OP-0512 DC Charger Control Unit

Product Manual

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1、 Main Control Board Introduction

The OP-0512 DC Control Unit is a controller developed by our company for DC charging piles, operating at a voltage of DC 12V. It employs the RT-Thread embedded operating system and integrates high-capacity FLASH and RAM memory. The main control board features 7 input channels, 7 output channels, 3 CAN communication interfaces, 2 RS-485 communication interfaces, 1 TTL serial port, 1 Ethernet interface, and 1 insulation detection circuit.

Road Control Guidance、1 Road work power supply。

Main Control Features:

1. Supports 12/24V onboard switching without requiring an external intermediate relay
2. Supports onboard insulation and high-voltage sampling without the need for external insulation detectors or sampling modules.
3. Spports onboard metering; this function can be used directly without a meter requirement
4. This main controller can reduce energy consumption to below 3%.
5. Supports remote OTA (over-the-air) updates and remote operations and maintenance, enabling precise problem localization to reduce operational costs.

1.1 Main control board dimensions

Outer Size:193mm(L)×100mm(W)×20mm(H)

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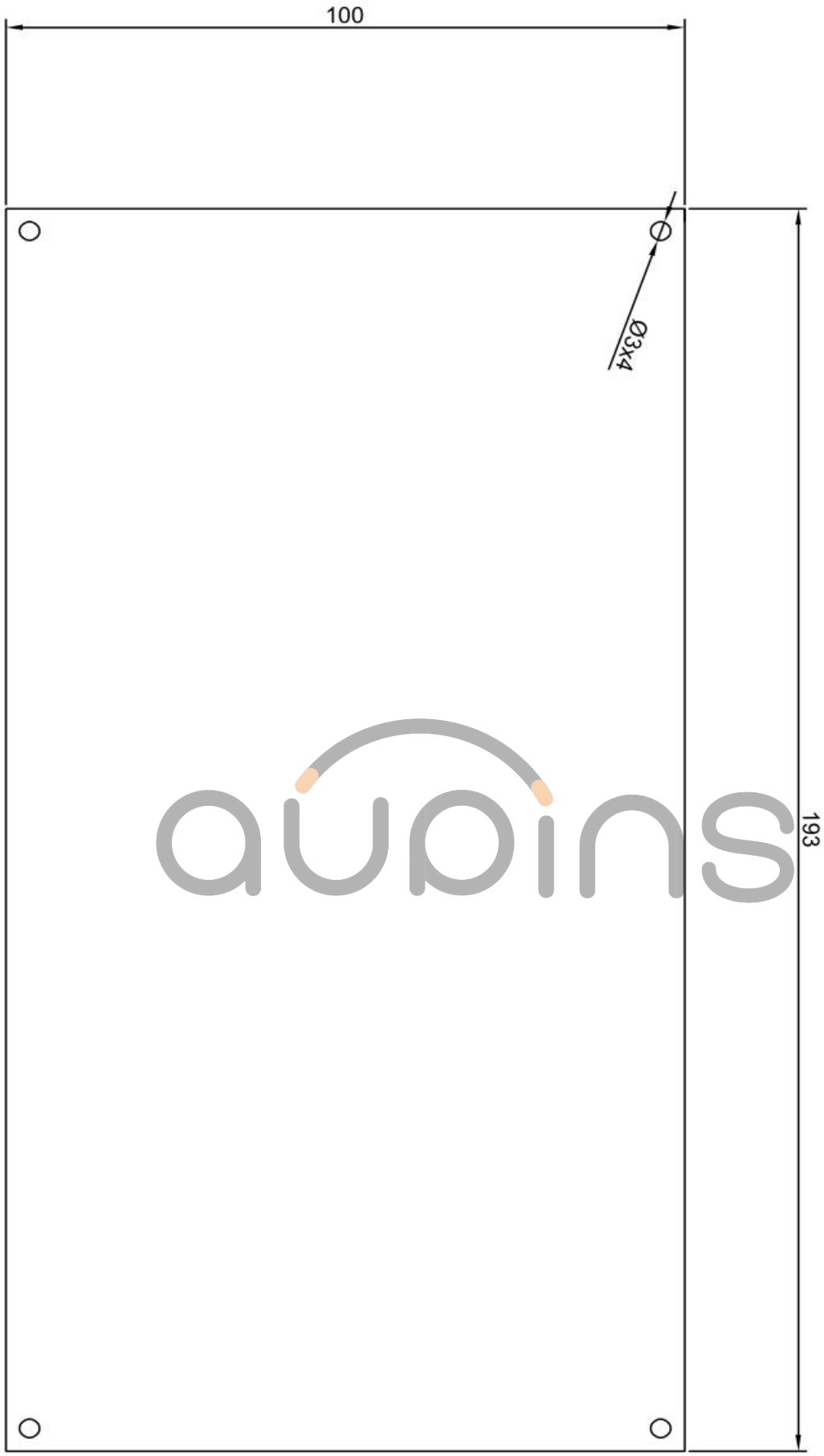


Figure 1: External Dimensions of OP-0511

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1.2 On the Main Control Board

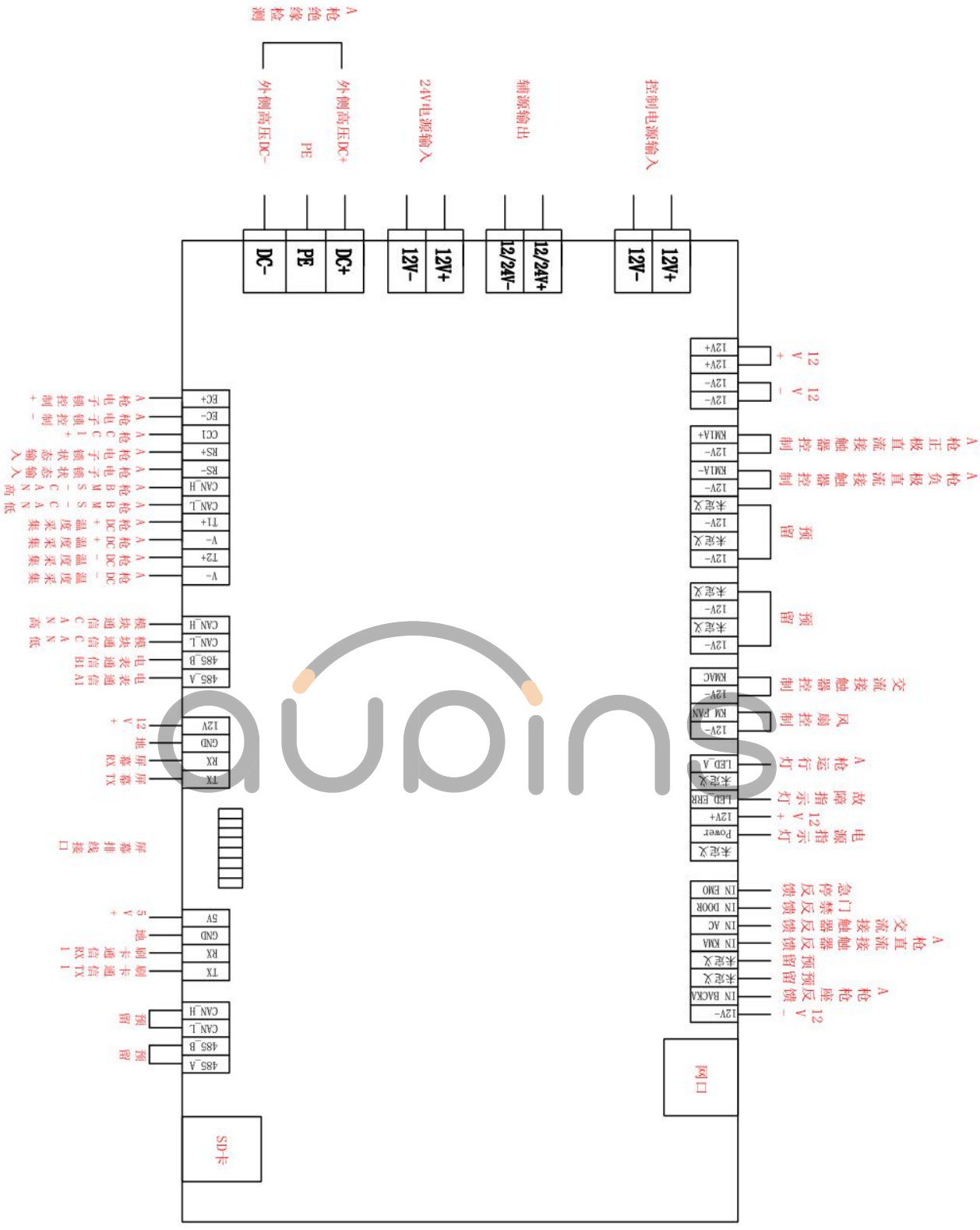


Figure 2: OP-0512 Port

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Figure 3: Actual Photograph of the OP-0510 Main Controller

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2、 Product Function

(1) It enables charging interaction with the BMS, controls the charger's charging status, collects operational data,

(2) It can be applied to single-device-per-charger terminals, group-charger terminals, and PCU modules.

(3) Equipped with electronic lock control and temperature detection for charging guns, each charging gun operates independently in terms of detection and control.

(4) CompatiblewithpowermodulesfrombrandssuchasShenghong,Infyuan,

(5)Compatible with Divin, Xinruida, and XinXian touchscreens to enable human-machine interaction functions;

（6）Supports serial card reader operation, with card-swiping and billing functionality

（7）Integrates 1-channel battery voltage acquisition functionality

（8）Integrates 1-channel control and guidance functionality

（8）Integrates 1-channel insulation detection functionality

（9）It can record charging data, with a maximum of 500 records.

(10）It features back end communication capabilities,enabling wireless interaction with back end monitoring systems to transmit statusandrelevant data

（11）Integrated Ethernet functionality; (Optional)

（12）Integrated 4G extension. (Optional)

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

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

3、 Product Features

（1）High integration and compact size; it integrates input/output functions, communication, analog signals, insulation detection, and control guidance into a single unit, significantly reducing the space occupied within the pile body.

(2)high compatibility: EMC offers exceptional stability with up to Class 4 electromagnetic compatibility.

(3) Supports multiple network backends: enables rapid deployment and monitoring of your own charging network;

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

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4、 Terminal Interface Definition

4.1 Working Power Supply

Terminal number	Order number	Pin Definition	Brief function description
J1	1	-12V	-12V
	2	+12V	+12V
J2	1	+12V	Reserve Power Supply+12V
	2	+12V	Reserve Power Supply+12V
	3	+12V	Reserve Power Supply+12V
	4	+12V	Reserve Power Supply+12V

4.2 GPRS (4G module) & Ethernet

Pin Number	Serial No	Pin Definition	Brief Description of the Function
Built-in	/		Wireless communication module socket
J8	RJ45		Ethernet communication

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4.3 Accessory Power Supply

Pin number	Order number	Pin Definition	Brief function description
J18	1	12/24V-	Accessory power supply A-
	2	12/24V+	Accessory power supply A+
J17	1	24V-	-24V power input
	2	24V+	+24V Power Input

4.4 Charging Cable

Pin Number	Serial No	Pin Definition	Brief Description of the Function
J15	1	EC+	electronic lock power supply+
	2	EC-	electronic lock power supply-
	3	CC1	Charging Connection Confirmation
	4	RS+	electronic lock feedback+
	5	RS-	electronic lock feedback-
	6	CAN_H	BMS CAN High 有120Ω resistance
	7	CAN_L	BMS CAN Low 有120Ω resistance
	8	T1+	DC Temperature
	9	V-	DC Temperature
	10	T2+	DC+Temperature
	11	V-	DC+Temperature

4.5 Enter/Exit

Terminal number	Order number	Pin Definition	Brief function description
J3	1	KMA	Control of positive DC contactors K1K2

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	2	12V-	Control of positive DC contactors K1K2
	3	KM1A	Control of positive DC contactors K1K2
	4	12V-	Control of positive DC contactors K1K2
	5	KMB	Reserve
	6	12V-	Reserve
	7	KMB	Reserve
	8	12V-	Reserve
J4	1	KM12	Reserve
	2	12V-	Reserve
	3	KM12	Reserve
	4	12V-	Reserve
J5	1	KM_AC	AC contactor control
	2	12V-	AC contactor control
	3	KM_FAN	Fan Control
	4	12V-	Fan Control
J6	1	LED_A	Running Light
	2	LED_B	Reserve
	3	LED_ERROR	trouble light
	4	12V+	Power light
	5	12V-	
	6	12V-	Reserve
J7	1	IN_EMO	Emergency Stop Feedback
	2	IN_DOOR	Access control feedback
	3	IN_AC	AC contactor feedback
	4	IN_KMA	DC contactor K1K2 feedback

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	1	IN_KMB	Reserve
	2	IN_KM12	Reserve
	3	IN_BACK	Reversed Gun Feedback
	4	12V-	12V-

4.6 Communication

d 号	NO	Pin Definition	Brief function description
J9	1	SD卡	Upgrade
J10	1	CAN_H	CANH Reserve
	2	CAN_L	CANL Reserve
	3	485_B	485CAN B Reserve
	4	485_A	485CANA Reserve
J11	1	+5V	Card swipe card communication
	2	GND	
	3	RX	
	4	TX	
J12	1	Screen cable interface	Screen cable interface
J13	1	+12V	Serial port screen with 3.81 terminal interface
	2	GND	
	3	232_RX	
	4	232_TX	
J14	1	CAN_H	Power module communication: CAN high
	2	CAN_L	Power module communication: CAN low voltage
	3	485_B	Electric Meter Communication B
	4	485_A	Electric Meter Communication A

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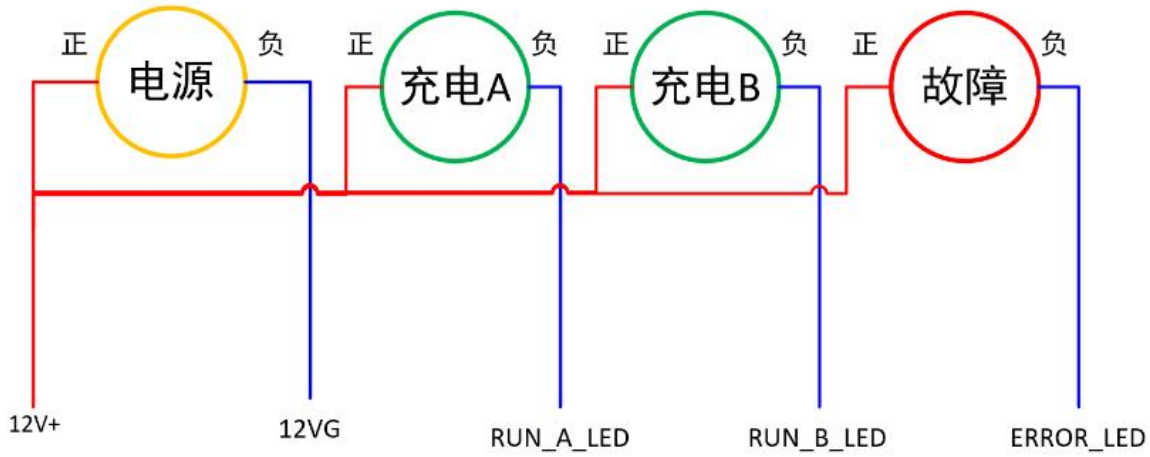
4.7 Moisture Insulation Detection and High-Voltage Sampling

Terminal number	Order number	Pin Definition	Brief function description
J18	1	DC−	High-voltage sampling DC line (connected between K1K2 and the gun line)
	2	PE	Earth wire
	3	DC+	High-voltage sampling DC+ (connected between K1K2 and the gun wire)

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5 Wiring Reference Diagram

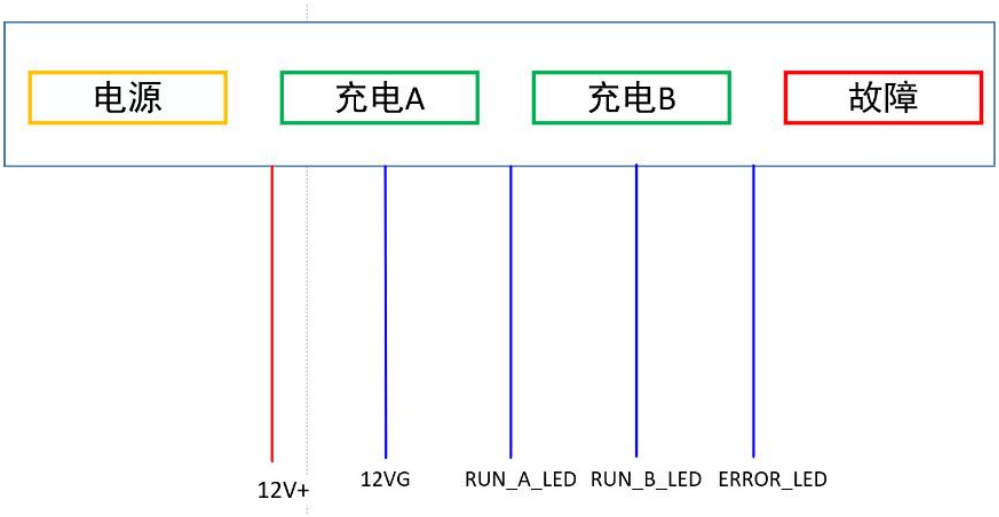
5.1 Indication Light Wiring Method



Bulb connection method

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Light strip connection method



Picrure6. The wiring connection between the main controller and the charging station indicator light

（1）Bulb connection method：

Use the common-anode connection method: connect the anodes of all bulbs to the 12V supply, and connect the cathodes to the corresponding output ports. The lighting control on the controller is a transistor with polarity; therefore, wiring must strictly follow the port specifications shown in the diagram to avoid abnormal lighting behavior.

Manufacturers can customize the color of the LEDs as needed.

（2）Light strip installation method

The light strip uses a common-anode type.

Design the light strip with a rated voltage of 12V and a current of 50mA. Exceeding these parameters may damage the corresponding electronic components.

The indicator light on the controller indicates a transistor, which has polarity; therefore, wiring must strictly follow the port specifications shown in the diagram, otherwise the light will display an abnormal status.

5.7 Key Points

1. Since the CC1 probe confirmation signal requires a ground supply, the PE and-12V terminals of the auxiliary power supply must be shorted; otherwise, the probe signal cannot be detected.

2. The insulation detection function requires grounding; the PE wire at terminal J3 must be connected, otherwise it cannot determine whether a leakage current exists.

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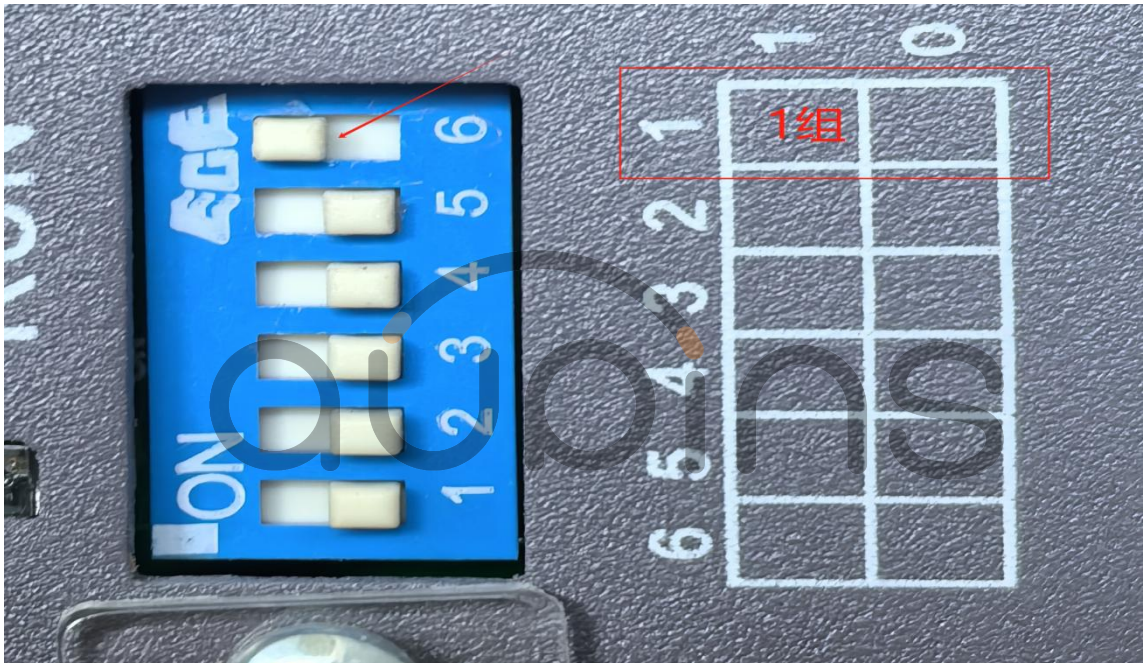
6 Power Module Configuration Instructions

This main controller supports modules from brands such as Infinova, Youyou, Yonglian, Shenghong, Tonghe, and Xingyuan Borui. Theoretically, it can accommodate all modules implementing either the Infinova protocol or the State Grid protocol. Below are detailed explanations using the Infinova 20 kW module and the Youyou 30 kW State Grid module as examples.

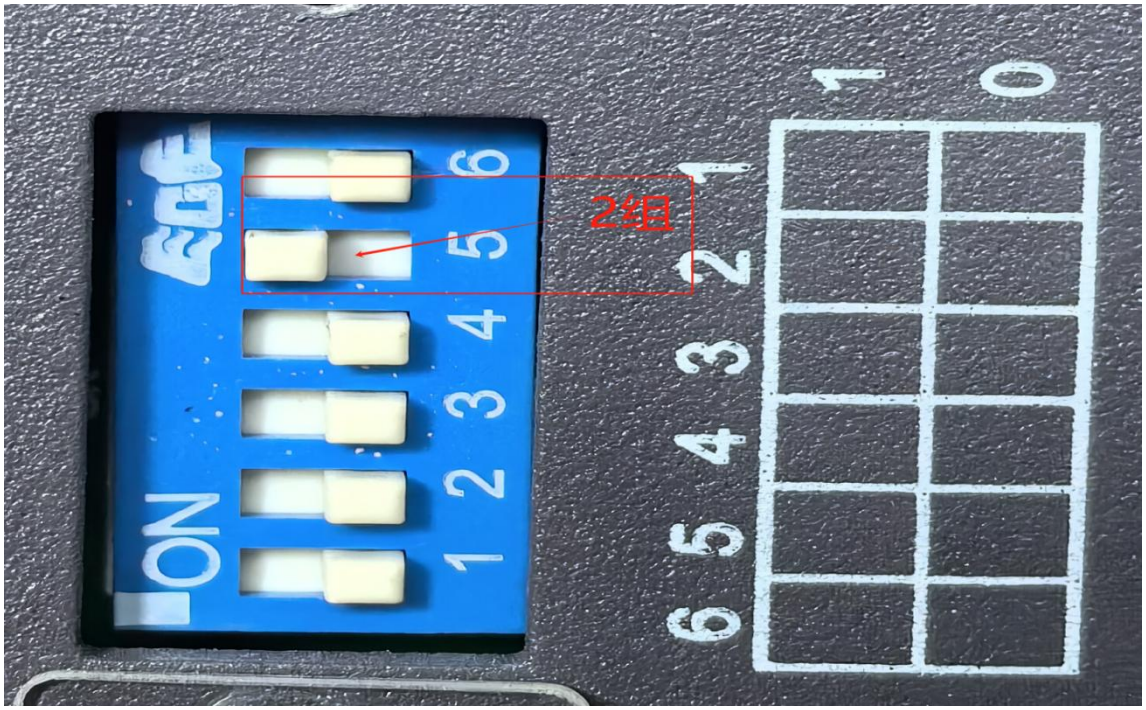
6.1 Infineon Module

This main controller employs a fixed grouping mode, where all codes within the same group are identical, ensuring convenient and error-free operation. For example, a 120 kW dual-gun charging station using the 75050 Infineon module adopts a dual-module power supply configuration.

Set all module dialers in Group 1 (corresponding to the 6 on the dial panel) to valid (dial from bottom to top), and set all module dialers in Group 2 (corresponding to the 5 on the dial panel) to valid (dial from bottom to top), as shown in the figure below:



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6.2 Youyou Module

The address configuration for all State Grid modules is largely similar. Taking the 30 kW Youyou State Grid module as an example, addresses are set via an LED screen: the first module in Group 1 starts decoding from 0x80, while the first module in Group 2 begins at 0x88. As shown below:



Figure 9. First Module Address Settings for Group 1

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7 Meter Configuration

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

The default configuration on the meter side is as follows:

Baud rate： 2400bps

Parity check method: Parity Check

Machine Address: A Gun 0x01, B Gun 0x02

Take the Yinglida electricity meter as an example:

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

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8 Revision Record

Date	Modifying Person	Description
2024/05/05	Win	First Release
2024/10/20	Win	Reference wiring diagram for the indicator light
2025/04/06	Win	Provide a definition explanation for the input/output terminals

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