# OP-0515 Four-Channel DC Charging Unit Control Module

## Product Instruction Manual

Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

# Table Table

1 Introduction to the Main Control Board ..... 2
1.1 Main Control Board Dimensions ..... 2
1.3 Actual Photos of the Main Control Board ..... 6
2 Product Features ..... 8
3 Product Features ..... 8
4 Pin Assignment ..... 9
4.1 Power Supply ..... 9
4.2 GPRS (4G Module) ..... 9
4.3 Auxiliary Power ..... 10
4.4 Antenna cable ..... 10
4.5 Input/Output ..... 12
4.6 Communication ..... 14
4.7 SD Card and Ethernet ..... 16
4.8 Insulation Testing and High-Voltage Sampling ..... 16
5 Wiring Reference Diagram ..... 17
5.2 Main Control Wiring Diagram ..... 19
5.3 Card Reader Board - Main Control Wiring Diagram ..... 20
5.4 Indicator Light Wiring ..... 21
(1) Light Bulb Wiring ..... 22
(2) LED Strip Wiring ..... 22
6 Power Module Configuration Instructions ..... 23
6.1 Infosource Modules ..... 23
6.2 Youyou State Grid Module ..... 24
7 Electric Meter Configuration ..... 26
8 Revision History ..... 27
9 Disclaimer ..... 27



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

# 1 Introduction to the Main Control Board

The OP-0515 Four-Gun DC Control Unit is a controller developed by our company for four-gun DC charging stations, operating at a voltage of 12V DC.It utilizes the RT-Thread embedded operating system and integrates high-capacity FLASH and RAM. The main control board features 33 digital inputs, 22 digital outputs, 5 analog channels, 5 CAN communication channels, 6 serial communication channels, 4 channels for insulation and high-voltage detection, 4 control guidance channels, 3 power supply channels, 1 Ethernet port, and 1 USB/SD port.

**Main Control Board Features:**

1. Supports ultra-low-tariff charging (deep-valley pricing).
2. Supports flexible scheduling for up to 4 module groups.
3. Supports on-board 12V/24V switching, eliminating the need for external intermediate relays.
4. Supports on-board insulation monitoring and high-voltage sampling, eliminating the need for external insulation detectors or sampling modules.
5. Supports on-board metering; if external metering is not required, this built-in function can be utilized directly without connecting an external electricity meter.
6. Supports simultaneous charging via dual guns or quad guns, with a maximum current capacity of 900A.
7. Supports remote OTA (Over-the-Air) updates and remote operation & maintenance (O&M), enabling precise fault localization to help you save on O&M costs.

## 1.1 Main Control Board Dimensions

The main control board measures 491 mm (length) × 315 mm (width).



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

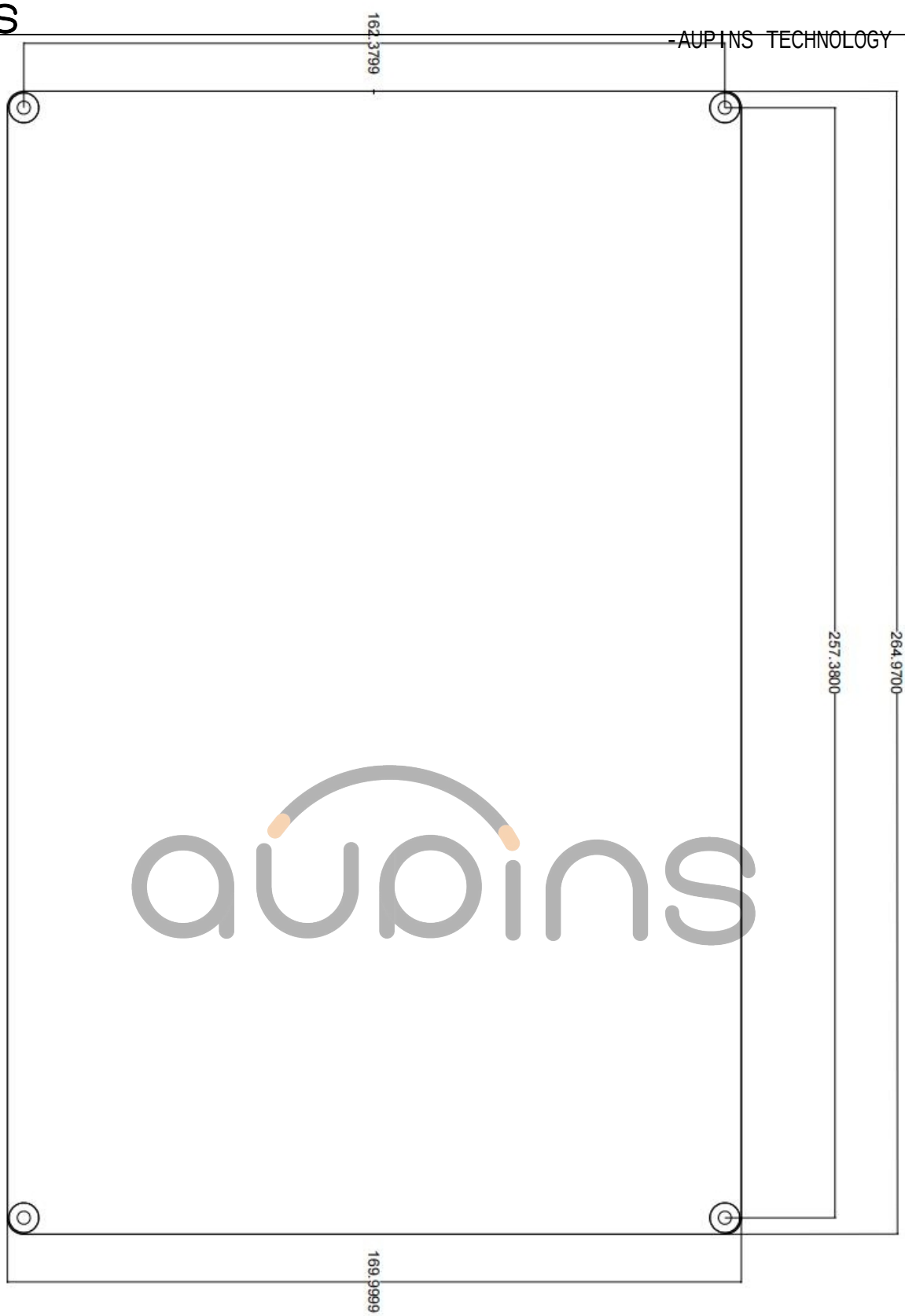
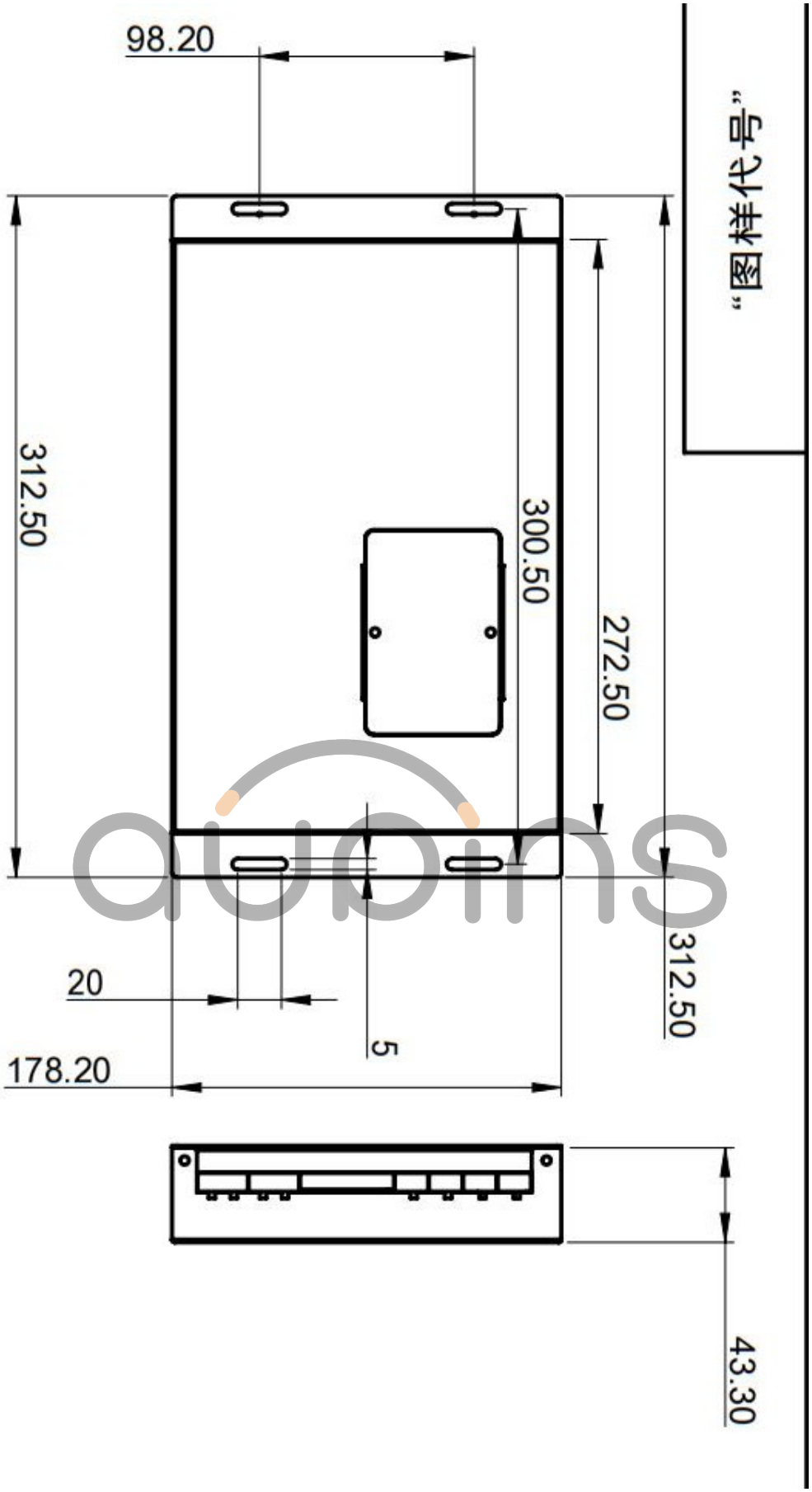



Figure 1: OP-0515 Main Control Board Dimensions (without enclosure)



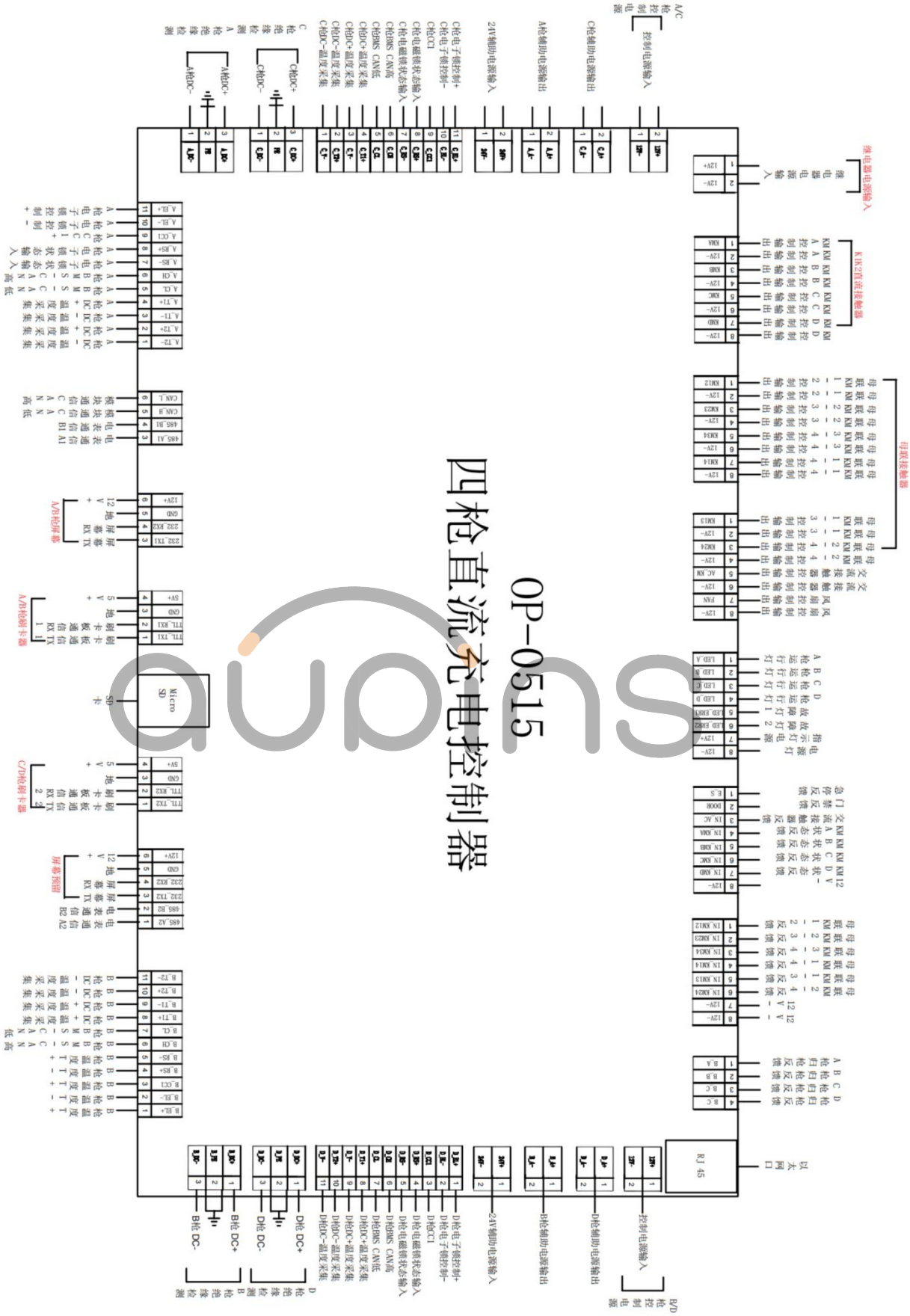
Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com






Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

## 1.2 Main Control Board Port Definitions

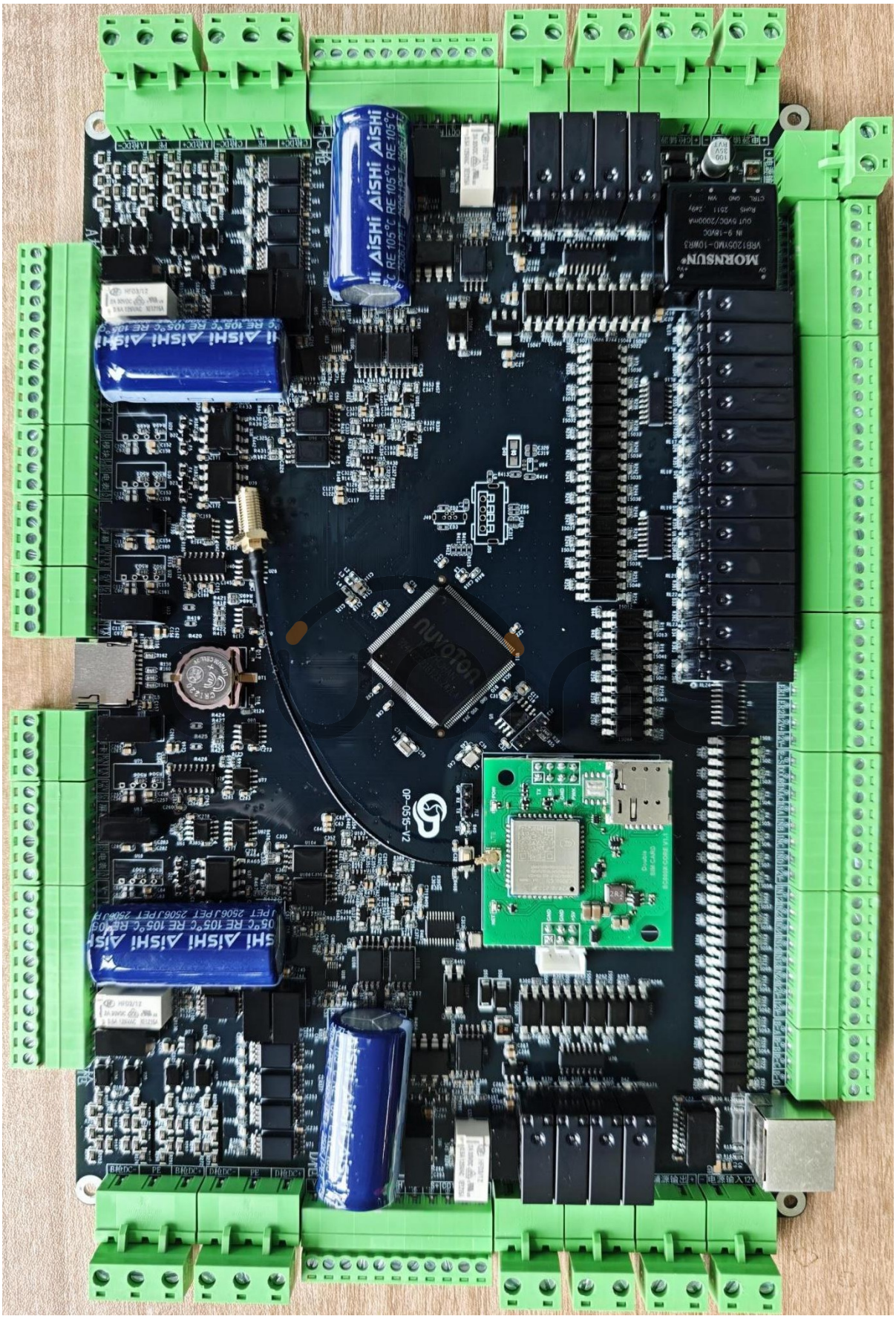





Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

Figure 2: OP-0515 Ports

## 1.3 Actual Photo of the Main Control Board






Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

## 2 Product Features

(1) Enables charging interaction with the BMS, controls the charging status of the charger, collects operational data, and automatically shuts down in case of abnormal conditions;

(2) Applicable to DC charging stations such as four-in-one, master-slave, and small-group charging configurations;

(3) Includes charging gun electronic lock control and temperature monitoring, with each charging gun operating independently;

(4) Compatible with power modules from Shenghong, Yingfeiyuan, Youyou, Yonglian, Tonghe, Xingyuan Borui, and others;

(5) Compatible with touchscreens from Diwen, Xinruida, and Xinxian to enable human-machine interaction;

(6) Supports serial card readers to enable card-swipe billing;

(7) Integrated 4-channel battery voltage monitoring;

(8) Integrated with 4-channel control and guidance functions;

(8) Integrated 4-channel insulation detection;

(9) Capable of recording charging data, with a maximum capacity of 500 entries;

(10) Features backend communication capabilities, enabling wireless communication with backend monitoring systems to transmit status and relevant data; currently supports monitoring platforms such as YunKuaiChong, DakCloud, WeijingCloud, and Xiaoju;

(11) Integrated Ethernet functionality; (optional)

(12) Integrated 2G and 4G expansion capabilities. (Optional)

(13) Integrated NFC card reader functionality. (Optional)

(14) The main control board supports direct connection to 12V/24V auxiliary power sources without the need for additional intermediate relays.

## 3 Product Features

(1) Highly integrated and compact; combines digital inputs, digital outputs, communication, analog signals, insulation detection, and control guidance into a single unit, significantly reducing the space occupied within the charging station;

(2) High electromagnetic compatibility: High EMC stability, meeting Class 4 electromagnetic compatibility standards;

(3) Supports multiple network backends: Enables rapid deployment and monitoring of proprietary charging networks;

(4) Strong compatibility: Compatible with all vehicle models compliant with both the new and old GB/T 27930 national standards; compatible with LCD screens from major manufacturers on the market; compatible with all electricity meters compliant with DL/T 645 and MODBUS protocols.



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

# 4 Terminal Interface Definitions

## 4.1 Power Supply

| Terminal No. | No. | Pin Definition | Brief Description of Function |
|---|---|---|---|
| J1 | 1 | +12V | Relay power input |
| | 2 | -12V | |
| J10 | 1 | +12V | B/D gun control power input |
| | 2 | -12V | |
| J31 | 1 | -12V | A/C gun control power input |
| | 2 | +12V | |

## 4.2 GPRS (4G module)

| Terminal No. | No. | Pin Definition | Brief Function Description |
|---|---|---|---|
| Built-in | | / | Wireless Communication Module Socket |



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

## 4.3 Auxiliary Power

| Terminal Number | No. | Pin Definition | Brief Description of Function |
|---|---|---|---|
| J11 | 1 | D#A+ | D-Gun Auxiliary Power Positive |
| | 2 | D#A- | D Gun Auxiliary Power Negative Terminal |
| J12 | 1 | B#A+ | B Gun Auxiliary Power Positive Terminal |
| | 2 | B#A- | B Gun Auxiliary Power Negative Terminal |
| J13 | 1 | 24V+ | 24V auxiliary power positive terminal |
| | 2 | 24V- | 24V auxiliary power negative terminal |
| J28 | 1 | 24V- | 24V auxiliary power negative |
| | 2 | 24V+ | 24V Auxiliary Power Positive Terminal |
| J29 | 1 | C#A- | C- Gun Auxiliary Power Negative |
| | 2 | C#A+ | C-gun auxiliary power positive terminal |
| J30 | 1 | A#A- | A Gun Auxiliary Power Negative Terminal |
| | 2 | A#A+ | A Gun Auxiliary Power Positive Terminal |

## 4.4 Gun Cable

| Terminal No. | No. | Pin Definition | Brief Function Description |
|---|---|---|---|
| J14 | 1 | D#EL+ | Positive power supply for D-Gun electronic lock |
| | 2 | D#EL- | D-Gun Electronic Lock Negative Power Supply |
| | 3 | D#CC1 | D-Gun Charging Connection Confirmation |
| | 4 | D#RS+ | D-Gun electronic lock feedback+ |
| | 5 | D#RS- | D-Gun Electronic Lock Feedback- |
| | 6 | D#CAN_H | D-Gun BMS CAN High has a 120 Ω resistor |
| | 7 | D#CAN_L | D-Gun BMS CAN Low with a 120 Ω resistor |
| | 8 | D#T1+ | D-Gun DC-Temperature |



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

| | | | |
|---|---|---|---|
| | 9 | D#T1- | D Gun DC - Temperature |
| | 10 | D#T2+ | D Gun DC+ Temperature |
| | 11 | D#T2- | D Gun DC+ Temperature |
| J17 | 1 | B#EL+ | B Gun Electronic Lock Power Supply Positive Terminal |
| | 2 | B#EL- | B-Gun Electronic Lock Negative Power Supply |
| | 3 | B#CC1 | B Gun Charging Connection Confirmation |
| | 4 | B#RS+ | B Gun Electronic Lock Feedback+ |
| | 5 | B#RS- | B-Gun Electronic Lock Feedback- |
| | 6 | B#CAN_H | B-gun BMS CAN high with a 120 Ω resistor |
| | 7 | B#CAN_L | B-gun BMS CAN Low with a 120 Ω resistor |
| | 8 | B#T1+ | B Gun DC-Temperature |
| | 9 | B#T1- | B Gun DC - Temperature |
| | 10 | B#T2+ | B Gun DC+ Temperature |
| | 11 | B#T2- | B Gun DC+ Temperature |
| J24 | 1 | A#T2- | B Gun DC+ Temperature |
| | 2 | A#T2+ | B Gun DC + Temperature |
| | 3 | A#T1- | B Gun DC- Temperature |
| | 4 | A#T1+ | B Gun DC- Temperature |
| | 5 | A#CAN_L | B Gun BMS CAN Low with 120 Ω resistor |
| | 6 | A#CAN_H | B-gun BMS CAN High with a 120 Ω resistor |
| | 7 | A#RS- | B-gun electronic lock feedback- |
| | 8 | A#RS+ | B-Gun Electronic Lock Feedback+ |
| | 9 | A#CC1 | B Gun Charging Connection Confirmed |
| | 10 | A#EL- | B-Gun Electronic Lock Negative Power Supply |
| | 11 | A#EL+ | B-gun electronic lock power supply positive terminal |



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

| | | | |
|---|---|---|---|
| J25 | 1 | C#T2- | C Gun DC+ Temperature |
| | 2 | C#T2+ | C-gun DC+Temperature |
| | 3 | C#T1- | C-Gun DC- Temperature |
| | 4 | C#T1+ | C Gun DC-Temperature |
| | 5 | C#CAN_L | C-Gun BMS CAN Low (with a 120 Ω resistor) |
| | 6 | C#CAN_H | C-gun BMS CAN High with a 120 Ω resistor |
| | 7 | C#RS- | C-gun electronic lock feedback- |
| | 8 | C#RS+ | C-Gun Electronic Lock Feedback+ |
| | 9 | C#CC1 | C-Gun Charging Connection Confirmation |
| | 10 | C#EL- | C-gun electronic lock power supply negative terminal |
| | 11 | C#EL+ | C-Gun Electronic Lock Power Supply Negative Terminal |

## 4.5 Input/Output

| Terminal No. | No. | Pin Definition | Brief Description of Function |
|---|---|---|---|
| J2 | 1 | KMA | K1 K1 DC Contactor - KMA Control Output |
| | 2 | 12V- | |
| | 3 | KMB | K1K1 DC Contactor - KMB Control Output |
| | 4 | 12V- | |
| | 5 | KMC | K1K1 DC Contactor - KMC Control Output |
| | 6 | 12V- | |
| | 7 | KMD | K1K1 DC Contactor - KMD Control Output |
| | 8 | 12V- | |
| | 1 | KM12 | Bus Tie Contactor - KM12 Control Output |
| | 2 | 12V- | |
| | 3 | KM23 | Bus tie contactor - KM23 control output |



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

| | | | |
|---|---|---|---|
| J3 | 4 | 12V- | |
| | 5 | KM34 | Bus tie contactor - KM34 control output |
| | 6 | 12V- | |
| | 7 | KM14 | Bus tie contactor - KM14 control output |
| | 8 | 12V- | |
| J4 | 1 | KM13 | Bus tie contactor - KM13 control output |
| | 2 | 12V- | |
| | 3 | KM24 | Bus tie contactor - KM24 control output |
| | 4 | 12V- | |
| | 5 | AC_KM | AC Contactor Control |
| | 6 | 12V- | |
| | 7 | FAN | Fan Control |
| | 8 | 12- | |
| J5 | 1 | LED_A | A/B/C/D Operation Indicator Lights |
| | 2 | LED_B | |
| | 3 | LED_C | |
| | 4 | LED_D | |
| | 5 | LED_ERR1 | Host fault indicator |
| | 6 | LED_ERR2 | Subunit Fault Indicator |
| | 7 | 12V+ | Indicator Power Supply |
| | 8 | 12V- | Reserved |
| | 1 | E_S | Emergency stop feedback |
| | 2 | DOOR | Door Access Feedback |
| | 3 | IN_AC | AC Contactor Feedback |
| | 4 | IN_KMA | K1 K1 Contactor - KMA Status Feedback |



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

| | | | |
|---|---|---|---|
| J6 | 5 | IN_KMB | K1K1 Contactor - KMB Status Feedback |
| | 6 | IN_KMC | K1K1 Contactor - KMC Status Feedback |
| | 7 | IN_KMD | K1K1 Contactor - KMD Status Feedback |
| | 8 | 12V- | 12V- |
| J7 | 1 | IN_KM12 | Bus tie contactor - KM12 feedback |
| | 2 | IN_KM23 | Bus Tie Contactor - KM23 Feedback |
| | 3 | IN_KM34 | Bus Tie Contactor - KM34 Feedback |
| | 4 | IN_KM14 | Bus Tie Contactor - KM14 Feedback |
| | 5 | IN_KM13 | Bus Tie Contactor - KM13 Feedback |
| | 6 | IN_KM24 | Bus Tie Contactor - KM24 Feedback |
| | 7 | 12V- | 12V- |
| | 8 | 12V- | 12V- |

## 4.6 Communication

| Terminal No. | No. | Pin Definitions | Brief Description of Function |
|---|---|---|---|
| J18 | 1 | 485_A2 | Meter Communication A2, Reserved (for slave unit) |
| | 2 | 485_B2 | Meter Communication B2, Reserved (for slave unit) |
| | 3 | 232_TX2 | Display communication, reserved (for slave unit) |
| | 4 | 232_RX2 | |
| | 5 | GND | |
| | 6 | 12V+ | |
| J19 | 1 | TTL_TX2 | Card reader communication, reserved (for sub-unit) |
| | 2 | TTL_RX2 | |
| | 3 | GND | |
| | 4 | 5V+ | |



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

| | | | |
|---|---|---|---|
| J21 | 1 | TTL_TX2 | Communication with the host card reader |
| | 2 | TTL_RX2 | |
| | 3 | GND | |
| | 4 | 5V+ | |
| J22 | 1 | 232_TX1 | Host Screen Communication |
| | 2 | 232_TX2 | |
| | 3 | GND | |
| | 4 | 12V+ | |
| J23 | 1 | 485_A1 | Master-slave meter communication |
| | 2 | 485_B1 | |
| | 3 | CAN_H | Power Module Communication |
| | 4 | CAN_L | |



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

## 4.7 SD Card and Ethernet

| Pin number | No. | Pin Definition | Brief Description of Function |
|---|---|---|---|
| J10 | 1 | RJ-45 | Ethernet |
| J20 | 1 | Micro SD | SD card |

## 4.8 Insulation testing and high-voltage sampling

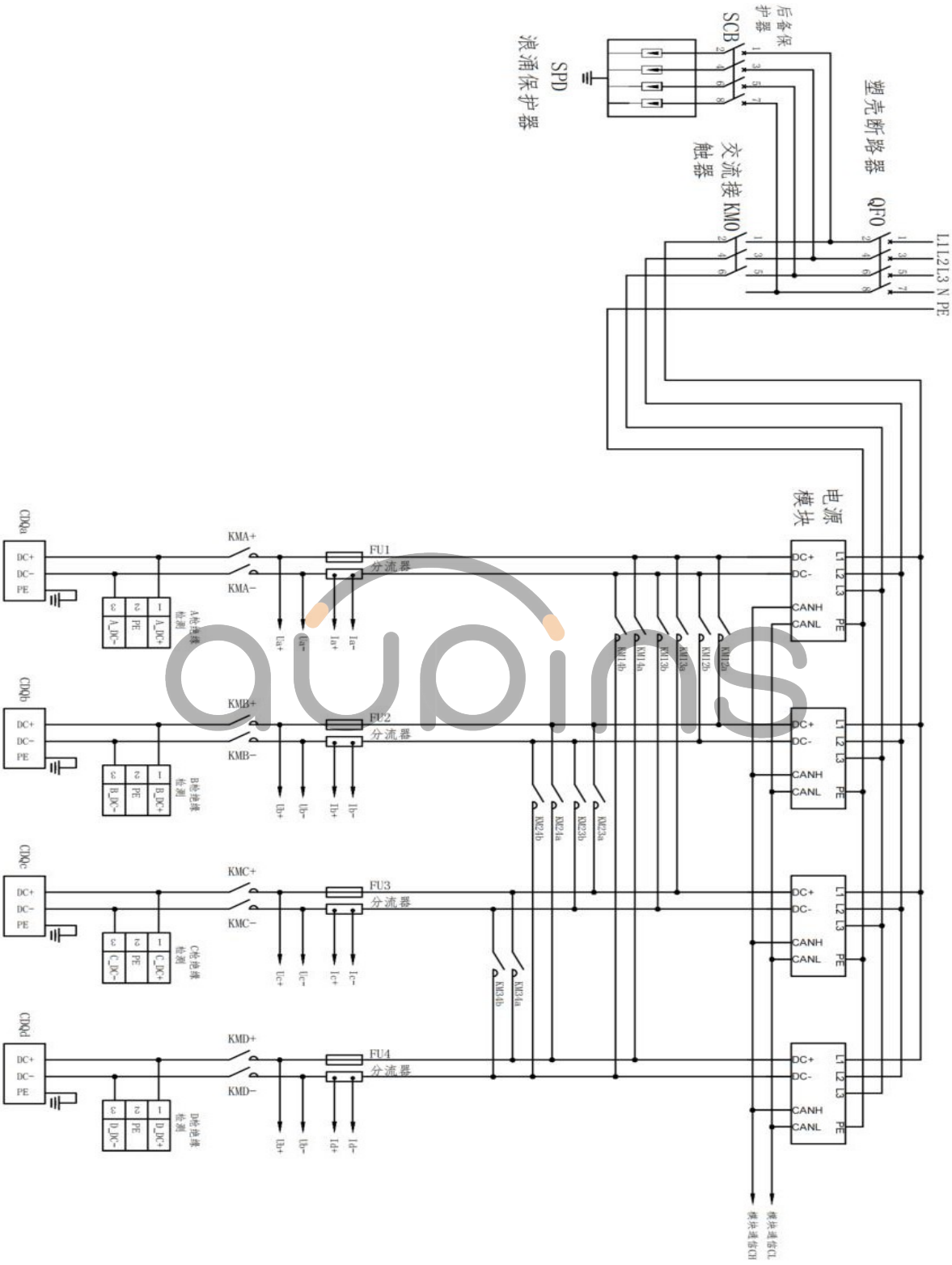
| Terminal No. | No. | Pin Definition | Brief Description of Function |
|---|---|---|---|
| J15 | 1 | D# DC+ | D-gun insulation detection and high-voltage sampling |
| | 2 | D#PE | |
| | 3 | D#DC- | |
| J16 | 1 | B#DC+ | B Gun Insulation Test and High-Voltage Sampling |
| | 2 | B#PE | |
| | 3 | B#DC- | |
| J25 | 1 | A#DC- | A Gun Insulation Testing and High-Voltage Sampling |
| | 2 | A#PE | |
| | 3 | A#DC+ | |
| J26 | 1 | C#DC- | B Gun Insulation Test and High-Voltage Sampling |
| | 2 | C#PE | |
| | 3 | C#DC+ | |



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

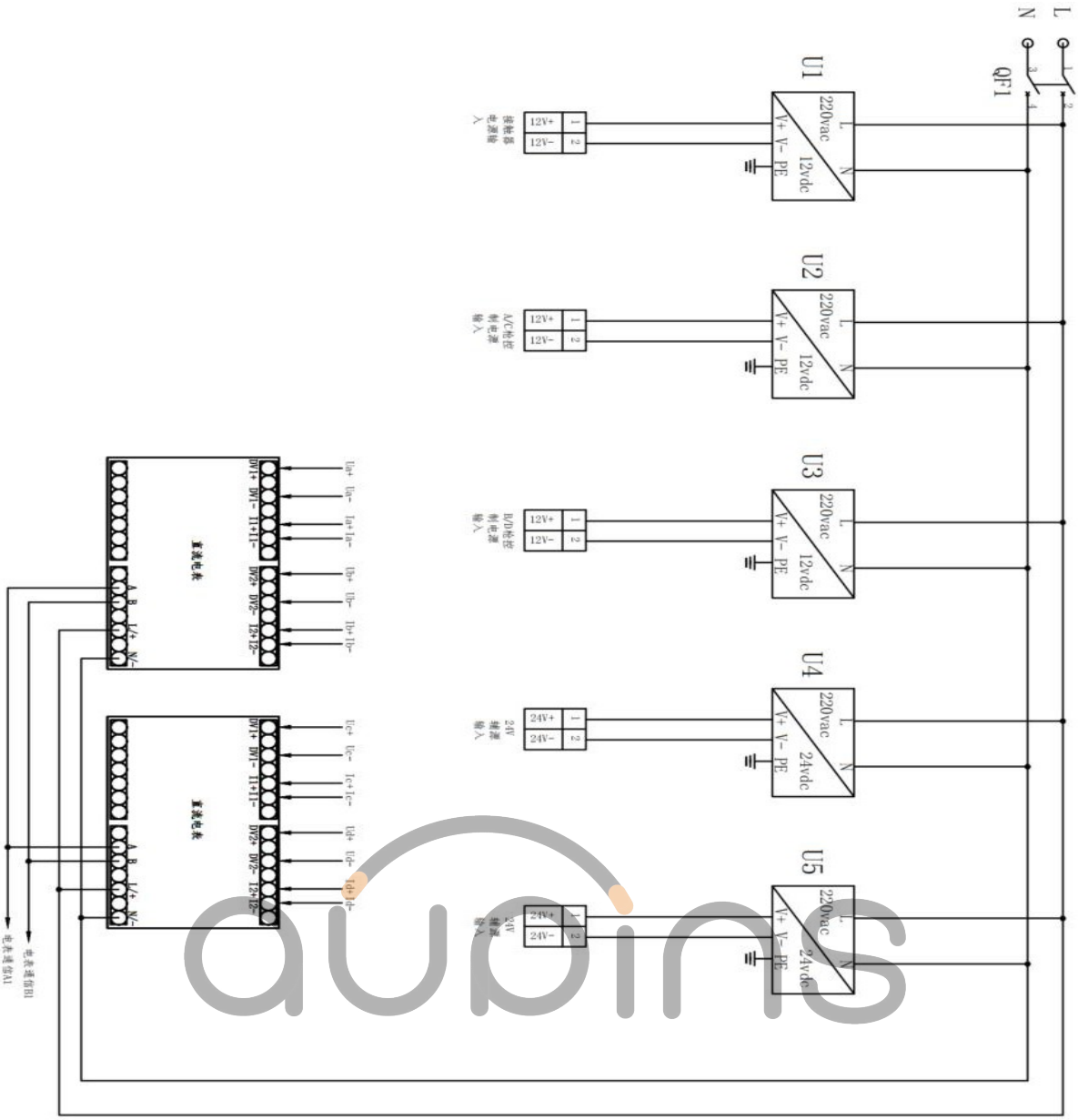
# 5 Wiring Reference Diagram

## 5.1 Electrical Schematic






Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

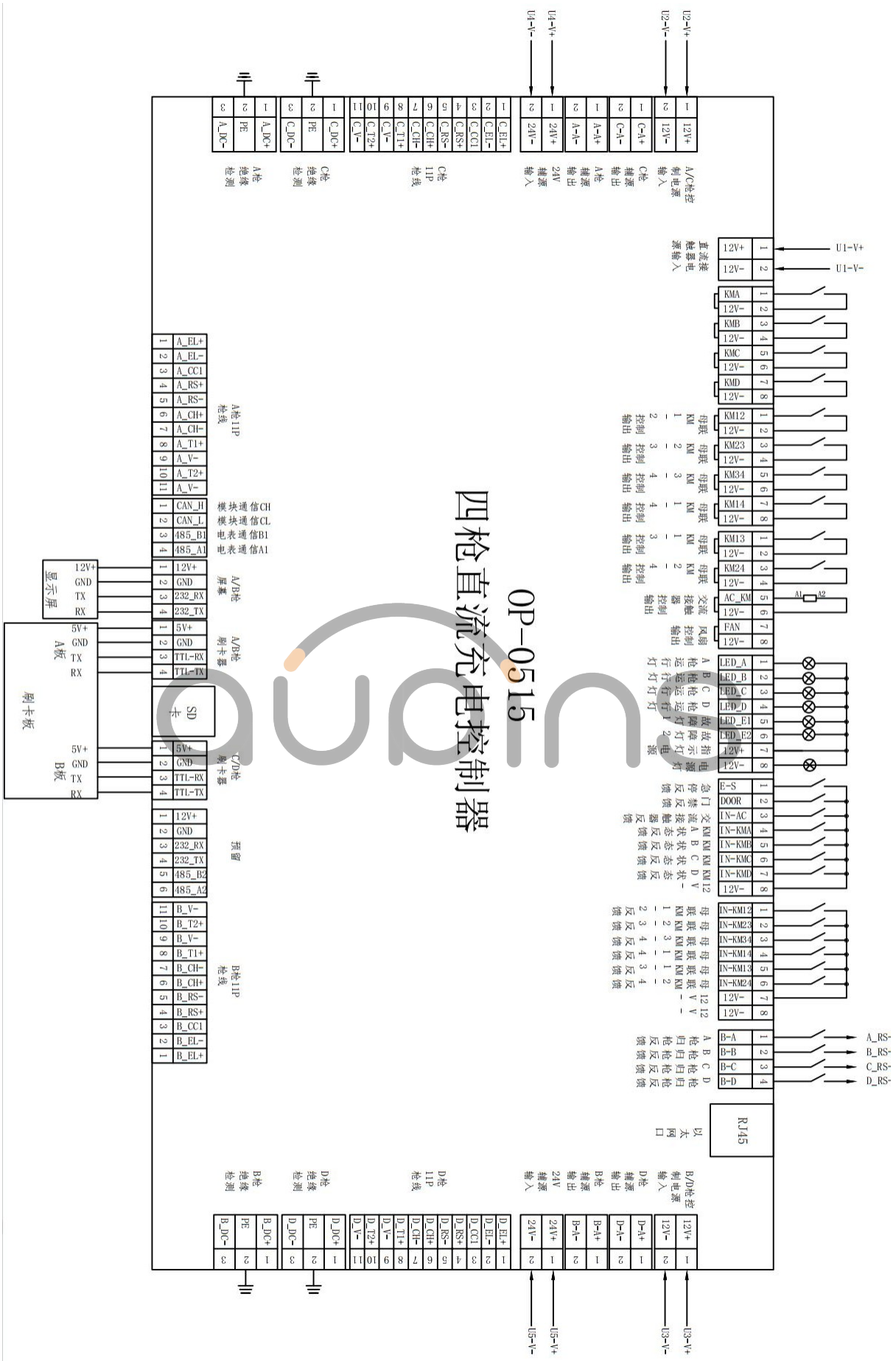



Electrical Schematic B



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

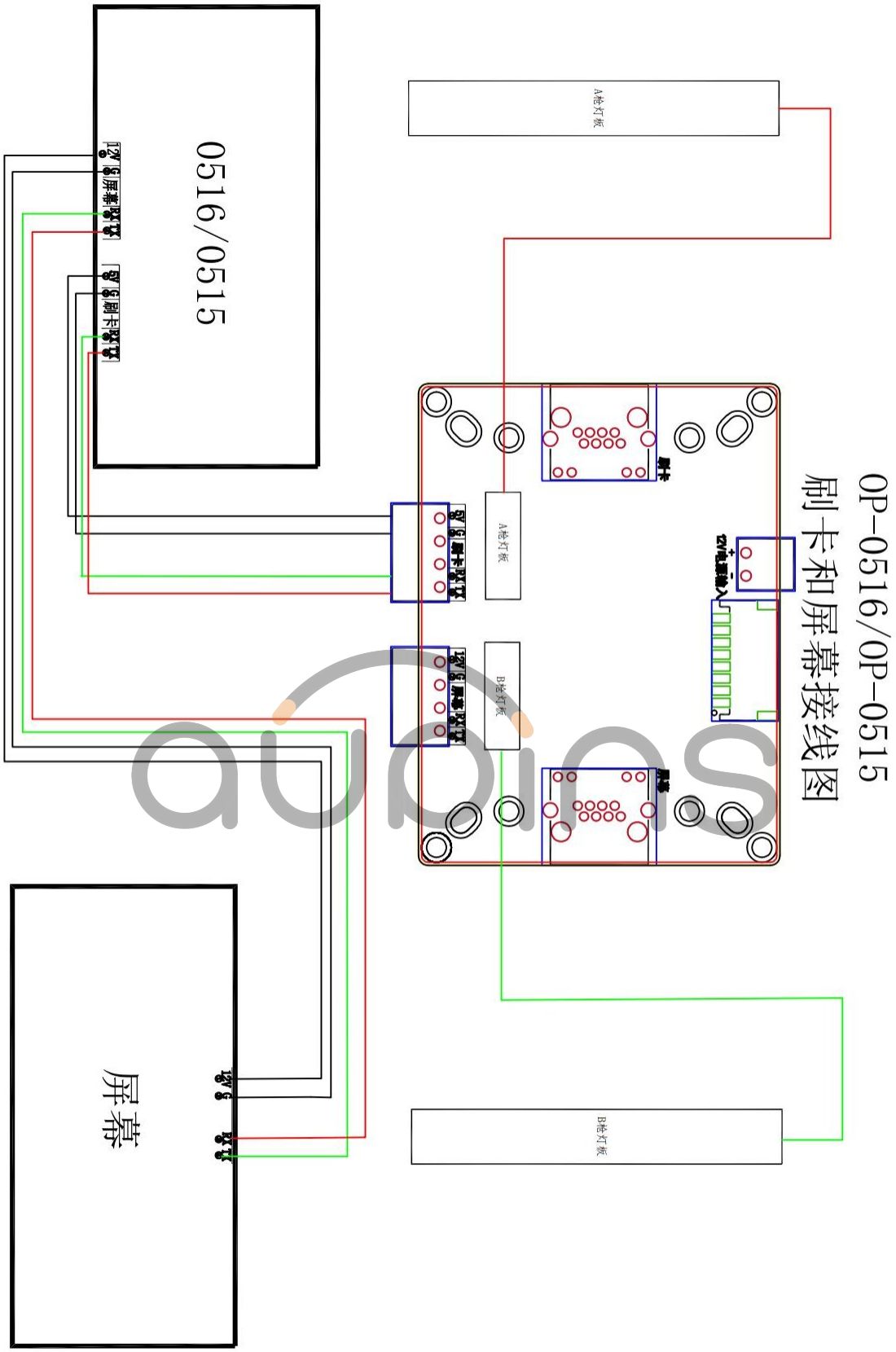
## 5.2 Main Control Wiring Diagram






Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

## 5.3 Card Reader Board - Main Control Wiring Diagram

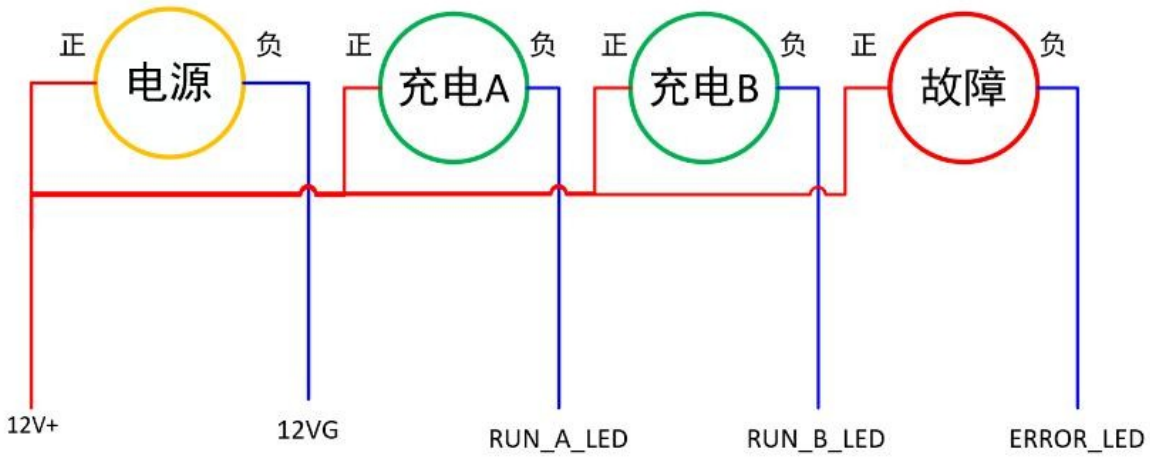





Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

## 5.4 Indicator Light

**Wiring** Light Bulb Wiring






Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

LED Strip Wiring

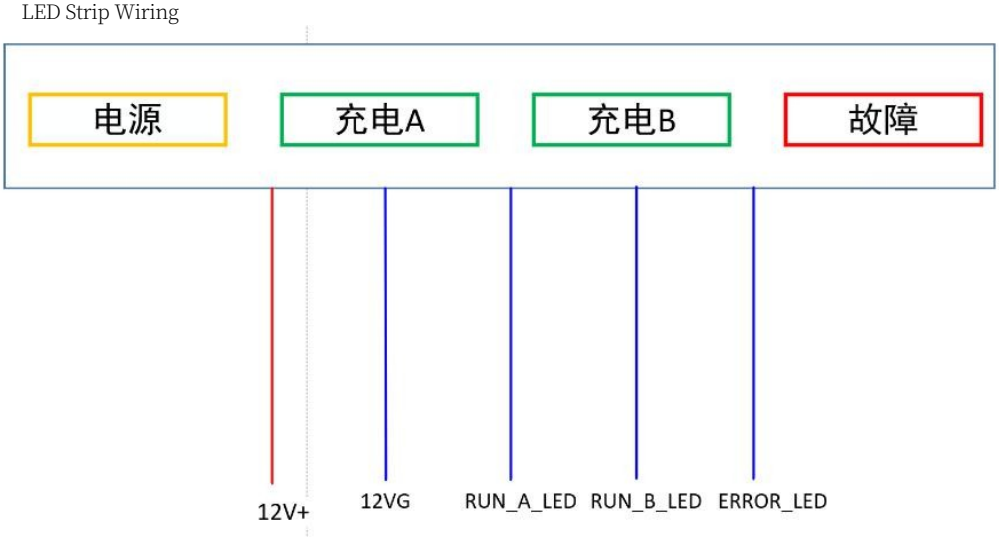



Fig. 6. Wiring Between Main Controller and Charging Station Indicator Lights

（1） Light Bulb Wiring

Use a common-anode connection: connect the positive terminals of all bulbs to the 12V supply, and connect the negative terminals to the corresponding output terminals. The controller's lighting output uses transistors, which are polarized; therefore, wiring must strictly follow the port layout shown in the diagram. Otherwise,

the lights will display abnormally.

Manufacturers can customize LED colors as needed.

（2） LED Strip Wiring

The light strip uses a common-anode configuration.

Please design the light strip based on a rated voltage of 12V and a current of 50mA; exceeding this range may damage the corresponding electronic components.

The light output on the controller is a transistor with polarity; therefore, wiring must strictly follow the port configuration shown in the diagram, otherwise the lights will display abnormally.

Manufacturers can customize LED colors as needed.



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

# 6 Power Module Configuration Instructions

This main controller supports modules from InfiSource, YouYou, Yonglian, Shenghong, Tonghe, Xingyuan Borui, and others. In theory, it can support all modules that implement the InfiSource protocol and the State Grid protocol. The following sections explain the use of the InfiSource 20kW module and the YouYou 30kW State Grid module, respectively.

## 6.1 Yingfuyuan Module

This controller uses **a fixed grouping mode**, where all DIP switches in the same group are set identically. This makes configuration simple and reduces the likelihood of errors. For example: A 120kW dual-gun charging station using 75050 Infosun modules employs a two-group module power supply configuration.

**In this case, all** DIP switches **for Group 1** (corresponding to DIP position 6) are set to "Enabled" (slid up from the bottom), and **all** DIP switches **for Group 2** (corresponding to DIP position 5) are set to "Enabled" (slid up from the bottom), as shown in the figure below:

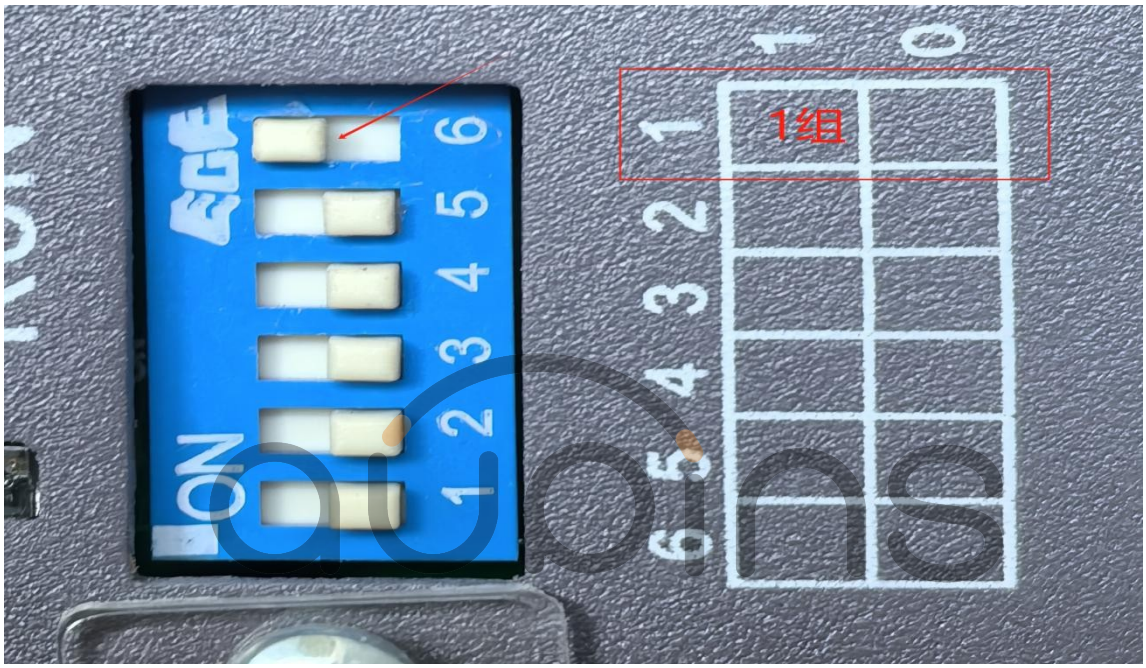



Figure 7. Group 1 DIP Switch Settings



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

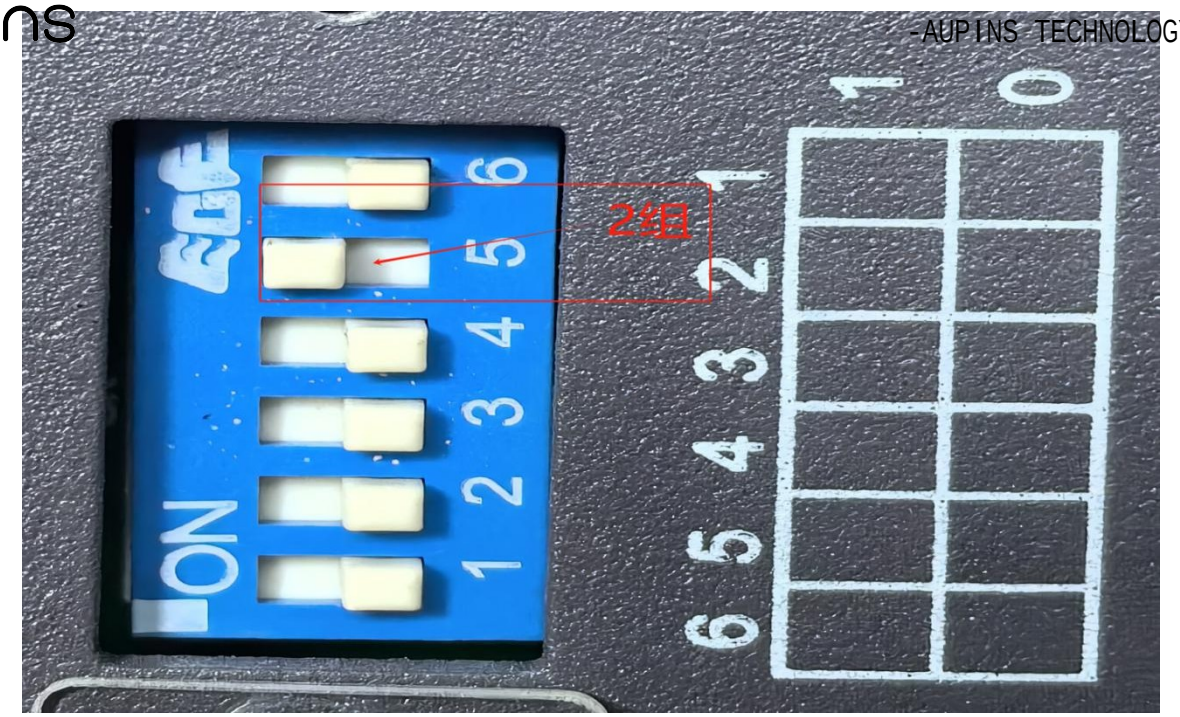



Figure 8. Group 2 DIP Switch Settings

## 6.2 Youyou State Grid Module

The address configuration for all State Grid modules is largely similar. Taking Youyou's 30kW State Grid module as an example, the address must be set via the LED display. The first module in Group 1 starts with a DIP switch setting of 0x80, and the first module in Group 2 starts with a DIP switch setting of 0x88. As shown in the figure below:




Figure 9. Address Setting for the First Module in Group 1



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

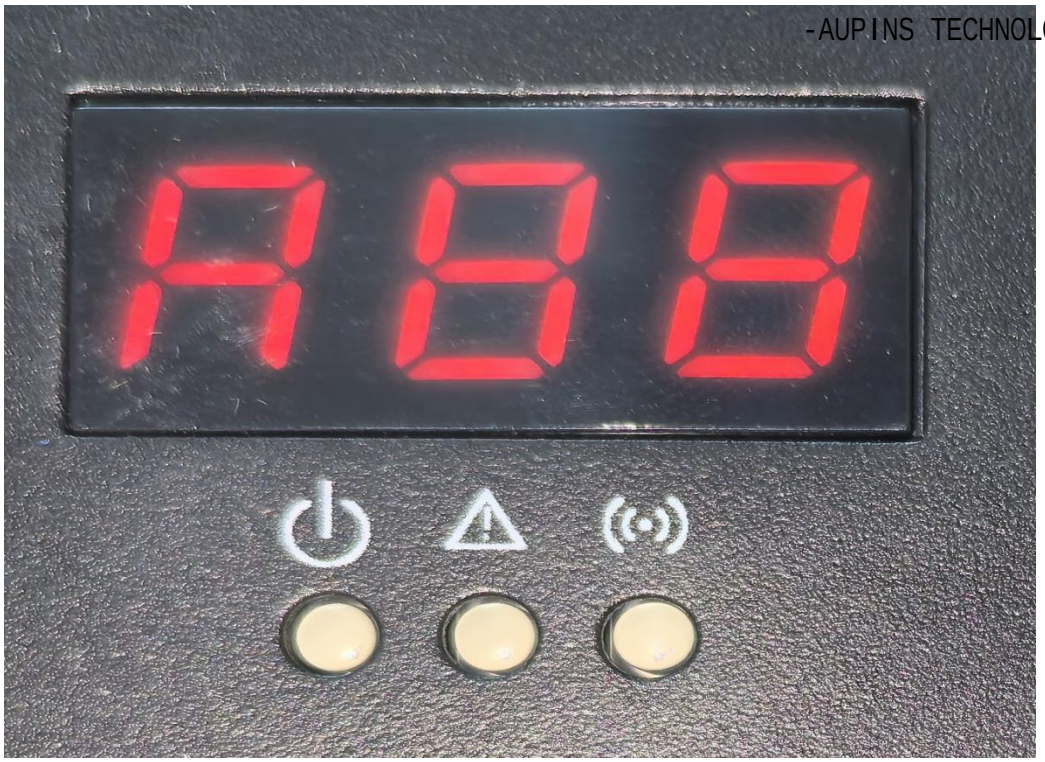



Figure 10. Address Setting for the First Module in Group 2



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

# 7 Electric Meter Configuration

This product supports the DL/T 645-2007 protocol. In theory, any electricity meter that implements DL/T 645-2007 can be used. Currently compatible meter brands include Yada, Yinglida, Kedarui, Ruiyin, Kaixian, and Ankerui.

**The default configuration on the electricity meter side is as follows:** Baud rate: 2400 bps

Parity: Even

Slave Address: A-gun 0x01, B-gun 0x02

Taking the Yinglida electricity meter as an example:

Channel 1: 000001 -> Channel 2: 000002 ------> Channel 1: 22400 -------> Channel 2: 22400

Channel 1 slave address -- Channel 2 slave address -- Channel 1 parity and baud rate - Channel 2 parity and baud rate



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

## 8 Revision Log

| Date | Revised by | Description |
|---|---|---|
| August 3, 2024 | Win | Initial Release |
| January 2, 2025 | Win | Added indicator light wiring reference diagram |
| June 6, 2025 | Win | Added definition descriptions for output and input terminals |
| September 8, 2025 | Win | Added enclosure dimension drawings and corrected the power indicator wiring diagram |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

## 9 Disclaimer

(1) Our company will continuously upgrade and iterate on this product; the specifications and parameters of future versions may vary accordingly. This document serves as an introduction to the system control unit; the images, data, and descriptions provided herein are not to be used as the basis for physical product acceptance.

(2) Users of this product must possess certain professional skills and knowledge of charging stations. Customers must carefully read the reference manual and wiring diagrams. This product is intended to assist customers in accelerating product development. Any programs, documents, test results, solutions, support, or other materials and information provided during the service process are for reference only.Customers have the right to choose not to use them or to modify them at their discretion. The Company makes no warranties regarding completeness, reliability, or any other aspect. The Company shall not be liable for any special, incidental, or consequential damages arising from the use of this product for any reason.



Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com