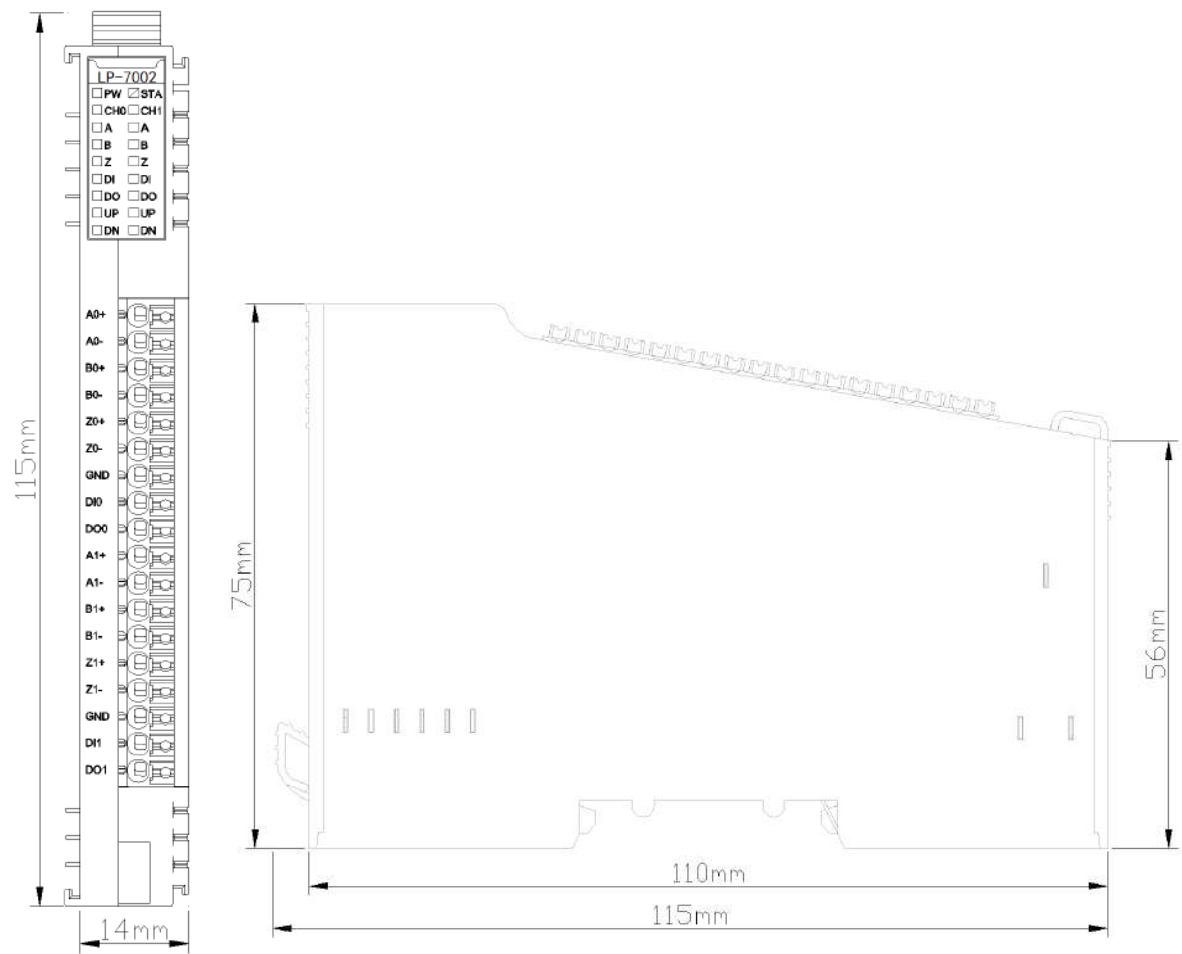
**Transmission Ratio Active Ch#(0-1):** 1) Transmission ratio (main) (Default: 1)

Value range: 1-65535

**Transmission Ratio Slave Ch#(0-1):** Transmission ratio (main) (Default: 1)

Value range: 1-65535

A Dimension drawing



## **7 Communication Module**

### **LS-1111 CANopen Master Station Module**

#### **1 Module features**

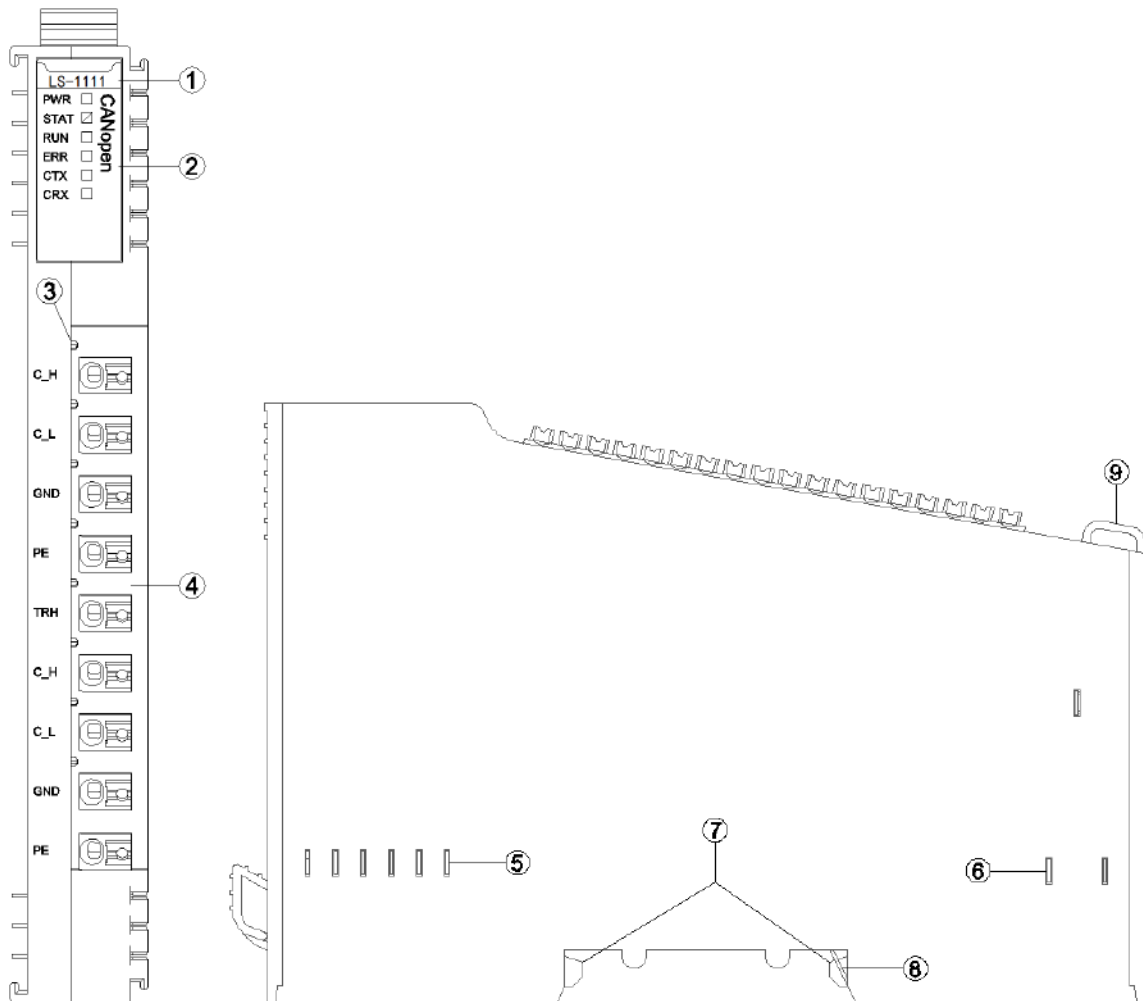
The CANopen master station module supports a single CAN interface and operates in CANopen master mode. Used in conjunction with a coupler module, it can convert the CANopen protocol to other protocols, such as Modbus TCP, Profinet, EtherCAT, Ethernet/IP, etc. The module needs to be configured through the IO Config software via its built-in Type-C interface for input and output commands.

All slave devices that support the CANopen protocol can use this module to interconnect with upper-level PLCs or host computers. This includes CANopen remote IO stations, various CANopen sensors, CANopen drivers, and more.

## 2 Technical Parameters

| General parameters        |                                                              |
|---------------------------|--------------------------------------------------------------|
| Power                     | Max.50mA@5.0Vdc                                              |
| Isolation                 | I/O to internal bus: magnetic isolation<br>(3KVrms)          |
| Field Power               | Rated voltage : 24Vdc<br>Input range : 22~28Vdc              |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                              |
| Mounting Type             | 35mmDIN-Rail                                                 |
| Size                      | 115*14*75mm                                                  |
| Weight                    | 65g                                                          |
| Environment Specification |                                                              |
| Operational Temperature   | -40~85°C                                                     |
| Operational Humidity      | 5%~95% RH(No Condensation)                                   |
| Ingress Protection Rating | IP20                                                         |
| CAN Parameter             |                                                              |
| Number of Channels        | 1channel                                                     |
| Interface                 | CAN                                                          |
| Protocol                  | CANopen<br>Compliance DS301 V4.02                            |
| Operating Mode            | CANopen Master Station                                       |
| Supported Slave Stations  | 16stations                                                   |
| Baud Rate                 | 10K~1Mbps                                                    |
| Supports                  | PDO、SDO、Heartbeat、NMT、<br>EMCY、Network Scanning              |
| Supports                  | Automatic PDO mapping number<br>assignment, default disabled |
| Supports                  | Automatic PDO COB-ID assignment,<br>default disabled         |
| Supports                  | One-click reset function, restore<br>factory settings        |

### 3 Hardware Interface



- ① Module Type
- ② State indicator
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 Terminal definition

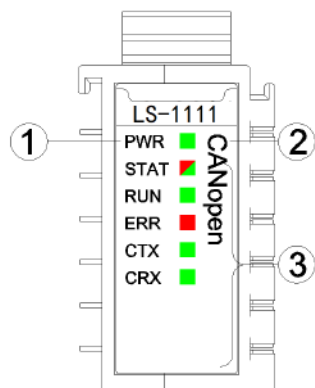
| Terminal Number | Position at the Beginning and End of CAN | Position in the Middle of CAN Bus |
|-----------------|------------------------------------------|-----------------------------------|
| C_H             | CAN_H Signal Line                        | CAN_H Signal Line                 |
| C_L             | CAN_L Signal Line                        | CAN_L Signal Line                 |
| GND             | CAN Signal Ground                        | CAN Signal Ground                 |
| PE              | Ground Terminal                          | Ground Terminal                   |
| TRH             | Built-in Terminal Resistor               |                                   |
| C_H             |                                          | CAN_H Signal Line                 |
| C_L             | Empty                                    | CAN_L Signal Line                 |
| GND             |                                          | CAN Signal Ground                 |
| PE              |                                          | Ground Terminal                   |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



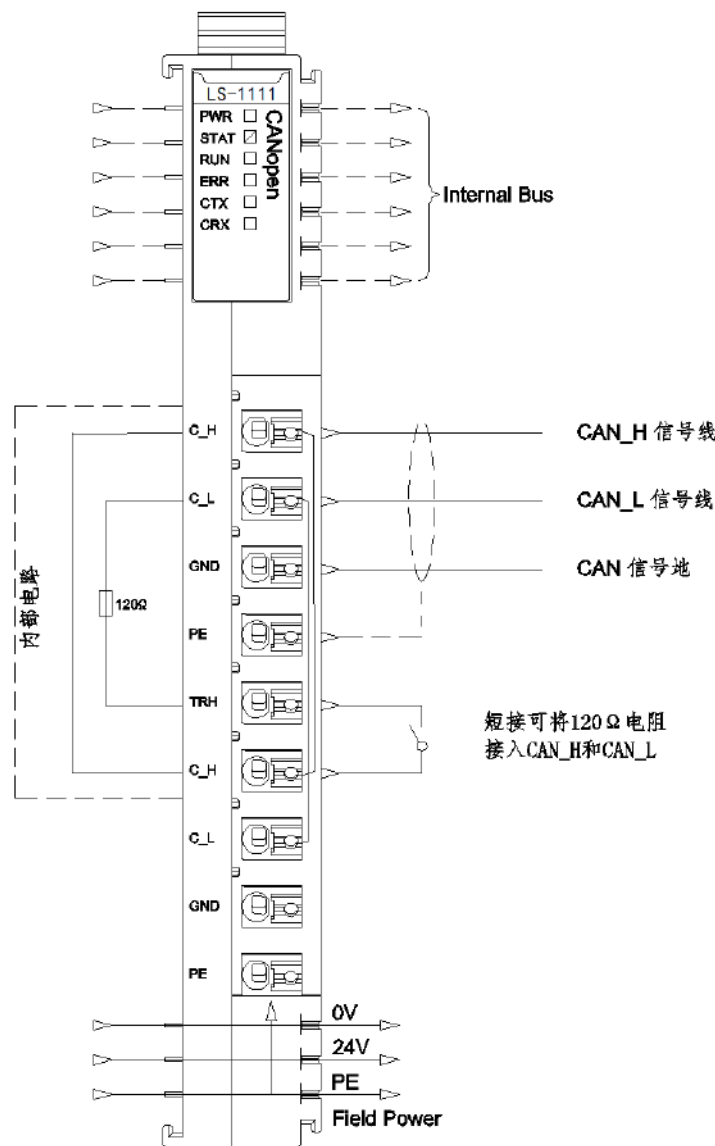
### 3.2 LED indicator definition



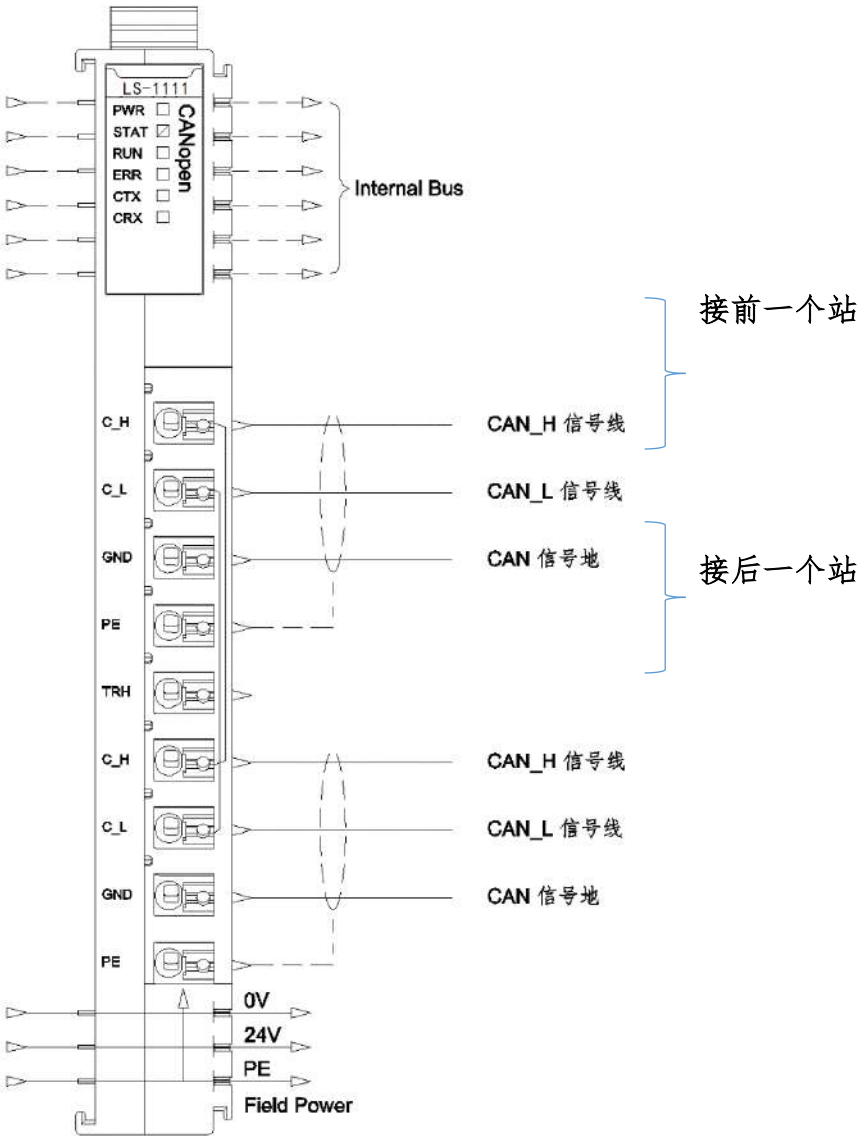
| PWR Power State (RED)                              | Definition                           |
|----------------------------------------------------|--------------------------------------|
| ON                                                 | System Power Normal                  |
| OFF                                                | System Power Failure                 |
| STAT Module State (RED/GREEN)                      | Definition                           |
| Double Flash (RED)                                 | Module Soft Restarted by Hard-Fault  |
| ON(GREEN)                                          | Running                              |
| Flash(GREEN)                                       | Stopping                             |
| Flash(2.5Hz) (RED/GREEN)                           | Boot Mode                            |
| Flash(10Hz) (RED/GREEN)                            | Firmware Updating                    |
| RUN Operation Status Indicator Light (Green Light) | Definition                           |
| Flash (2Hz)                                        | Pre-operational state                |
| Flash                                              | Stopped state                        |
| ON                                                 | Operational state                    |
| ERR Error Status Indicator Light (Red Light)       | Definition                           |
| Flash                                              | CAN error frames reach warning level |
| Double Flash                                       | Error control event                  |
| ON                                                 | Bus off                              |
| OFF                                                | Bus normal                           |
| CTX CAN Transmit Indicator Light (Green Light)     | Definition                           |
| Flash                                              | CAN is transmitting data             |
| OFF                                                | CAN is not transmitting data         |
| CRX CAN Receive Indicator Light (Green Light)      | Definition                           |
| Flash                                              | CAN is receiving data                |

|     |                           |
|-----|---------------------------|
| OFF | CAN is not receiving data |
|-----|---------------------------|

4 Wiring



模块CT-5331接在CAN总线首、尾位置



模块CT-5331接在CAN总线中间位置

## 5.1 Module Process Data Definition

The LS-1111 module itself does not have input/output process data.

The network coupler reads and writes the input/output process data of the LS-1111's submodules in real time through the internal bus.

## 6.1 LS-1111 Configuration Parameter Definition

| Configuration Parameter |                 |       |       |       |               |                 |            |             |
|-------------------------|-----------------|-------|-------|-------|---------------|-----------------|------------|-------------|
| Bit No                  | Bit 7           | Bit 6 | Bit 5 | Bit 4 | Bit 3         | Bit 2           | Bit 1      | Bit 0       |
| BYTE0                   |                 |       |       |       | Auto COB-ID   | Auto PDO Number | Auto Start | CAN Mode    |
| BYTE1                   | Manager Node ID |       |       |       |               |                 |            |             |
| BYTE2                   |                 |       |       |       | CAN Baud Rate |                 |            |             |
| BYTE3                   |                 |       |       |       |               |                 |            | SYNCEENABLE |
| BYTE4                   | SYNC COBID      |       |       |       |               |                 |            |             |
| BYTE5                   |                 |       |       |       |               |                 |            |             |
| BYTE6                   | SYNC Cycle      |       |       |       |               |                 |            |             |
| BYTE7                   |                 |       |       |       |               |                 |            |             |
| BYTE8                   |                 |       |       |       |               |                 |            |             |

|            |                                   |
|------------|-----------------------------------|
| E8         |                                   |
| BYT<br>E9  |                                   |
| BYT<br>E10 | SYNC Window Length                |
| BYT<br>E11 |                                   |
| BYT<br>E12 |                                   |
| BYT<br>E13 |                                   |
| BYT<br>E14 | Heartbeat time                    |
| BYT<br>E15 |                                   |
| BYT<br>E16 | Consumer/Producer Heartbeat Ratio |
| BYT<br>E17 |                                   |
| BYT<br>E18 |                                   |
| BYT<br>E19 |                                   |
| BYT<br>E20 | SDO timeout                       |
| BYT<br>E21 |                                   |

**Working Mode:** Module working mode. (Default value: CANopen Master)

**Auto Start:** Enabled by default

**Auto Generate PDO Number:** Automatically allocate PDO number, enable/disable option available, (Default value: Enabled)

**Auto Generate PDO COB-ID:** Automatically allocate PDO COB-ID, enable/disable option available, (Default value: Enabled)

**Manager Node-ID:** Manager node address (Default value: 127)

**CAN BaudRate:** CAN baud rate (Default value: 125KBit/sec)

0: 1MBit/sec

1: 800 KBit/sec

2: 500 KBit/sec

3: 250 KBit/sec

4: 125 KBit/sec

5: 100 KBit/sec

6: 50 KBit/sec

7: 20 KBit/sec

8: 10 KBit/sec

SYNC Enable: Synchronization enable (Default: Disabled)

0: Disabled

1: Enabled

**SYNC COB-ID:** Synchronization identifier (Default: 0x0800)

Communication Cycle Period (us): Synchronization cycle (us), unsigned 32-bit value can be set, (Default: 0)

**Synchronous Windows Length (us):** Synchronous window length (us), an unsigned 32-bit value can be set, (Default: 0)

**Manager Producer Heartbeat Time (ms):** Manager heartbeat cycle (ms) 065535 can be set (Default: 1000)

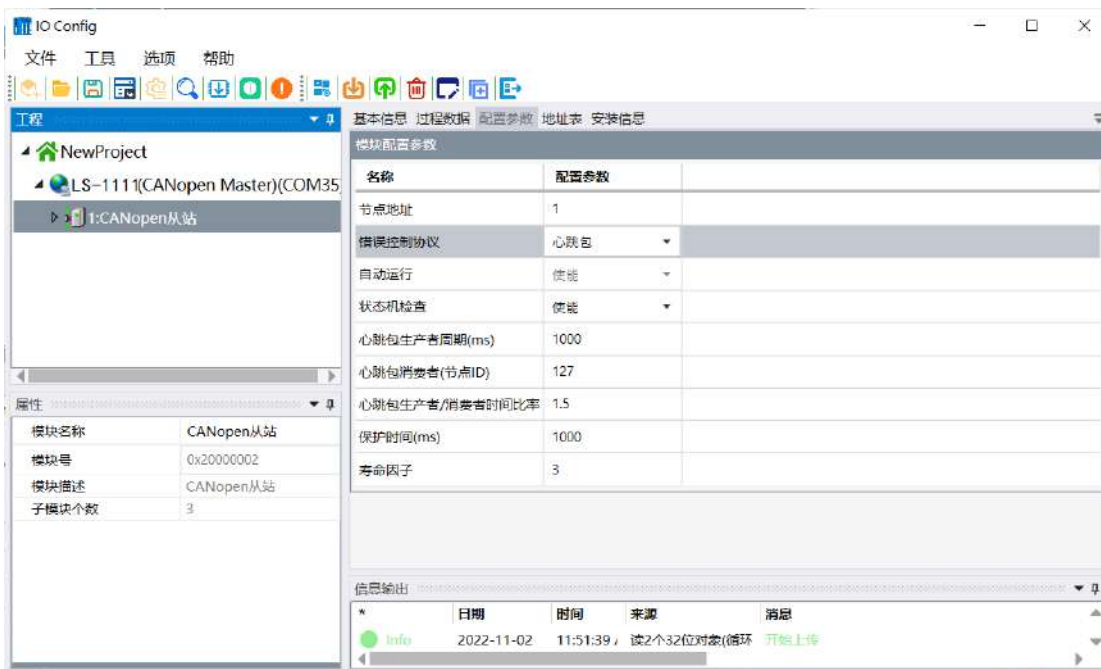
**Consumer/Producer Heartbeat Ratio:** Heartbeat consumer/producer time ratio, 1.510 can be set (Default 1.5)

**SDO Response Timeout:** SDO response timeout (ms): Time for the master to wait for a response from the slave after sending a command. 100~2000 can be set (Default 500).

### 6.2.1 CANopen Slave

### 6.2.1.1 CANopen Slave Configuration Parameters

| Configuration Parameters |                                   |       |       |       |       |                     |           |                        |
|--------------------------|-----------------------------------|-------|-------|-------|-------|---------------------|-----------|------------------------|
| Bit No                   | Bit 7                             | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2               | Bit 1     | Bit 0                  |
| BYTE0                    | CAN Node ID                       |       |       |       |       |                     |           |                        |
| BYTE1                    |                                   |       |       |       |       | State Machine Check | Auto Star | Error Control Protocol |
| BYTE2                    | Producer Heartbeat Time(ms)       |       |       |       |       |                     |           |                        |
| BYTE3                    |                                   |       |       |       |       |                     |           |                        |
| BYTE4                    | Consumer Heartbeat Time Node ID   |       |       |       |       |                     |           |                        |
| BYTE5                    | Consumer/Producer Heartbeat Ratio |       |       |       |       |                     |           |                        |
| BYTE6                    |                                   |       |       |       |       |                     |           |                        |
| BYTE7                    |                                   |       |       |       |       |                     |           |                        |
| BYTE8                    |                                   |       |       |       |       |                     |           |                        |
| BYTE9                    | Guard Time(ms)                    |       |       |       |       |                     |           |                        |
| BYTE10                   |                                   |       |       |       |       |                     |           |                        |
| BYTE11                   | Life Time Factor                  |       |       |       |       |                     |           |                        |



**CAN Node ID:** Slave node address: configurable from 1 to 127, default is 1

**Error Control Protocol:** Error control protocol, heartbeat, node guarding optional, default is heartbeat

**Auto Star:** Automatic operation, enabled by default

**State Machine Check:** State machine check, enable/disable optional, default is enabled

**Producer Heartbeat Time:** Heartbeat producer cycle (ms), 16-bit unsigned data, default is 1000

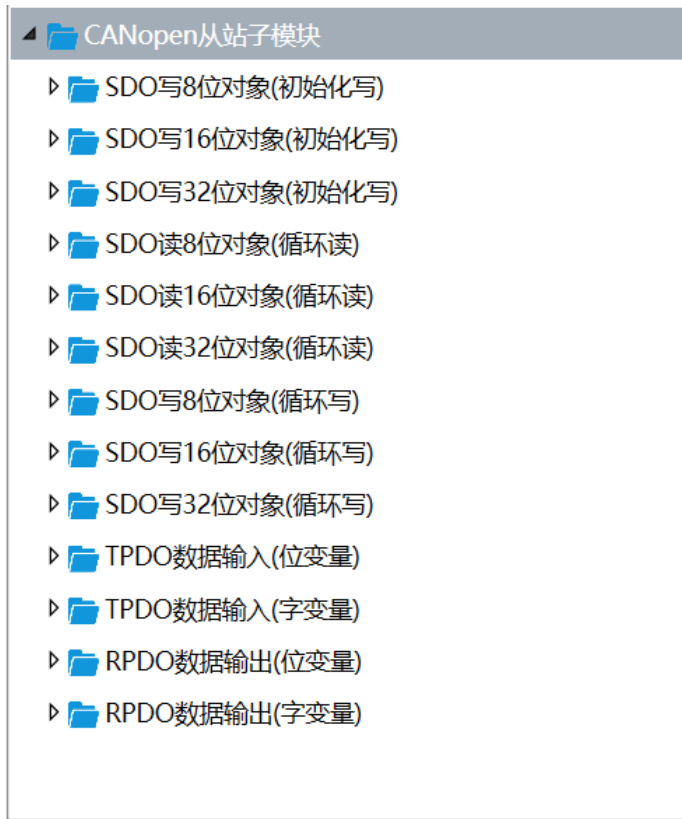
**Consumer Heartbeat Time Node ID:** Heartbeat consumer (node ID), configurable from 0 to 127, default is 127

**Consumer/Producer Heartbeat Ratio:** Heartbeat consumer/producer time ratio, configurable from 1.5 to 10, default is 1.5

**Guard Time:** Guard time (ms), 16-bit unsigned data, default is 1000

**Life Time Factor:** Lifetime factor, 8-bit unsigned data, default is 3

### 6.2.1.2 CANopen Slave Submodule



Includes:

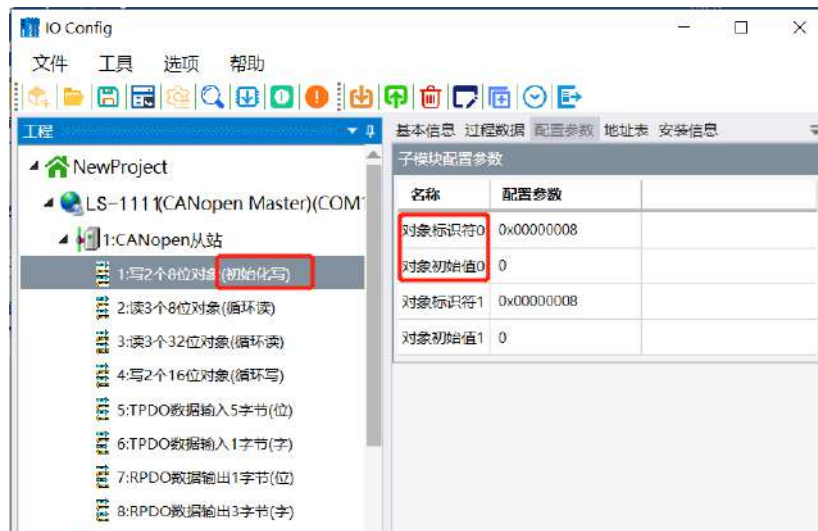
- SDO Write 8-bit Object (Initial Write): Includes writing 1-8 eight-bit objects (Initial Write)
- SDO Write 16-bit Object (Initial Write): Includes writing 1-8 sixteen-bit objects (Initial Write)
- SDO Write 32-bit Object (Initial Write): Includes writing 1-8 thirty-two-bit objects (Initial Write)
- SDO Read 8-bit Object (Cyclic Read): Includes reading 1-8 eight-bit objects (Cyclic Read)
- SDO Read 16-bit Object (Cyclic Read): Includes reading 1-8 sixteen-bit objects (Cyclic Read)
- SDO Read 32-bit Object (Cyclic Read): Includes reading 1-8 thirty-two-bit objects (Cyclic Read)
- SDO Write 8-bit Object (Cyclic Write): Includes writing 1-8 eight-bit objects (Cyclic Write)
- SDO Write 16-bit Object (Cyclic Write): Includes writing 1-8 sixteen-bit objects (Cyclic Write)
- SDO Write 32-bit Object (Cyclic Write): Includes writing 1-8 thirty-two-bit objects (Cyclic Write)

(Cyclic Write)

- TPDO Data Input (Bit Variable): Includes TPDO data input of 1-8 bytes (Bit)
- TPDO Data Input (Word Variable): Includes TPDO data input of 1-8 bytes (Word)
- TPDO Data Output (Bit Variable): Includes RPDO data input of 1-8 bytes (Bit)
- TPDO Data Output (Word Variable): Includes RPDO data input of 1-8 bytes (Word)

1. **SDO Initial Write Command Configuration Parameters include:** Object Identifier (Index + Subindex + Data Length) and Object Initial Value.
  - **Object Identifier:** Object identifier, (Index + Subindex + Data Length)
  - **Object Initial Value:** Object initial value

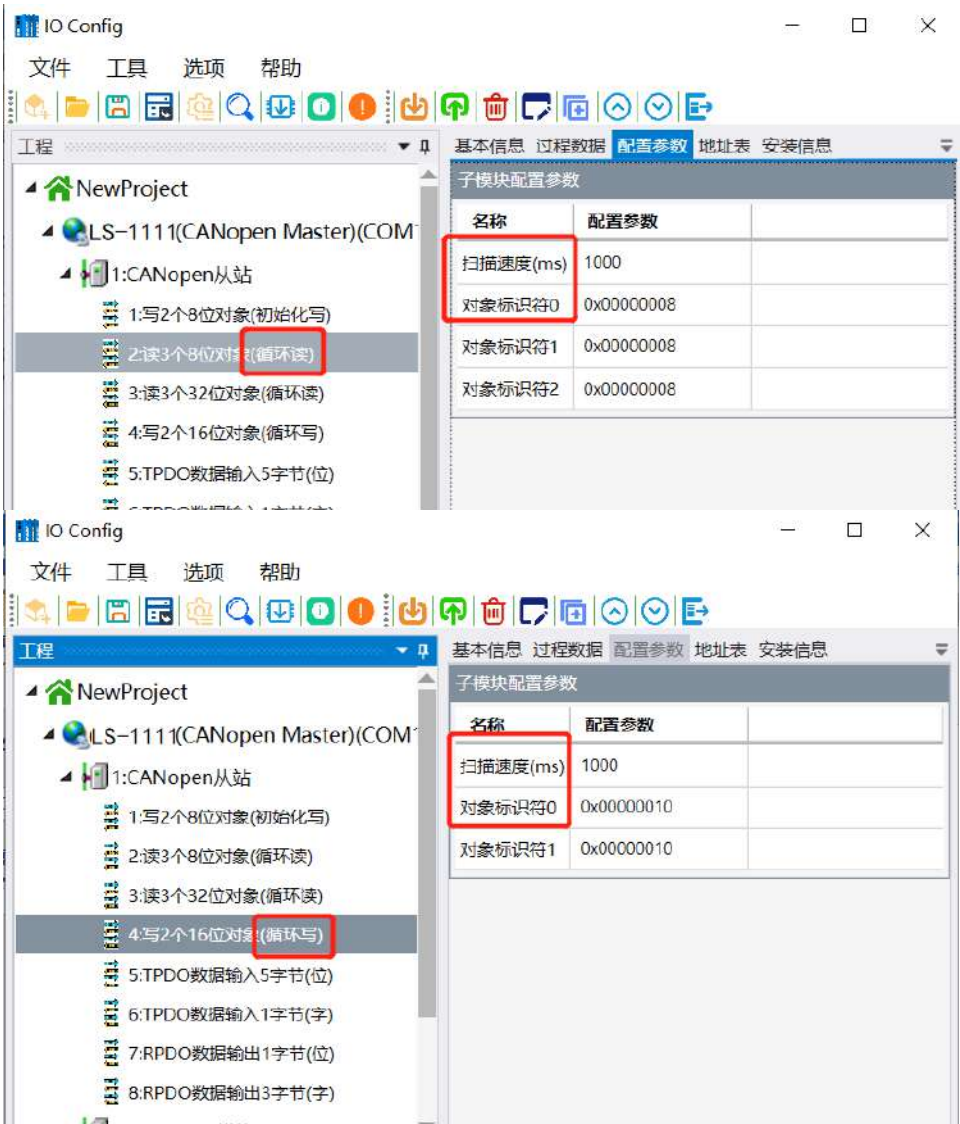
2. **SDO Read Cyclic**



**Cyclic and Write Command**

**Configuration Parameters include:** Scan Rate and Object Identifier (Index + Subindex + Data Length).

- **Scan Rate(ms):** Scan rate, default 1000ms
- **Object Identifier:** Object identifier, (Index + Subindex + Data Length)



**3. TPDO  
Data  
Input**

**Configuration Parameters include:**



Data Input Configuration Parameters include:

- **TPDO Number:** TPDO1, TPDO2, TPDO3... up to TPDO64
- **PDO Enable:** PDO enable, enable/disable can be set, default is enabled
- **COB-ID(HEX):** 16#0x180+Node\_ID
- **Transmission Type:** Transmission type, options include synchronous (non-cyclic), **Object Identifier:** synchronous (cyclic), event-driven (vendor negotiation), event-driven (device sub-protocol specific), default: event-driven (device sub-protocol specific)
- **Transmission Rate:** Transmission rate, 8-bit unsigned data, default: 1
- **Inhibit Time(100us):** Inhibit time (100us), 16-bit unsigned data, default: 10
- **Event Timer:** Event timer (ms), 16-bit unsigned data, default: 1000
- Object identifier, (Index + Subindex + Data Length)

#### 4. RPDO Data Output Configuration Parameters include:



- RPDO Number: RPDO1, RPDO2, RPDO3... up to RPDO64
- PDO Enable: PDO enable, enable/disable can be set, default is enabled
- COB-ID(HEX): 16#0x200+Node\_ID
- Transmission Type: Transmission type, options include synchronous (non-cyclic), synchronous (cyclic), event-driven (vendor negotiation), event-driven (device sub-protocol specific), default: event-driven (device sub-protocol specific)
- Transmission Rate: Transmission rate, 8-bit unsigned data, default: 1
- Inhibit Time(100us): Inhibit time (100us), the minimum interval between two PDO transmissions, 16-bit unsigned data, default: 10
- Event Timer: Event timer (ms), 16-bit unsigned data, default: 1000
- Object Identifier: Object identifier, (Index + Subindex + Data Length)

### 6.2.2 EMCY Control Module

EMCY Control Module Configuration Parameters: EMCY overwrite disabled/enabled, optional, default: Disabled

Emergency messages are triggered by fatal errors occurring within the device and are sent to other devices with the highest priority by the relevant application device. This is suitable for interrupt-type error alarm signals.

An emergency message consists of 8 bytes, formatted as follows:

sender → receiver(s)

|        |             |       |         |
|--------|-------------|-------|---------|
| COB-ID | Byte<br>0-1 | Byte2 | Byte3-7 |
|--------|-------------|-------|---------|

|                   |                                    |                                         |                                      |
|-------------------|------------------------------------|-----------------------------------------|--------------------------------------|
| 0x080+No<br>de_ID | Error<br>Code<br>Error<br>Register | Error<br>Register<br>(Object<br>0x1001) | Manufacturer-specific<br>error field |
|-------------------|------------------------------------|-----------------------------------------|--------------------------------------|

Emergency error codes in hexadecimal are shown in the table below. The 'xx' part of the emergency error codes is defined by the respective device sub-protocol.

Table 3-5 Emergency Error Codes (Hexadecimal)

| Emergency<br>Error Code | Code Function Description             |
|-------------------------|---------------------------------------|
| 00xx                    | Error Reset or No Error               |
| 10xx                    | Generic Error                         |
| 20xx                    | Current                               |
| 21xx                    | Current , device input side           |
| 22xx                    | Current , inside the device           |
| 23xx                    | Current , device output side          |
| 30xx                    | Voltage                               |
| 31xx                    | Mains voltage                         |
| 32xx                    | Voltage inside the device             |
| 33xx                    | Output voltage                        |
| 40xx                    | Temperature                           |
| 41xx                    | Ambient temperature                   |
| 42xx                    | Device tempearture                    |
| 50xx                    | Device hardware                       |
| 60xx                    | Device software                       |
| 61xx                    | Internal software                     |
| 62xx                    | User software                         |
| 63xx                    | Data set                              |
| 70xx                    | Additional modules                    |
| 80xx                    | Monitoring                            |
| 81xx                    | communication                         |
| 8110                    | CAN overrun                           |
| 8120                    | Error Passive                         |
| 8130                    | Life Guard Error 或 Heartbeat<br>Error |
| 8140                    | Recovered from Bus-Off                |

|      |                                                                 |
|------|-----------------------------------------------------------------|
| 82xx | Protocol Error                                                  |
| 8210 | PDO no processed Due to<br>lenvgth error<br>Due to length error |
| 8220 | Length exceedd                                                  |
| 90xx | External error                                                  |
| F0xx | Additional functions                                            |
| FFxx | Device specific                                                 |

The Error Register (Error Register) is in the device's object dictionary (index 0x1001), and Table 3-6 explains the bit definitions of the error register. The device can map internal errors to this status byte and quickly view the current error.

For a complete translation, please provide the specific bit definitions as detailed in Table 3-6.

| Bit | Error Type              |
|-----|-------------------------|
| 0   | Generic                 |
| 1   | Current                 |
| 2   | Voltage                 |
| 3   | Temperature             |
| 4   | Communication           |
| 5   | Device profile specific |
| 6   | Reserved(=0)            |
| 7   | Manufacturer specific   |

The manufacturer-specific error field may contain other error information related to the device. Emergency messages are triggered by fatal errors occurring within the device and are sent to other devices with the highest priority by the relevant application device. This is suitable for interrupt-type error alarm signals.

The emergency alarm function is implemented by adding an EMCY control module submodule. The data address correspondence of the EMCY control module is as follows in the diagram:

| 字偏移 | 描述      | 高字节                |               |                |                |   |   |          |          | 低字节 |        |                    |   |   |   |   |   | 数据说明 |  |
|-----|---------|--------------------|---------------|----------------|----------------|---|---|----------|----------|-----|--------|--------------------|---|---|---|---|---|------|--|
|     | 位       | 7                  | 6             | 5              | 4              | 3 | 2 | 1        | 0        | 7   | 6      | 5                  | 4 | 3 | 2 | 1 | 0 |      |  |
| 0   | 状态字     | EMCYDATA_Reset     | Counter_Reset | Overflow_Reset | NonEmpty_Reset | / |   | Overflow | NonEmpty | /   | NodeID |                    |   |   |   |   |   |      |  |
| 1   | 溢出计数    | Overflow_Counter   |               |                |                |   |   |          |          |     |        |                    |   |   |   |   |   |      |  |
| 2   | EMCY数据1 | Error_Code         |               |                |                |   |   |          |          |     |        |                    |   |   |   |   |   |      |  |
| 3   | EMCY数据2 | Manufacture_Data_0 |               |                |                |   |   |          |          |     |        | Error_Register     |   |   |   |   |   |      |  |
| 4   | EMCY数据3 | Manufacture_Data_2 |               |                |                |   |   |          |          |     |        | Manufacture_Data_1 |   |   |   |   |   |      |  |
| 5   | EMCY数据4 | Manufacture_Data_4 |               |                |                |   |   |          |          |     |        | Manufacture_Data_3 |   |   |   |   |   |      |  |
| 0   | 扫描控制字   | EMCYDATA_Reset     | Counter_Reset | Overflow_Reset | NonEmpty_Reset | / |   | /        |          | /   |        | NodeID             |   |   |   |   |   |      |  |

Note: Blue: Feedback; Green: Resettable

#### Control Process:

1. Wait for the input bit NonEmpty to be set to 1, indicating that one emergency message has been received.
2. Read the emergency message information NodeID, Error\_Code, Error\_Register, Manufacture\_Data, and process the alarm information.
3. Control the rising edge of the output bit NonEmpty\_Reset to clear the input NonEmpty flag.
4. If the input bit Overflow is set to 1, it indicates that current emergency messages have been discarded, and Overflow\_Counter shows the number of discarded emergency messages.
5. Control the rising edge of the output bits Overflow\_Reset and Counter\_Reset to clear the input Overflow and Overflow\_Counter.
6. The rising edge of the controllable output bit EMCYDATA\_Reset can be used to clear the emergency message information NodeID, Error\_Code, Error\_Register, Manufacture\_Data.

#### 6.2.3 NMT Network Management

CANopen NMT (Network Management) functions can be implemented through read and write operations in the "System Control Area" of the NMT Control Field.

NMT Command Word is a network management control command, with valid command values as follows:

- 0x01: Start remote node.
- 0x02: Stop remote node.
- 0x80: Enter pre-operational state.
- 0x81: Reset node.
- 0x82: Reset communication.

Writing other NMT command values will be ignored. When the trigger bit changes from 0 to 1, an NMT command transmission will be initiated. The NMT slave address is the remote node address, with values from 1-127, and 0 represents the broadcast

address. NMT Status includes the current state of all slaves in the network (to obtain a valid slave status, the slave's error control function Node Guarding or Heartbeat must be activated). Slave status content is read-only; writing any value will be ignored. The status value corresponds to the states shown in "Table 7". The initialization state indicates that the master station has received the slave's Boot-up start message. When the master station queries the slave status timeout or receives the slave heartbeat packet timeout, it indicates the slave is offline. When receiving the slave's status information, it is in stop, operational, or pre-operational states. If no slave status information is received, it is an unknown state.

Table 7. Slave Status List

| Status Value | Node Status           |
|--------------|-----------------------|
| 0x00         | Initialization State  |
| 0x01         | Offline State         |
| 0x04         | Stop State            |
| 0x05         | Operational State     |
| 0x7F         | Pre-operational State |

Control of slave states can be achieved by adding an NMT (Network Management) network management module submodule. The data address correspondence of the NMT network management module is as follows in the diagram:

| 数据方向 | 字偏移 | 描述     | 高字节    |   |   |   |   |   |   |   | 低字节    |                 |   |   |   |   |   |   | 数据说明 |  |
|------|-----|--------|--------|---|---|---|---|---|---|---|--------|-----------------|---|---|---|---|---|---|------|--|
|      |     | 位      | 7      | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7      | 6               | 5 | 4 | 3 | 2 | 1 | 0 |      |  |
| 输入   | 0   | NMT控制字 | NMT命令字 |   |   |   |   |   |   |   | 0→1触发位 | NodeID, 0代表广播地址 |   |   |   |   |   |   |      |  |
| 输出   | 0   | NMT控制字 | NMT命令字 |   |   |   |   |   |   |   | 0→1触发位 | NodeID, 0代表广播地址 |   |   |   |   |   |   |      |  |

**Note: Blue color indicates data feedback**

Control Process:

1. Assign the NodeID node address, representing the node ID to be operated, with 0 representing the broadcast address.
2. Assign the NMT command word.
3. A rising edge from 0 to 1 on the trigger bit initiates the sending of the NMT command.

### 6.2.3 SDOSDO Control Module

The online read and write functionality of SDO can be achieved through read and write operations in the SDO Control Field in the "System Control Area". The specific data encoding format is shown in "Table 9"

**Table 9. SDO Control Register Encoding Format**

| 描述       | 高字节              |            |             |   |          |           |          |   | 低字节          |          |          |   |   |   |   |   | 数据说明 |  |
|----------|------------------|------------|-------------|---|----------|-----------|----------|---|--------------|----------|----------|---|---|---|---|---|------|--|
| 位        | 7                | 6          | 5           | 4 | 3        | 2         | 1        | 0 | 7            | 6        | 5        | 4 | 3 | 2 | 1 | 0 |      |  |
| 索引       | Index            |            |             |   |          |           |          |   |              |          |          |   |   |   |   |   |      |  |
| 节点ID/子索引 | /                | NodeID     |             |   |          |           |          |   |              | SubIndex |          |   |   |   |   |   |      |  |
| 控制字      | Abort_Code_Reset | Done_Reset | Error_Reset | / | SDO_Done | SDO_Error | SDO_Read | / | Trigger      | RW_Type  | Byte_Len |   |   |   |   |   |      |  |
| 中止代码     | Abort_Code_3     |            |             |   |          |           |          |   | Abort_Code_2 |          |          |   |   |   |   |   |      |  |
|          | Abort_Code_1     |            |             |   |          |           |          |   | Abort_Code_0 |          |          |   |   |   |   |   |      |  |
| SDO数据1   | SDO_Data_1       |            |             |   |          |           |          |   |              |          |          |   |   |   |   |   |      |  |
| .        | .                |            |             |   |          |           |          |   |              |          |          |   |   |   |   |   |      |  |
| .        | .                |            |             |   |          |           |          |   |              |          |          |   |   |   |   |   |      |  |
| SDO数据16  | SDO_Data_16      |            |             |   |          |           |          |   |              |          |          |   |   |   |   |   |      |  |
| 索引       | Index            |            |             |   |          |           |          |   |              |          |          |   |   |   |   |   |      |  |
| 节点ID/子索引 | /                | NodeID     |             |   |          |           |          |   |              | SubIndex |          |   |   |   |   |   |      |  |
| 控制字      | Abort_Code_Reset | Done_Reset | Error_Reset | / |          |           |          | / | Trigger      | RW_Type  | Byte_Len |   |   |   |   |   |      |  |
| SDO数据1   | SDO_Data_1       |            |             |   |          |           |          |   |              |          |          |   |   |   |   |   |      |  |
| .        | .                |            |             |   |          |           |          |   |              |          |          |   |   |   |   |   |      |  |
| .        | .                |            |             |   |          |           |          |   |              |          |          |   |   |   |   |   |      |  |
| SDO数据16  | SDO_Data_16      |            |             |   |          |           |          |   |              |          |          |   |   |   |   |   |      |  |

**Note:** Red indicates read-only; blue indicates feedback; orange indicates conditional feedback; green indicates resettable

Object Index Index, SubIndex SubIndex are the parameters of the object to be accessed. The valid address range for SDO server slave numbers is 1-127. The data type Data Type of the object dictionary is defined as shown in "Table 10".

**Table 10. Object Dictionary Data Type**

| 编号   | 数据类型           |
|------|----------------|
| 0x01 | BOOLEAN        |
| 0x02 | INTEGER8       |
| 0x03 | INTEGER16      |
| 0x04 | INTEGER32      |
| 0x05 | UNSIGNED8      |
| 0x06 | UNSIGNED16     |
| 0x07 | UNSIGNED32     |
| 0x08 | REAL32         |
| 0x09 | VISIBLE_STRING |
| 0x0A | OCTET_STRING   |
| 0x0B | UNICODE_STRING |
| 0x0C | TIME_OF_DAY    |
| 0x0D | TIM_DIFFERENCE |

#### Control Process: A: Read Process

1. Set the object index/subindex/node address information  
Index/SubIndex/NodeID.
2. Set RW\_Type to 0, indicating SDO upload.
3. Trigger the start of SDO transmission by setting the Trigger bit to a rising edge;  
SDO\_Busy bit is set to 1.
4. Wait for SDO\_Done to complete and be set to 1.
5. If SDO transmission is normal, SDO\_Error and Abort\_Code are 0; Byte\_Len  
stores the byte length of the read object data, and SDO\_Data stores the value  
of the object, with the effective byte length being Byte\_Len.
6. If SDO transmission fails, SDO\_Error bit is set to 1; Abort\_Code stores the  
abort code, indicating the reason for failure. Byte\_Len and SDO\_Data are  
cleared.
7. Control the rising edge of Done\_Reset/Error\_Reset to clear the  
SDO\_Done/SDO\_Error flags, ready for the next transmission.
8. Control the rising edge of Abort\_Code\_Reset to clear the Abort\_Code error  
code.

#### B: Write Process

1. Set the object index/subindex/node address information  
Index/SubIndex/NodeID.
2. Set RW\_Type to 1, indicating SDO download; set output data length and output  
data value Byte\_Len/SDO\_Data, the output value will be reflected in the  
corresponding input value.
3. Trigger the start of SDO transmission by setting the Trigger bit to a rising edge;  
SDO\_Busy bit is set to 1.
4. Wait for SDO\_Done to complete and be set to 1.

5. If SDO transmission is normal, SDO\_Error and Abort\_Code are 0.
6. If SDO transmission fails, SDO\_Error bit is set to 1; Abort\_Code stores the abort code, indicating the reason for failure.
7. Control the rising edge of Done\_Reset/Error\_Reset to clear the SDO\_Done/SDO\_Error flags, ready for the next transmission.
8. Control the rising edge of Abort\_Code\_Reset to clear the Abort\_Code error code.

### 6.2.3 Network Scanning Module

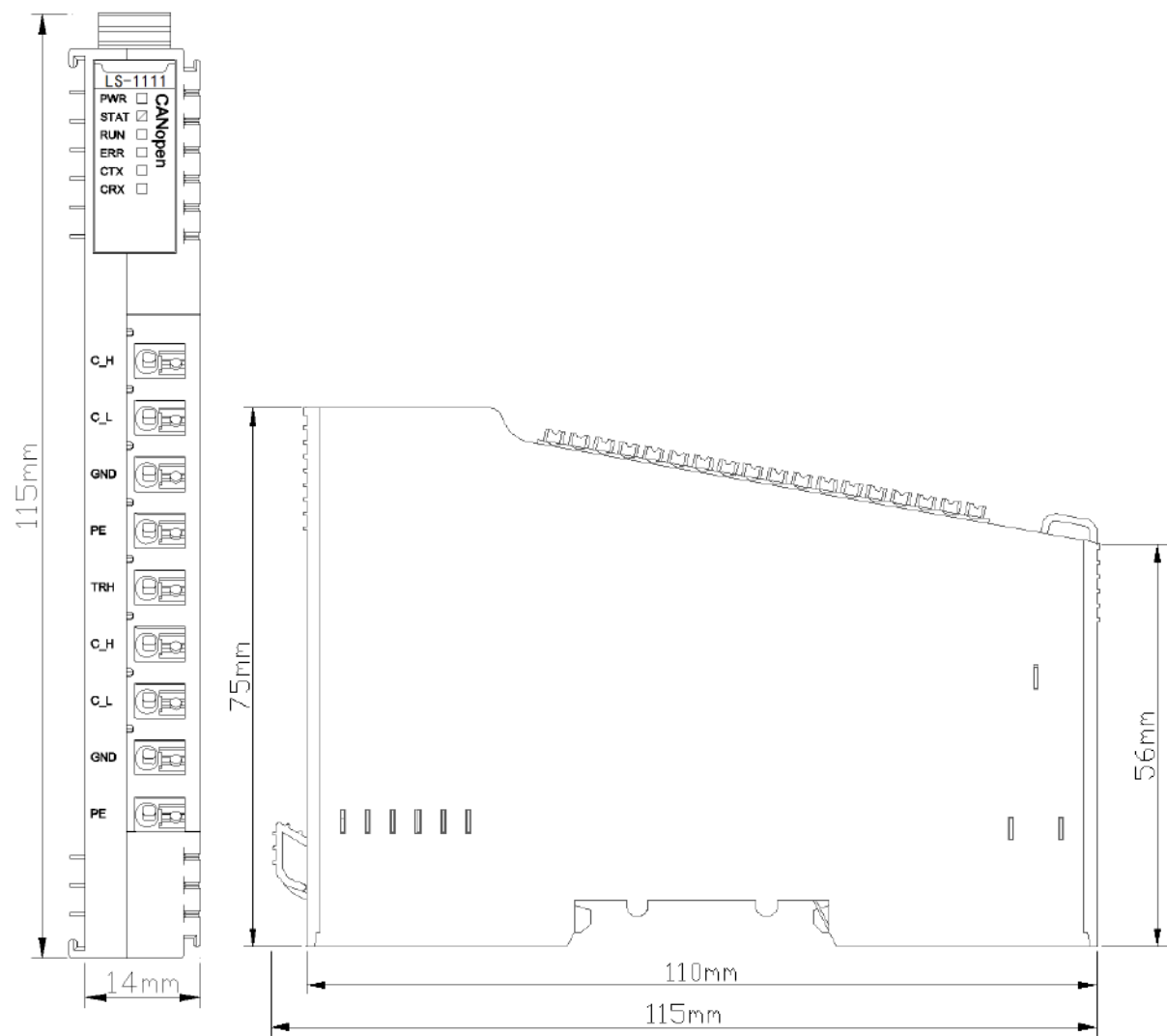
Supports scanning module node numbers including:

- Network Scanning Module 8 nodes
- Network Scanning Module 16 nodes
- Network Scanning Module 32 nodes
- Network Scanning Module 64 nodes
- Network Scanning Module 126 nodes

On a CANopen network with a maximum of 127 nodes, the gateway itself occupies one node address. The network scanning function can preliminarily scan the basic situation of slave devices on the CANopen network. Network scanning functionality is implemented by adding a network scanning module. The data address correspondence of the network scanning module is as follows in the diagram: Note: Green: Read-only; Blue: Feedback Control Process:

1. Trigger a scan by setting the output trigger bit from 0 to 1 on a rising edge.
2. The scanning status is set to 1, and the node count and module information are all reset to zero.
3. Wait for the scan to complete, and the scanning status bit is reset to zero.
4. The node count stores the total number of nodes scanned on the current network, and the module information stores node ID and node state machine information.

A Dimension drawing



# LS-1211 Modbus Serial Communication Module

## 1 Module features

The Modbus serial port module supports 1 channel of RS485, RS232, or RS422 (choose one), supports Modbus RTU/ASCII protocol, and operates in master, slave, or transparent transmission modes.

Used in conjunction with the coupler module, it can convert Modbus protocol into other protocols, such as Modbus TCP, Profinet, EtherCAT, EtherNet/IP, etc. The module requires configuration of serial port parameters and Modbus commands in the IO Config software when in use.

RS485/RS232/RS422 interfaces supporting Modbus-RTU/ASCII protocol devices can use this product to interconnect with upper-level PLCs or PCs. This includes PLCs, DCS, distributed I/O, frequency converters, motor starting protection devices, intelligent high and low voltage electrical appliances, electrical measurement devices, intelligent field measurement equipment, and instruments, etc.

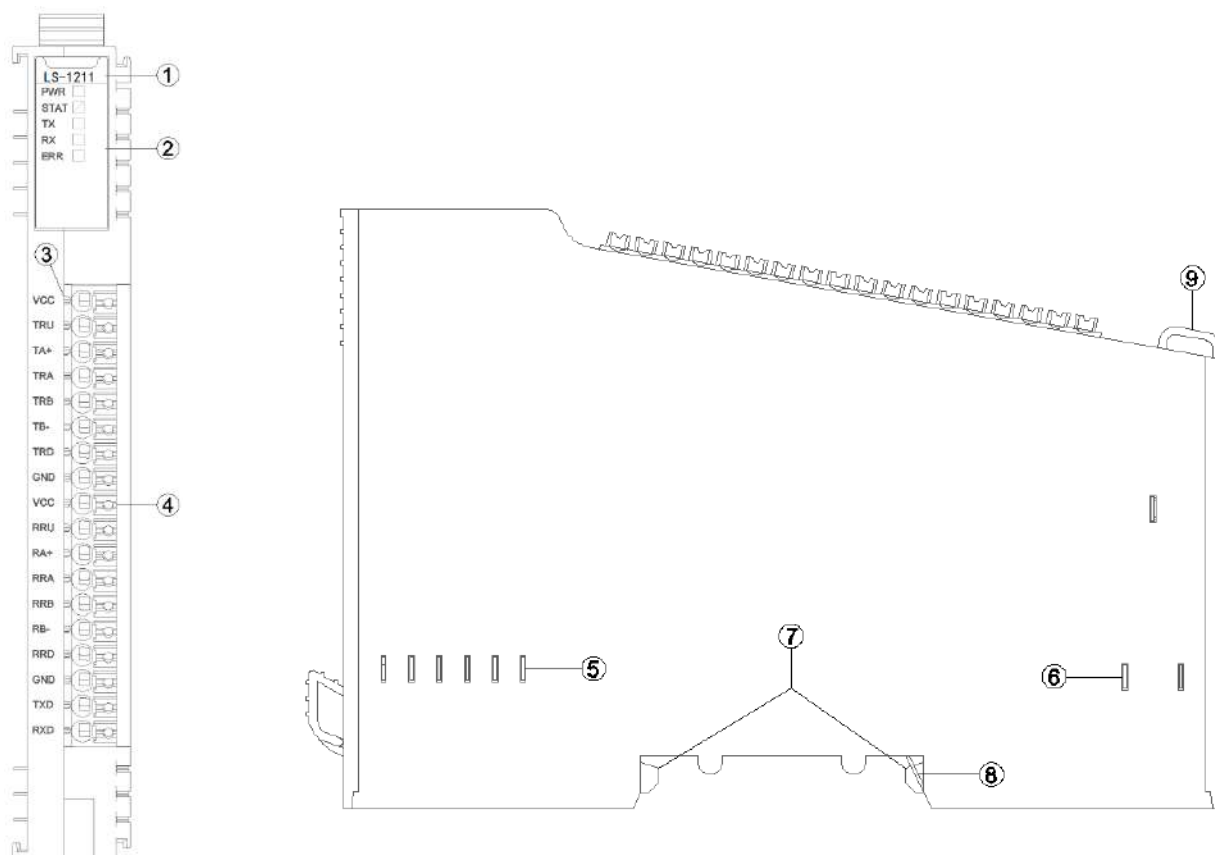
## 2 Technical Parameters

| General parameters        |                                                  |
|---------------------------|--------------------------------------------------|
| Power                     | Max.50mA@5.0Vdc                                  |
| Isolation                 | I/O to internal bus: magnetic isolation (3KVrms) |
| Field Power               | Rated voltage: 24Vdc<br>Input range: 22~28Vdc    |
| Wiring                    | Max.1.0mm <sup>2</sup> (AWG 17)                  |
| Mounting Type             | 35mmDIN-Rail                                     |
| Size                      | 115*14*75mm                                      |
| Weight                    | 65g                                              |
| Environment Specification |                                                  |
| Operational Temperature   | -40~85°C                                         |
| Operational Humidity      | 5%~95% RH(No Condensation)                       |
| Ingress Protection Rating | IP20                                             |
| Serial Port Parameters    |                                                  |
| M/S/F: Channel Count      | 1 channel                                        |
| M/S/F: Interface          | RS485/RS232/RS422                                |
| M/S: Protocol             | Modbus RTU/ASCII                                 |

|                           |                                                                      |
|---------------------------|----------------------------------------------------------------------|
| M/S/F: Operating Mode     | Modbus Master, Slave, Transparent Transmission                       |
| M/S/F: Baud               | 300bps-500Kbps                                                       |
| M/S/F: Data               | 7, 8 bits                                                            |
| M/S/F: Parity             | None, Odd, Even                                                      |
| M/S/F: Stop Bits          | 1, 2 bits                                                            |
| M/S/F: Character Interval | 1.5t-200t                                                            |
| F: Byte Order Conversion  | Disable, Enable                                                      |
| M/F: Response Timeout     | Customizable, default: 1000                                          |
| M/F: Polling Timeout      | Customizable, default: 100                                           |
| M: Data Reading Handling  | Maintain the last input value, Clear input value                     |
| M: Data Output Mode       | Polling, Event Triggered (Data Change)                               |
| M: Module Control Enable  | Disable, Enable                                                      |
| M: Module Control Mode    | Level Trigger (Continuous Valid), Rising Edge Trigger (Single Valid) |
| M: Power-On Event Output  | Enable, Disable                                                      |
| S: Slave ID               | Customizable, default: 1                                             |
| S: Response Time          | Customizable, default: 50                                            |

Note: M: indicates parameters valid in master station mode, S: indicates parameters valid in slave station mode, F: indicates parameters valid in free transparent transmission mode.

### 3 Hardware Interface



- ① Module Type
- ② State indicator
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

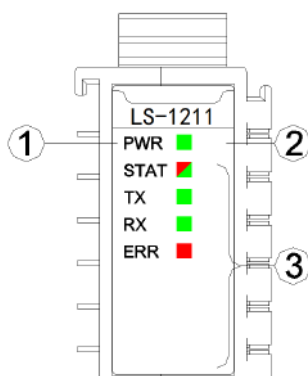
3.1 Terminal definition

| T<br>ermin<br>V<br>CC<br>T<br>PU<br>T<br>A+<br>T<br>RA<br>T<br>RB<br>T<br>B-<br>T<br>RD<br>G<br>ND<br>V<br>CC<br>R<br>PU<br>R<br>A+<br>R<br>RA<br>R<br>RB<br>R<br>B-<br>R<br>RD<br>G<br>ND<br>T<br>XD<br>R<br>XD | RS485                              | RS422                                   | RS232 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------------------------------------|-------|
|                                                                                                                                                                                                                  | 4.7K pull-up<br>resistor shorted   | 4.7K pull-up<br>resistor shorted (TX)   |       |
|                                                                                                                                                                                                                  | A+                                 | TX+                                     |       |
|                                                                                                                                                                                                                  | 120R terminal<br>resistor shorted  | 120R terminal<br>resistor shorted (TX)  |       |
|                                                                                                                                                                                                                  | B-                                 | TX-                                     |       |
|                                                                                                                                                                                                                  | 4.7K pull-down<br>resistor shorted | 4.7K pull-down<br>resistor shorted (TX) |       |
|                                                                                                                                                                                                                  |                                    | 4.7K pull-up<br>resistor shorted (RX)   |       |
|                                                                                                                                                                                                                  |                                    | RX+                                     |       |
|                                                                                                                                                                                                                  |                                    | 120R terminal<br>resistor shorted (RX)  |       |
|                                                                                                                                                                                                                  |                                    | RX-                                     |       |
|                                                                                                                                                                                                                  |                                    | 4.7K pull-down<br>resistor shorted (RX) |       |
|                                                                                                                                                                                                                  | GND                                |                                         | GND   |
|                                                                                                                                                                                                                  |                                    |                                         | TXD   |
|                                                                                                                                                                                                                  |                                    |                                         | RXD   |

It is recommended to use cables with cores smaller than 1mm².  
The cold-pressed terminal parameters are as follows:

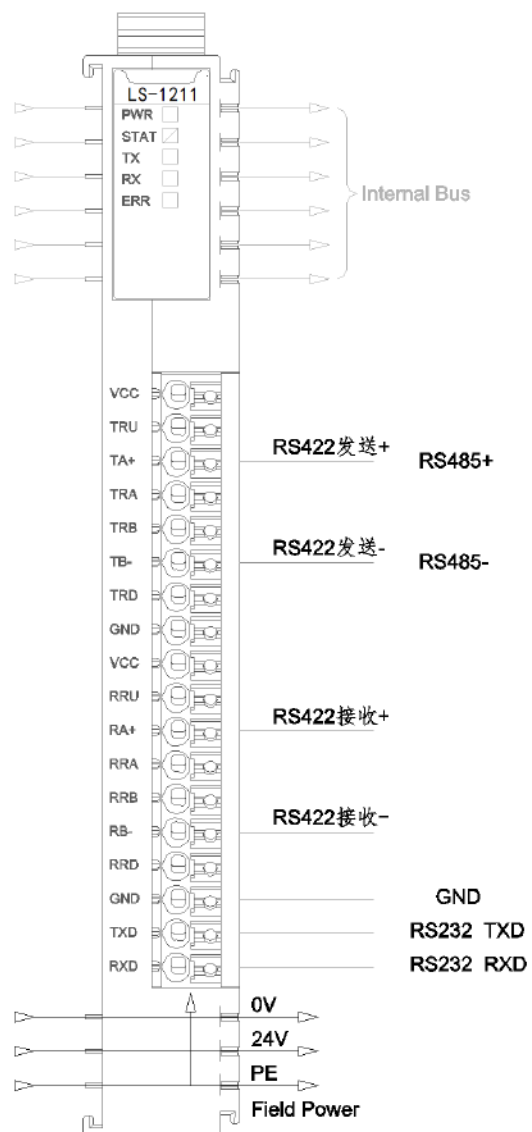


### 3.2 LED indicator definition



| PWR Power State (RED)                              | Definition                                 |
|----------------------------------------------------|--------------------------------------------|
| ON                                                 | System Power Normal                        |
| OFF                                                | System Power Failure                       |
| STAT Module State (RED/GREEN)                      | Definition                                 |
| Double Flash (RED)                                 | Module Soft Restarted by Hard-Fault        |
| ON(GREEN)                                          | Running                                    |
| Flash(GREEN)                                       | Stopping                                   |
| Flash(2.5Hz) (RED/GREEN)                           | Boot Mode                                  |
| Flash(10Hz) (RED/GREEN)                            | Firmware Updating                          |
| RUN Operation Status Indicator Light (Green Light) | Definition                                 |
| Off                                                | No data transmission                       |
| Flash                                              | Serial port data transmission              |
| RX Serial Port Receive Indicator Light             | Meaning                                    |
| Off                                                | No data reception                          |
| Flash                                              | Serial port data reception                 |
| ERR Operation Indicator Light                      | Meaning                                    |
| Off                                                | Configuration normal, communication normal |
| Single Flash                                       | Communication abnormal                     |
| Flashing                                           | Configuration error                        |

## 4 Wiring



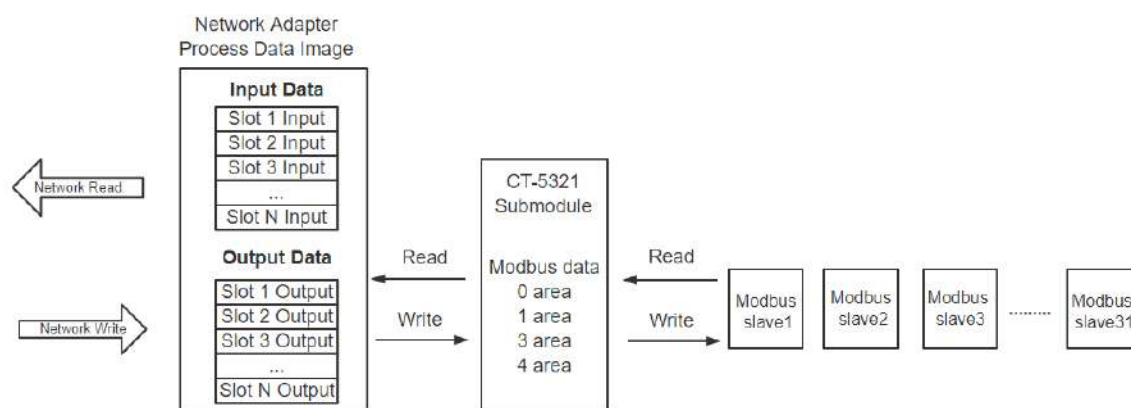
## 5 Process Data Definition

### 5.1 Module Process Data Definition

The LS-1211 module itself does not have input or output process data.

### 5.2 Submodule Process Data Mapping

The network coupler reads and writes the process data of the input and output of the LS-1211 submodules in real time through the internal bus. The data mapping model is as shown in the following diagram:



## 6 Configuration Parameter Definition

### 6.1 LS-1211 Configuration Parameter Definition

| Configuration Parameter |                         |           |             |                          |                     |                       |              |                               |
|-------------------------|-------------------------|-----------|-------------|--------------------------|---------------------|-----------------------|--------------|-------------------------------|
| Bit No                  | Bit 7                   | Bit 6     | Bit 5       | Bit 4                    | Bit 3               | Bit 2                 | Bit 1        | Bit 0                         |
| Byte 0                  |                         |           |             |                          |                     | Baud Rate Select      | Gateway Mode |                               |
| Byte 1                  | Standard Baud Rate      |           |             |                          |                     |                       |              |                               |
| Byte 2                  |                         |           |             |                          |                     |                       |              |                               |
| Byte 3                  |                         |           |             |                          |                     |                       |              |                               |
| Byte 4                  |                         |           |             |                          |                     |                       |              |                               |
| Byte 5                  | Custom Baud Rate        |           |             |                          |                     |                       |              |                               |
| Byte 6                  |                         |           |             |                          |                     |                       |              |                               |
| Byte 7                  |                         |           |             |                          |                     |                       |              |                               |
| Byte 8                  |                         |           |             |                          |                     |                       |              |                               |
| Byte 9                  |                         | Byte Swap | Serial Mode | Stop Bits                |                     | Parity Bits           |              | Data Bits                     |
| Byte 10                 | Char Pitch              |           |             |                          |                     |                       |              |                               |
| Byte 11                 | Response Timeout(ms)    |           |             |                          |                     |                       |              |                               |
| Byte 12                 |                         |           |             |                          |                     |                       |              |                               |
| Byte 13                 | Delay Between Polls(ms) |           |             |                          |                     |                       |              |                               |
| Byte 14                 |                         |           |             |                          |                     |                       |              |                               |
| Byte 15                 |                         |           |             | First Output on Power-Up | Module Control Mode | Module Control Enable | Output Mode  | Fault Action for Read Command |
| Byte 16                 | Slave ID                |           |             |                          |                     |                       |              |                               |
| Byte 17                 | Response Delay(ms)      |           |             |                          |                     |                       |              |                               |
| Byte 18                 |                         |           |             |                          |                     |                       |              |                               |

**M/S/F: Gateway Mode:** Module operating mode. (Default value: Modbus Master)

- 0: Modbus Master
- 1: Modbus Slave
- 2: Free Port Communication Mode

**M/S/F: BaudRate Select:** Baud rate selection. (Default value: Standard Baud Rate)

- 0: Standard Baud Rate
- 1: Custom Baud Rate

**M/S/F: Standard BaudRate:** Standard baud rate (Default value: 9600bps)

- 0: 300bps
- 1: 600bps
- 2: 1200bps
- 3: 2400bps
- 4: 4800bps
- 5: 9600bps
- 6: 14400bps
- 7: 19200bps
- 8: 38400bps
- 9: 57600bps
- 10: 115200bps
- 11: 128000bps
- 12: 230400bps
- 13: 256000bps
- 14: 384000bps
- 15: 500000bps

**M/S/F: Custom BaudRate:** Custom baud rate: 300-500000bps adjustable, default 9600. Note: For some customers' equipment with non-standard baud rates, customization is possible.

**M/S/F: Data Bits:** Data Bits: Data bits, (Default value: 8 bits)

- 0: 7 bits
- 1: 8 bits

**M/S/F: Parity Bits:** Parity bits, (Default value: No parity)

- 0: No parity
- 1: Odd parity
- 2: Even parity

**M/S/F: Stop Bits:** Stop bits, (Default value: 1 bit)

- 0: 1 bit
- 1: 2 bits

**M/S:Serial Mode:** Serial mode. (Default value: RTU)

- 0: RTU
- 1: ASCII

**F:Btye Swap:** Serial mode. (Default value: RTU)

0: Disable

1: Enable

**M/S/F:Char Pitch:** Character interval: Frame interval detection time during message reception. (t is the time taken for a single character transmission, related to baud rate) (Default value: 5 characters)

0: 1.5 characters

1: 3.5 characters

2: 5 characters

3: 10 characters

4: 20 characters

5: 50 characters

6: 100 characters

7: 200 characters

**M/F: Response Timeout:**Response timeout (ms): Time for the master to wait for a response from the slave after sending a command. Adjustable from 1 to 65535, default 1000.

**M/F:Delay Between Polls:** Interval between sending Modbus commands (delay from receiving a response message from the slave to sending the next command), adjustable from 0 to 65535, default 100.

**M:Fault Action for Read Command:** Fault handling for read command: Data handling method after timeout in slave read data. (Default value: Maintain the last input value)

0: Maintain the last input value

1: Clear input value

**M:Output Mode:** Data output mode. In 'Polling mode', Modbus sends write messages periodically. In 'Event Triggered' mode, write commands are sent only when Modbus output data changes. (Default value: Polling)

0: Polling

1: Event Triggered (Data changes)

**M:Module Control Enable:** Module control enable. When control over Modbus read/write commands is required, select enable mode and control Modbus read/write commands through the value of 'Module Control Output'. (Default value: Disable)

0: Disable

1: Enable

**M: Module Control Mode:** Module control mode. This value is only effective in module control enable mode. (Default value: Level Trigger)

0: Level Trigger (Continuously valid)

1: Rising Edge Trigger (Single Trigger)

**M:First Output on Power-on:** Power-on event output. (Default value: Enable)

0: Disable

1: Enable

**S:Slave ID:** Adjustable from 1 to 247. This parameter is only effective in slave mode.

**S: Respond Delay:** Adjustable from 0 to 65535, default 50.

## 6.2 LS-1211 Submodule Parameter Definitions

### 6.2.1 Submodules in Master Mode

M: Diagnostic Module

M: Read Coils (0xxxx) supports 8128 bits, selectable

M: Read Discrete Inputs (1xxxx) supports 8128 bits, selectable

M: Read Input Registers (3xxxx) supports 116 words, selectable

M: Read Holding Registers (4xxxx) supports 116 words, selectable

M: Write Coils (0xxxx) supports single coil, 8128 bits, selectable

M: Write Holding Registers (4xxxx) supports single register, 116 words, selectable

**M: Diagnostic Module:** Includes module status input, module error code input, module control output, polling time input; commands from the drop-down menu need to be added to the first 8 rows of the slot.

**Module Status Input:** 8~48 channels selectable. Module status can monitor the working status of each data slot. When a fault occurs in a data slot, the corresponding status bit is set to 1 and is automatically cleared after fault recovery.

**Module Error Code Input:** 8-48 channels selectable. When a fault occurs in a data slot, the error code module can display the function code and specific error code of the faulty channel. Users can judge the cause of the fault based on the error code and then take corresponding adjustment measures. For detailed descriptions, refer to the "Modbus Error Code Table."

**Module Control Output:** 8~48 channels selectable. When the serial port parameter (M: Module Control) is in enable mode, the command's output control for read/write channels is valid.

**Polling Time Input:** Used to monitor the polling time of the serial port.

### 6.2.2 Submodules in Slave Mode

S: Diagnostic Module

S: Read Coils (0xxxx) supports 11024 Bytes, selectable

S: Read Holding Registers (4xxxx) supports 1512 words, selectable

S: Write Coils (0xxxx) supports 11024 Bytes, selectable

S: Write Discrete Inputs (1xxxx) supports 81024 Bytes, selectable

S: Write Input Registers (3xxxx) supports 1512 words, selectable

S: Write Holding Registers (4xxxx) supports 1512 words, selectable

S: Diagnostic Module

The slave module input status can monitor communication faults. Refer to the table below to check faults.

**Modbus Error Codes Table**

| Error Codes | Fault Description                 | Troubleshooting Method                                                                                                                   |
|-------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| 0x00        | Working Normally                  | None                                                                                                                                     |
| 0x01        | Illegal Function Code             | The device does not support the current function code, please refer to the slave manual to select the corresponding function code module |
| 0x02        | Illegal Data Address              | Data exceeds the device's address range, refer to the slave manual to modify the data start address or data length                       |
| 0x03        | Illegal Data Value                | Data length error, data length exceeds the maximum allowable value of 125 (Word) or 2000 (Bit), modify the length                        |
| 0x04        | Data Processing Error             | Check whether the data value range meets the requirements of the slave                                                                   |
| 0x05        | Application Layer Length Mismatch | Increase the receive character interval, check the communication parameter settings                                                      |
| 0x06        | Protocol ID Error                 | Check the message from the sending end                                                                                                   |
| 0x07        | Cache Address Error               | Internal device error                                                                                                                    |
| 0x08        | Bit Offset Error                  | Internal device error                                                                                                                    |
| 0x09        | Slave ID Number Mismatch          | Increase the timeout period, check the hardware connection status, check the communication parameter settings                            |
| 0x0A        | CRC Error                         | CRC error, check the communication line                                                                                                  |
| 0x0B        | LRC Error                         | LRC error, check the communication line                                                                                                  |
| 0x0C        | Response Function Code Mismatch   | Check the hardware connection status                                                                                                     |
| 0x0D        | Response Address Mismatch         | Check the hardware connection status                                                                                                     |
| 0x0E        | Response Data Length Mismatch     | Check the hardware connection status                                                                                                     |
| 0x0F        | Communication Timeout             | Increase the timeout period, check the hardware connection status, check the communication parameter settings                            |

|      |                                  |                                                     |
|------|----------------------------------|-----------------------------------------------------|
| 0x10 | ASCII Mode Start Character Error | ':' colon start character error                     |
| 0x11 | ASCII Mode End Character Error   | CR/LF carriage return/line feed end character error |
| 0x12 | ASCII Mode Non-character Data    | Data contains non-hexadecimal ASCII characters      |
| 0x13 | ASCII Mode Character Count Error | Incorrect response length from the slave            |

### 6.2.3 Submodules in Free Transparent Transmission Mode

F : Control and Status Module

F : Input and Output Data Modules support 1~512 words, selectable

Process Data Definition for Control and Status Module:

| Data Direction | Data Name                      | Variable Name          | Data Type | Byte Offset |
|----------------|--------------------------------|------------------------|-----------|-------------|
| Input Data     | Output Control Word - Feedback | Control_Word_Feedback  | uint16_t  | 0           |
|                | Send_Data_Len_Feedback         | Send_Data_Len_Feedback | uint16_t  | 2           |
|                | COM_Status                     | COM_Status             | uint16_t  | 4           |
|                | Error_Counter                  | Error_Counter          | uint16_t  | 6           |
|                | Received_Counter               | Received_Counter       | uint16_t  | 8           |
|                | Received_Data_Len              | Received_Data_Len      | uint16_t  | 10          |
| Output Data    | Output Control Word            | Control_Word           | uint16_t  | 0           |
|                | Send_Data_Len                  | Send_Data_Len          | uint16_t  | 2           |

Variable Definitio

| 变量名称                   | Bit 15-7          | Bit 6            | Bit 5          | Bit 4       | Bit 3         | Bit 2        | Bit 1      | Bit 0   |
|------------------------|-------------------|------------------|----------------|-------------|---------------|--------------|------------|---------|
| Control_Word_Feedback  | Reseverd          | Input Data Reset | Received Reset | Error Reset | Timeout Reset | Parity Reset | Done Reset | Trigger |
| Send_Data_Len_Feddback | Send Data Len     |                  |                |             |               |              |            |         |
| COM_Status             | Reseverd          |                  |                |             | Timeout Error | Parity Error | Done       | Busy    |
| Error_Counter          | Error Counter     |                  |                |             |               |              |            |         |
| Received_Counter       | Received Counter  |                  |                |             |               |              |            |         |
| Received_Data_Len      | Received Data Len |                  |                |             |               |              |            |         |
| Control_Word           | Reseverd          | Input Data Reset | Received Reset | Error Reset | Timeout Reset | Parity Reset | Done Reset | Trigger |
| Send_Data_Len          | Send Data Len     |                  |                |             |               |              |            |         |

### Input Data Description:

1. **Control\_Word\_Feedback** is the feedback value of the output control word **Control\_Word**. After the control word is refreshed to the module, it will be updated in the control word feedback.

2. **Send\_Data\_Len\_Feedback** is the feedback value of the frame byte length **Send\_Data\_Len**. After the frame byte length is refreshed to the module, it will be updated in the frame byte length feedback.

3. In response mode, when serial data is sent, the **Busy** bit is set to 1.

3.1 If a response is received within the timeout period, the **Busy** bit is cleared, the **Done** completion bit is set to 1, the **Received\_Counter** count is incremented by 1. If the received frame has parity errors, then the **Parity\_Error** bit is set to 1, and the **Error\_Counter** count is also incremented by 1. **Received\_Data\_Len** saves the byte count of the current received frame.

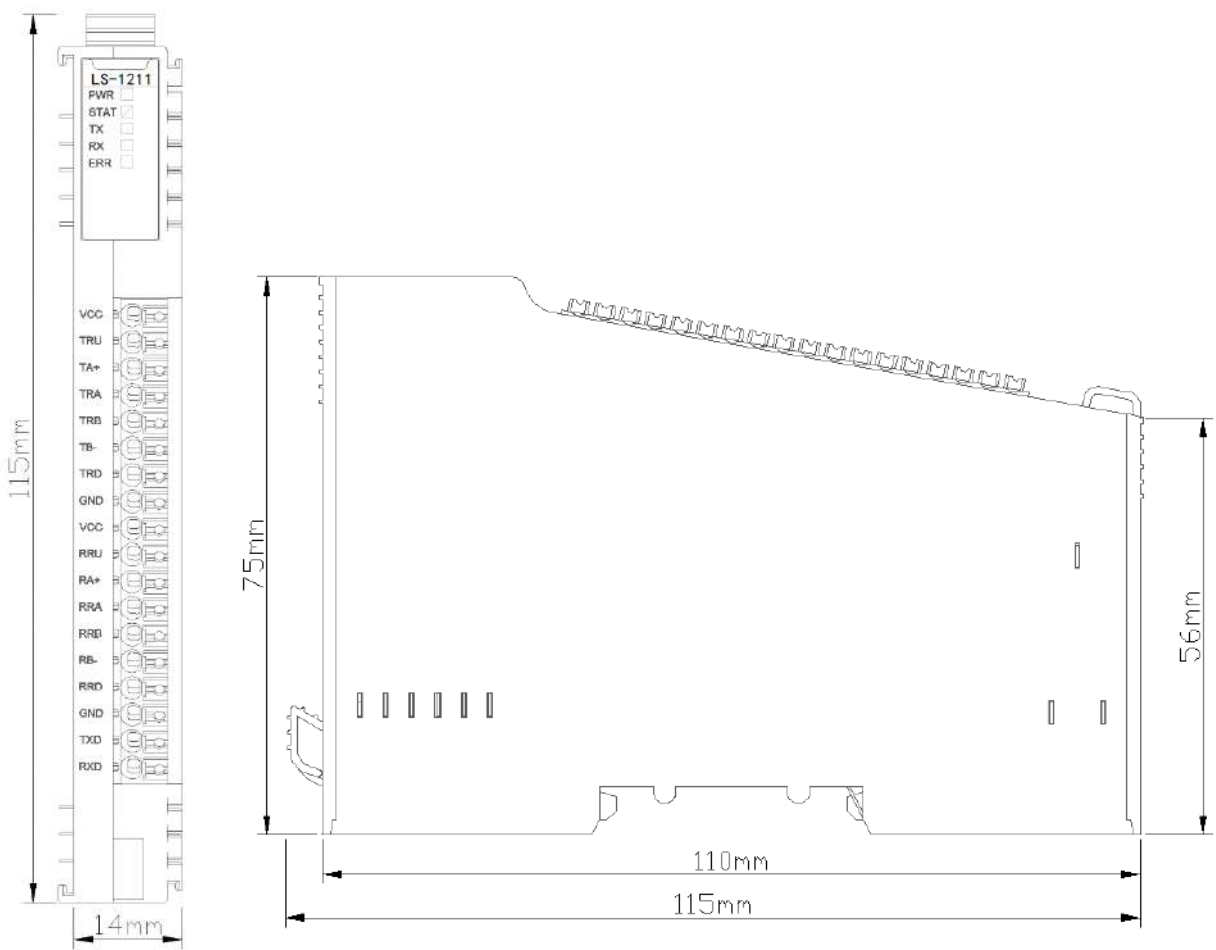
3.2 If no response is received within the timeout period, the **Busy** bit is cleared, the **Done** completion bit is set to 1, and the **Timeout\_Error** is set to 1. The **Error\_Counter** error count is incremented by 1, and the value of **Received\_Data\_Len** is cleared.

4. In active reporting mode, when the slave receives a data packet, the **Received\_Counter** count is incremented by 1. If the received frame has parity errors, then the **Parity\_Error** bit is set to 1, and the **Error\_Counter** count is also incremented by 1.

### Output Data Description:

1. On the rising edge of **Received\_Counter\_Reset**, the received count **Received\_Counter** is cleared. On the rising delay of **Error\_Counter\_Reset**, the error count **Error\_Counter** is cleared. On the rising delay of **Timeout\_Error\_Reset**, **Timeout\_Error** is cleared. On the rising delay of **Parity\_Error\_Reset**, **Parity\_Error** is cleared. On the rising delay of **Done\_Reset**, **Done** is cleared.
2. In active reporting mode, the **Trigger** bit is invalid, and **Send\_Data\_Len** is invalid.
3. In master-slave response mode, on the rising delay of **Trigger**, a serial data transmission is triggered once. The serial port will send a data packet according to the data length of **Send\_Data\_Len** and wait for a response for processing.

A Dimension drawing



## 8 Special Purpose Module

### LX-1005 Bus extended master module

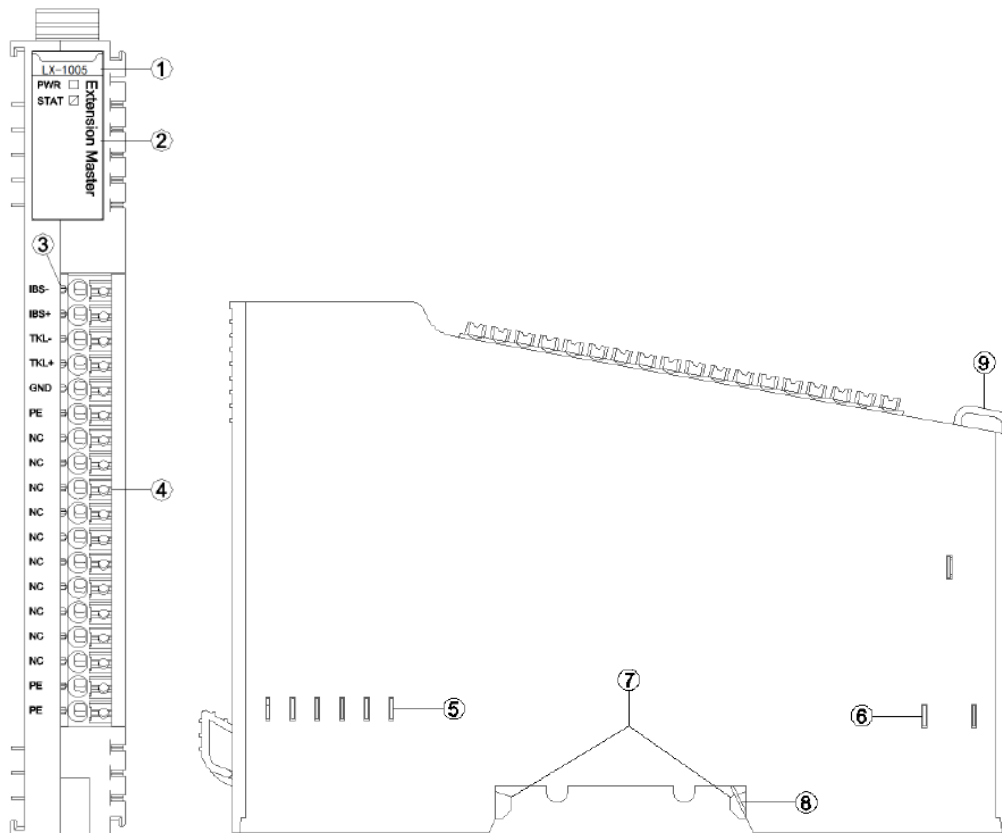
#### 1 Module Description

The bus extended master module is used to extend the bus. The bus extended master module has no process data and configuration parameters.

#### 2 Technical Parameters

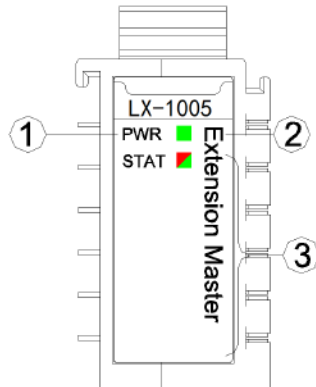
| General parameters        |                            |
|---------------------------|----------------------------|
| Power                     | Max.20mA@5.0Vdc            |
| Mounting Type             | 35mmDIN-Rail               |
| Size                      | 115*14*75mm                |
| Weight                    | 65g                        |
| Environment Specification |                            |
| Operational Temperature   | -40~85℃                    |
| Operational Humidity      | 5%~95% RH(No Condensation) |
| Ingress Protection Rating | IP20                       |

### 3 Hardware Interface



- ① Module Type
- ② State indicator
- ③ Channel indicator (N/A)
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power (N/A)
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

### 3.1 LED indicator definition

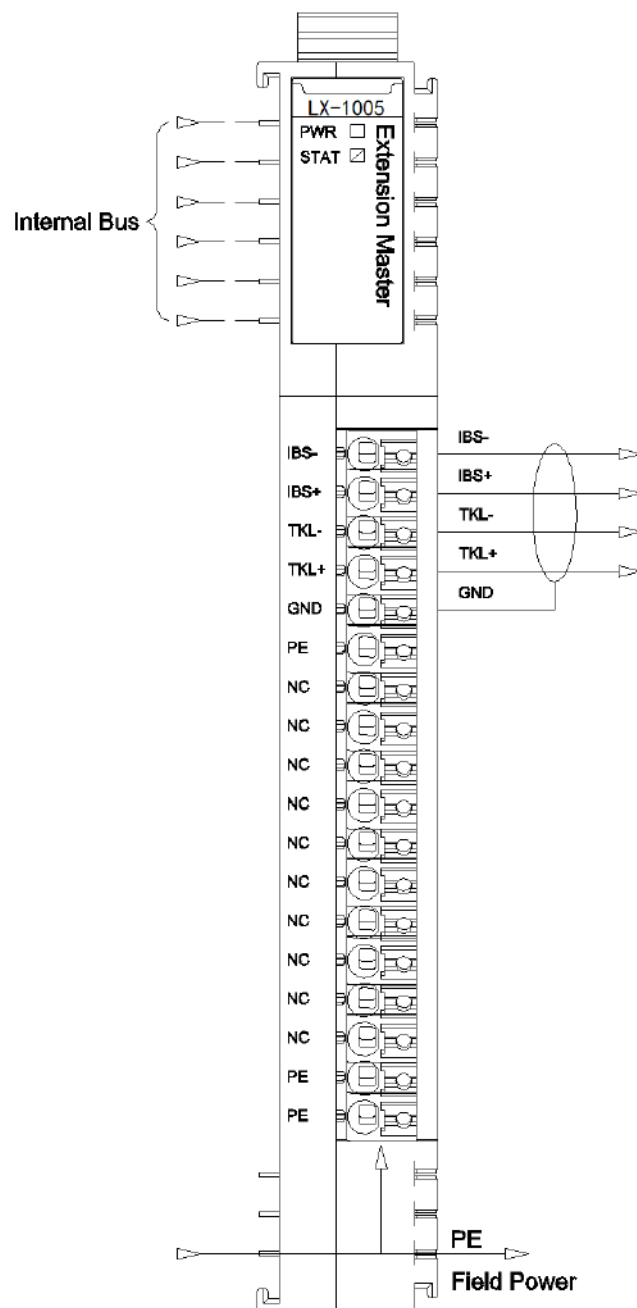


- ① System Power LED indicator (red)
- ② Bus State LED indicator (red/green)

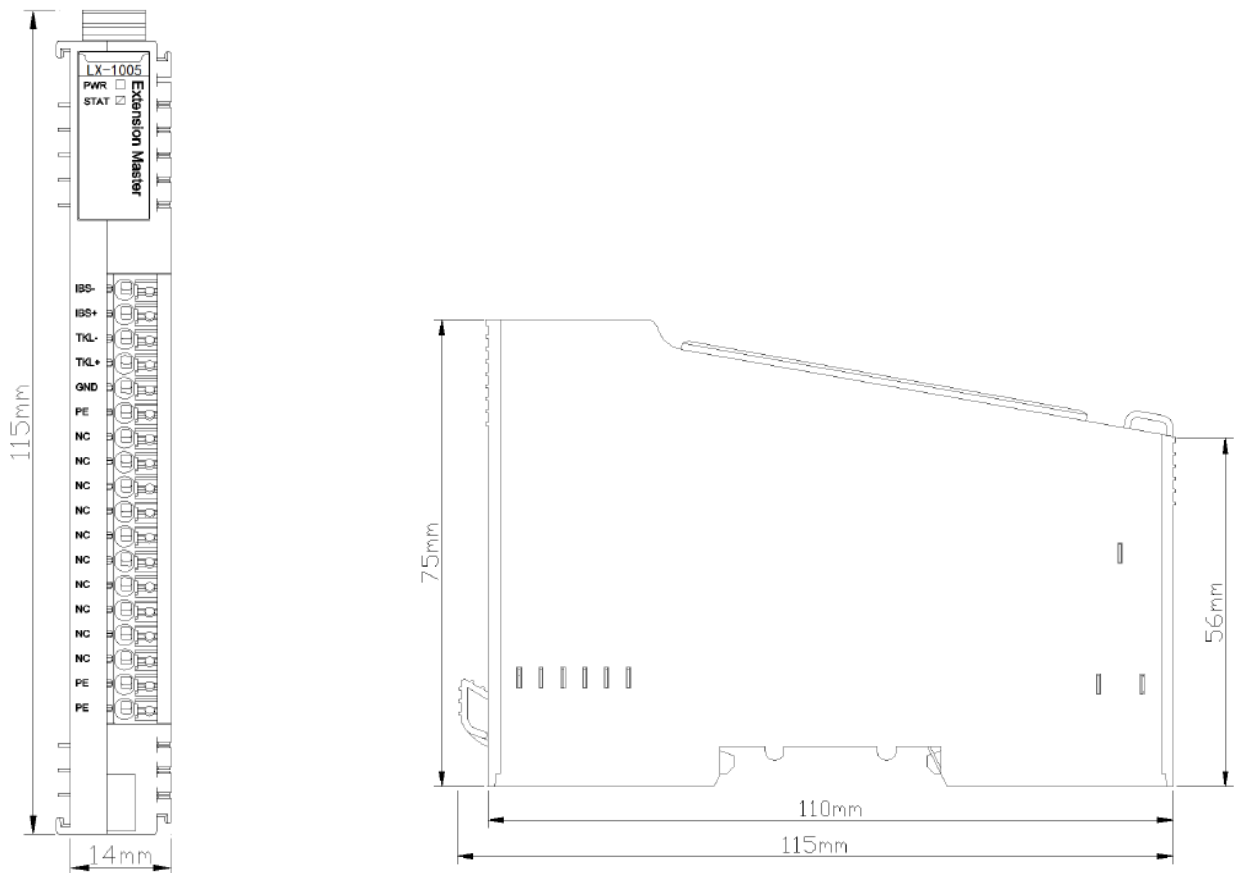
| PWR POWER STATE (RED)      | Definition                               |
|----------------------------|------------------------------------------|
| ON                         | System Power Normal                      |
| OFF                        | System Power Failure                     |
| STAT Bus STATE (RED/GREEN) | Definition                               |
| Green slow flash (2.5Hz)   | Module internal bus is not started       |
| Red slow flash (2.5Hz)     | Module internal bus offline              |
| ON (GREEN)                 | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)   | Upgrading mode                           |
| Flash(10Hz) (RED/GREEN)    | Firmware Update                          |
| Double Flash (RED)         | Module Exception has been soft-restarted |

## 4 Wiring

Bus extended cable requires 5 core shielded cable, IBS+ and IBS- must use twisted pair. PE guarantees a reliable grounding and the total length of the bus extended cable should not exceed 10 meters.

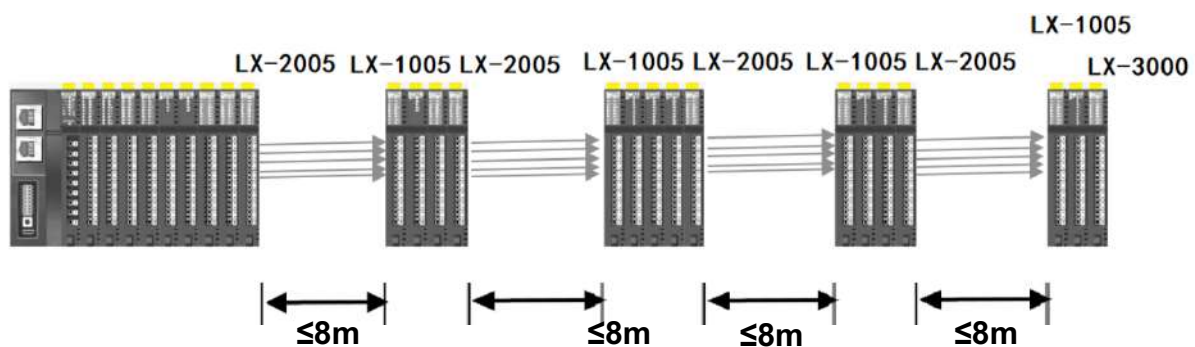


## A Dimension drawing



### 4.1 Bus Expansion Topology Diagram

The backplane bus expansion length spacing should not be greater than 8 meters, the IO module expansion data should be less than 32 units, and it must be equipped with a terminal module LX-3000



## LX-2005 Bus extended slave module

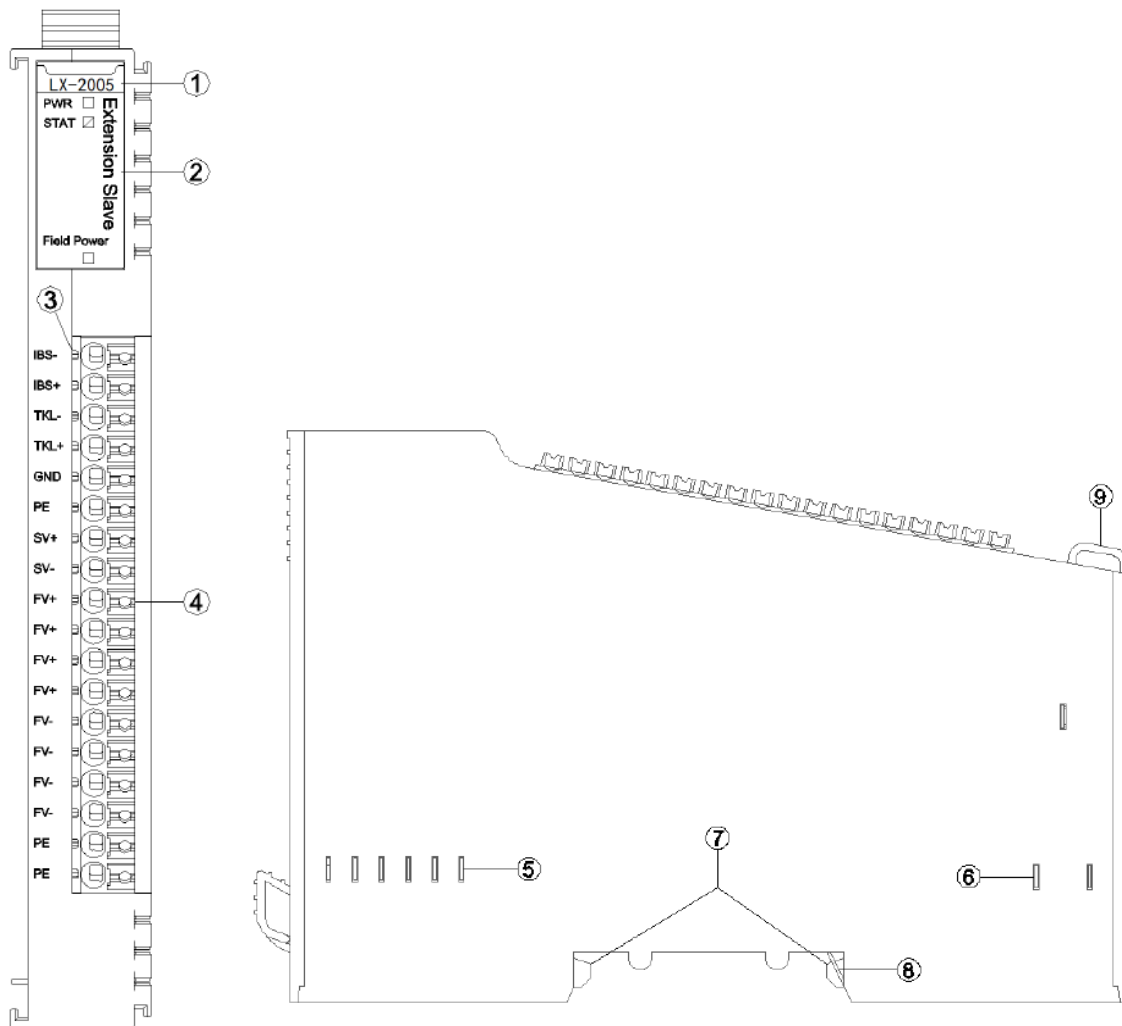
### 1 Module Description

The bus extended slave module is used to extend the bus. The bus extended slave module has no process data and configuration parameters.

### 2 Technical Parameters

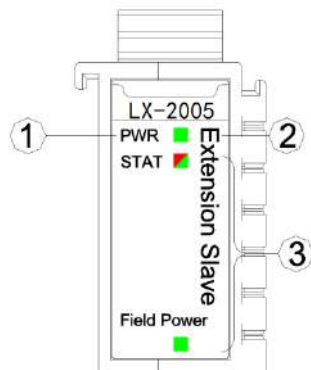
| General parameters          |                                                                                               |
|-----------------------------|-----------------------------------------------------------------------------------------------|
| Power                       | Max.20mA@5.0Vdc                                                                               |
| Mounting Type               | 35mmDIN-Rail                                                                                  |
| Size                        | 115*14*75mm                                                                                   |
| Weight                      | 65g                                                                                           |
| System Power                | Nominal: 24Vdc, Range: 9-36Vdc<br>Protection: Overcurrent Protection, Reverse Protection: YES |
| Internal BUS Supply Current | Max. 2.5A@5VDC                                                                                |
| Isolation                   | System Power to Field Power Isolation                                                         |
| Field Power Supply          | Power Supply: 22~28V (Nominal 24VDC)<br>Protection: Reverse Protection: YES                   |
| Field Power Supply Current  | Max. DC 8A                                                                                    |
| Environment Specification   |                                                                                               |
| Operational Temperature     | -40~85°C                                                                                      |
| Operational Humidity        | 5%~95% RH(No Condensation)                                                                    |
| Ingress Protection Rating   | IP20                                                                                          |

### 3 Hardware Interface



- ① Module Type
- ② State indicator
- ③ Channel indicator (N/A)
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

#### 3.1 LED indicator definition

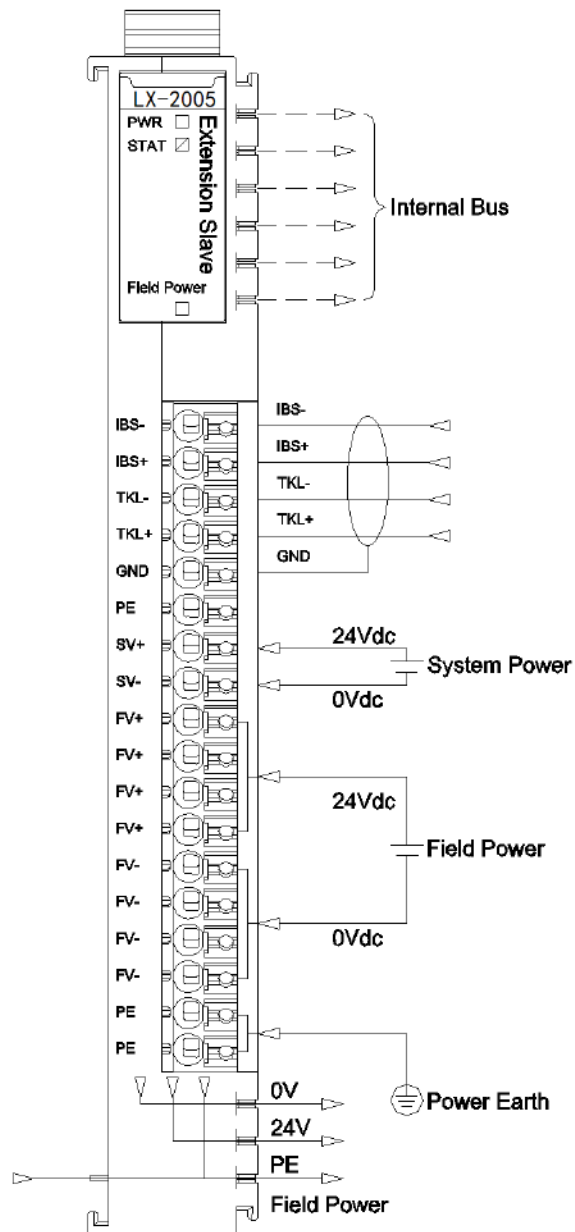


- ① System Power LED indicator (red)
- ② Bus State LED indicator (red/green)

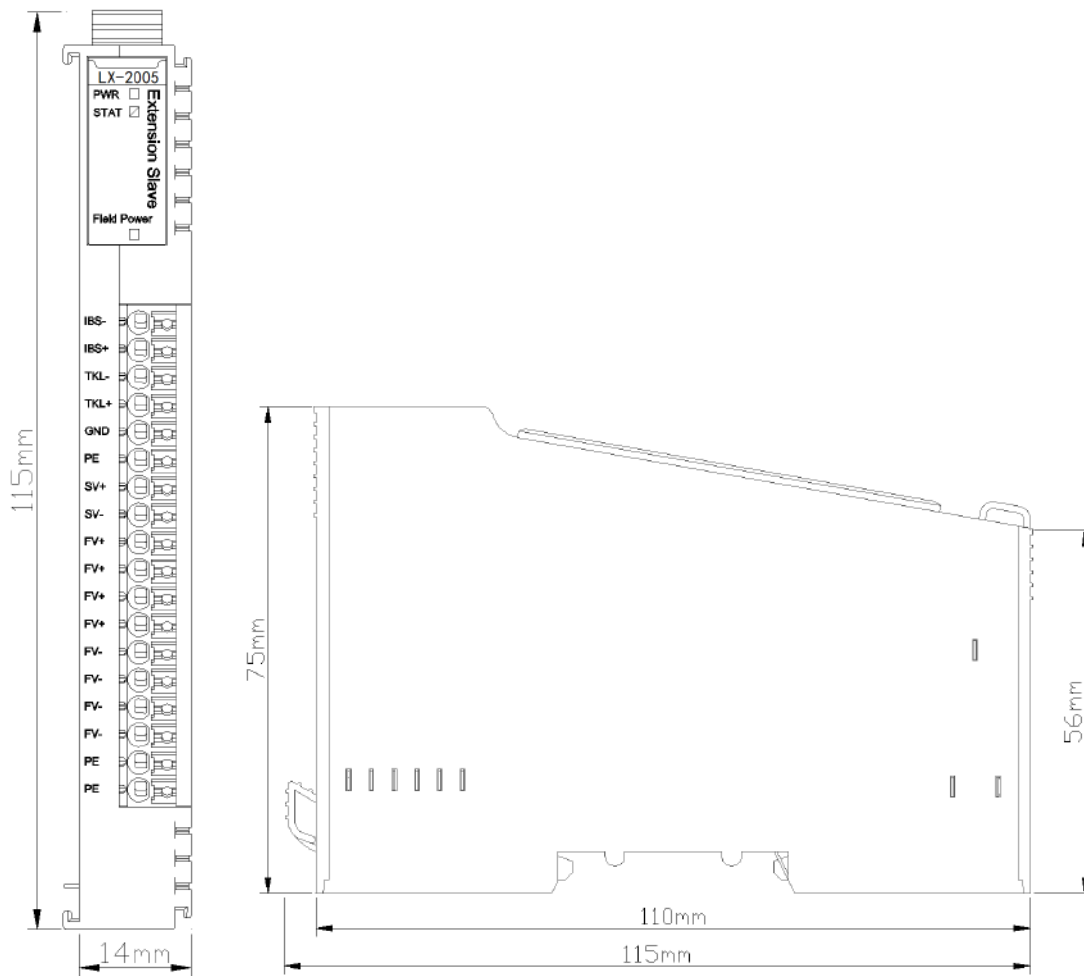
| PWR POWER STATE (RED)      | Definition                               |
|----------------------------|------------------------------------------|
| ON                         | System Power Normal                      |
| OFF                        | System Power Failure                     |
| STAT Bus STATE (RED/GREEN) | Definition                               |
| Green slow flash (2.5Hz)   | Module internal bus is not started       |
| Red slow flash (2.5Hz)     | Module internal bus offline              |
| ON (GREEN)                 | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)   | Upgrading mode                           |
| Flash(10Hz) (RED/GREEN)    | Firmware Update                          |
| Double Flash (RED)         | Module Exception has been soft-restarted |

## 4 Wiring

Bus extended cable requires 5 core shielded cable, IBS+ and IBS- must use twisted pair. PE guarantees a reliable grounding and the total length of the bus extended cable should not exceed 10 meters.

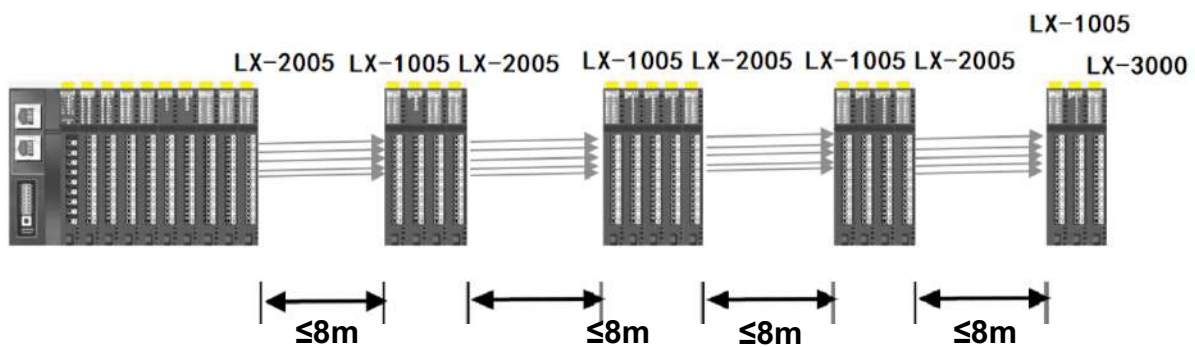


## A Dimension drawing



### 4.1 Bus Expansion Topology Diagram

The backplane bus expansion length spacing should not be greater than 8 meters, the IO module expansion data should be less than 32 units, and it must be equipped with a terminal module LX-3000



## LX-3000 Terminal module (Required)

### 1 Module Description

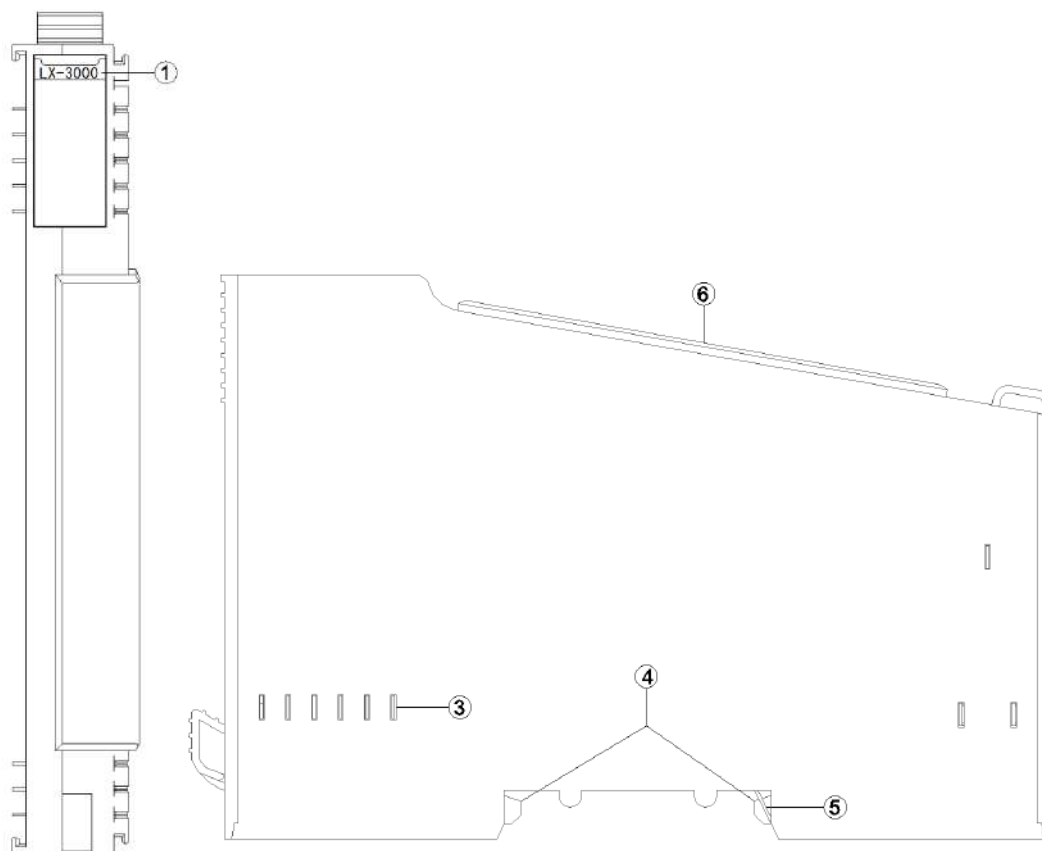
The terminal module is used to stabilize internal bus communication and it is required. The terminal module LX-3000 has no process data and no configuration parameters.

LX-3000 requires no configuration and occupies no slot in configuration.

### 2 Technical Parameters

None

### 3 Hardware Interface



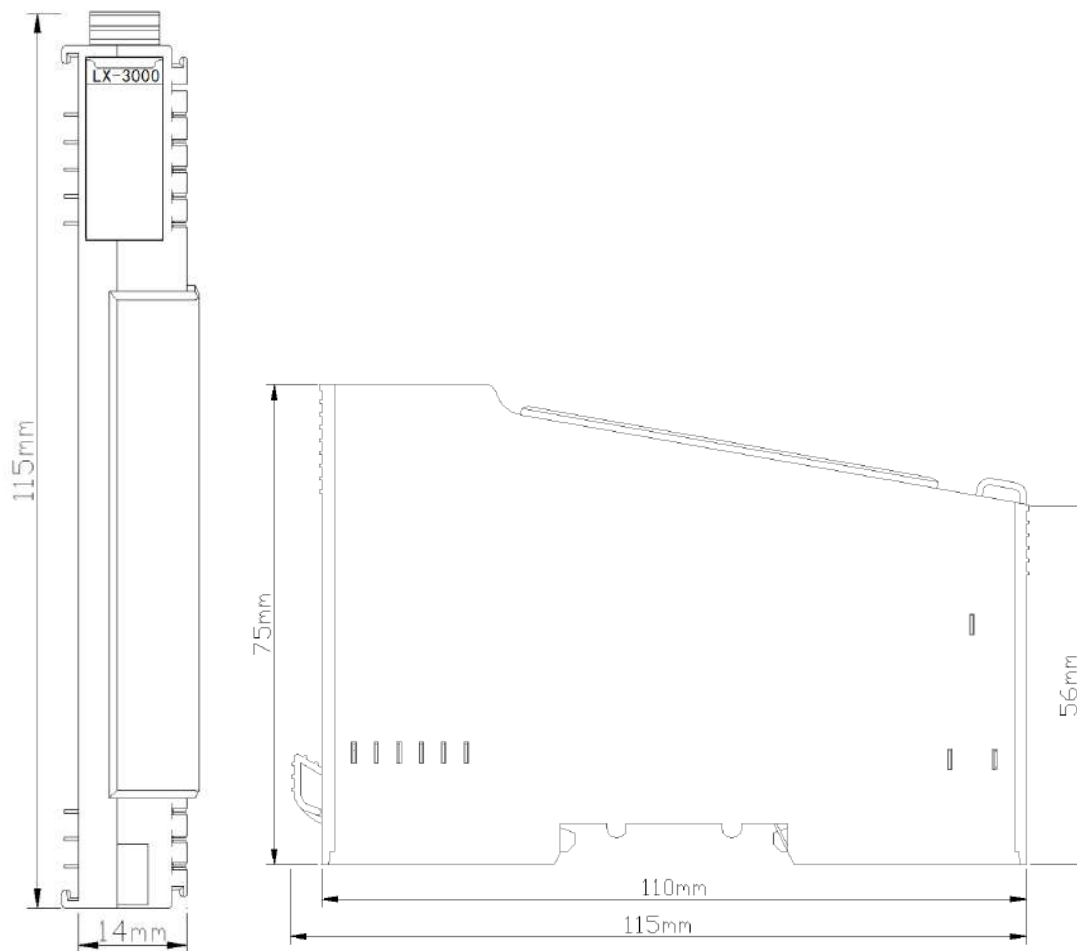
- ① Module Type
- ③ Internal Bus

- ④ Buckle
- ⑤ Grounding Spring Sheet
- ⑥ Terminal Cover

### 3.1 LED indicator definition

None

### A Dimension drawing



# LX-4108 Field Power Expansion Module 8A

*(No Configuration Required)*

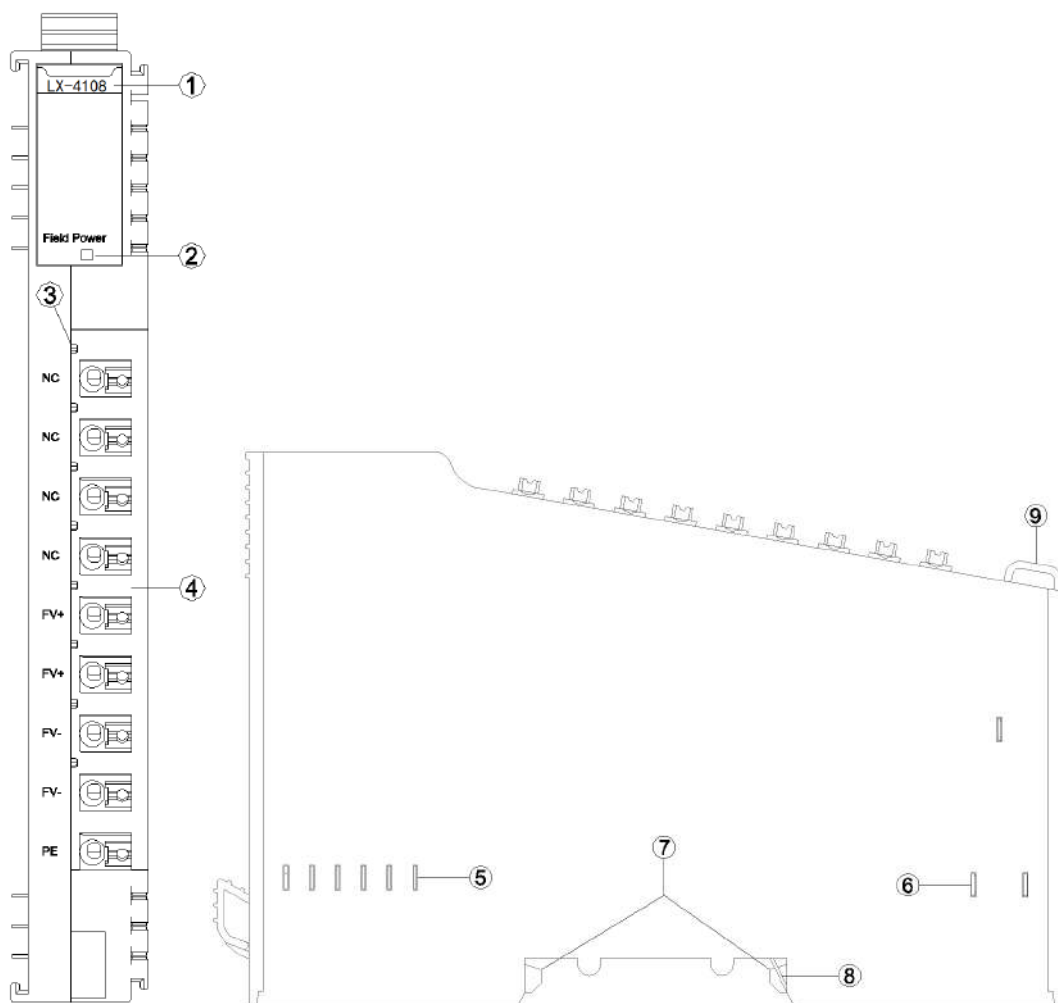
## 1 Module features

- ◆ Field Power Expansion
- ◆ Field Power Expansion with 8A Current
- ◆ No configuration required, does not occupy slot numbers

## 2 Technical parameters

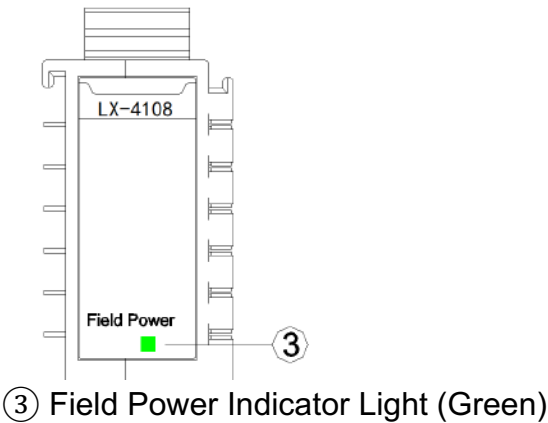
| General parameters        |                                                                          |
|---------------------------|--------------------------------------------------------------------------|
| Field Power               | Range: 22~28V (Nominal 24VDC)<br>Protection: Reverse Polarity Protection |
| Field Power Current       | Max DC 8A                                                                |
| Environment Specification |                                                                          |
| Operational Temperature   | -40~85°C                                                                 |
| Operational Humidity      | 5%-95% (No Condensation)                                                 |
| Ingress Protection Rating | IP20                                                                     |

### 3 Hardware interfaces



- ① Module Type
- ② State indicator
- ③ N.A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

3.1 LED indicator definition



| PW Power State (GREEN) | Definition                 |
|------------------------|----------------------------|
| ON                     | Internal bus Power Normal  |
| OFF                    | Internal bus Power Failure |

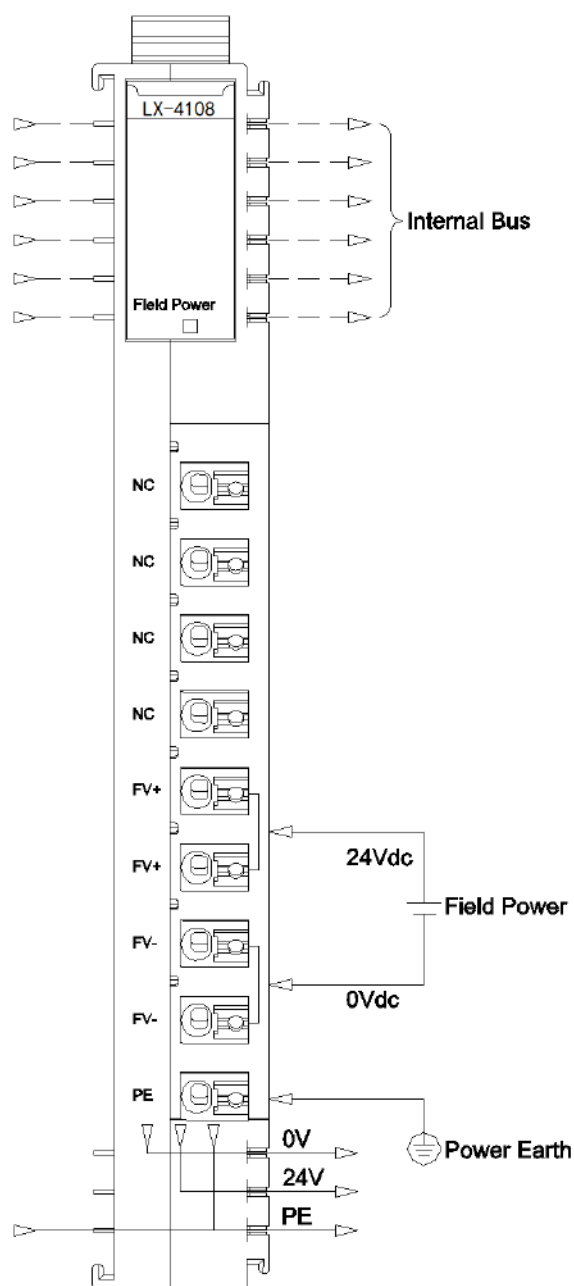
3.2 Terminal definition

| Terminal Number | Symbol | Definition           |
|-----------------|--------|----------------------|
| 1               | NC     | Idle                 |
| 2               | NC     |                      |
| 3               | NC     |                      |
| 4               | NC     |                      |
| 5               | FV+    | Field Power Positive |
| 6               | FV+    |                      |
| 7               | FV-    | Field Power Negative |
| 8               | FV-    |                      |
| 9               | PE     | System Ground        |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.  
The cold-pressed terminal parameters are as follows:



## 4 Wiring



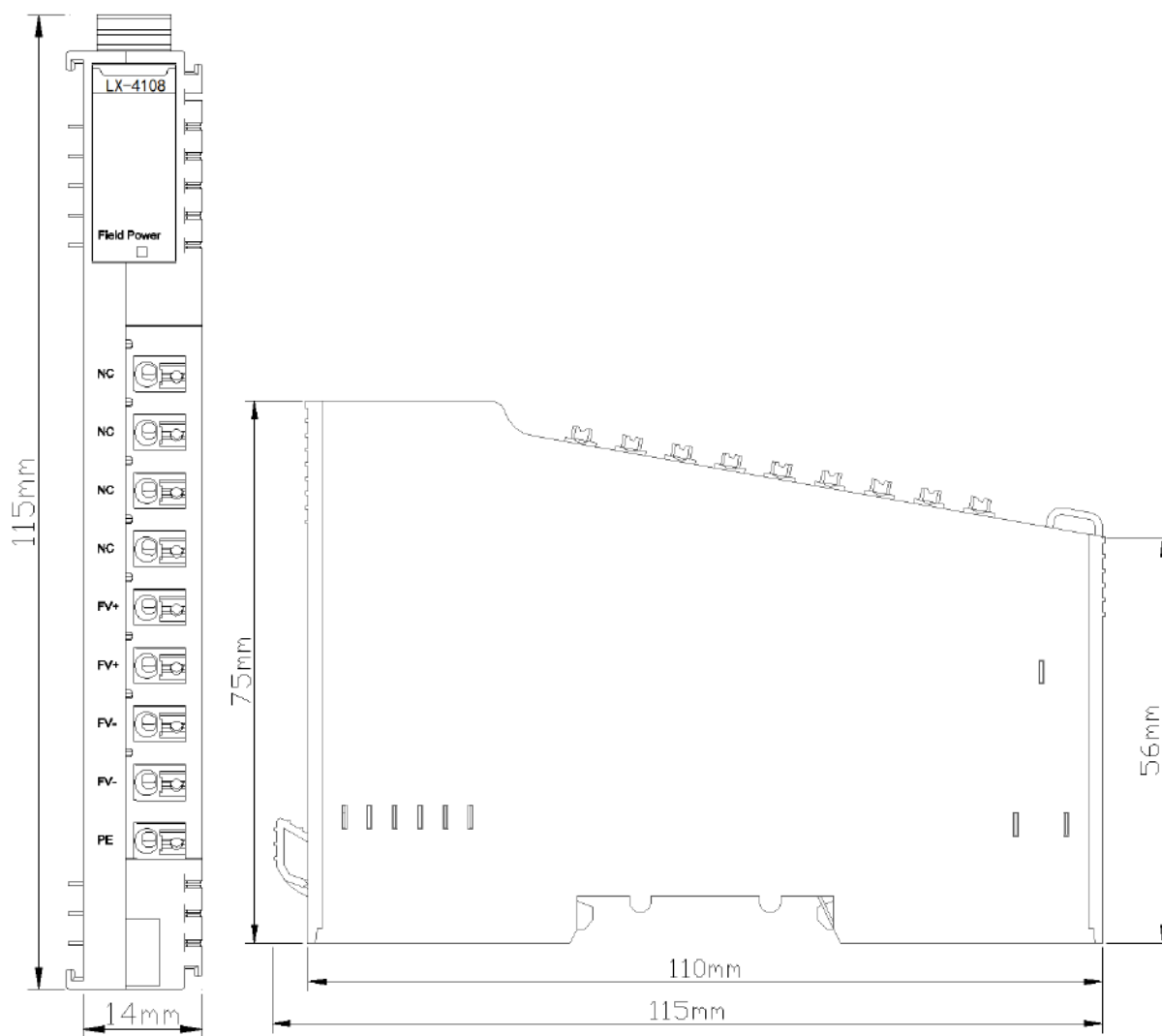
## 5 Process data definition

N.A

## 6 Configuration parameter definitions

N.A

## A Dimension drawing



# LX-4018 18-Channel Field Power Distribution Module (0Vdc)

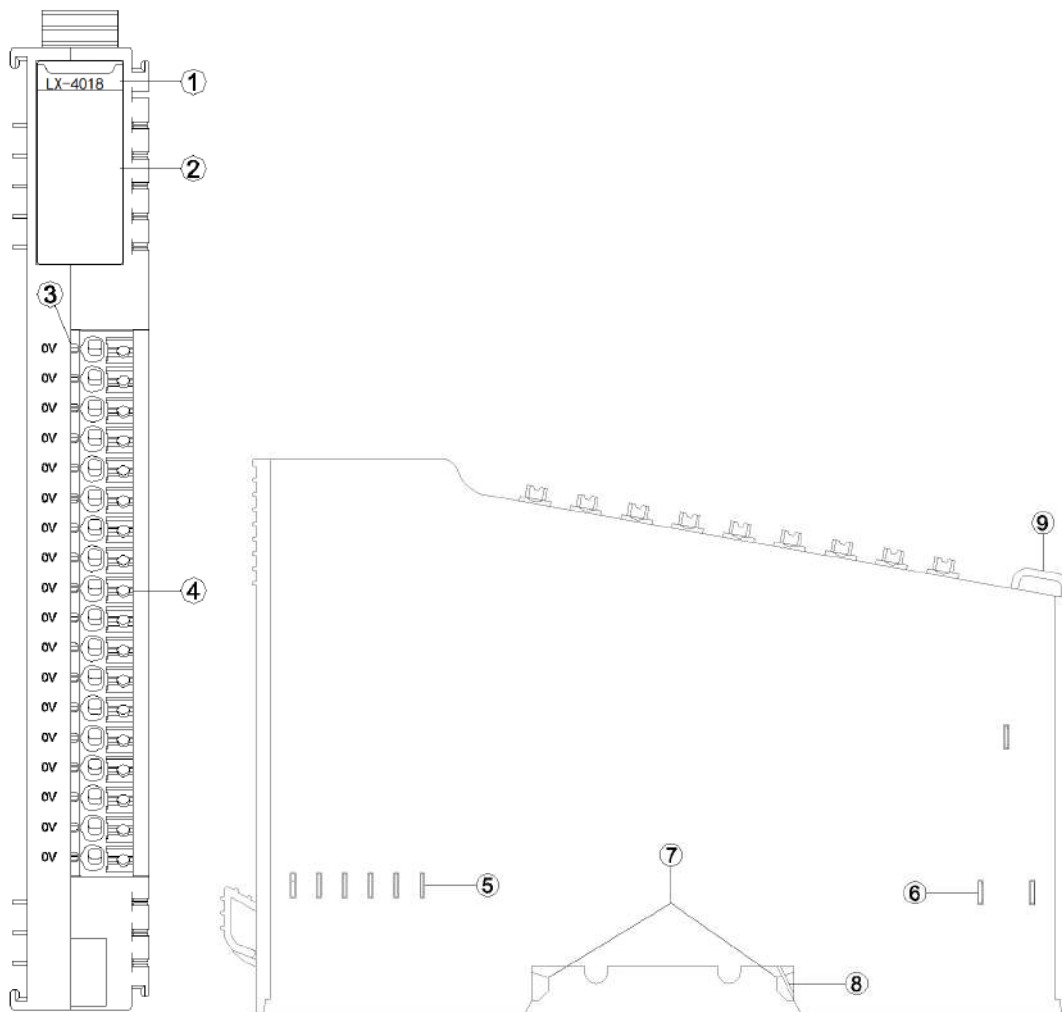
## 1 Module features

- ◆ Supports field power distribution, outputs 0Vdc
- ◆ Supports expansion of 18 channels
- ◆ No configuration required, does not occupy slot

## 2 Technical Parameters

| General parameters        |                                               |
|---------------------------|-----------------------------------------------|
| Operational Temperature   | -40~85℃                                       |
| Operational Humidity      | 5%~95% RH(No Condensation)                    |
| Ingress Protection Rating | IP20                                          |
| Output Parameter          |                                               |
| Channel Number            | 18-Channel 0Vdc Potential Distribution Output |

### 3 Hardware Interface



- ① Module Type
- ② N/A
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

#### 3.1 LED indicator definition

N/A

3.2 Terminal definition

| Terminal Number | Definition | Description |
|-----------------|------------|-------------|
| 1               | 0V         | 0Vdc output |
| 2               |            |             |
| 3               |            |             |
| 4               |            |             |
| 5               |            |             |
| 6               |            |             |
| 7               |            |             |
| 8               |            |             |
| 9               |            |             |
| 10              |            |             |
| 11              |            |             |
| 12              |            |             |
| 13              |            |             |
| 14              |            |             |
| 15              |            |             |
| 16              |            |             |
| 17              |            |             |
| 18              |            |             |

It is recommended to use cables with cores smaller than 1mm².  
The cold-pressed terminal parameters are as follows:



The diagram illustrates the LX-4018 terminal block with the following connections:

- Internal Bus:** A group of 10 terminals on the right side, connected to the internal bus.
- 0VDC (PV-):** A group of 16 terminals in the middle, labeled 0V, connected to the 0VDC (PV-) line.
- Field Power:** Three terminals at the bottom labeled 0V, 24V, and PE, connected to the field power supply.

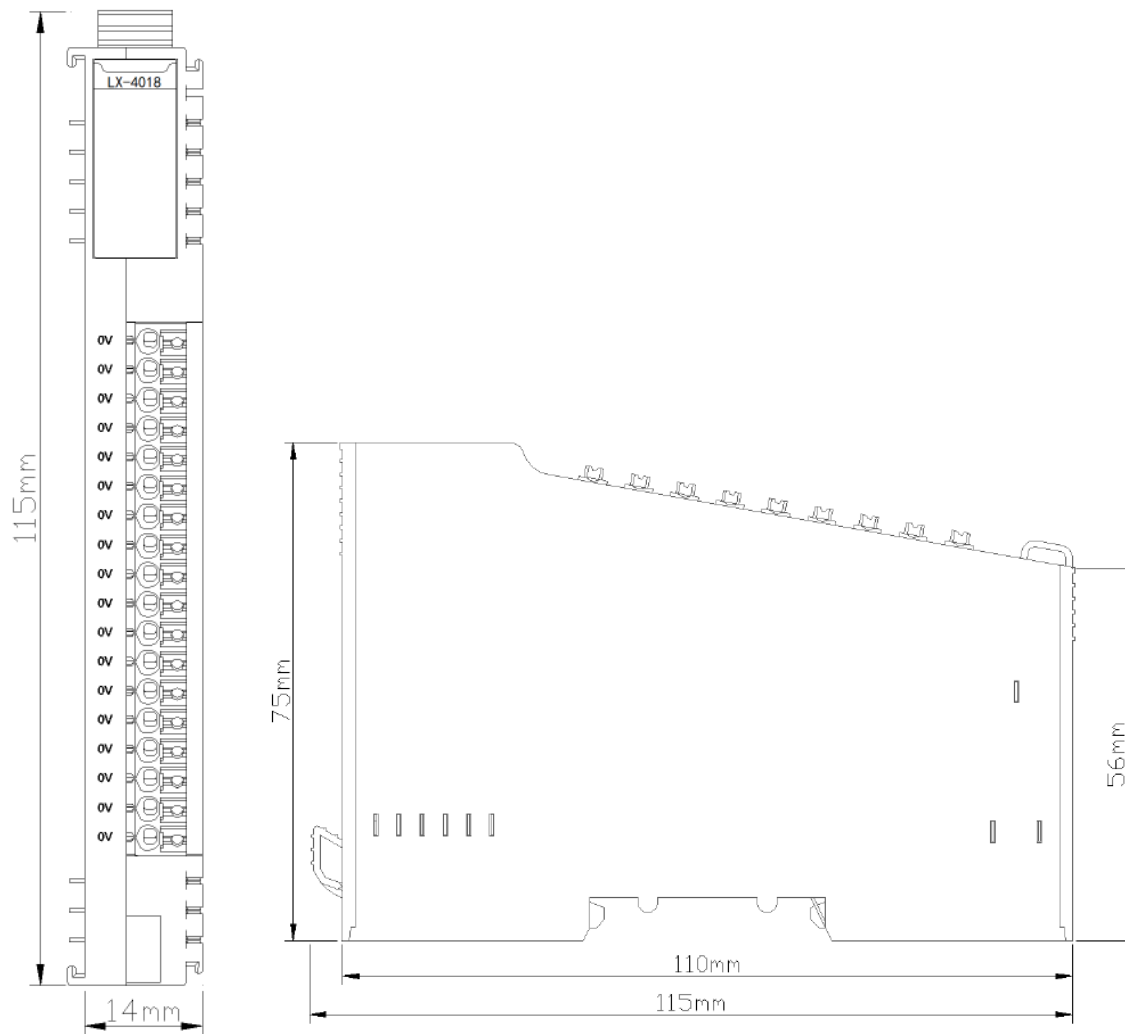
## 5 Process data definition

N/A

## 6 Configuration parameters definition

N/A

## A Dimension drawing



# LX-4118 18-Channel Field Power Distribution Module (24Vdc)

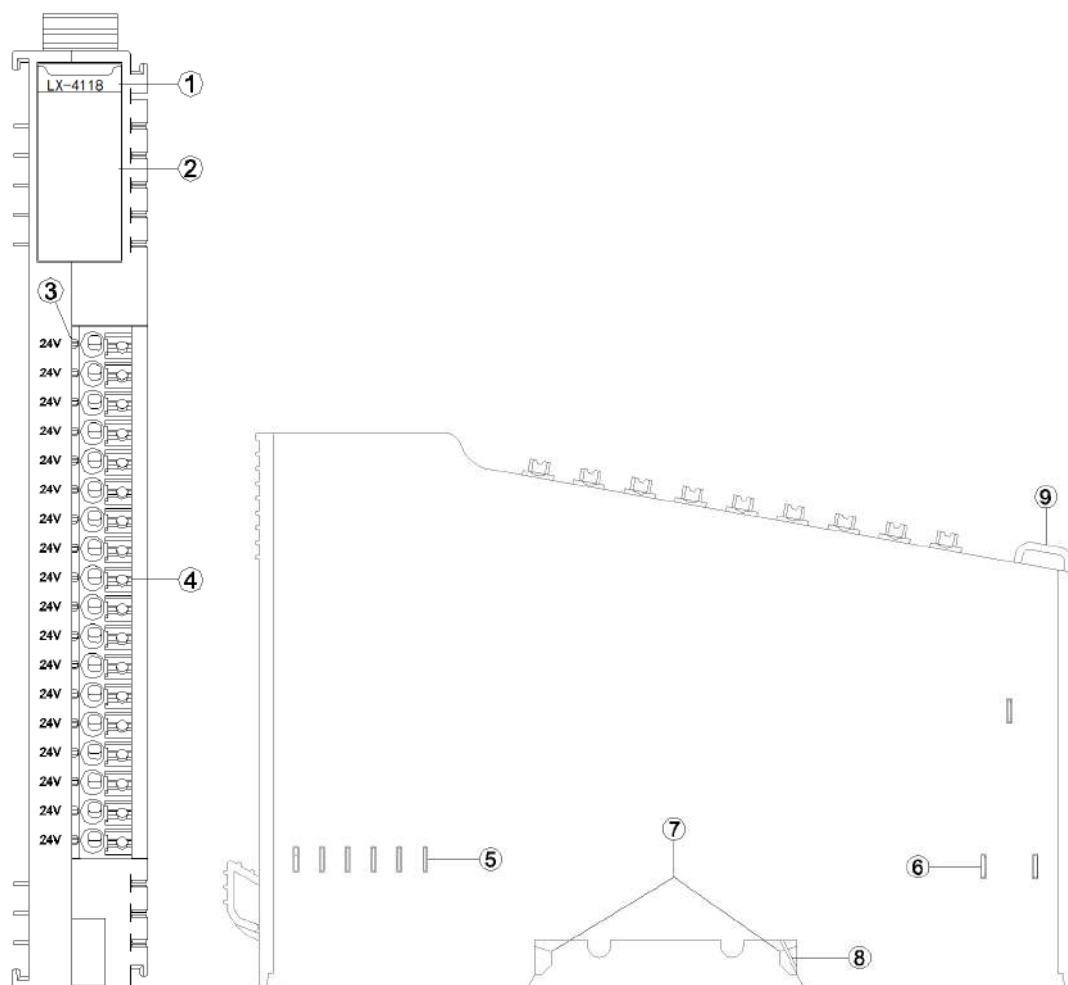
## 1 Module features

- ◆ Supports field power distribution, outputs 24Vdc
- ◆ Supports expansion of 18 channels
- ◆ No configuration required, does not occupy slot numbers

## 2 Technical Parameters

| Environment Specification |                                                |
|---------------------------|------------------------------------------------|
| Operational Temperature   | -40~85°C                                       |
| Operational Humidity      | 5%~95% RH(No Condensation)                     |
| Ingress Protection Rating | IP20                                           |
| Output Parameter          |                                                |
| Channel Number            | 18-Channel 24Vdc Potential Distribution Output |

### 3 Hardware Interface



- ① Module Type
- ② N/A
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

3.1 LED indicator definition

N/A

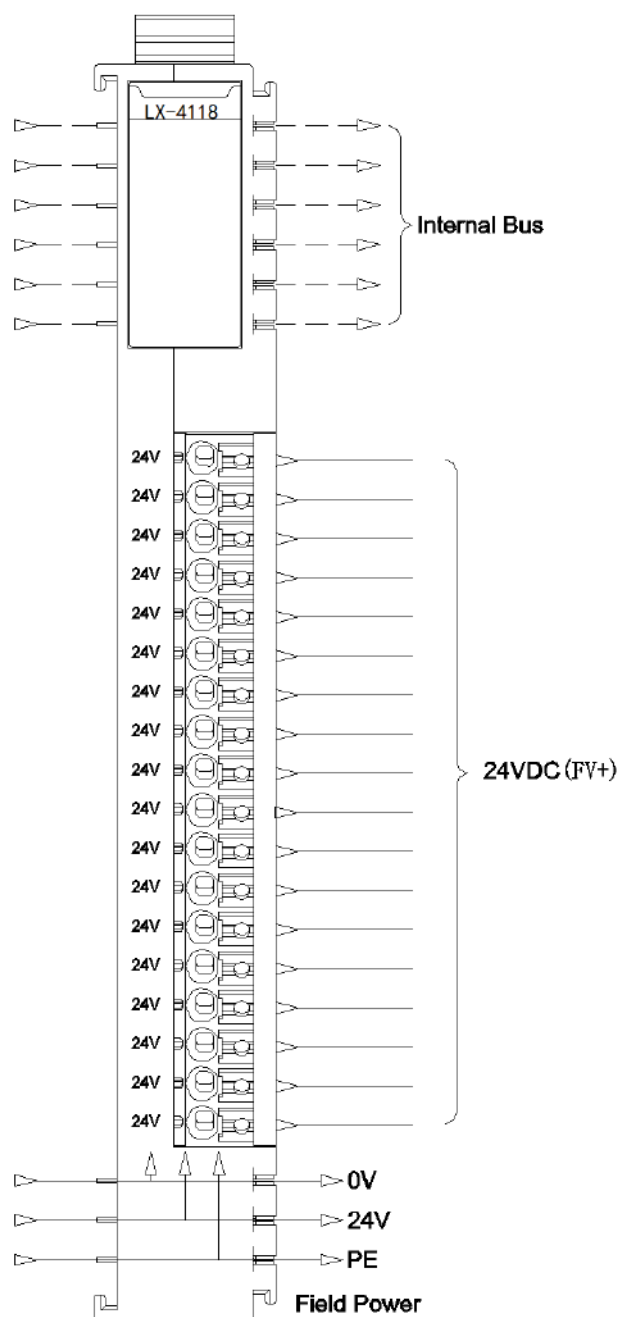
3.2 Terminal definition

| Terminal Number | Definition | Description  |
|-----------------|------------|--------------|
| 1               | 24V        | 24Vdc Output |
| 2               |            |              |
| 3               |            |              |
| 4               |            |              |
| 5               |            |              |
| 6               |            |              |
| 7               |            |              |
| 8               |            |              |
| 9               |            |              |
| 10              |            |              |
| 11              |            |              |
| 12              |            |              |
| 13              |            |              |
| 14              |            |              |
| 15              |            |              |
| 16              |            |              |
| 17              |            |              |
| 18              |            |              |

It is recommended to use cables with cores smaller than 1mm².  
The cold-pressed terminal parameters are as follows:



## 4 Wiring



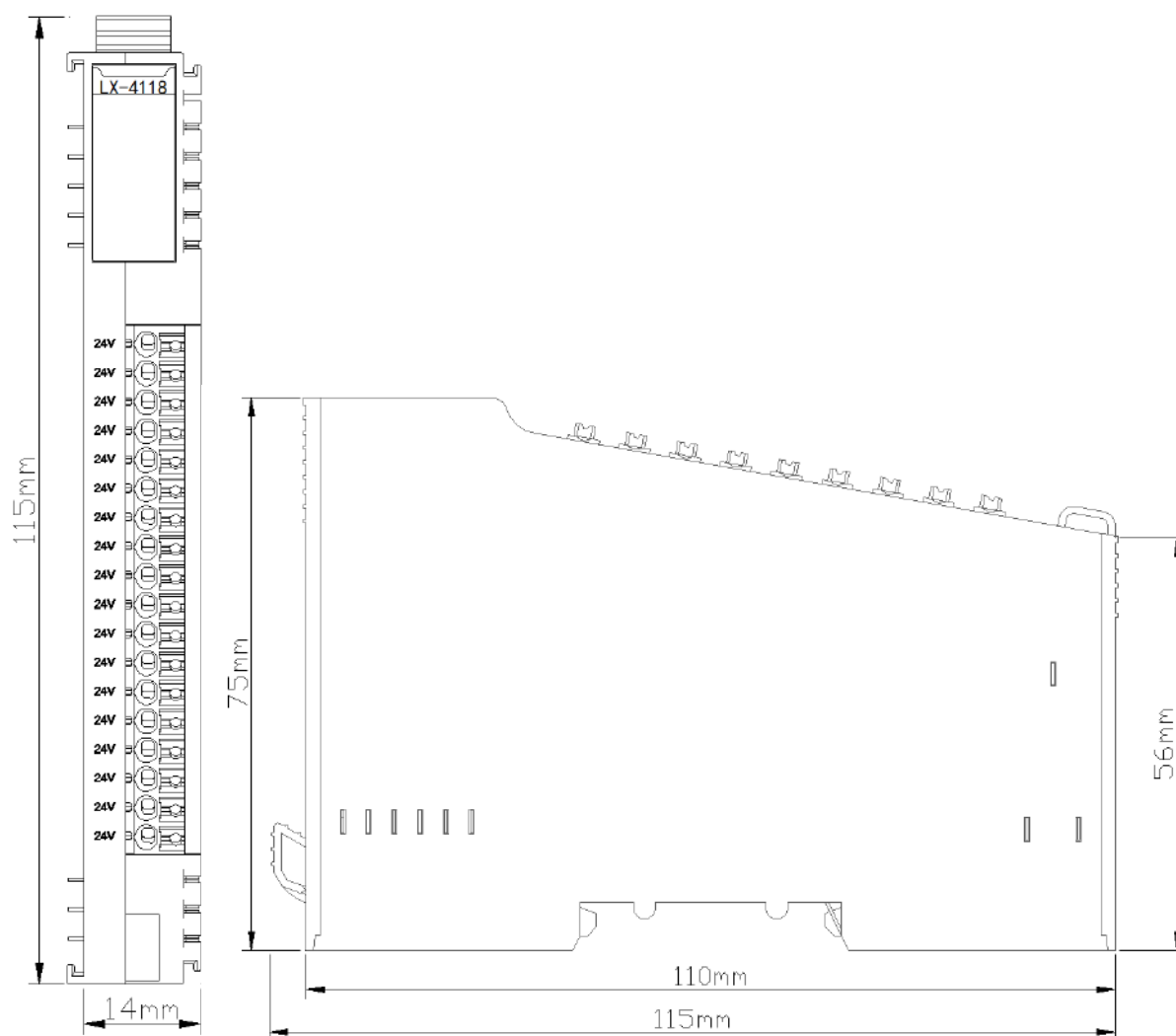
## 5 Process data definition

N/A

## 6 Configuration parameters definition

N/A

## A Dimension drawing



# LX-4218 18-Channel Field Power Distribution Module (PE)

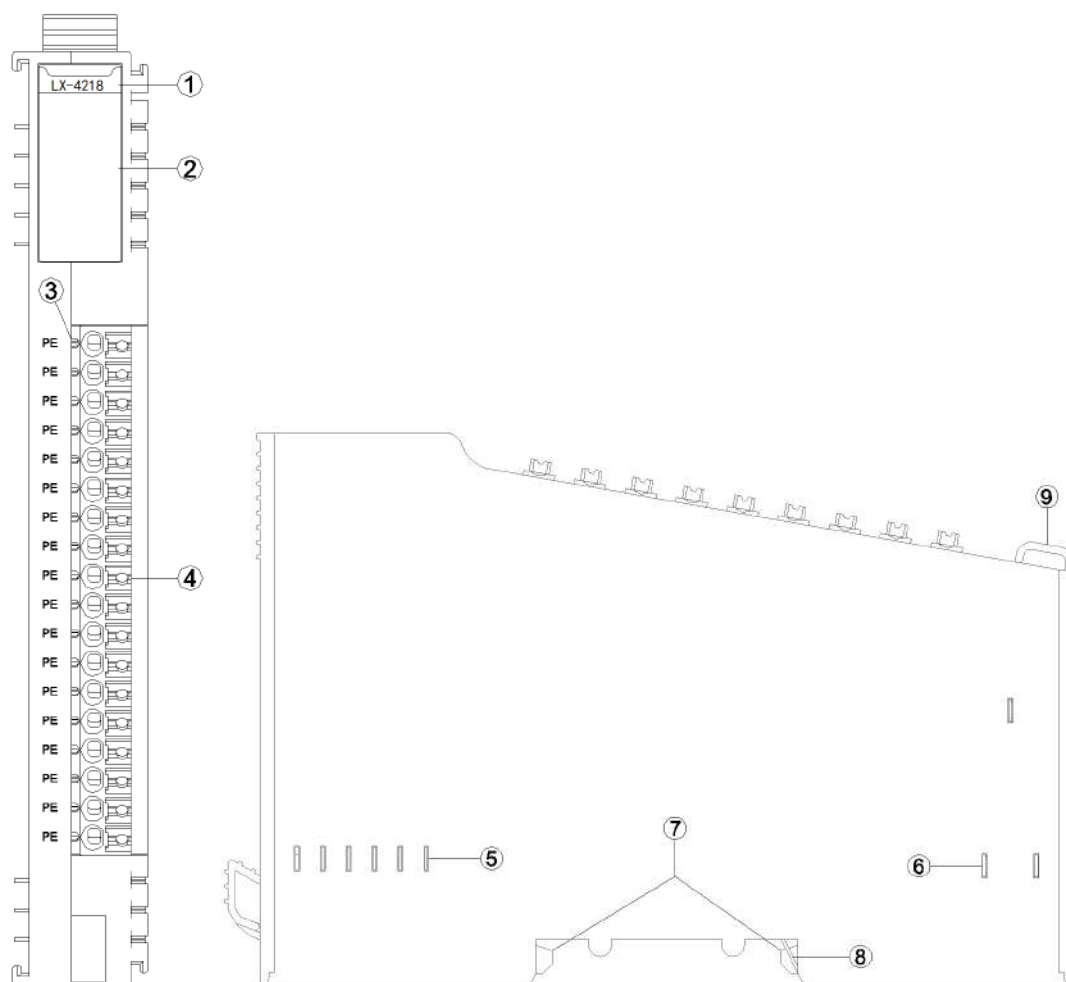
## 1 Module features

- ◆ Supports field power distribution, outputs PE
- ◆ Supports expansion of 18 channels
- ◆ No configuration required, does not occupy slot

## 2 Technical Parameters

| Environment Specification |                                             |
|---------------------------|---------------------------------------------|
| Operational Temperature   | -40~85℃                                     |
| Operational Humidity      | 5%~95% RH(No Condensation)                  |
| Ingress Protection Rating | IP20                                        |
| Output Parameter          |                                             |
| Channel Number            | 18-Channel PE Potential Distribution Output |

### 3 Hardware Interface



- ① Module Type
- ② N/A
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

#### 3.1 LED indicator definition

N/A

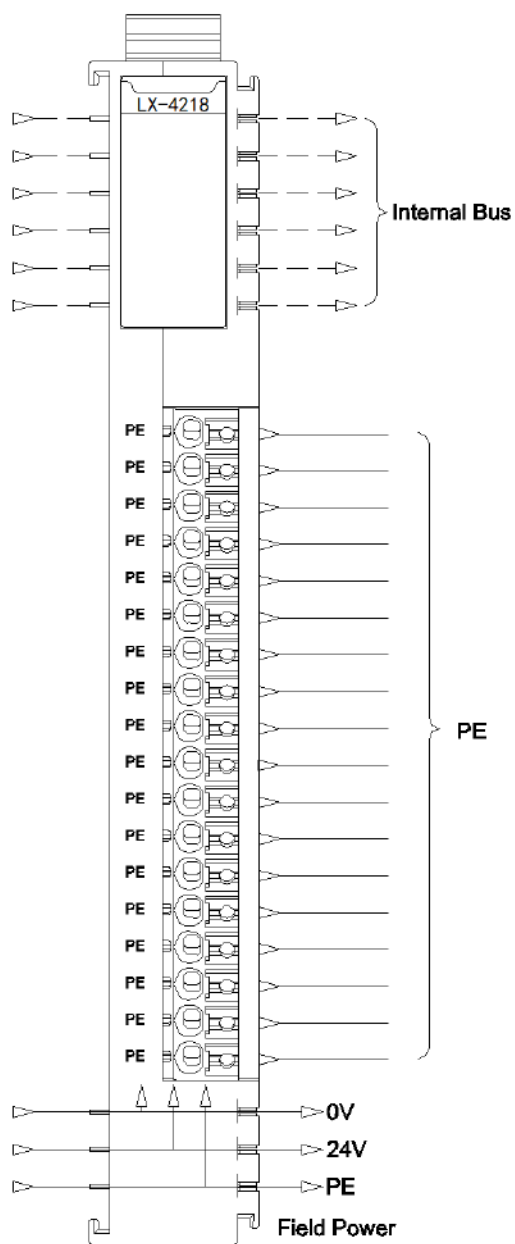
3.2 Terminal definition

| Terminal Number | Definition | Description |
|-----------------|------------|-------------|
| 1               | PE         | PE Output   |
| 2               |            |             |
| 3               |            |             |
| 4               |            |             |
| 5               |            |             |
| 6               |            |             |
| 7               |            |             |
| 8               |            |             |
| 9               |            |             |
| 10              |            |             |
| 11              |            |             |
| 12              |            |             |
| 13              |            |             |
| 14              |            |             |
| 15              |            |             |
| 16              |            |             |
| 17              |            |             |
| 18              |            |             |

It is recommended to use cables with cores smaller than 1mm².  
The cold-pressed terminal parameters are as follows:



## 4 Wiring



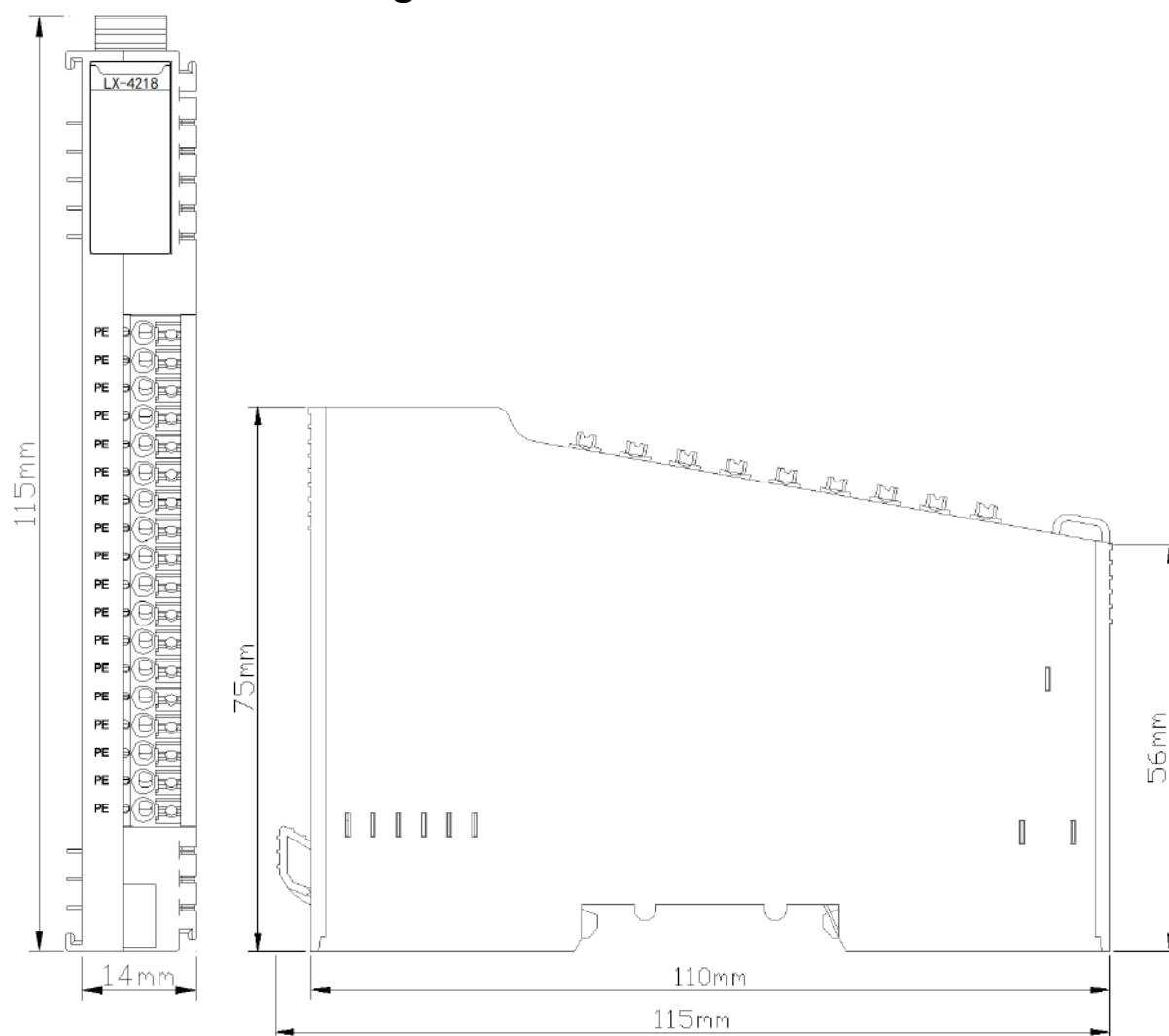
## 5 Process data definition

N/A

## 6 Configuration parameters definition

N/A

## A Dimension drawing



## LX-4009 18-Channel Field Power Distribution Module (24Vdc/0Vdc)

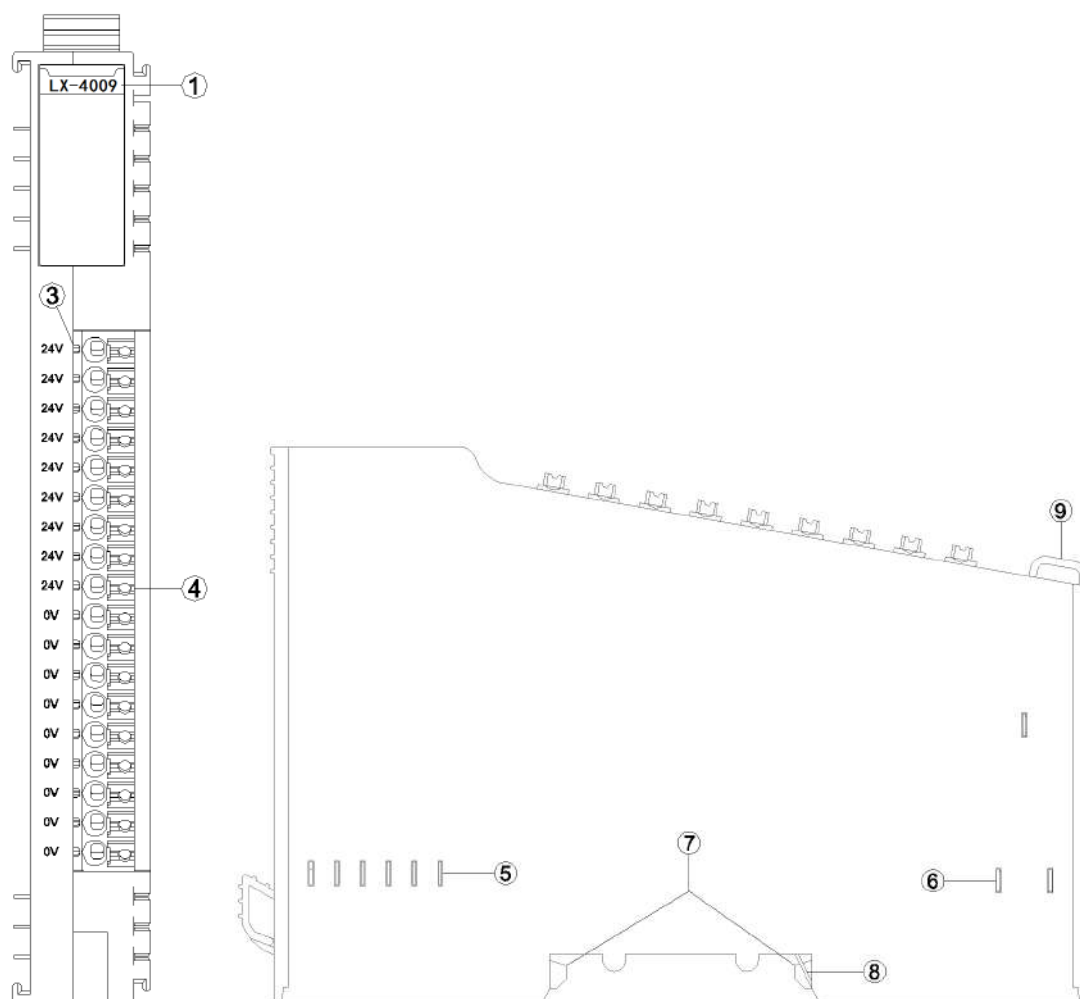
### 1 Module features

- ◆ Supports field power distribution, outputs 24Vdc/0Vdc
- ◆ Supports expansion of 18 channels, 9 channels for 24Vdc output, 9 channels for 0Vdc output
- ◆ No configuration required, does not occupy slot numbers

### 2 Technical Parameters

| Environment Specification |                                                                                               |
|---------------------------|-----------------------------------------------------------------------------------------------|
| Operational Temperature   | -40~85°C                                                                                      |
| Operational Humidity      | 5%~95% RH(No Condensation)                                                                    |
| Ingress Protection Rating | IP20                                                                                          |
| Output Parameter          |                                                                                               |
| Channel Number            | 9-Channel 24Vdc Potential Distribution Output<br>9-Channel 0Vdc Potential Distribution Output |

### 3 Hardware Interface



- ② Module Type
- ② N/A
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

3.1 LED indicator definition

N/A

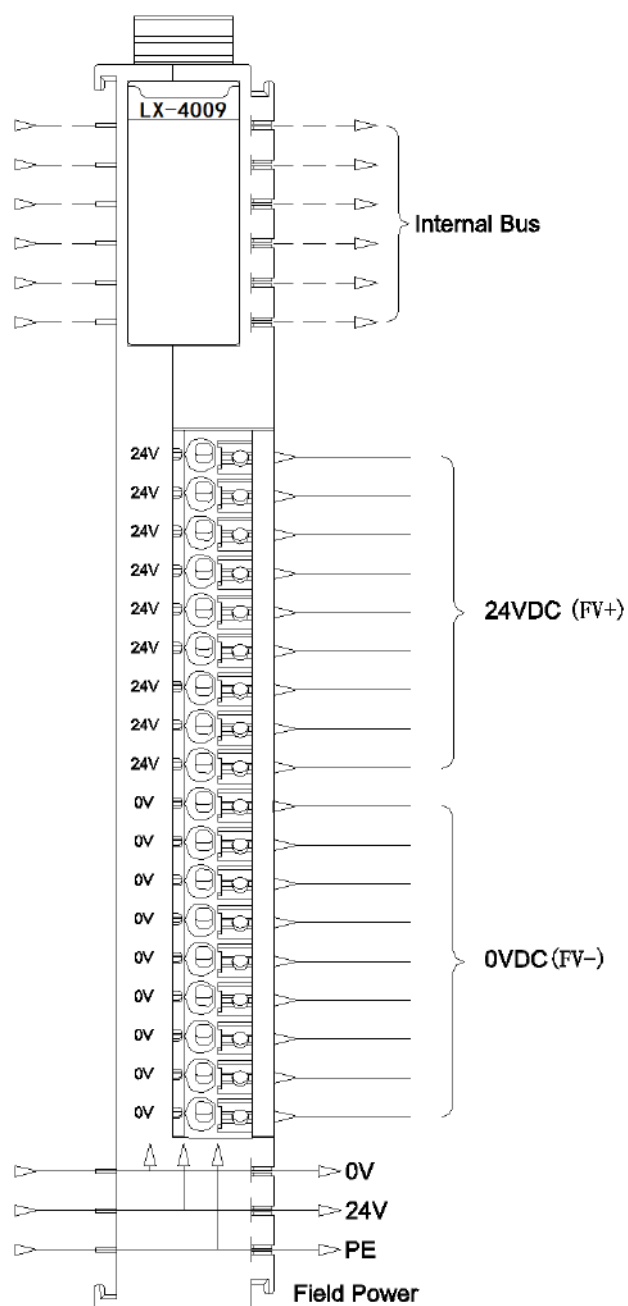
3.2 Terminal definition

| Terminal Number | Definition | Description  |
|-----------------|------------|--------------|
| 1               | 24Vdc      | 24Vdc Output |
| 2               |            |              |
| 3               |            |              |
| 4               |            |              |
| 5               |            |              |
| 6               |            |              |
| 7               |            |              |
| 8               |            |              |
| 9               |            |              |
| 10              | 0Vdc       | 0Vdc Output  |
| 11              |            |              |
| 12              |            |              |
| 13              |            |              |
| 14              |            |              |
| 15              |            |              |
| 16              |            |              |
| 17              |            |              |
| 18              |            |              |

It is recommended to use cables with cores smaller than 1mm².  
The cold-pressed terminal parameters are as follows:



## 4 Wiring



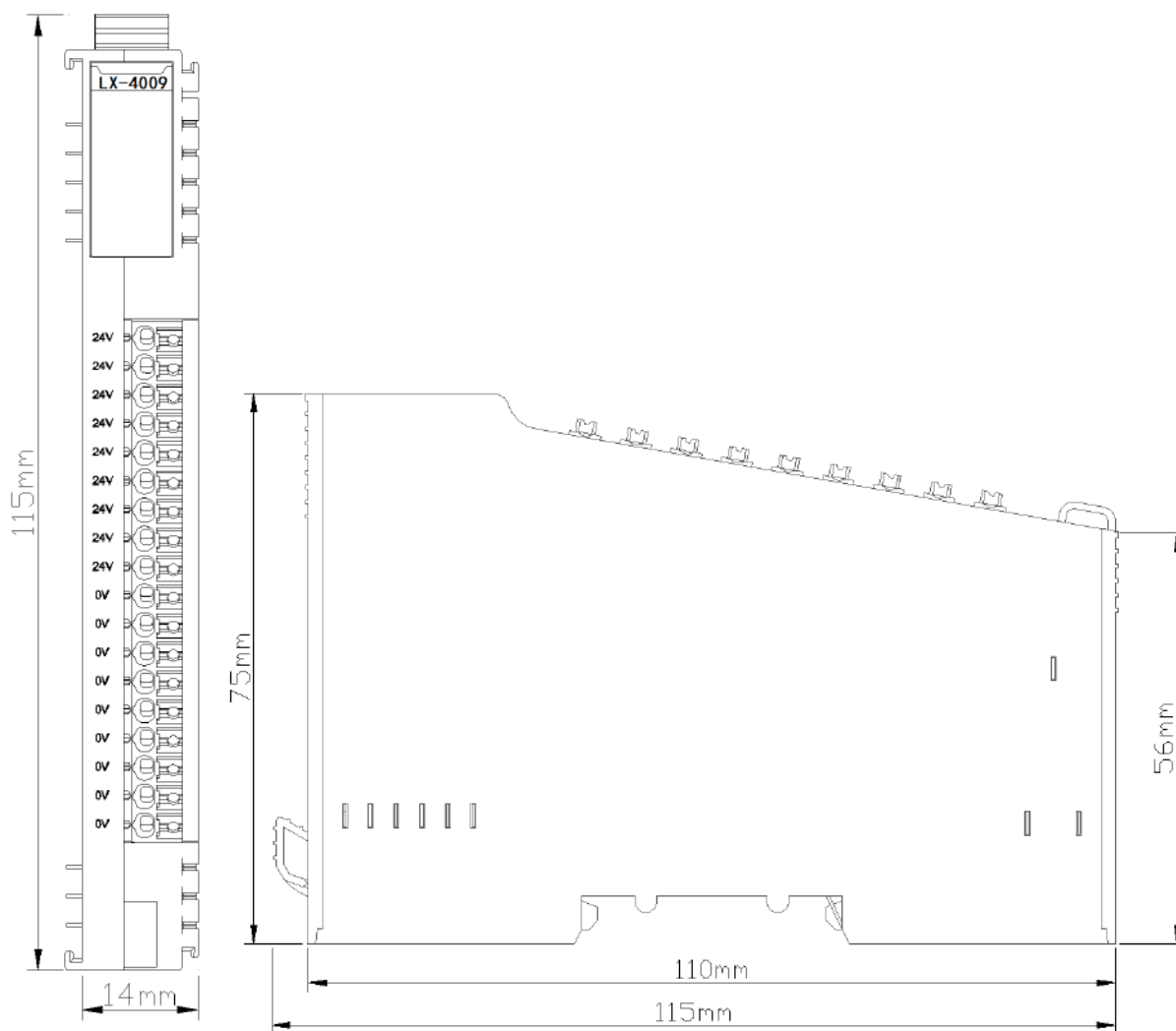
## 5 Process data definition

N/A

## 6 Configuration parameters definition

N/A

## A Dimension drawing



# LX-4006 18-Channel Field Power Distribution Module

## (24Vdc/0Vdc/PE)

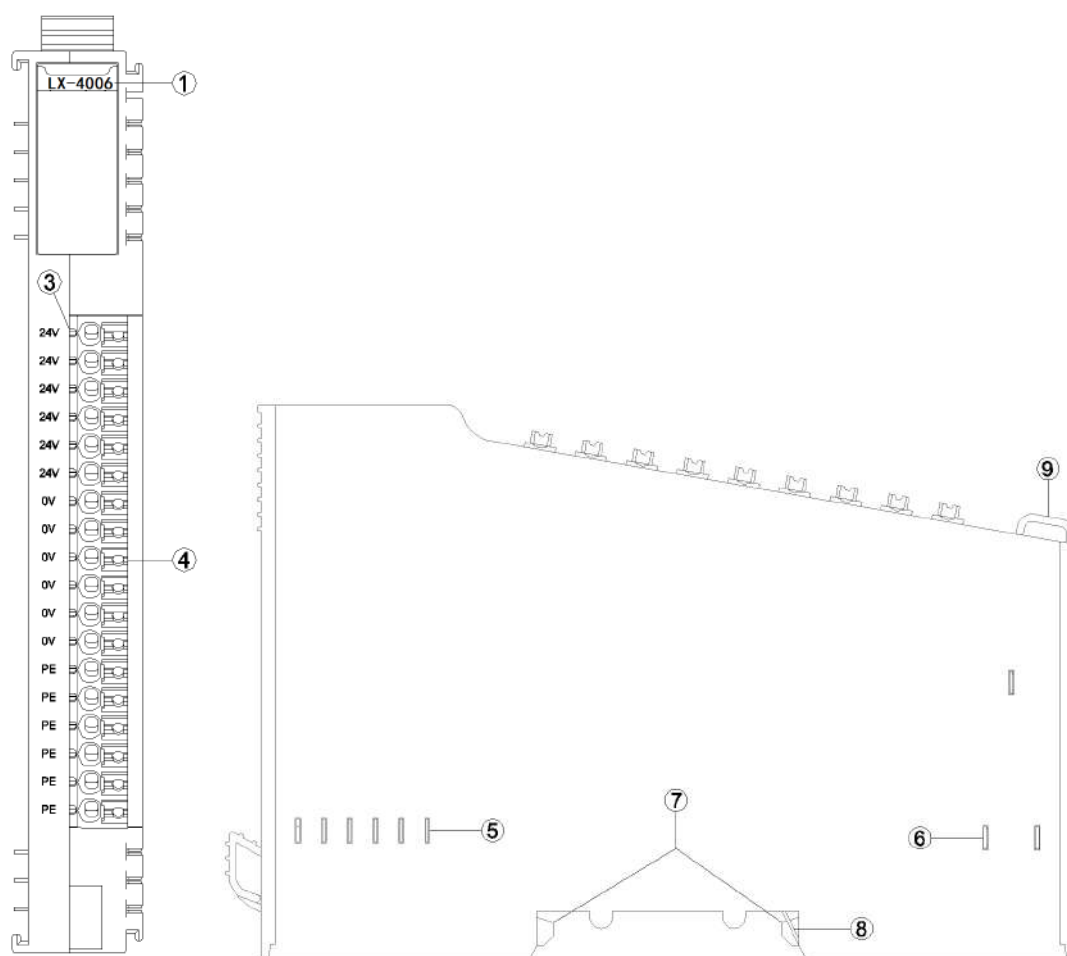
### 1 Module features

- ◆ Supports field power distribution, outputs 24Vdc/0Vdc/PE
- ◆ Supports expansion of 18 channels, with 6 channels for 24Vdc output, 6 channels for 0Vdc output, and 6 channels for PE output
- ◆ No configuration required, does not occupy slot numbers

### 2 Technical parameters

| Environment Specification |                                                                                                                                             |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Operational Temperature   | -40~85°C                                                                                                                                    |
| Operational Humidity      | 5%~95% RH(No Condensation)                                                                                                                  |
| Ingress Protection Rating | IP20                                                                                                                                        |
| Output Parameter          |                                                                                                                                             |
| Channel Number            | 6-Channel 24Vdc Potential Distribution Output<br>6-Channel 0Vdc Potential Distribution Output<br>6-Channel PE Potential Distribution Output |

### 3 Hardware Interface



- ① Module Type
- ② N/A
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

#### 3.1 LED indicator definition

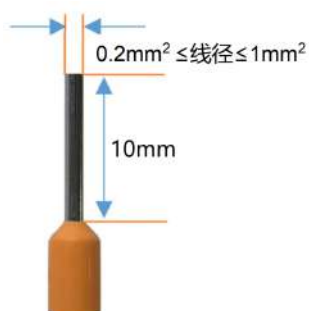
N/A

### 3.2 Terminal definition

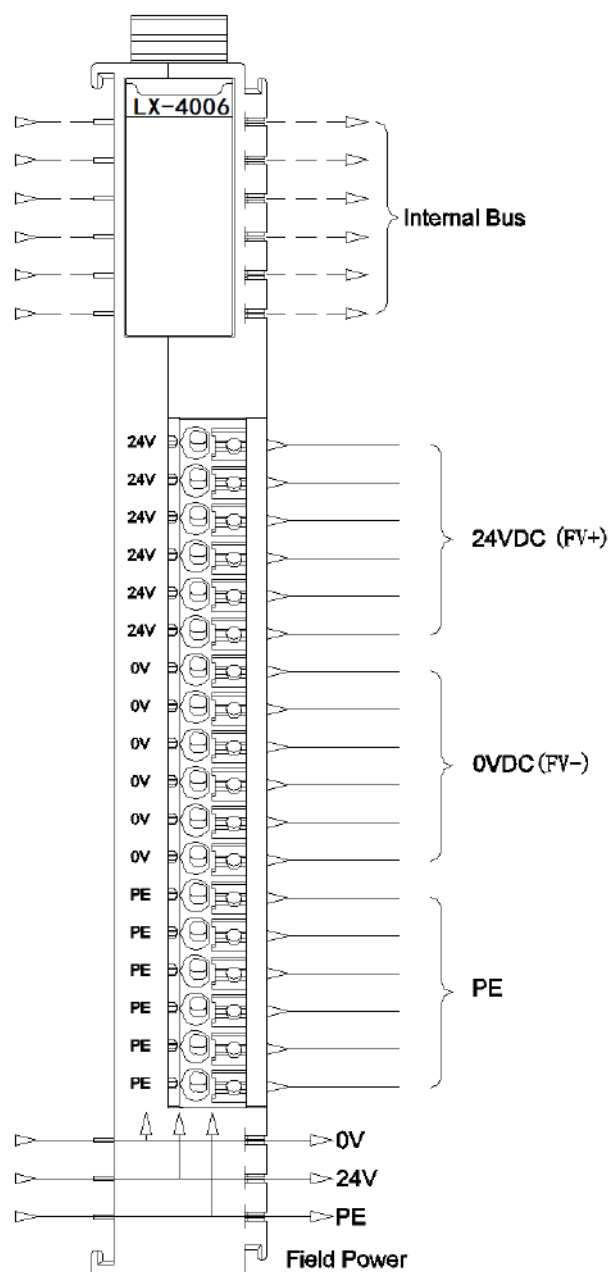
| Terminal Number | Definition | Description  |
|-----------------|------------|--------------|
| 1               | 24Vdc      | 24Vdc Output |
| 2               |            |              |
| 3               |            |              |
| 4               |            |              |
| 5               |            |              |
| 6               |            |              |
| 7               | 0Vdc       | 0Vdc Output  |
| 8               |            |              |
| 9               |            |              |
| 10              |            |              |
| 11              |            |              |
| 12              |            |              |
| 13              | PE         | PE Output    |
| 14              |            |              |
| 15              |            |              |
| 16              |            |              |
| 17              |            |              |
| 18              |            |              |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



## 4 Wiring



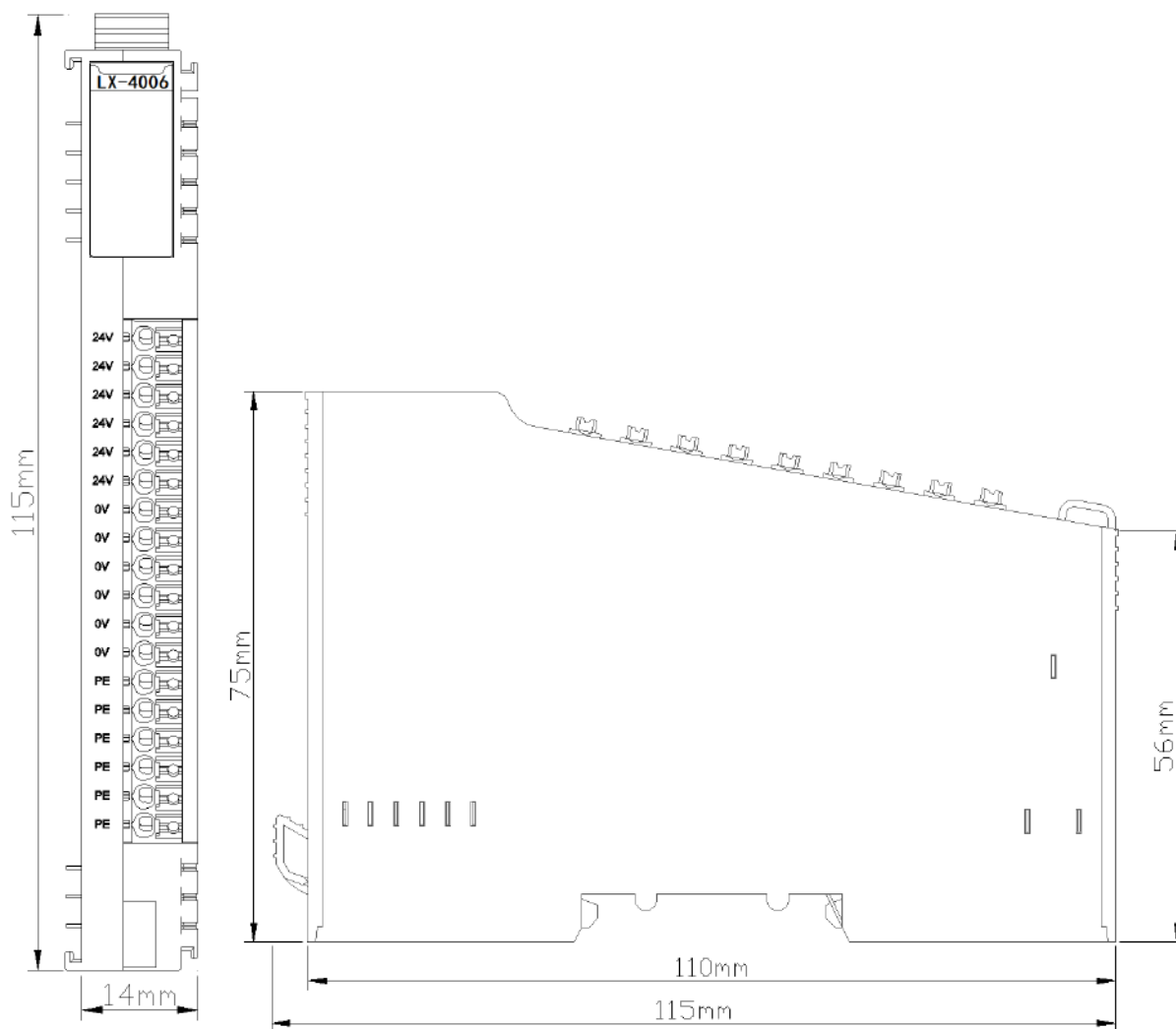
## 5 Process data definition

N/A

## 6 Configuration parameters definition

N/A

## A Dimension drawing



# LD-6008 Power Supply Extension Module 5V/2A

(requires no configuration)

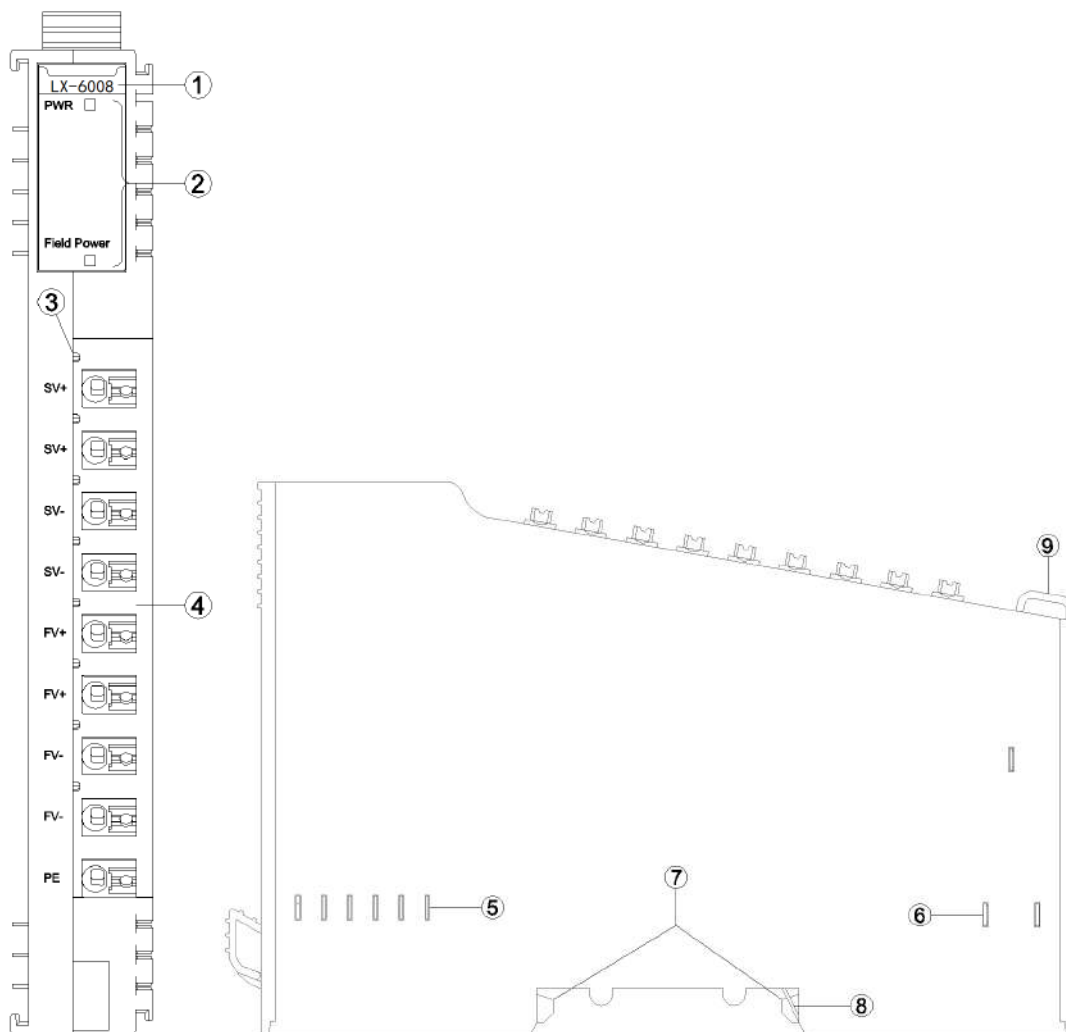
## 1 Module features

- ◆ System Power and Field Power Extension
- ◆ System Power Output 2A@5VDC
- ◆ Field Power Extension 8A Current
- ◆ Requires no configuration and occupies no slot in configuration.

## 2 Technical Parameters

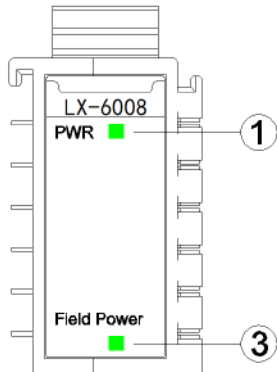
| General parameters          |                                                                                                          |
|-----------------------------|----------------------------------------------------------------------------------------------------------|
| System Power                | Nominal: 24Vdc, Range: 9-36Vdc<br>Protection: overcurrent protection, anti-reverse connection protection |
| Internal Bus Supply Current | Max: 2.0A@5VDC                                                                                           |
| Isolation                   | System Power to Field Power Isolation                                                                    |
| Field Power                 | Power Supply: 22~28V (Nominal: 24Vdc)<br>Protection: anti-reverse connection protection                  |
| Field Power Supply Current  | Max. DC 8A                                                                                               |
| Environment Specification   |                                                                                                          |
| Operational Temperature     | -40~85°C                                                                                                 |
| Operational Humidity        | 5%~95% RH(No Condensation)                                                                               |
| Ingress Protection Rating   | IP20                                                                                                     |

### 3 Hardware Interface



- ① Module Type
- ② State indicator
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

**3.1 LED indicator definition**



- ① System Power LED Indicator (green)
- ③ Field Power LED Indicator (green)

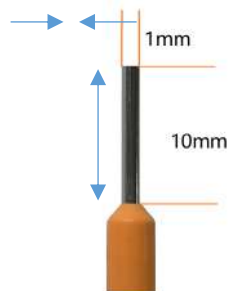
| PWR Power LED Indicator<br>(GREEN)     | Definition                          |
|----------------------------------------|-------------------------------------|
| ON                                     | The system power supply is normal.  |
| OFF                                    | The system power supply is failure. |
| Field Power LED Indicator<br>( GREEN ) | Definition                          |
| ON                                     | The field power supply is normal.   |
| OFF                                    | The field power supply is failure.  |

### 3.2 Terminal definition

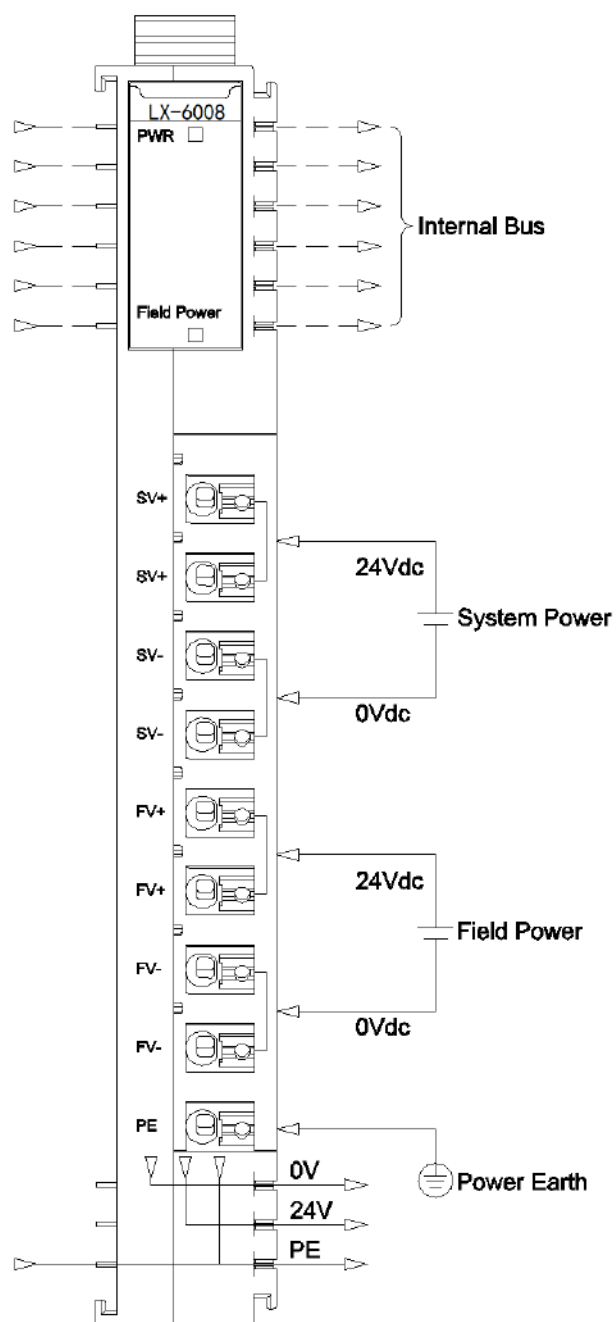
| Terminal Number | Definition | Description                |
|-----------------|------------|----------------------------|
| 1               | SV+        | System Power Positive Pole |
| 2               | SV+        |                            |
| 3               | SV-        | System Power Negative Pole |
| 4               | SV-        |                            |
| 5               | FV+        | Field Power Positive Pole  |
| 6               | FV+        |                            |
| 7               | FV-        | Field Power Negative Pole  |
| 8               | FV-        |                            |
| 9               | PE         | System Grounded            |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



## 4 Wiring



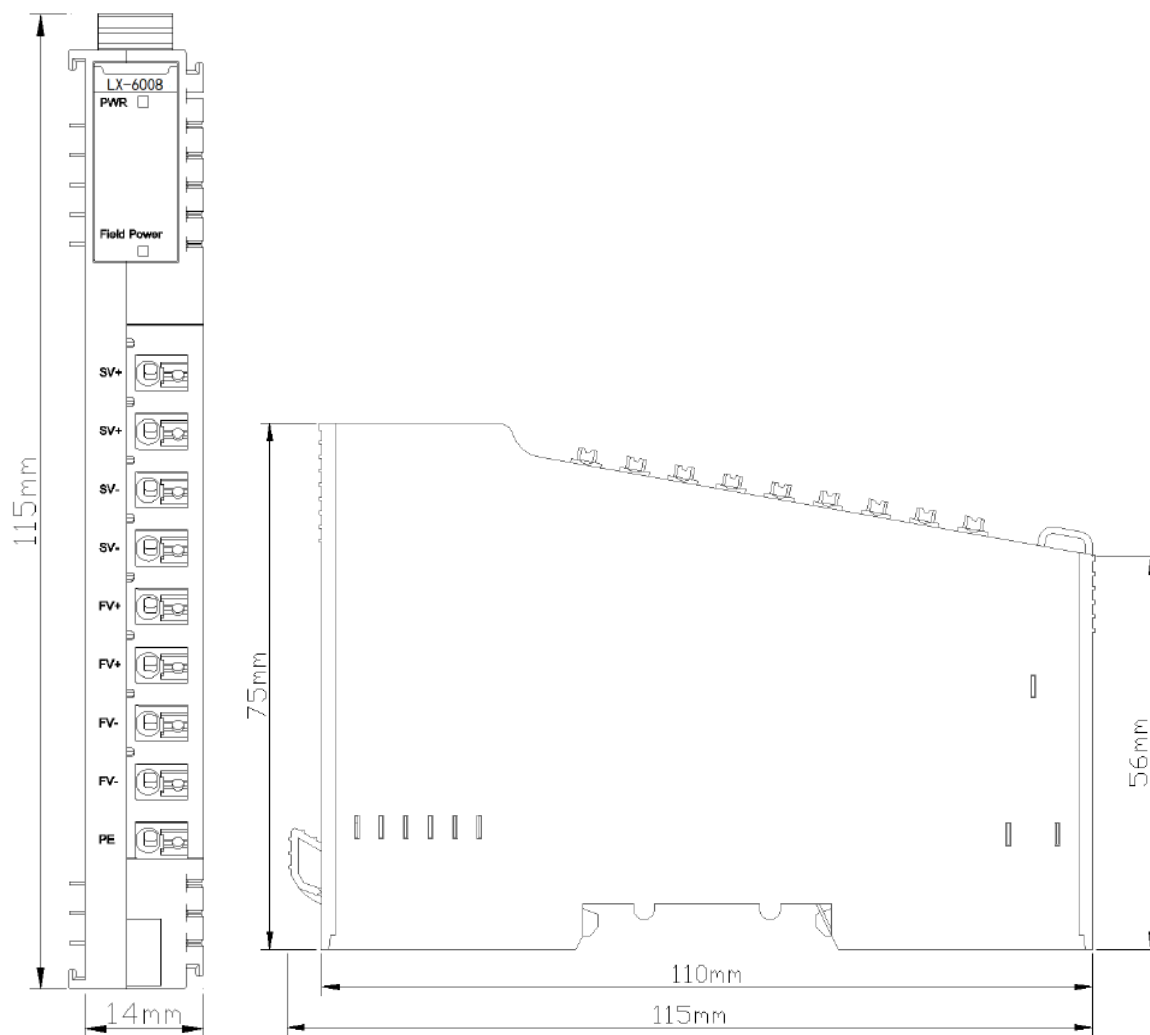
## 5 Process data definition

No process data.

## 6 Configuration parameters definition

No configuration parameter.

## A DIMENSION



## LX-6108 Power Expansion Module 5V/2A

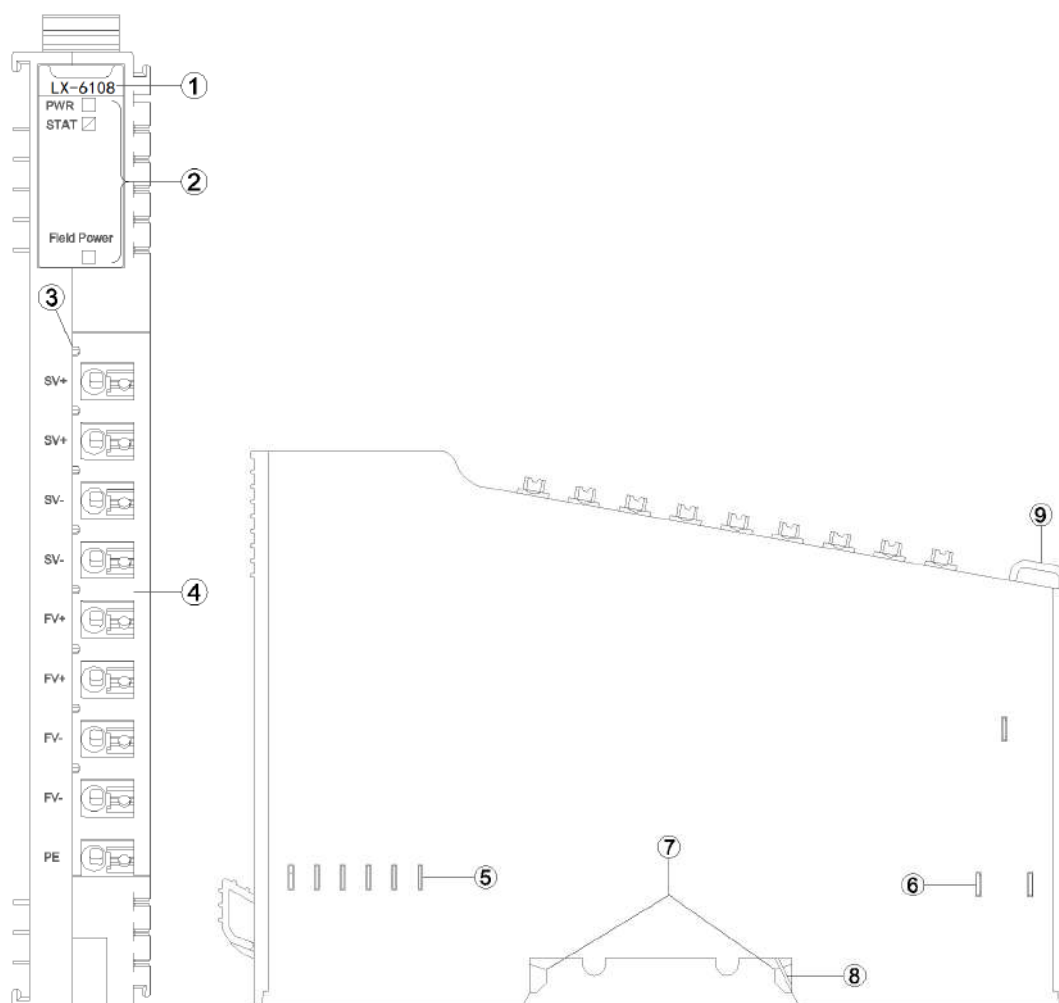
### 1 Module Description

- ◆ System Power and Field Power Expansion
- ◆ System Power Output 2A@5VDC
- ◆ Field Power Expansion 8A Current
- ◆ Requires Configuration, Occupies Slot Numbers

### 2 Technical Parameters

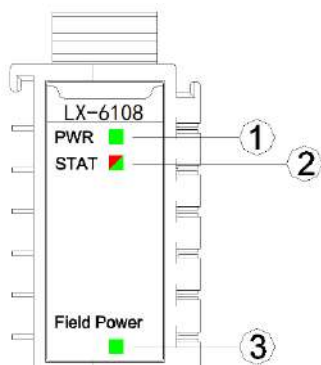
| General parameters                    |                                                                                                   |
|---------------------------------------|---------------------------------------------------------------------------------------------------|
| System Power Supply                   | Range: 9~36VDC (Nominal 24VDC)<br>Protection: Overcurrent protection, Reverse polarity protection |
| Module Internal Power Consumption     | 20mA@5VDC                                                                                         |
| Internal Bus Power Supply Current Max | Max: 2.0A@5VDC                                                                                    |
| Isolation                             | System Power to Field Power: Isolation                                                            |
| Field Power Supply                    | Range: 22~28V (Nominal 24VDC)<br>Protection: Reverse polarity protection                          |
| Field Power                           | Field Power Current Max DC 8A                                                                     |
| Environment Specification             |                                                                                                   |
| Operational Temperature               | -40~85°C                                                                                          |
| Operational Humidity                  | 5%~95% RH(No Condensation)                                                                        |
| Ingress Protection Rating             | IP20                                                                                              |

### 3 Hardware Interface



- ① Module Type
- ② State indicator
- ③ N/A
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

#### 3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State LED indicator (red/green)
- ③ Output channel LED indicator (green)

| PW POWER STATE (GREEN)        | Definition                               |
|-------------------------------|------------------------------------------|
| ON                            | Internal bus Power Normal                |
| OFF                           | Internal bus Power Failure               |
| STA MODULE STATE (RED/GREEN)  | Definition                               |
| Green slow flash (2.5Hz)      | Module internal bus is not started       |
| Red slow flash (2.5Hz)        | Module internal bus offline              |
| ON (GREEN)                    | Operation normal                         |
| Flash(2.5Hz) (RED/GREEN)      | Upgrading mode                           |
| Flash(10Hz) (RED/GREEN)       | Firmware Update                          |
| Double Flash (RED)            | Module Exception has been soft-restarted |
| Field Power Indicator (Green) | Definition                               |
| ON                            | The output value is not 0                |
| OFF                           | The output value is 0                    |

### 3.2 Terminal definition

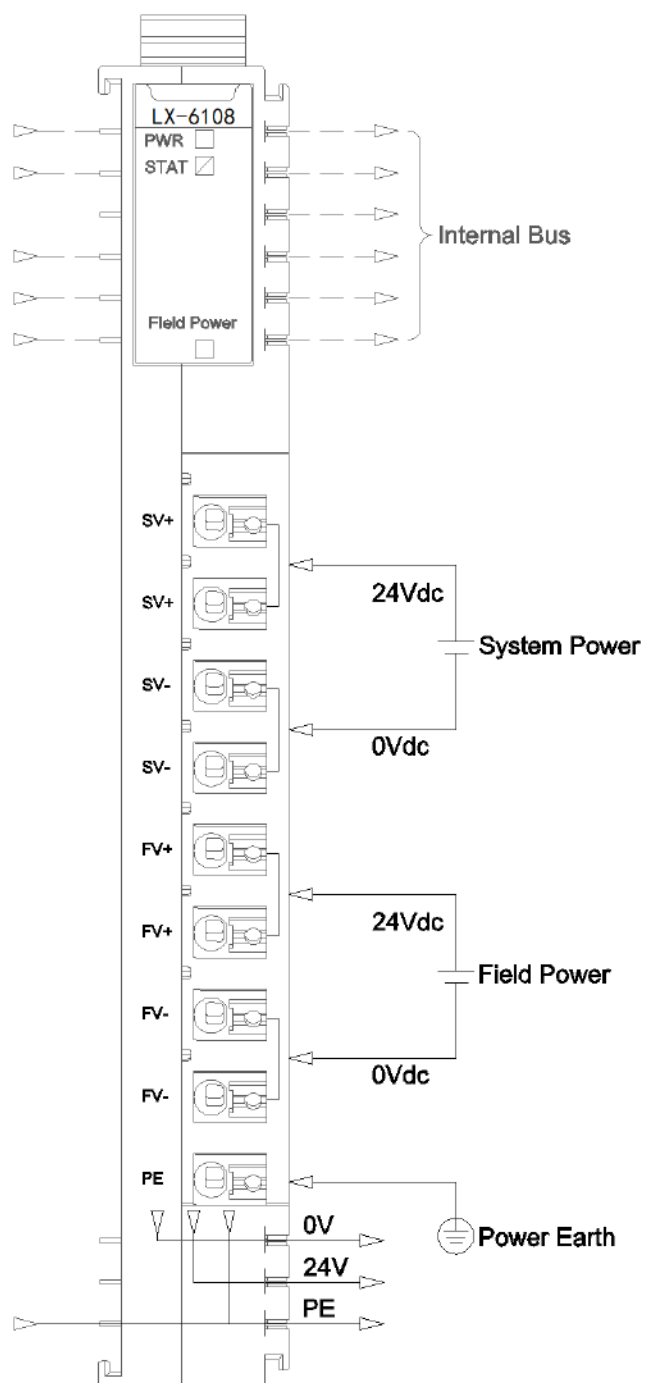
| Terminal Number | Definition | Description           |
|-----------------|------------|-----------------------|
| 1               | SV+        | System Power Positive |
| 2               | SV+        |                       |
| 3               | SV-        | System Power Negative |
| 4               | SV-        |                       |
| 5               | FV+        | Field Power Positive  |
| 6               | FV+        |                       |
| 7               | FV-        | Field Power Negative  |
| 8               | FV-        |                       |
| 9               | PE         | System Ground         |

It is recommended to use cables with cores smaller than 1mm<sup>2</sup>.

The cold-pressed terminal parameters are as follows:



## 4 Wiring



## 5 Process data definition

N.A

## 6 Configuration parameters definition

N.A

## A Dimension drawing

