VEICHI

Manual

AC800 Series Engineering Multi-Drive System

Preface

Thank you for purchasing AC800 series engineering multi-drive product designed and manufactured by our company. This manual describes how to use this product for benefits. Please read it carefully before using the product (installation, wiring, operation, maintenance, inspection, etc.).

The AC800 series multi-drive system consists of an inlet breaker, inlet contactor, AC buffer, rectifier, DC fuse, inverter, control module, and voltage and current display meters as well as status indicators and operational buttons. This system is known for its ease of use and maintenance, compact structure, and high system integration, and is widely used in industries such as metallurgy, petroleum, papermaking, harbor operations, marine engineering, testing, and power supply.

This user guide is a detailed description of the safety precautions, product technical data, mechanical installation instructions, electrical installation instructions, periodic inspection and maintenance, and peripheral electrical components purchased for this series of products. VEICHI reserves the right to continuously improve the product, and at the same time update the content in the corresponding manual, on which, VEICHI also has the final interpretation right.

If there are doubts about some functions and performance, please consult our support staff.

Catalog

Chapter 1 Safety Precaution

Before moving, installing, commissioning and operating the product, please read this manual carefully and strictly follow all safety precautions in this manual.

VEICHI will not take on any legal responsibility for personal safety accidents, property damage caused by unauthorized operation of the product.

1.1 Security Description

- **Safety level**
  - DANGER: Failure to comply with the relevant safety rules may result in serious personal accidents or even death.
  - WARNING: Failure to comply with the relevant safety rules may result in personal injuries or abnormalities or damages to the equipment.
  - CAUTION: Matters or procedures need to be observed for normal running of the equipment.
- **Operator**

This product must be installed, wired, operated and maintained by trained professionals. "Trained professionals" means that the personnel working on this product must be trained with specialized skills and knowledge about installation, wiring, operation and maintenance of the equipment, so they can respond correctly to various emergencies that arise during use.

1.2 Warnings and Signs

The following signs are used in this manual to highlight the key safety points. Failure to observe these points may result in damages to this product and the associated system, or even personal injuries.

Sign	Name	Description
	Danger	DANGER: Incorrect operation may result in death or major safety incidents.
	Warning	WARNING: Incorrect operation may result in personal injuries or abnormalities or damage to the equipment.
	Caution	CAUTION: Incorrect operation may result in minor injuries.
Note	Note	NOTE: Incorrect operation may result in damage to the product and the associated system.

1.3 Security Guidelines

The safety rules and warning signs presented for safety are measures taken to prevent personal injuries and damages to the product and the associated system. Please read this manual carefully before use and strictly follow the safety guidelines and warning signs in this manual. Users are required to follow the following safety guidelines before operating the product: handling and installation, unpacking and inspection, property verification, environment verification, installation verification, and debugging and operation, and strictly follow the steps of the safety guidelines to ensure the safety of humans and machines.

1.3.1 Handling and Installation

	● Module disassembly and installation must be performed with specialized tools. ● Forklifts or cranes must be used for the installation of the whole machine. ● Do not install the AC800 series drive near wet or flammable

	materials, and avoid the combustible and explosive materials adhere to it. ● Please connect the braking option (braking resistor, braking unit or feedback unit) according to the wiring diagram. ● Please cover the upper part of the product with a cloth or paper to prevent metal shavings, oil, water, and other foreign matter from falling into the cabinet during the drilling operation of the installation, and carefully remove these coverings after the installation. ● Do not operate the AC800 series if components are missing or damaged.

1.3.2 Unpacking Inspection

	● Check whether the packing is intact and whether there is damage, dampness, and deformation before unpacking. ● Check whether the model inside is consistent with the external labeling of the package box. ● Check whether there is damage, rust, or used signs of the product and its accessories after unpacking. ● Check the nameplate and code of the product to verify whether it matches the information on the outer packaging. ● Please check the packing list carefully after unpacking and count the number of products and accessories, including optional accessories.

If any of the above undesirable problems exist during the unpacking inspection, please contact the local dealer or contact VEICHI's after-sales department.

1.3.3 Property

	● Assess the load types driven by AC800 series devices and determine if overload is present and if power amplification or parallel operation is necessary for effective performance. ● Check if the AC800 series product complies with the specified communication protocol. ● Confirm that the grid voltage complies with the product’s input voltage range limit. ● Check that the actual operating current of the load motor is less than the rated current of the AC800 series.

1.3.4 Ambient Environment

	● Check whether the environment for AC800 series product exceeds 40℃. If the ambient temperature ranges from 40℃ to 50℃, the product's output current should be derated by 1% per 1℃ increase. Maintain the product's operating temperature below 50℃. ● Ensure that the ambient temperature for the AC800 series is above -10℃ to maintain operation within specified environmental conditions. ● Check whether the humidity for the AC800 series is greater than 90% and whether condensation exists. If so, increase protective measures and improve the ambient environment timely. ● Check if the AC800 series product is installed above 1,000m altitude. For every 100m elevation increase, a 1% derating applies. The maximum installation altitude for the AC800 series is 4,000m. ● Check whether the humidity exceeds 90% and if condensation is present. If so, enhance protective measures and promptly improve the environment. ● Ensure that the environment for the AC800 series is free of hazardous materials, including flammable and explosive substances.

1.3.5 Installation

	● Ensure that the input power lines and motor lines of the product meet the actual load requirements. ● No unauthorized modification of products is allowed. ● Ensure the product grounding system is reliably connected. ● Ensure that the external terminals of the product are tightened and that the torque meets the requirements. ● Do not install the product in a place where there are strong electromagnetic waves and electric fields. ● Ensure that the cabinets in which the products are stored are made of flame-retardant materials, and that the IP ratings comply with local laws and regulations as well as IEC standards. ● Ensure that there are no screws, cable lugs or other unwanted objects on the periphery of the product, so as to avoid them falling into the product. Additional protective measures around the product are required. ● Ensure good heat dissipation conditions at the product periphery.

1.3.6 Debugging and Operation

	● Pay attention to personal safety, as the AC drive operates at high voltage and can produce hazardous voltages in certain components of the product. ● Malfunctions in control equipment can lead to severe incidents or even personal injury. To guarantee safe operation, please adopt additional safety precautions and consider installing ancillary apparatus, such as autonomous current-limiting devices and mechanic safeguards. ● To ensure that the motor overload protection operates correctly, the motor parameters entered into the cabinet must correspond exactly to the actual use.

Chapter 2 Product Information

2.1 Nameplate Description and Naming Rule

Nameplate

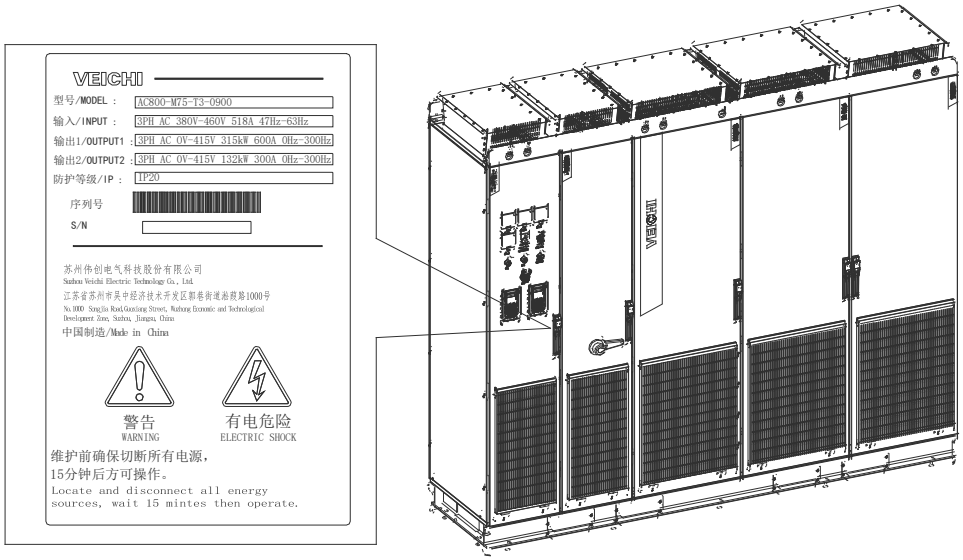


Figure 2-1 Nameplate Description

Naming Rule

Product Series-Unit Type-Module Type-IP-Voltage Class-Rated Value-Management Code

AC800– M 7 5–T3– 0900– X

Management Code

Product Series
AC800: AC800 air-cooled drive
AC800LC: AC800 liquid-cooled drive

Rated Value
0900: Rated current 900A

Unit Type
S: Single-drive
M: Multiple-drive

Voltage Class
T3: UN=400V (380V-460V)
T6: UN=690V (525V-690V)

Module Type
5: Basic rectifier
6: feedback rectifier
7: Active rectifier
8: DC chopper

IP
5: Cabinet (IP20)
6: Cabinet (IP21)
7: Cabinet (IP23)
8: Cabinet (IP43)
9: Cabinet (IP54)

2.2 Cabinet Units

2.2.1 Single Unit Type

Table 2-1 Unit Type

Name	400mm width	600mm width	900mm width
Control unit	2*VCU	4*VCU	-
Inlet unit	630A-1600A	2000A-2500A	-
Basic rectifier unit	1*V8T	2*V8T	3*V8T
Active rectifier unit	-	LCL+V8	LCL+2V8
Feedback rectifier unit	-	L+V8	L+2V8
V8 inverter unit	1*V8	2*V8	3*V8
V7 inverter unit	1*V7	2*V7	3*V7
V6 inverter unit	1*V6	2*V6	3*V6
Connection unit	400 width	-	-

2.2.2 Overall Drive Diagram

Here's an example of the overall drive diagram of the rectifier and inverter cabinets.

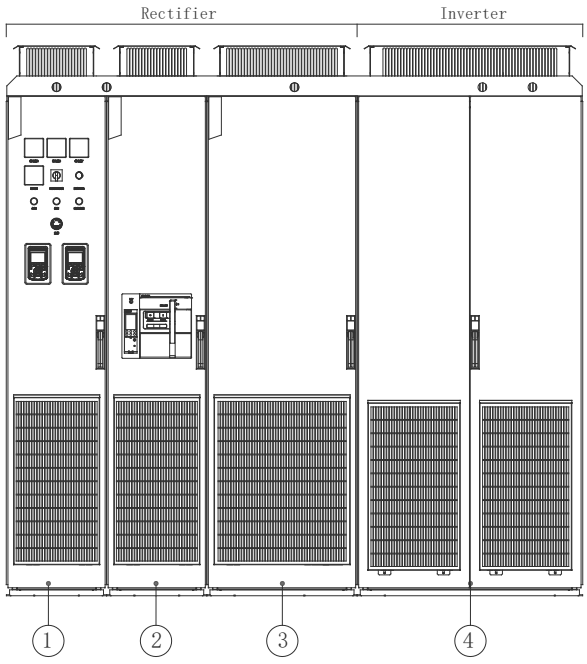


Figure 2-2 Multi-Drive Product Structure Layout

Table 2-2 Multi-Drive Product Structure Layout Comments

No.	Name	Description
①	Control unit	A centralized system control with customized DI/DO interfaces for VCU control module, control power supply, ammeter, voltmeter display, panel, etc.
②	Inlet unit	Inlet unit with grid-side components for connecting the grid to the rectifier units, including power input terminals and switches.
③	Rectifier unit	The rectifier unit converts AC voltage from the grid to DC voltage, supplying power to the inverter devices on the common DC bus. It includes the basic rectifier module, feedback rectifier module, active rectifier module, fuses, etc.
④	Inverter unit	An inverter for motor drives includes various types of power modules, DC fuses, etc.

2.3 Technical Specifications

Table 2-3 Technical Specifications

Item		Specification
Basic Rectifier Control	Input voltage	400V system: 380VAC~460VAC 690V system: 525VAC~690VAC, ±10%
	Input frequency	47Hz~63Hz
	Output voltage	400V system: 540VDC~650VDC 690V system: 740VDC~975VDC
	Overload capacity	Light load: 110% load, 1min overloaded is allowed for every 5min
		Heavy overload: 150% load, 1min overloaded is allowed for every 5min
	Operating efficiency	≥98%
	Power factor	≥0.95 (rated current)
Feedback Rectifier Control	Input voltage	400V system: 380VAC~415VAC 690V system: 525VAC~690VAC, ±10%
	Input frequency	47Hz~63Hz
	Output voltage	400V system: 540VDC~720VDC 690V system: 740VDC~975VDC

	Overload capacity	Light load: 110% load, 1min overloaded is allowed for every 5min
		Heavy overload: 150% load, 1min overloaded is allowed for every 5min
	Operating efficiency	≥98%
	Power factor	≥0.95 (rated current)
Active Rectifier Control	Input voltage	400V system: 380VAC~460VAC 690V system: 525VAC~690VAC, ±10%
	Input frequency	47Hz~63Hz
	Output voltage	400V system: 540VDC~720VDC 690V system: 740VDC~975VDC
	Overload capacity	Light load: 110% load, 1min overloaded is allowed for every 5min
		Heavy overload: 150% load, 1min overloaded is allowed for every 5min
	Operating efficiency	≥97%
	Power factor	≥0.99 (adjustable)
	Imbalance	≤±3% of rated line voltage
	Total harmonic distortion (THD)	THDI<5% (rated power); THDU<5%, (Rsc>20)
Inverter Module Control	Output voltage	400V system: 0VAC~415VAC 690V system: 0VAC~690VAC
	Output frequency	0Hz~300Hz
	Control mode	Frequency control (V/F), vector control without encoder (SVC), vector control with encoder (FVC)
	Speed ratio	V/F control: 1:50
		SVC: 1:200
		FVC: 1:1000
	Speed accuracy	SVC: 5% of rated slip for asynchronous products, 0.2% of rated speed for synchronous products
		FVC control: ±0.01% rated sync speed
	Speed ripple	SVC: ±0.2%
		FVC: ±0.1%
	Torque response	≤5ms
	Starting torque	SVC: 0.5Hz/150% T_N
		FVC: 0Hz/200% T_N

DC Chopper Control	Input voltage	400V system: 540VDC~720VDC 690V system: 740VDC~1050VDC
	Output voltage	400V system: 24VDC~670VDC 690V system: 24VDC~1000VDC
	Overload capacity	Fast overload: 200% load, 10s overloaded is allowed for every 60s
		Heavy overload: 150% load, 60s overloaded is allowed for every 300s
	Operating efficiency	≥97%
	Voltage accuracy	LV side: ≤0.1%Fs; HV side: ≤ 1%Fs
	Voltage ripple (Vrms)	LV side: ≤0.2%Fs; HV side: ≤ 0.5%Fs
	Current accuracy	≤1%Fs
	Response time	≤5ms (sudden load increase/decrease within 10%~90% of rated voltage)
	Switching time	≤10ms (sudden switching within +90% ~-90% of rated voltage)
Three-Phase Brake	Input voltage	400V system: 640VDC~750VDC 690V system: 1075VDC~1150VDC
	Output current	400V system: 0A~465A 690V system: 0A~465A
	Overload capacity	Cyclic load: 1min overloaded is allowed for every 5 min
Function	Protection	For short-circuit, overcurrent, overvoltage, undervoltage, phase loss, overheating, overload and encoder disconnection, etc.
	Standard function	V/F control, vector control, voltage auto-tuning, multi-speed frequency setting, forward/reverse rotation control, slip compensation, torque compensation, PID control
Environment	Temperature	-10℃~40℃; derating is required above 40℃; 1% derating for every 1℃ increase; the max. temperature is 50℃
	Operating humidity	5%~95%RH, non-condensing
	IP	Module: IP00; Cabinet: IP20, and can be customized to IP21, IP23, IP23, IP54
	Noise	≤85dB (A)

	Altitude	1000m and below: 100% full load (no derating); Above 1000m: derated by 1% for every 100m increase, 4000m max.
Mechanical Data	Vibration	Standard: Test Fc in IEC 60068-2-6
		Sine vibration: 10Hz~57Hz, 0.075mm; 57Hz~150Hz, 10m/s²
	Impact	Standard: Test Ea in IEC 60068-2-27:2008
		Half-sine pulse: 50m/s², for 30ms
	Cooling method	Forced air cooling AF

2.4 Derating

2.4.1 Temperature Derating

For reliability, please use the product in a place where the temperature does not change drastically.

- For a closed environment like a control cabinet, please use a fan or air conditioner to maintain temperatures within the acceptable range. Please avoid allowing the product to freeze, as extremely low temperatures can cause component malfunctions.
- Below 40°C, the product output current is not derated; within 40°C~50°C, the output current of the inverter module must be derated by 1% for every added 1°C. Calculate the $I_M$output currentI_N by multiplying the rated current by the derating factor (k). The temperature derating curve is shown below.

$$k = 1 - 1\% \times (T - 40)$$
$$I_M = I_N \times k = I_N \times (1 - 1\% \times (T - 40))$$

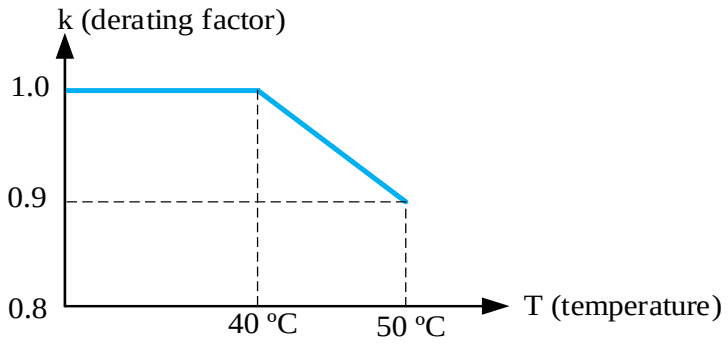


Figure 2-3 Temperature Derating

2.4.2 Altitude Derating

Below 1000m, the output current of the AC800 series is not derated; above 1000m, the output current shall be derated by 1% for every 100m increase in altitude. The altitude derating curve is shown below.

By supposing that the altitude is N, the derating current I_M is calculated by:

$$k = 1 - 1\% \times \left(\frac{N - 1000}{100}\right)$$

$$I_M = I_N \times k = I_N \times \left(1 - 1\% \times \left(\frac{N - 1000}{100}\right)\right)$$

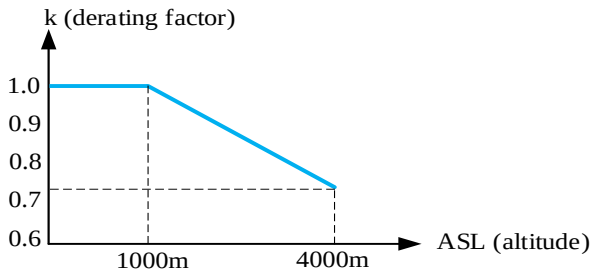


Figure 2-4 Derating and Altitude

2.5 Overload Capacity

When the AC800 series is used under an overload condition, the reference current must be adjusted according to the overload condition. The AC800 series has three reference current adjustment modes, light, fast and heavy.

2.5.1 Light Overload Mode

In light overload mode, the AC800 rectifier and inverter modules' currents allow 110% overload for 1min in every 5min operation.

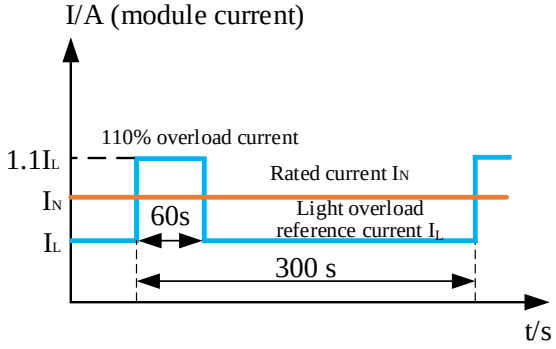


Figure 2-5 Current Time Curve in Light Overload Mode

2.5.2 Fast Overload Mode

The AC800 series DC chopper supports fast overload mode, allowing 200% overload for 10s in each minute.

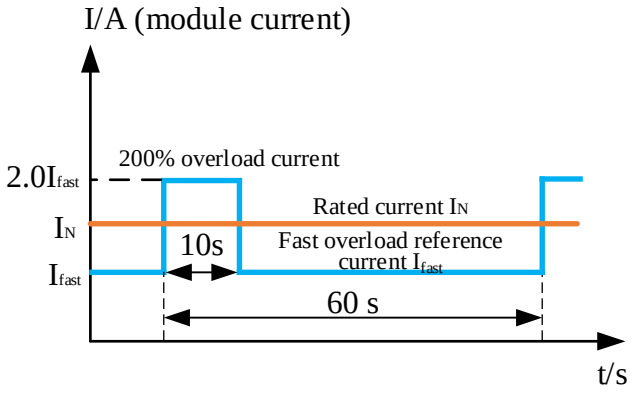


Figure 2-6 Current Time Curve in Fast overload Mode

2.5.3 Heavy Overload Mode

In heavy overload mode, the AC800 rectifier and inverter modules' currents allow 150% overload for 1min in every 5min operation.

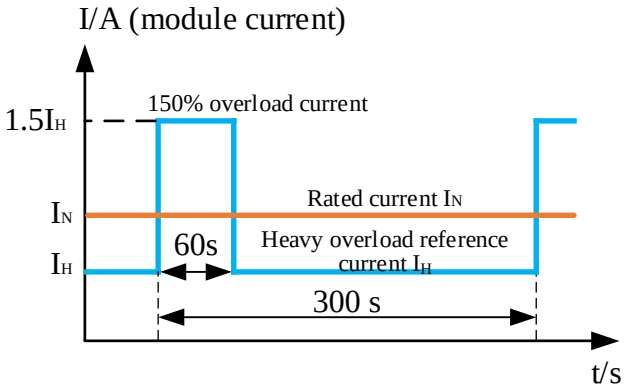


Figure 2-7 Current Time Curve in Heavy Overload Mode

2.6 Cabinet Unit Structural Layout

2.6.1 Control Unit

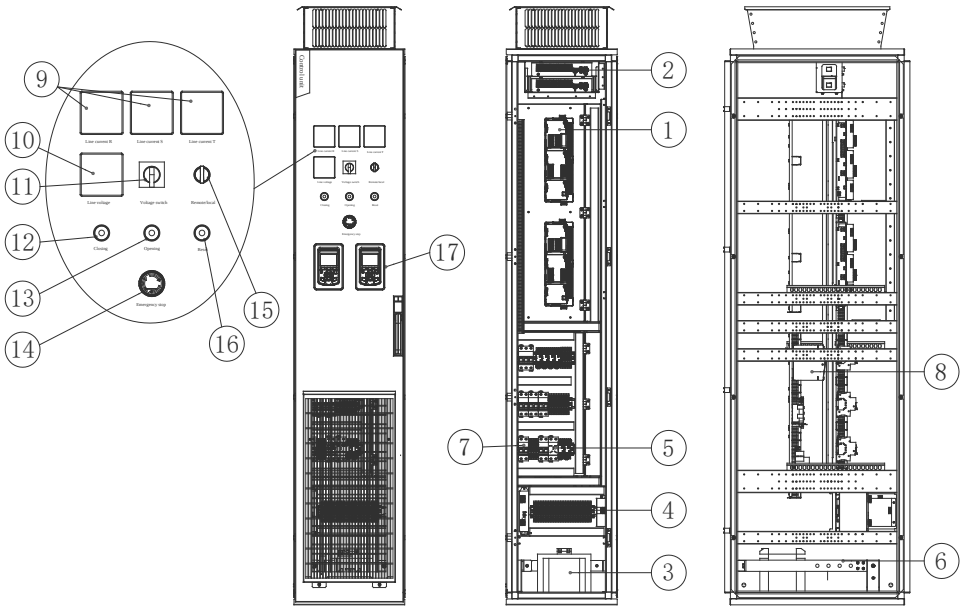


Figure 2-8 Control Unit Structural Layout

Table 2-4 Control Unit Structural Layout Comments

No.	Name	Description
①	VCU	For main control
②	VPCU	For paralleled expansion control
③	Power supply transformer	Auxiliary power transformer
④	Terminal block	External I/O signal input interface
⑤	Maintenance socket	Provide AC220V power
⑥	PE copper bar	For safety ground
⑦	Control breaker	For auxiliary power on/off and overload short-circuit protection
⑧	Switch power supply	24V DC power supply
⑨	AC ammeter	Main power supply input current display
⑩	AC voltmeter	Mains phase-to-phase voltage display
⑪	Voltage switch	Switch voltage displays between different phases

⑫	Closing switch	Closing switch triggered by power-on
⑬	Opening switch	Opening switch triggered by power-down
⑭	Emergency stop switch	To stop the output in case of emergency
⑮	Remote /local switch	Switch for remote control, local control
⑯	Reset button	Reset after failure
⑰	Intelligent operation panel	Rectifier/drive control and parameter display

2.6.2 Inlet Unit

- Manual breaker

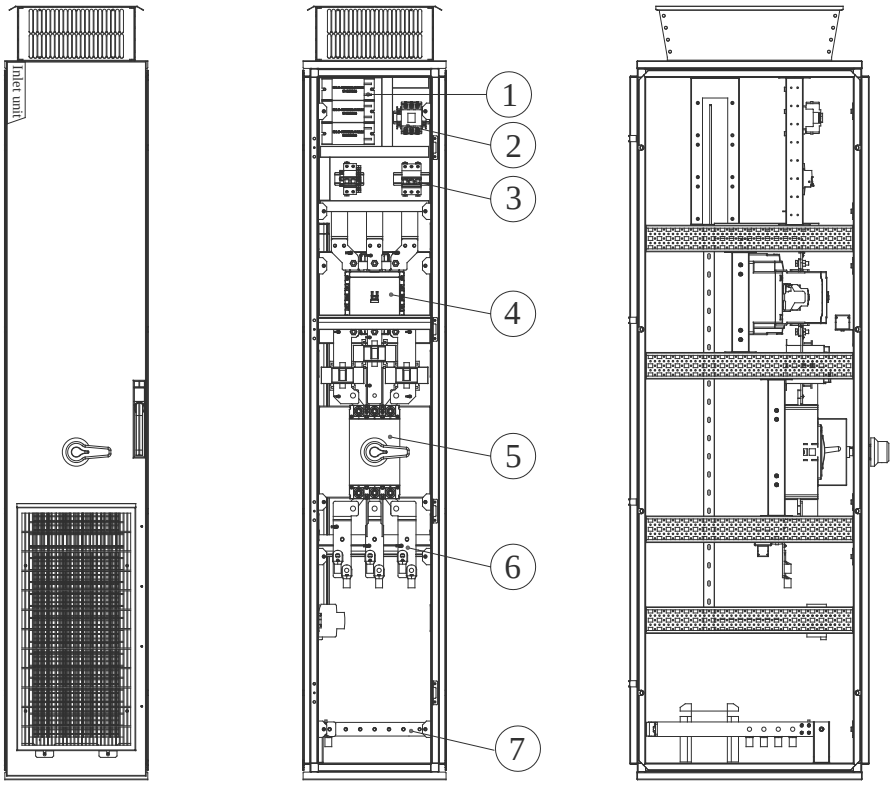


Figure 2-9 Manual Breaker Inlet Cabinet Unit Structural Layout

Table 2-5 Manual Breaker Inlet Cabinet Unit Structural Layout Comments

No.	Name	Description
①	Precharge resistance	Limit bus capacitor charging current
②	Precharge contactor	Control the pre-charge circuit on/off
③	Precharge circuit breaker	Control the pre-charge circuit on/off, overload and short-circuit protection

④	Main contactor	Control the main circuit on/off
⑤	Breaker	For main circuit on/off, overload/short-circuit protection
⑥	R/S/T input copper bar	For three-phase AC supply input
⑦	PE copper bar	For safety ground

■ Frame breaker

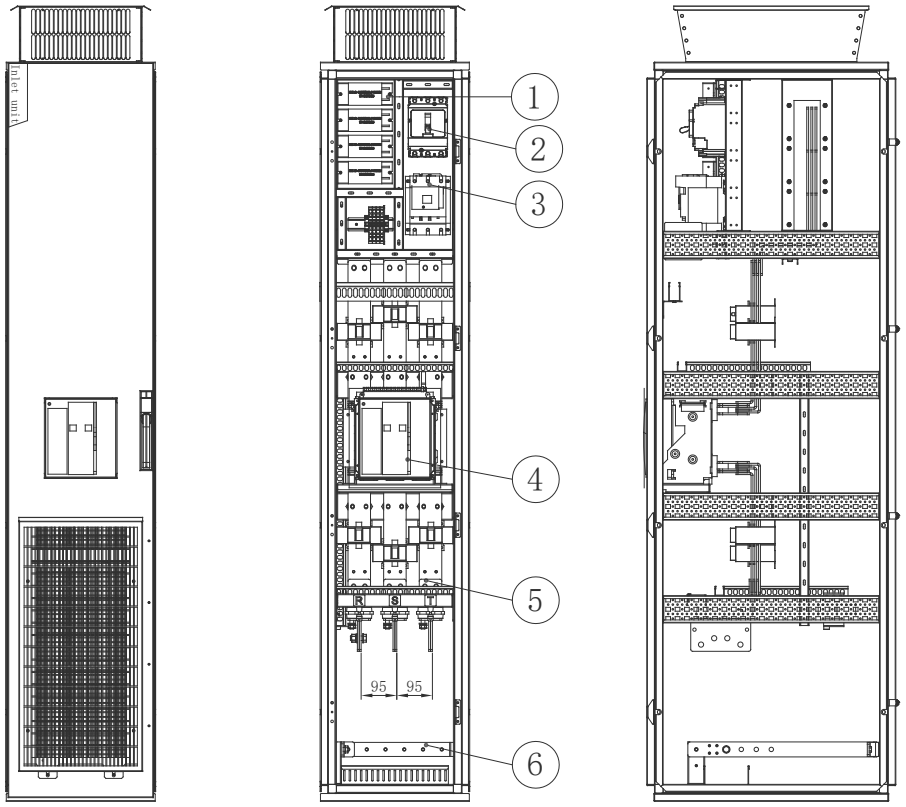


Figure 2-10 Frame Breaker Inlet Cabinet Unit Structural Layout

Table 2-6 Frame Breaker Inlet Cabinet Unit Structural Layout Comments

No.	Name	Description
①	Precharge resistance	Limit bus capacitor charging current
②	Precharge contactor	Control the pre-charge circuit on/off
③	Precharge circuit breaker	Control the pre-charge circuit on/off, overload and short-circuit protection
④	Frame breaker	For main circuit on/off and overload/short-circuit protection
⑤	R/S/T input copper bar	For three-phase AC supply input
⑥	PE copper bar	For safety ground

- 12-pulse basic rectifier inlet unit
  - Manual breaker

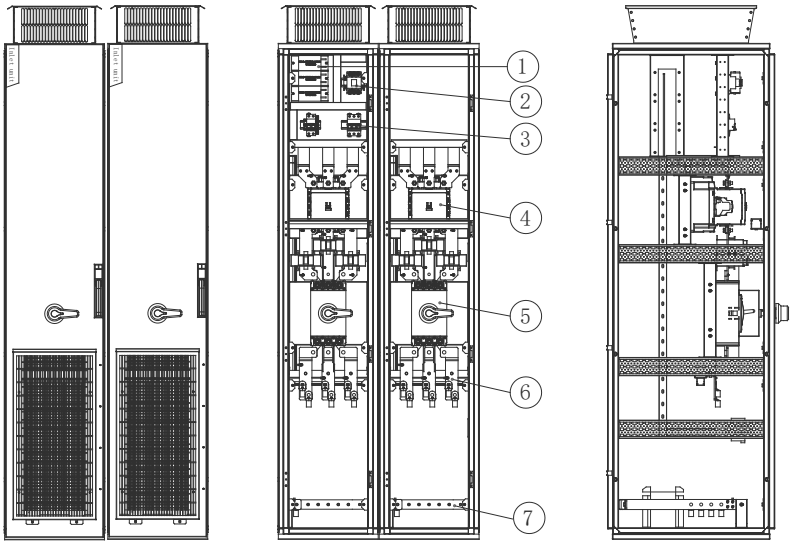


Figure 2-11 12-Pulse Basic Rectifier Inlet Unit Structural Layout

Table 2-7 12-Pulse Basic Rectifier Inlet Unit Structural Layout Comments

No.	Name	Description
①	Precharge resistance	Limit bus capacitor charging current
②	Precharge contactor	Control the pre-charge circuit on/off
③	Precharge circuit breaker	Control the pre-charge circuit on/off, overload and short-circuit protection
④	Main contactor	Control the main circuit on/off
⑤	Breaker	For main circuit on/off and overload/short-circuit protection
⑥	R/S/T input copper bar	For three-phase AC supply input
⑦	PE copper bar	For safety ground

■ Frame breaker

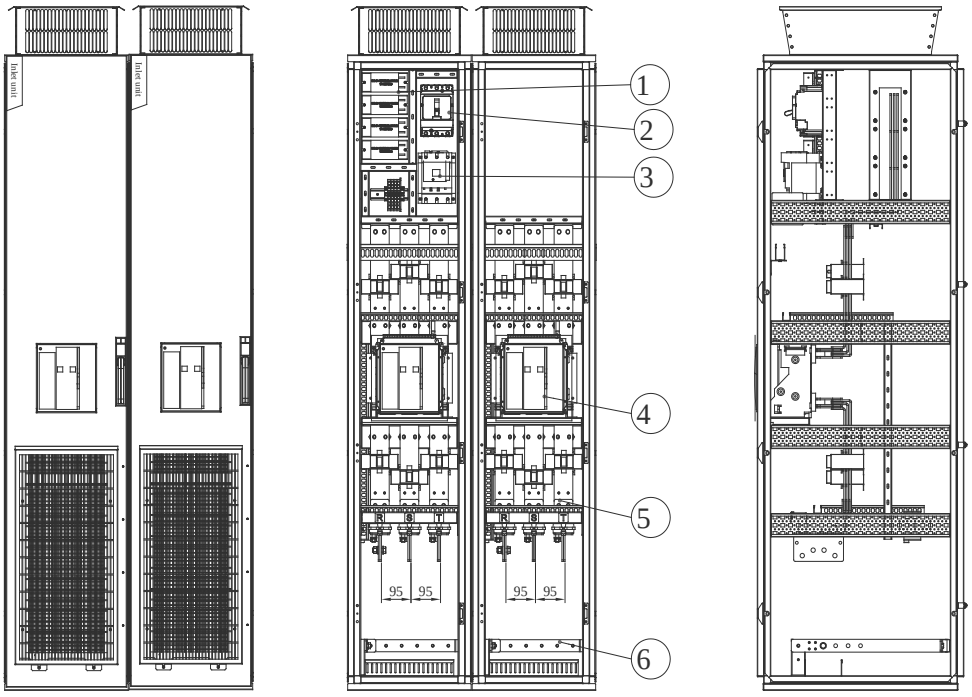


Figure 2-12 12-Pulse Frame Breaker Inlet Unit Structural Layout

Table 2-8 12-Pulse Frame Breaker Inlet Unit Structural Layout Comments

No.	Name	Description
①	Precharge resistance	Limit bus capacitor charging current
②	Precharge contactor	Control the pre-charge circuit on/off
③	Precharge circuit breaker	Control the pre-charge circuit on/off, overload and short-circuit protection
④	Frame breaker	For main circuit on/off and overload/short-circuit protection
⑤	R/S/T input copper bar	For three-phase AC supply input
⑥	PE copper bar	For safety ground

2.6.3 Basic Rectifier Unit

- V8T basic rectifier unit

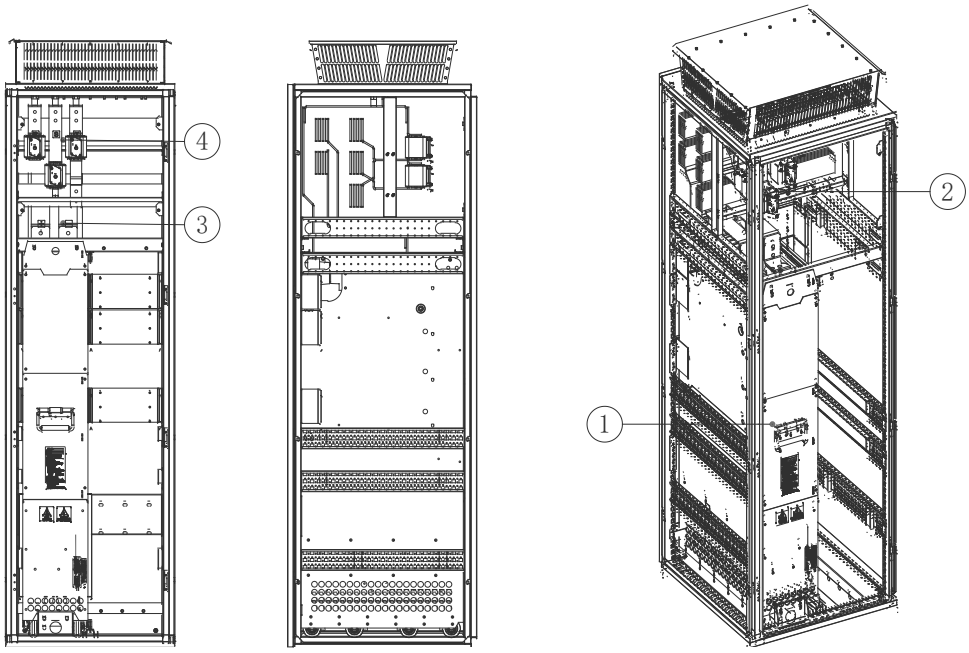


Figure 2-13 V8T Basic Rectifier Unit Structural Layout

Table 3-3 V8T Basic Rectifier Unit Structural Layout Comments

No.	Name	Description
①	Basic rectifier module	Basic rectifier thyristor power module
②	AC fuse (optional)	For feedback rectifier side overload and short-circuit protection
③	(+)/(-) output copper bar	For DC bus output
④	R/S/T input copper bar	For three-phase AC supply input

■ 2V8T basic rectifier unit

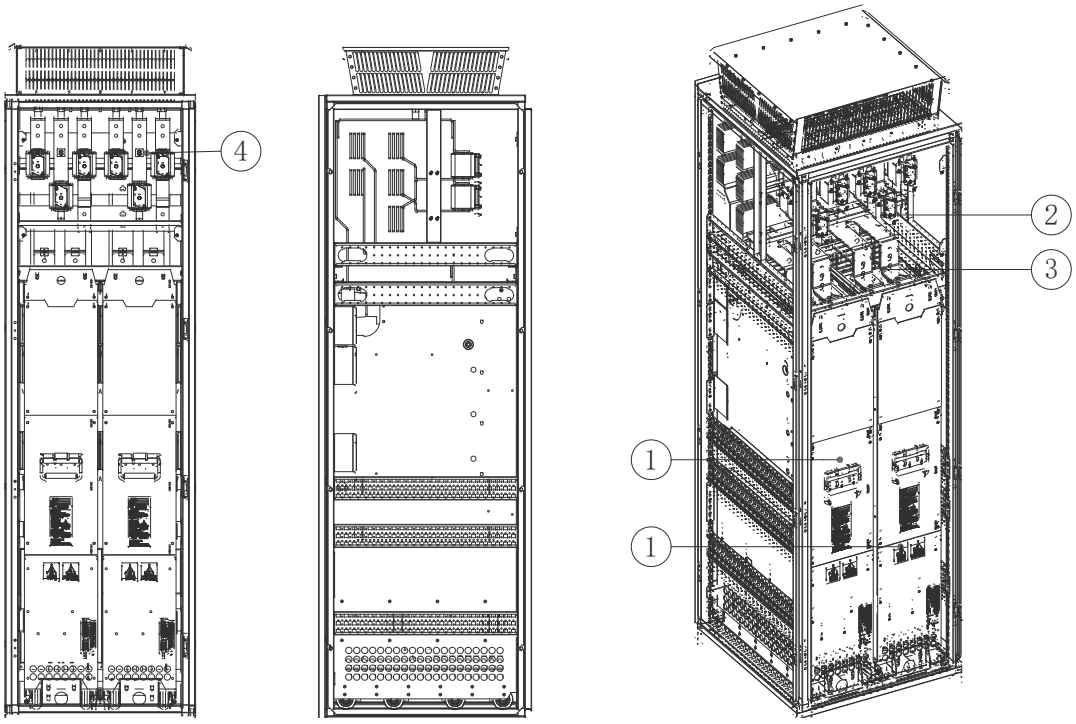


Figure 2-14 2V8T Basic Rectifier Unit Structural Layout

Table 2-10 2V8T Basic Rectifier Unit Structural Layout Comments

No.	Name	Description
①	Basic rectifier module	Basic rectifier thyristor power module
②	AC fuse (optional)	For feedback rectifier side overload and short-circuit protection
③	(+)/(-) output copper bar	For DC bus output
④	R/S/T input copper bar	For three-phase AC supply input

2.6.4 Feedback Rectifier Unit

- L+V8 feedback rectifier unit

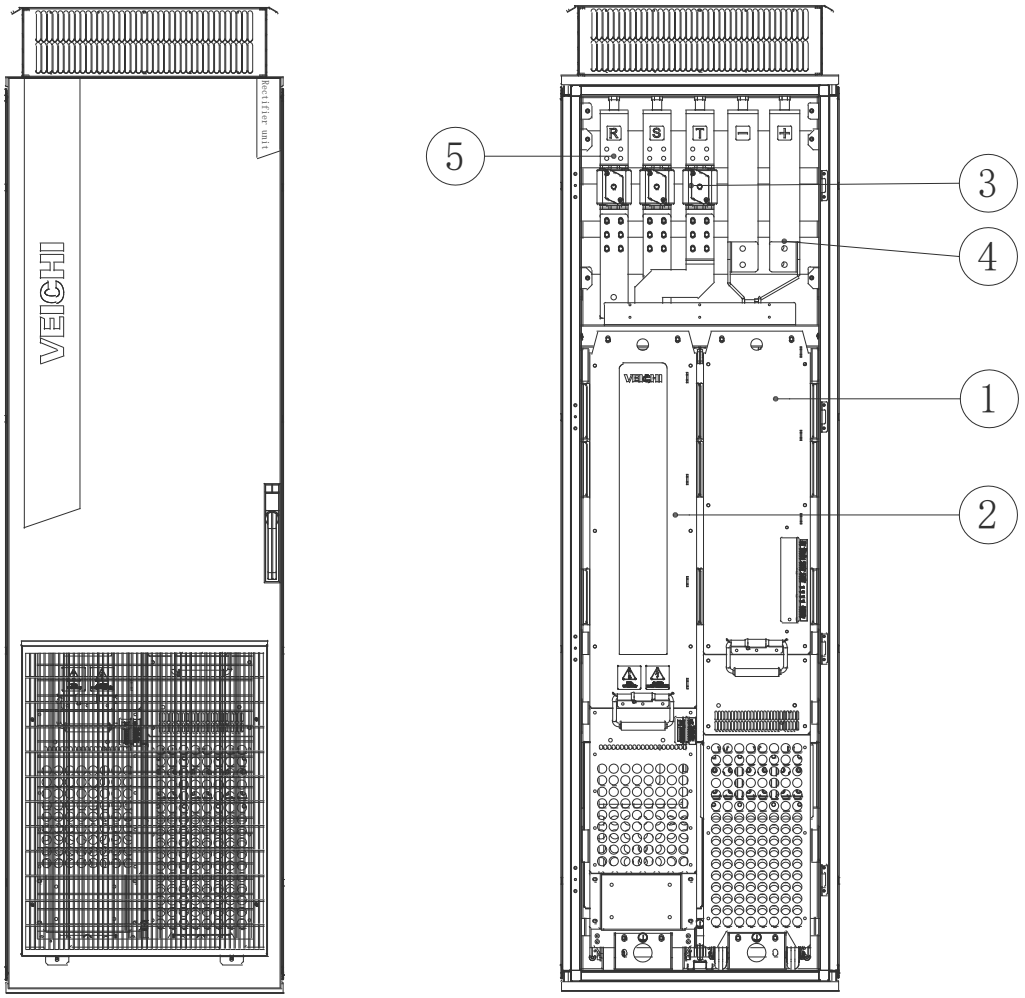


Figure 2-15 L+V8 Feedback Rectifier Unit Structural Layout

Table 2-11 L+V8 Feedback Rectifier Unit Structural Layout Comments

No.	Name	Description
①	Feedback rectifier module	Feedback rectifier IGBT power module, which must be used with a feedback rectifier filter module
②	Feedback rectifier filter module	Feedback rectifier input side L filter
③	AC fuse (optional)	For feedback rectifier side overload and short-circuit protection
④	(+)/(-) input copper bar	For DC bus output
⑤	R/S/T input copper bar	For three-phase AC supply input

■ L+2V8 feedback rectifier unit

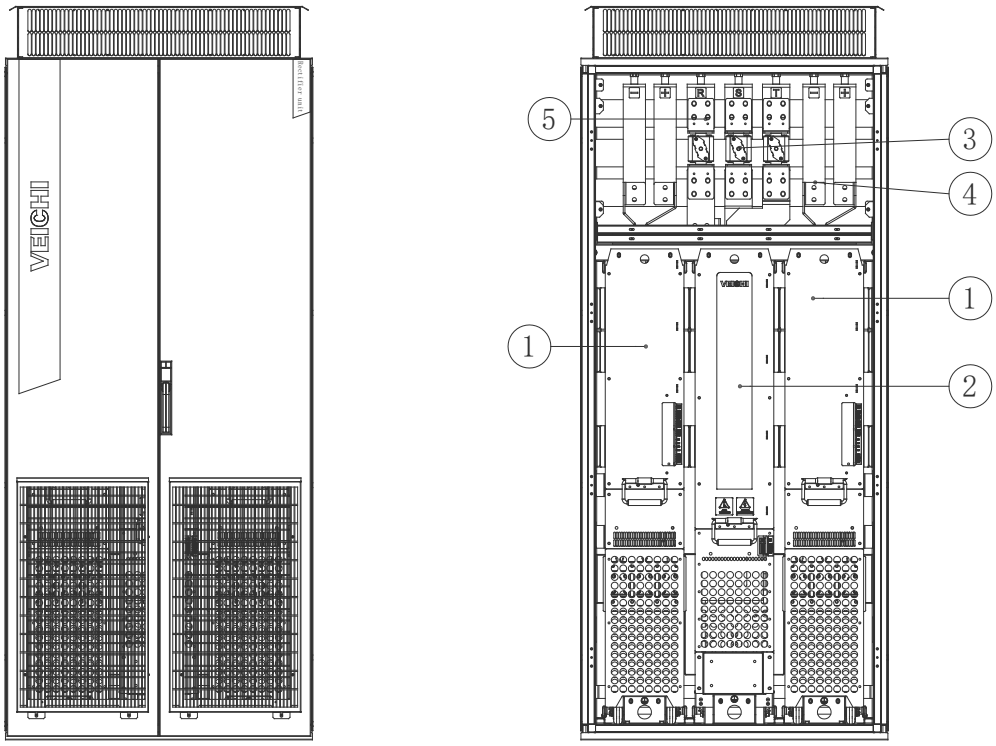


Figure 2-16 L+2V8 Feedback Rectifier Unit Structural Layout

Table 2-12 L+2V8 Feedback Rectifier Unit Structural Layout Comments

No.	Name	Description
①	Feedback rectifier module	Feedback rectifier IGBT power module, which must be used with a feedback rectifier filter module
②	Feedback rectifier filter module	Feedback rectifier input side L filter
③	AC fuse (optional)	For feedback rectifier side overload and short-circuit protection
④	(+)/(-) output copper bar	For DC bus output
⑤	R/S/T input copper bar	For three-phase AC supply input

2.6.5 Active Rectifier Unit

- LCL+V8 active rectifier unit

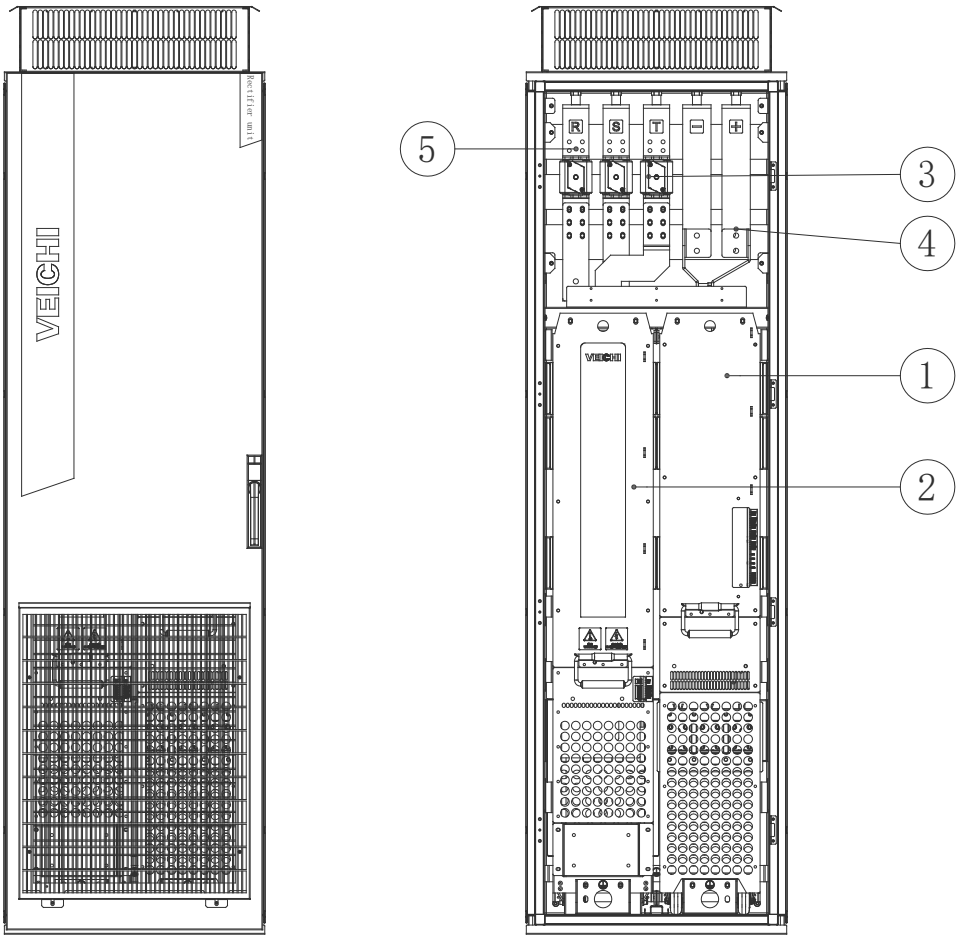


Figure 2-17 LCL+V8 Active Rectifier Unit Structural Layout

Table 2-13 LCL+V8 Active Rectifier Unit Structural Layout Comments

No.	Name	Description
①	Active rectifier module	Active rectifier IGBT power module, which must be used with an active rectifier filter module
②	Active rectifier filter module	Active rectifier input side LCL filter
③	AC fuse (optional)	For active rectifier side overload and short-circuit protection
④	(+)/(-) input copper bar	For DC bus output
⑤	R/S/T input copper bar	For three-phase AC supply input

■ LCL+2V8 active rectifier unit

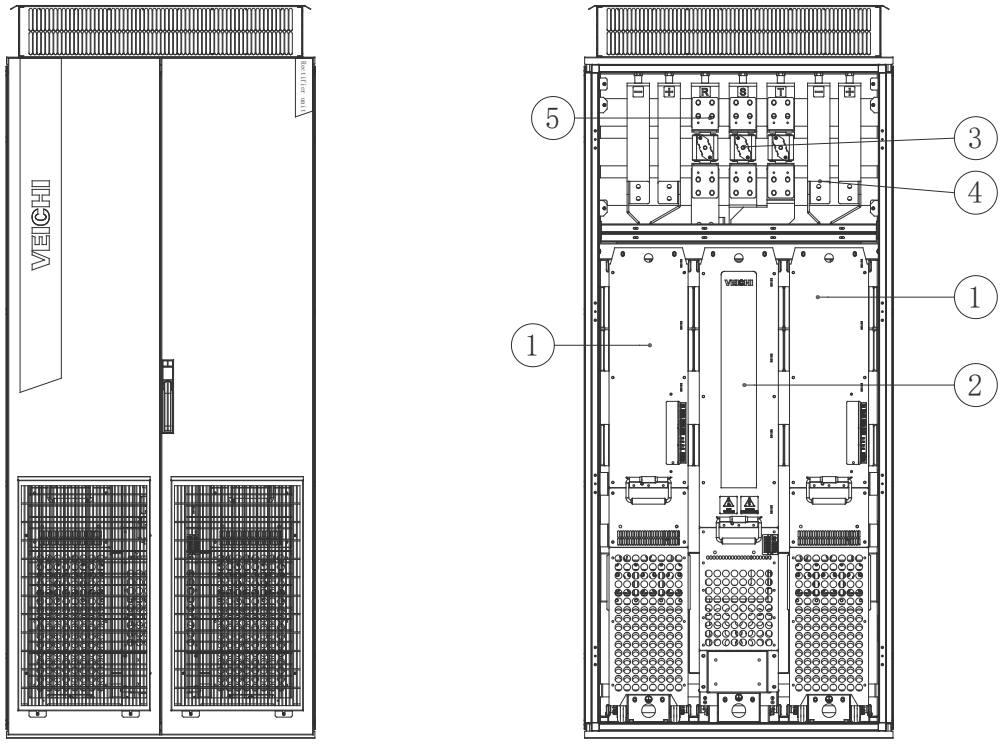


Figure 2-18 LCL+2V8 Active Rectifier Unit Structural Layout

Table 2-14 LCL+2V8 Active Rectifier Unit Structural Layout Comments

No.	Name	Description
①	Active rectifier module	Active rectifier IGBT power module, which must be used with an active rectifier filter module
②	Active rectifier filter module	Active rectifier input side LCL filter
③	AC fuse (optional)	For active rectifier side overload and short-circuit protection
④	(+)/(-) output copper bar	For DC bus output
⑤	R/S/T input copper bar	For three-phase AC supply input

2.6.6 Inverter Cabinet Unit

■ Inverter unit structural layout

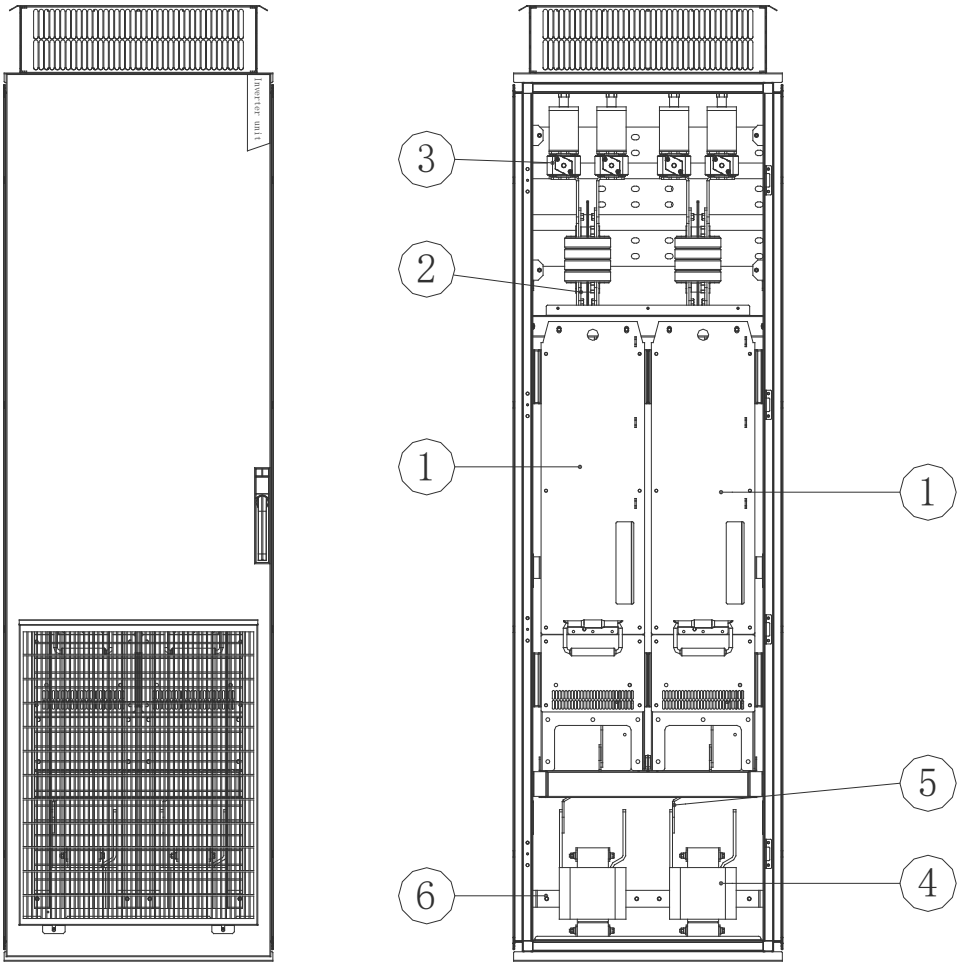


Figure 2-19 Inverter Cabinet Unit Structural Layout

Table 2-15 Inverter Cabinet Unit Structural Layout Comments

No.	Name	Description
①	Inverter module	Inverter IGBT power module
②	(+)/(-) input copper bar	For DC bus input
③	DC fuse (optional)	For overload and short-circuit protection
④	Output reactor	For inverter module output filter and equalization
⑤	U/V/W output copper bar	For AC voltage output
⑥	PE copper bar	For safety ground

2.6.7 DC Chopper Unit

■ DC chopper single unit

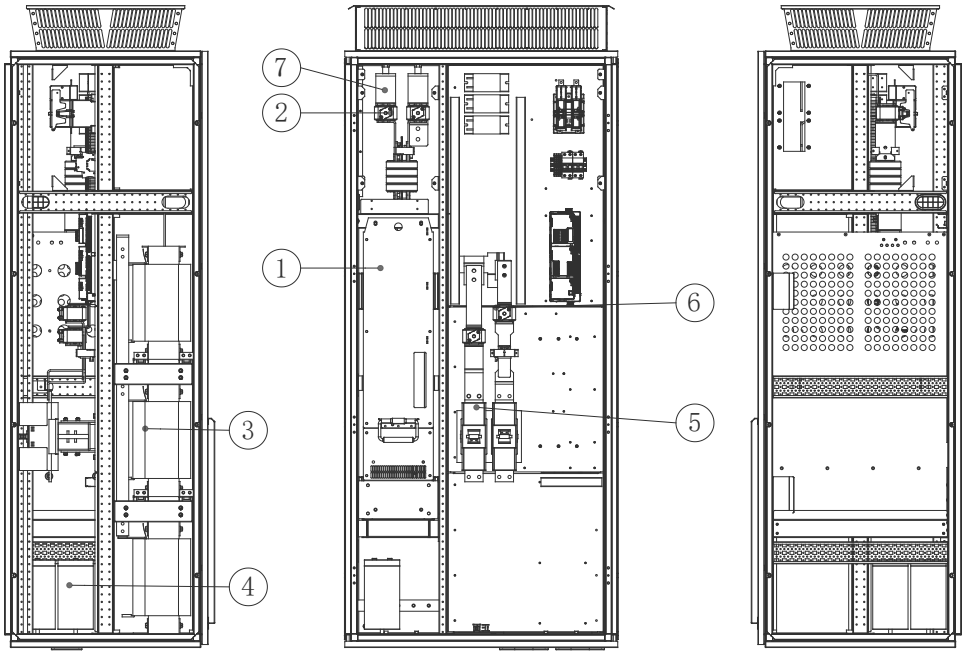


Figure 2-20 DC Chopper Single Unit Structural Layout

Table 2-16 DC Chopper Single Unit Structural Layout Comments

No.	Name	Description
①	DC chopper module	DC chopper IGBT power module, which must be used with an LC filter module
②	DC fuse (optional)	For high-voltage side DC bus input protection
③	Reactor	For low-voltage side DC filtering
④	Film capacitor	For low-voltage side DC filtering
⑤	Bipolar DC main contactor	For low voltage side DC output on/off
⑥	DC fuse (optional)	For low voltage side DC output protection
⑦	(+)/(-) copper bar	For high-voltage side DC bus input

■ DC chopper paralleled unit

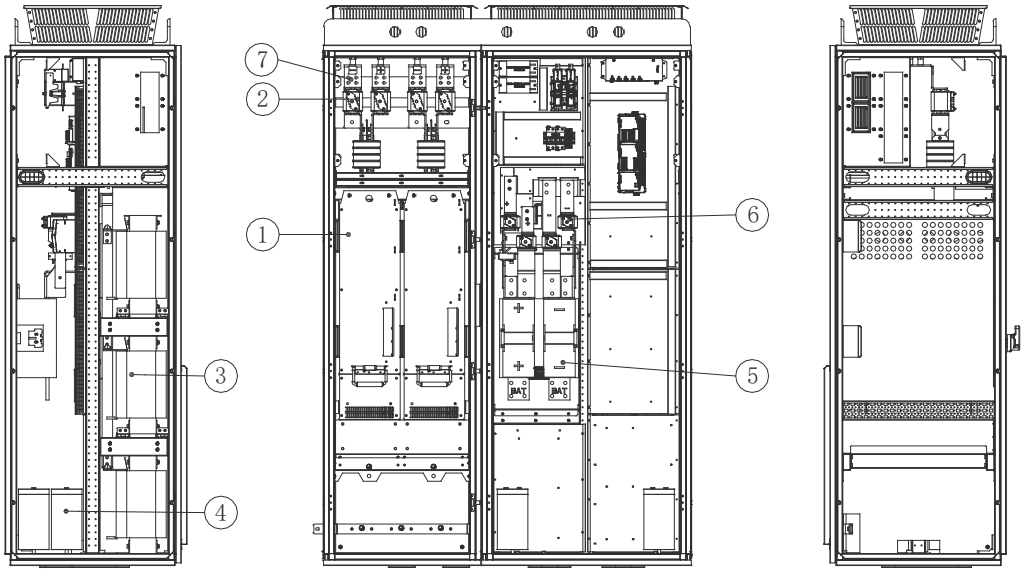


Figure 2-21 DC Chopper Unit Structural Layout

Table 2-17 DC Chopper Unit Structural Layout Comments

No.	Name	Description
①	DC chopper module	DC chopper IGBT power module, which must be used with an LC filter module
②	DC fuse (optional)	For high-voltage side DC bus input protection
③	Reactor	For low-voltage side DC filtering
④	Film capacitor	For low-voltage side DC filtering
⑤	Bipolar DC main contactor	For low voltage side DC output on/off
⑥	DC fuse (optional)	For low voltage side DC output protection
⑦	(+)/(-) copper bar	For high-voltage side DC bus input

Chapter 3 Mechanical Installation

3.1 Precautions and Requirements

3.1.1 Storage

There are strict requirements for its storage environment to ensure the product safety performance. The storage environment must be clean and dry, and its temperature must be maintained between -40℃~+70℃, and the temperature change must be <1℃/min. If the equipment remains unused for extended periods, protect it from environmental contaminants with a dust cover or similar safeguards. For short-term storage after purchase, it is advisable to retain the original packaging and place the item back into VEICHI's box. For long-term storage, the storage space for the machine must be protected from humidity, heat or sunlight.

3.1.2 Transportation

To transport the AC800 series, please use a forklift or crane with the pallet below. Operators must be certified and trained. During transportation with a forklift, the equipment must be secured to the pallet to avoid the machine slipping during lifting. When using a crane for transport, secure the equipment on pallets for joint lifting, and ensure the handling gear's capacity exceeds the equipment's weight.

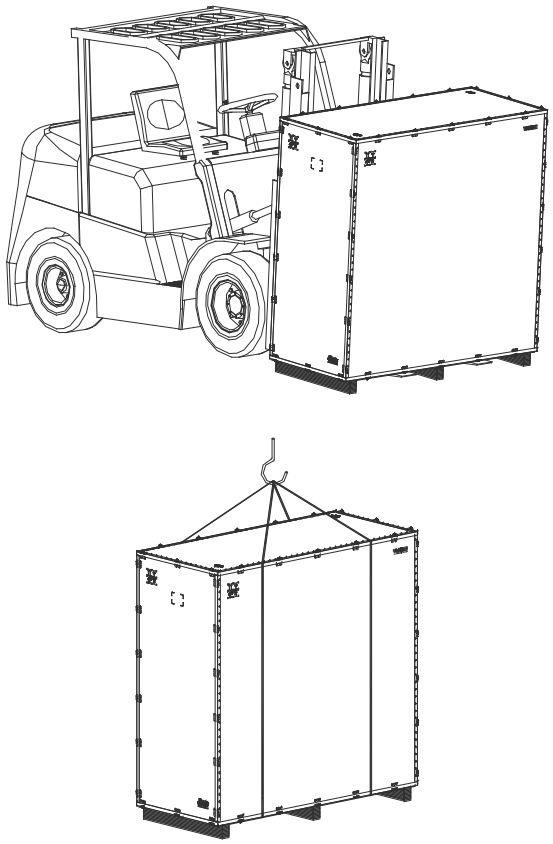


Figure 3-1 Equipment relocation before unpackaging

3.1.3 Installation Environment

The installation environment is very important to give full play to the performance of this product and maintain its function for a long time. Please install the product in an environment that complies with the requirements listed below.

Table 3-1 Environment Requirements

Environment	Requirement
Cooling and ventilation	Mount the purchased equipment on a flame-retardant surface with ample clearance for heat dissipation, and secure it vertically on a stable bracket via screws.
Humidity	Below 95%RH, non-condensing
Temperature	Comply to the specified climate conditions: power derating is necessary for ambient temperatures above 40℃, as well as the altitudes above 1000m. For derating factors, please see "2.4 Derating".
Surroundings	Please install the AC drives in the following places: ● Places free of oil mist, corrosive gas, flammable gas, and dust ● Places where metal powder, oil, water and other foreign objects will not enter into the product (do not install it on flammable materials such as wood) ● Places free of radioactive materials and flammable materials ● Places free of harmful gases and liquids ● Places with less salt erosion ● Places without direct sunlight
Vibration	● 10Hz~20Hz: 9.8m/s^2 ● 20Hz~55Hz: 5.9m/s^2
Protective enclosure	This product requires in-cabinet installation and will be used in a final system which must include suitable fireproof, electrical, and mechanical protective enclosures, adhering to local legislation and relevant IEC standards.

3.1.4 Installation Space

- Single Unit

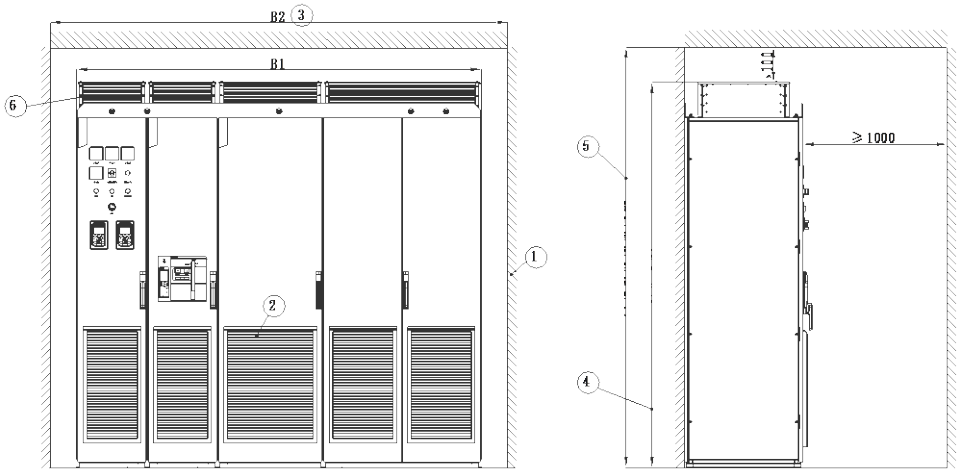


Figure 3-2 Single Unit Installation Space

- Multi-Unit

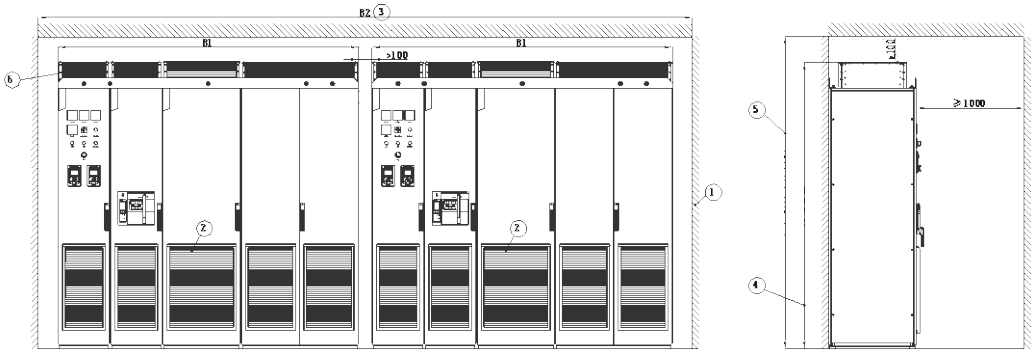


Figure 3-3 Multi-Unit Installation Space

3.2 Unit Installation

1. The base design must account for access space at the front of the AC800 drive unit, and the installation and routing of power cables, motor drive cables, and system control cables. It is recommended to include a cable trench or lead-in trough under the AC800 series (separate power and signal cables, as their interference can affect equipment functionality).
2. The unit must be installed vertically and upright, and can be bolted to the floor through the fixing holes.

Chapter 4 Electrical Installation

4.1 Safety Precautions

4.1.1 Pre-installation Safety Protection Requirements

Pre-installation safety protection measures
 ● This product is designed for use in strong industrial electric fields. When operating, handle the product with care due to its electrical components and moving parts to prevent injury. The unauthorized removal of product covers, or failure to follow this manual and lack of maintenance can result in property damage, significant injury, or even death. ● Before using the product, please read the safety instructions in the manual carefully to ensure proper use. ● All work performed by personnel on electrical equipment must always be conducted in accordance with the following principles: 1. Power down the system by disconnecting the main power supply. 2. Confirm that the system will not be repowered. 3. Double-check with a multimeter to confirm the absence of voltage or that it is below the human safety threshold. 4. Ensure the machine is well grounded. 5. Isolate the adjacent live parts with insulation spacers or cover plates.

4.1.2 Pre-Installation Electrical Safety Requirements

	● The product must be grounded reliably when it is put into operation, otherwise it may cause personal injury or death and failure of the device. ● In order to ensure the safe operation, the product installation and wiring must be carried out by trained professionals. ● Do not carry out work with the power supply on, as there is a risk of electric shock and death. ● Be careful when working on disconnected equipment as external supply voltage may still be present. Even when the product is off, power and control terminals can remain live. ● Since a DC bus capacitor is installed inside the product, please ensure that the voltage is below 36VDC before powering on the device, as it may remain live for up to 15 minutes after a power outage.
	● The product control cables and power supply cables, and the motor connection lines should be separated to avoid routing them together in the same cable duct or cable tray. ● This device can only be used for the purpose specified by the manufacturer. If you need to use it in other special occasions, please consult our sales department.
Note	● It is forbidden to use high-voltage insulation testing device to test the product and the insulation of the cables connected to it ● When the product and peripheral equipment (filters, reactors, etc.) need the insulation test, it should first use a 500 V megohm-meter to measure its insulation resistance to ground, and the insulation resistance should not be less than 4 MΩ.

4.1.3 Pre-Installation Insulation Requirements

The AC800 series is verified by factory insulation testing between the main circuit and chassis; thus, do not conduct any voltage withstand or insulation resistance tests on its built-in module. Users only need to verify the device's peripheral configuration during use. For peripheral components, please inspect motor insulation and wiring as follows.

Equipment insulation check
● Before the drive system is connected to the main power supply, the user needs to check the equipment insulation. During this process, please reconfirm the drive system is disconnected from the main power supply (input power) to prevent safety hazards by ensuring that the equipment is not live. ● For the machine's output side, make sure that the drive output terminals U, V, W are disconnected from the motor cable and that the motor cable is connected to the motor.

4.2 EMC-Compliant Installation and Wiring

4.2.1 EMC Standards Introduction

Environment introduction

- First Environment: This includes civilian facilities and those, without intermediate transformer, directly connected to a low-voltage power supply network which supplies buildings used for civilian purposes.
- Second Environment: This includes all facilities other than those directly connected to a low-voltage power supply network which supplies buildings used for civilian purposes.

Equipment introduction

- Equipment Category C1: electric drive system of rated voltage less than 1000V, intended for use in the first environment.
- Equipment Category C2: electric drive system of rated voltage less than 1000V, which is neither a plug-in device nor a movable device. When used in the first

environment, it can only be installed and commissioned by the professionals.

- Equipment Category C3: electric drive system of rated voltage less than 1000V, intended for use in the second environment and not intended for use in the first environment.
- Equipment Category C4: electric drive system of rated voltage equal to or above 1000V, or rated current equal to or above 400A, or intended for use in the complex system in the second environment.

4.2.2 Cable Requirements and Wirings

For compliance with EMC standards, cables and wirings need to meet the following requirements:

1. Use shielded cables with shielding layer. Shielded cables include those with three phase conductors and those with four phase conductors. If the conductivity of the shielding layer does not meet the requirements, it is necessary to add another separate PE wire or use a shielded cable with four phase conductors, one of which is a PE wire. In order to effectively suppress the emission and conduction of RF interference, the shielding layer of the shielded cable is composed of the coaxial copper braid. For the better shielding performance and conductivity, the shielding layer should have a braid density of more than 90%.
2. Motor cables and their PE shielding conductors (twisted shield) should be as short as possible to reduce electromagnetic radiation as well as stray and capacitive currents outside the cable. If the length of the motor cable exceeds 100m of, an output filter or dv/dt reactor is required.
3. It is recommended to use shielded cables for all control lines.
4. Motor cables should be routed away from other cables. Motor cables for multiple drives can be wired in parallel.
5. It is recommended to route the motor cable, input power cable and control cable in separate raceways. To minimize electromagnetic interference from the AC drive's rapid output voltage changes, please avoid long parallel runs between motor cables and other cables.
6. When control cables must be routed across power cables, ensure that the angle between the two cables remains as close to as 90° as possible. Do not route other cables through the drive.

7. The I/O lines of the drive power and the weak signal line (such as control lines) should not be routed in parallel. If possible, please arrange them vertically.
8. Cable raceways must be well connected to each other and well grounded. Aluminum raceways can be used to improve the equal potential.
9. The filter, drive, and motor should all be well lapped to the system (machinery or device), protected by applying a spray on the mounted portion, and securely connected to the conductive metal.

4.2.3 Routing Recommendations

1. Route the cables that carry different signals separately. Reserve a proper distance between interference cables and sensitive cables; a distance of 30 cm is recommended. If the two types of cables must cross, arrange them at an angle of 90° to prevent interference.

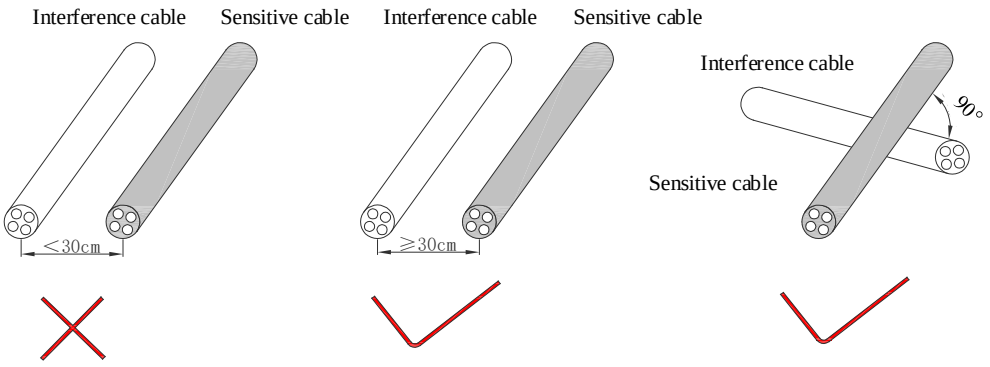


Figure 4-1 Routing of Interference Cables and Sensitive Cables

2. It is recommended to route different signal cables distinctly, and separate the signals in different types via equipotential signal. When routing cables carrying the same signal, the equipotential signal cables should be routed on the outer layers, and if possible, please consider to arrange as many as the equipotential signals in the center. Please refer to the followings:

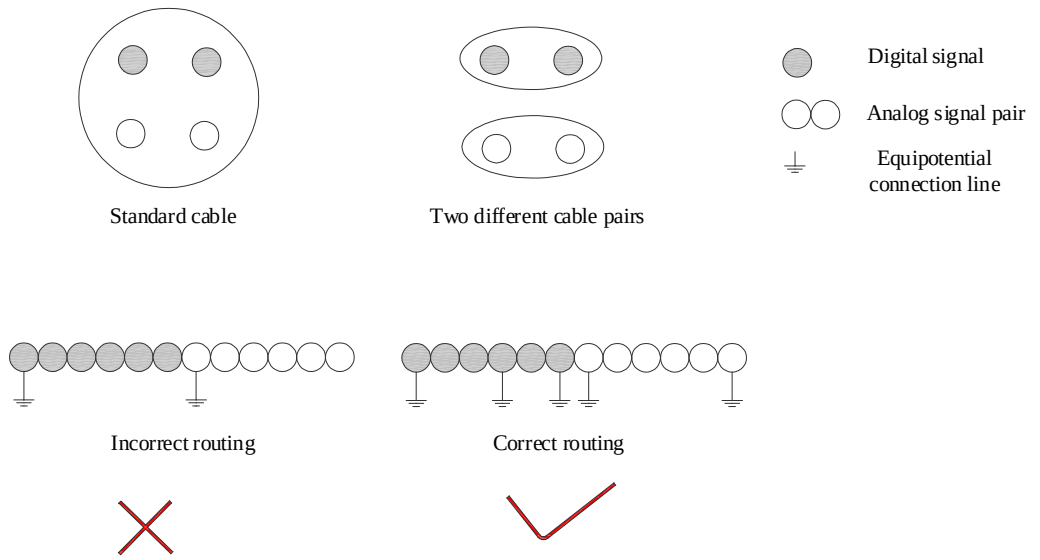


Figure 4-2 Separate Routing of Different Types of Signal Cables

3. For multi-core cables, it is recommended to use a single cable for each signal type. If different signal types must be transmitted via one cable, ensure its internal core wires are shield, as shown in the following figure:

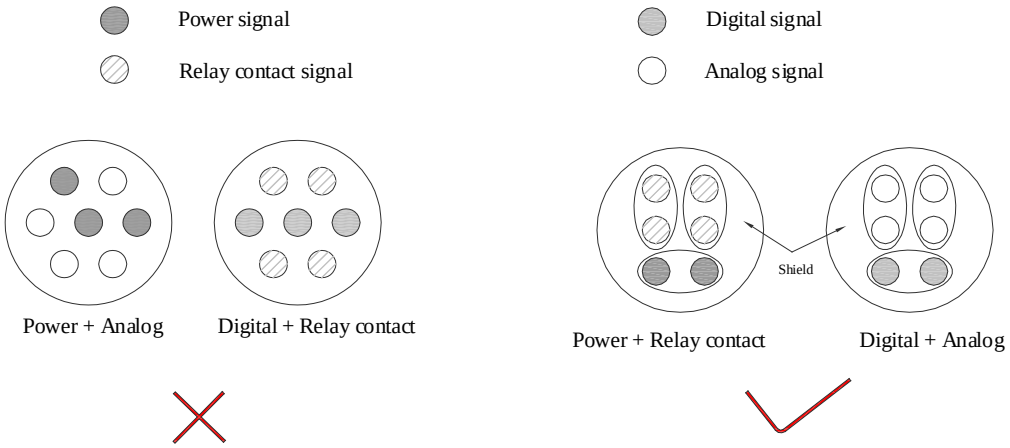


Figure 4-3 Routing of Multicore Cables

4. When some cores in the multicore connecting cable are not used, connect all unused (or reversed) conductors to the equipotential connection point.

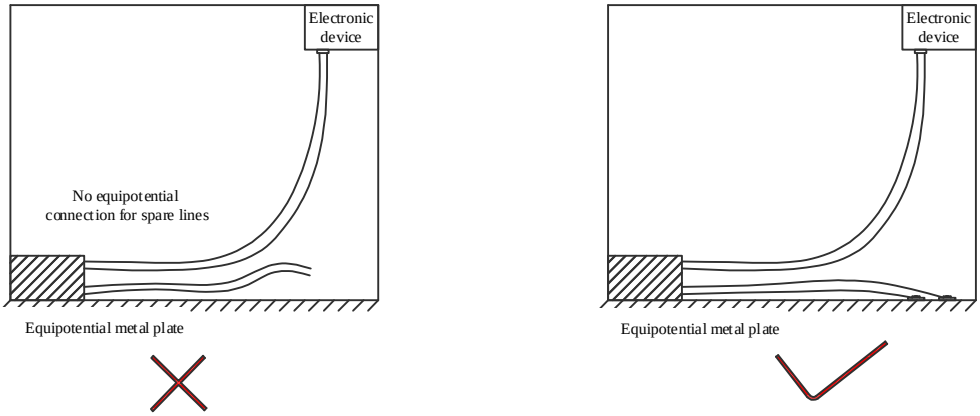


Figure 4-4 Handling of Unused Cores in A Multicore Cable

5. The low-level sensor signal cables and relay signal cables with a common line should be laid as close to each other as possible to avoid too large loop area. The analog signal cables must be twisted pairs, and the digital signal cables must be laid closely.

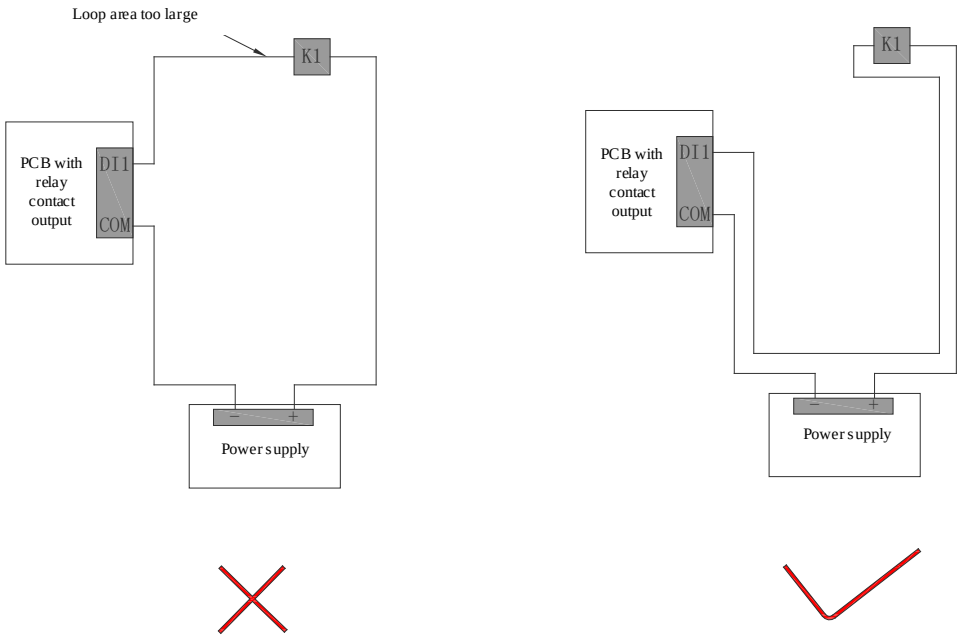


Figure 4-5 Routing for Preventing Excessive Loop Area

6. When there are multiple types of cables, lay them along the equipotentially connected metal block and reserve a distance as large as possible between them to improve internal EMC. If the cables in the same metal (zinc-iron or stainless-steel) duct are separated by metal plates, the EMC performance will be better.

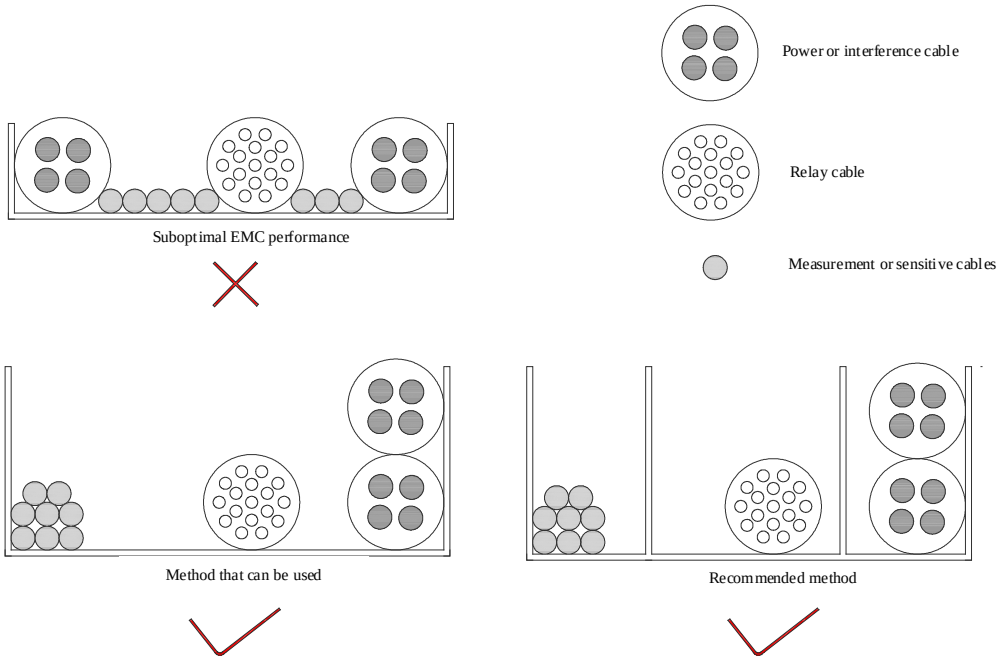


Figure 4-6 Routing for Multiple Types of Cables

4.3 Cabinet Electrical Connections

4.3.1 Cabinet Inlet and Outlet Wiring

Preparation

- Install and fix cabinet equipment correctly.
- Take comprehensive safety precautions at the installation site.

Wiring steps

1. Open the front door panel of the cabinet and remove the protective cover in the power cable terminal area.
2. Lead the inlet cable into the cabinet from below.
3. Connect the PE cable securely to the PE circuit.

4. Continue to lead the cable up to the wiring copper bar in the cabinet, with the input wire connected to R\ S\ T and the output wire connected to U\ V\ W.

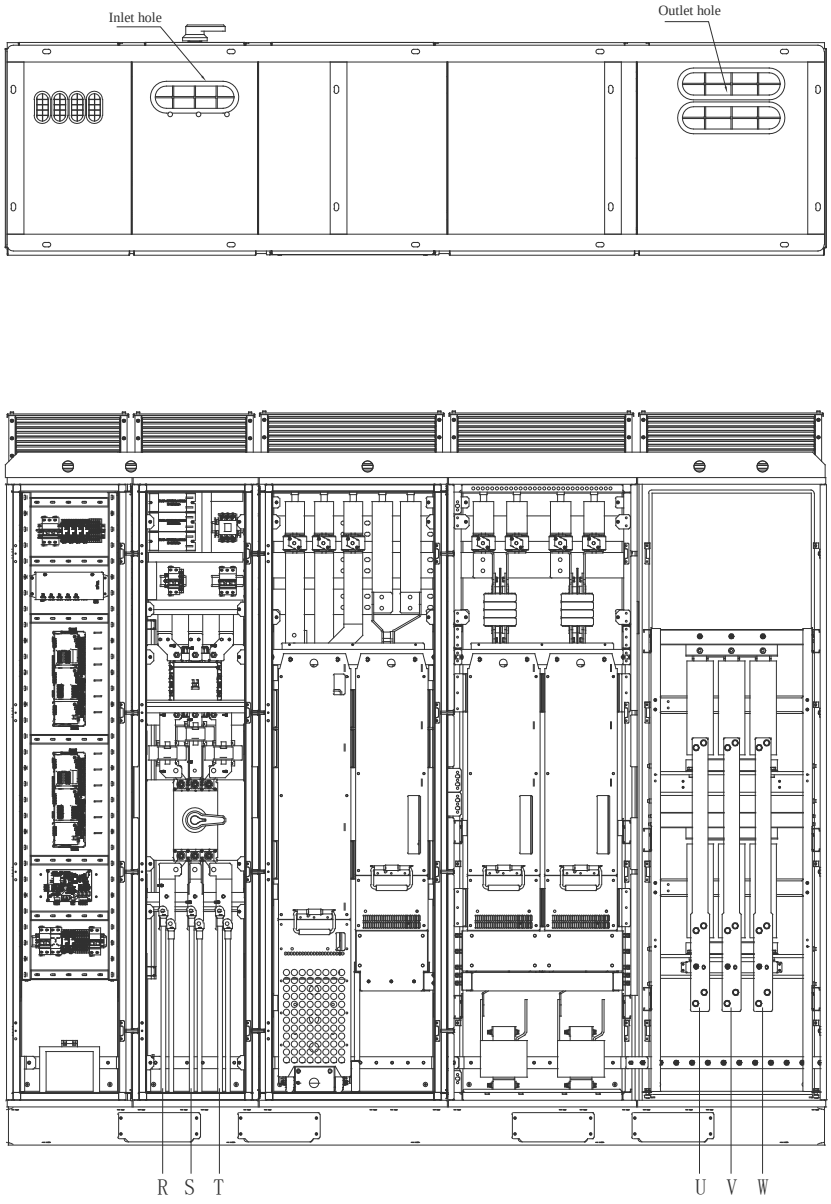


Figure 4-7 Inlet and Outlet Wiring

5. Connect the cable to the copper bar and fix it in place.

Note: When using shielded power cables, the shielding layer must be fixed to the shielding plate in compliance with EMC requirements.

4.3.2 Cable Specifications and Recommended Models

Table 4-1 Main Circuit Cable Selection List (T3)

Power level (kW)	Rated output current (A)	Recommended cable quantity and diameter (mm^2)	Terminal
2.2	5	1×2.5	OT/2.5-5
4	7	1×2.5	OT/2.5-5
5.5	12	1×2.5	OT/2.5-5
7.5	17	1×4	OT/4-5
11	23	1×6	OT/6-5
15	33	1×6	OT/6-5
18.5	43	1×10	OT/10-6
22	49	1×10	OT/10-6
30	60	1×16	OT/16-6
37	80	1×16	OT/16-6
45	100	1×25	OT/25-6
55	121	1×35	OT/35-10
75	149	1×50	OT/50-10
90	200	1×70	OT/70-10
110	240	1×95	OT/95-12
132	300	2×70	OT/70-10
160	350	2×70	OT/70-10
200	396	2×95	OT/95-12
250	518	3×95	OT/95-12
315	600	3×120	OT/120-12
355	670	3×120	OT/120-12
400	758	4×120	OT/120-12
500	900	4×120	OT/120-12

Table 4-2 Main Circuit Cable Selection List (T6)

Power level (kW)	Rated output current (A)	Recommended cable quantity and diameter (mm^2)	Terminal
55	62	1×16	OT/16-6
75	82	1×25	OT/25-6
90	99	1×35	OT/35-10
110	125	1×50	OT/50-10
132	144	1×50	OT/50-10
160	192	1×95	OT/95-12
200	217	1×120	OT/120-12
250	270	2×70	OT/70-10
315	340	2×70	OT/70-10
400	410	2×95	OT/95-12
500	530	3×95	OT/95-12
560	600	3×120	OT/120-12
630	650	3×120	OT/120-12
710	721	4×120	OT/120-12

4.4 VCU Control Module Terminal Connection

The terminal connection diagram of the AC800 inverter module is shown below (connected by optical fiber communication).

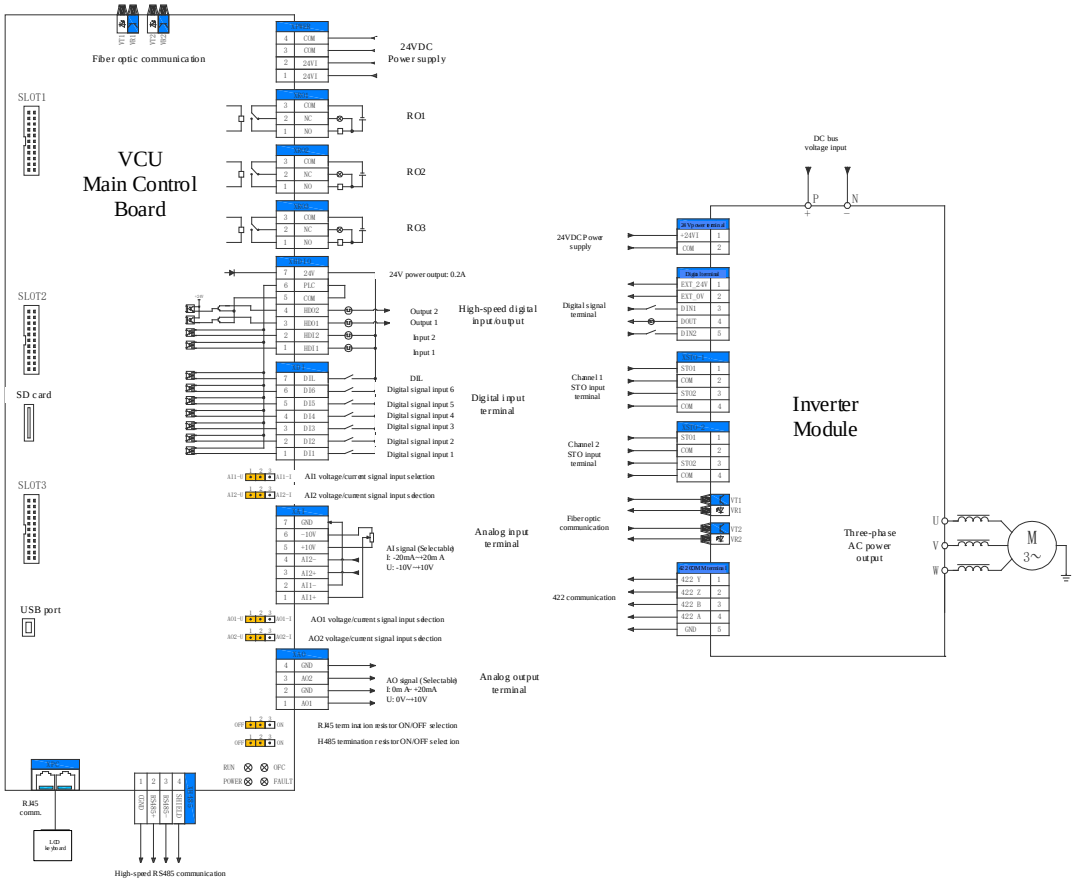


Figure 4-8 AC800 Series Terminal Connection

Table 4-3 AC800 Series Wiring Comments

Name	Description
P (+), N (-)	Bus voltage input
U, V, W	Three-phase AC power output
2-channel optical fiber communication terminal	Fiber optic communication, connected to VCU control module
422-communication terminal	422 communication
STO terminal	STO security function input (optional)
24VDC power supply terminal	24VDC power supply input
External digital reserved terminals	Support 2-channel DI and 1-channel DO

4.5 IOP-10-800 and PC Connection

Steps

1. Open the USB connection terminal cover.

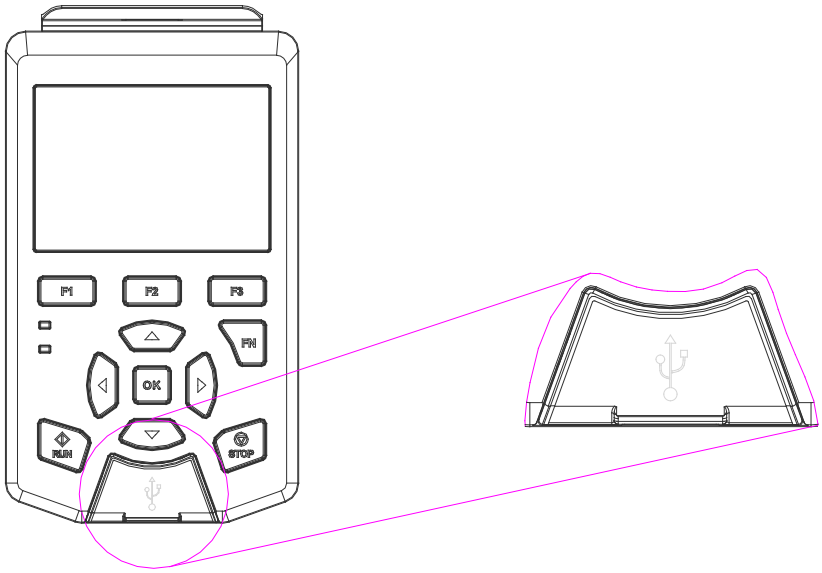


Figure 4-9 USB Connection Terminal

2. Plug in the USB cable. It is recommended to use a cable with a ferrite magnetic ring as shown below.

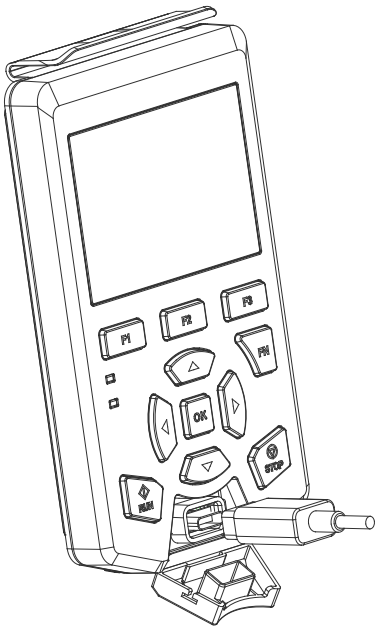


Figure 4-10 Plug-in USB Shielded Cable

3. Connect the line to the PC.

4.6 IOP-10-800 and Drive Connection

The IOP-10-800 has an RJ45 connection terminal on the back and can be connected to the drive control board (e.g. VCU, see the "VCU Control Module Hardware Manual" for details) via a network cable that meets EIA/TIA/568A or 568B standards. Jumpers are required on the control board at the end of the communication network to select the terminal resistance. The IOP-10-800 bus cable is recommended to use the twisted pair shielded wire with a total maximum length of 100m.

Table 4-4 IOP-10-800 Bus Cable Parameters

Length (m)	Baud rate (kbps)	Node count	Cable diameter	Note
100	1000	32	≥0.5mm^2	For case with repeaters, the number of the nodes is up to 128. Without repeaters, the maximum is 32 nodes. If there is the polarity bias, the max. node count decreases by 4.
50	2000	32	≥0.5mm^2	
25	4000	32	≥0.5mm^2	

4.7 Tightening Torque for Screw and Bolt

Table 4-5 Tightening Torque Specifications

Main circuit terminal screw mm	Recommended fixing force N▪m	Recommended copper conductor cable mm^2
M6	4~6	16
M8	10~12	25
M10	20~25	35
M10	20~25	50
M10	20~25	70
M12	36~45	95
M12	36~45	120

4.8 Installation Completion Check

Please check against the following table after the electrical connection of the inverter module has been completed. Ensure that the electrical connection of the equipment is correct.

Table 4-6 Checklist

No.	Item
1	The input power and motor cables are connected correctly, as well as the PN positive and negative poles.
2	The positive and negative terminals of the external 24V power supply are correctly connected.
3	The cable connected to the motor shall be fixed on the provided joint terminals with the required torque.
4	If EMC shielded cables are used, the shielding layer of the encoder shielding cable is grounded only with one end to prevent signal interference.
5	If paralleling is required, ensure the correct wiring when connecting the parallel outputs to the motors.

Chapter 5 VCU Control Module

5.1 VCU Control Module Composition

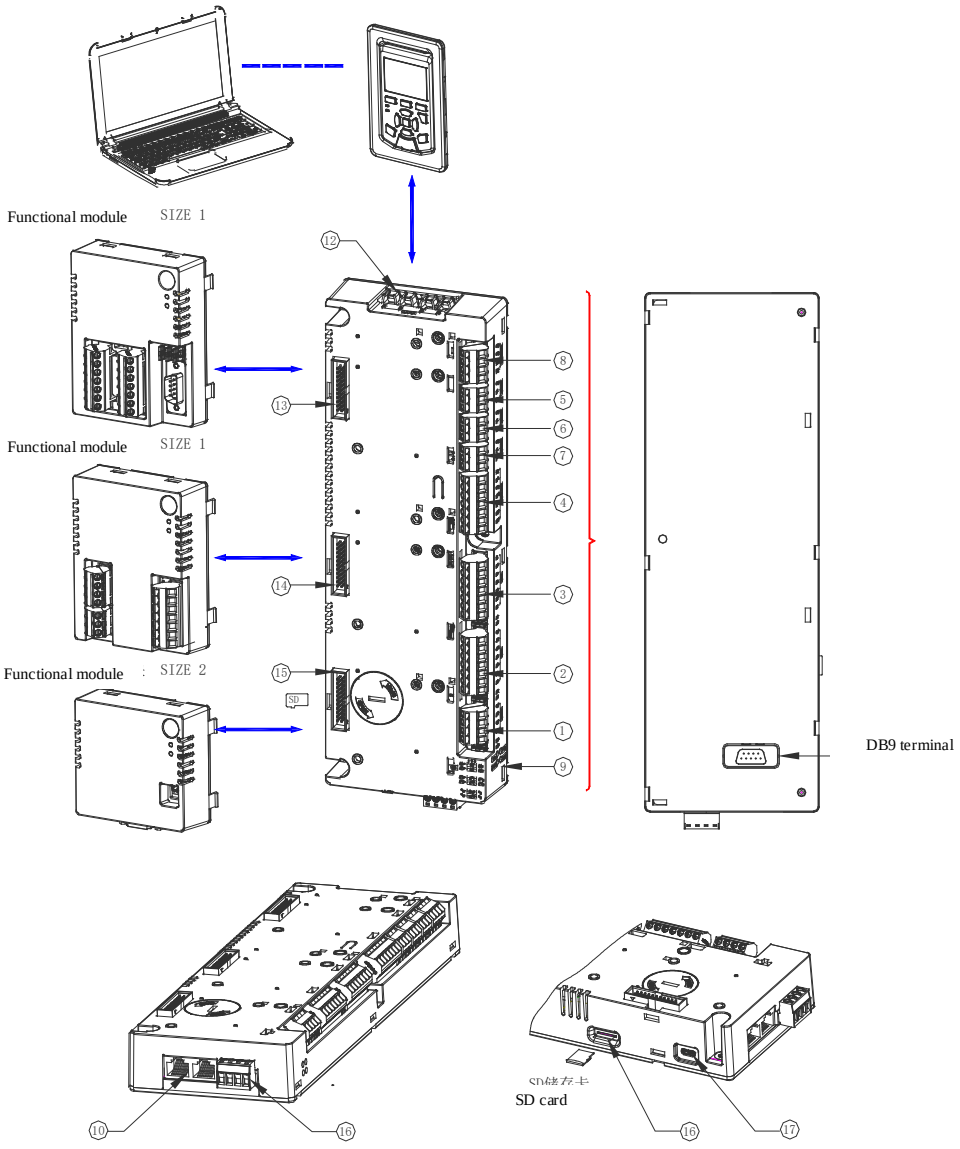


Figure 5-1 VCU Composition

Table 5-1 VCU Wiring Comments

No.	Name	Description
1	XAO port	2-channel AO with short-circuit caps; the output signal type setting: as the voltage-type output when it is shorted to AO-U, as the current-type output signal when it is shorted to AO-I
2	XAI port	2-channel AI with short-circuit caps; the input signal type setting: as the voltage-type input when it is shorted to AI-U, as the current-type input when it is shorted to AI-I
3	XDI port	7-channel DI
4	XHDIO port	2-channel high-speed DI, DO
5	XRO3 port	Relay output, output type: passive normally open and normally closed contacts
6	XRO2 port	Relay output, output type: passive normally open and normally closed contacts
7	XRO1 port	Relay output, output type: passive normally open and normally closed contacts
8	XPWER port	VCU control module power supply terminal
9	Power supply indicator	Fault indicator in VCU running
10	XPC communication port	Intelligent panel connection port
11	XH485 port	High-speed 485 communication port, VeiLink high-speed communication RS485 terminal, several product units master-slave configuration networking
12	VR/VT port	Fiber optic transceiver port
13	SLOT1	Function module expansion port
14	SLOT2	Function module expansion port
15	SLOT3	Function module expansion port
16	Mirco SD card slot	VCU comes standard with Mirco SD card with a capacity of 8GB
17	USB interface	Program burning port

5.2 LED Indicators

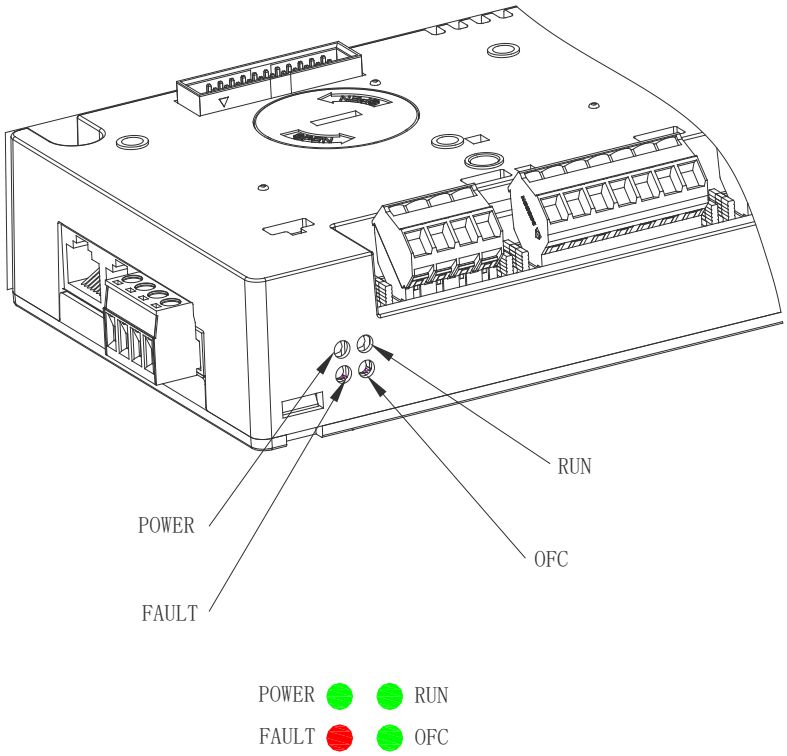


Figure 5-2 Indicator Description

Table 5-2 Indicator Description

No.	Name	Description
1	POWER	Green indicator on: normal power supply Green indicator off: no power or abnormal power supply
2	RUN	Green indicator on: normal running Green indicator off: shut down
3	FAULT	Red light on: fault Red light off: no fault
4	OFC	Flashing/2.56s: communication disconnected Flashing/1.28s: normal communication Flashing/0.25s: abnormal communication

5.3 Micro SD Memory Card

The VCU is equipped with Micro SD card, which is used to store the real-time data of the control module to monitor and analyze the power module. The data will be stored in the Micro SD card for the relevant professionals to analyze.

5.4 VCU Dimensions and Installation Guidelines

5.4.1 Pre-installation

Installation precautions

1. Before installation, make sure that the cabinet is powered off for more than 15 minutes (including external power supply).
2. Handle the VCU module with care to prevent damage from drops or impacts.
3. Do not disassemble the VCU module, otherwise the module may be damaged.
4. Do not use excessive torque for tightening to prevent damage to the terminals.

Required installation tools

Tools that may be used during installation: Phillips screwdriver 1 #

Tightening torque of screws and fasteners

The screws mentioned in this manual need to achieve the following tightening torques.

Table 5-3 Tightening Torques Description

Main circuit terminal screw mm	Recommended fixing force N▪m	Recommended copper conductor cable mm^2
M4	2.5~3.3	10

5.4.2 VCU Dimension Description

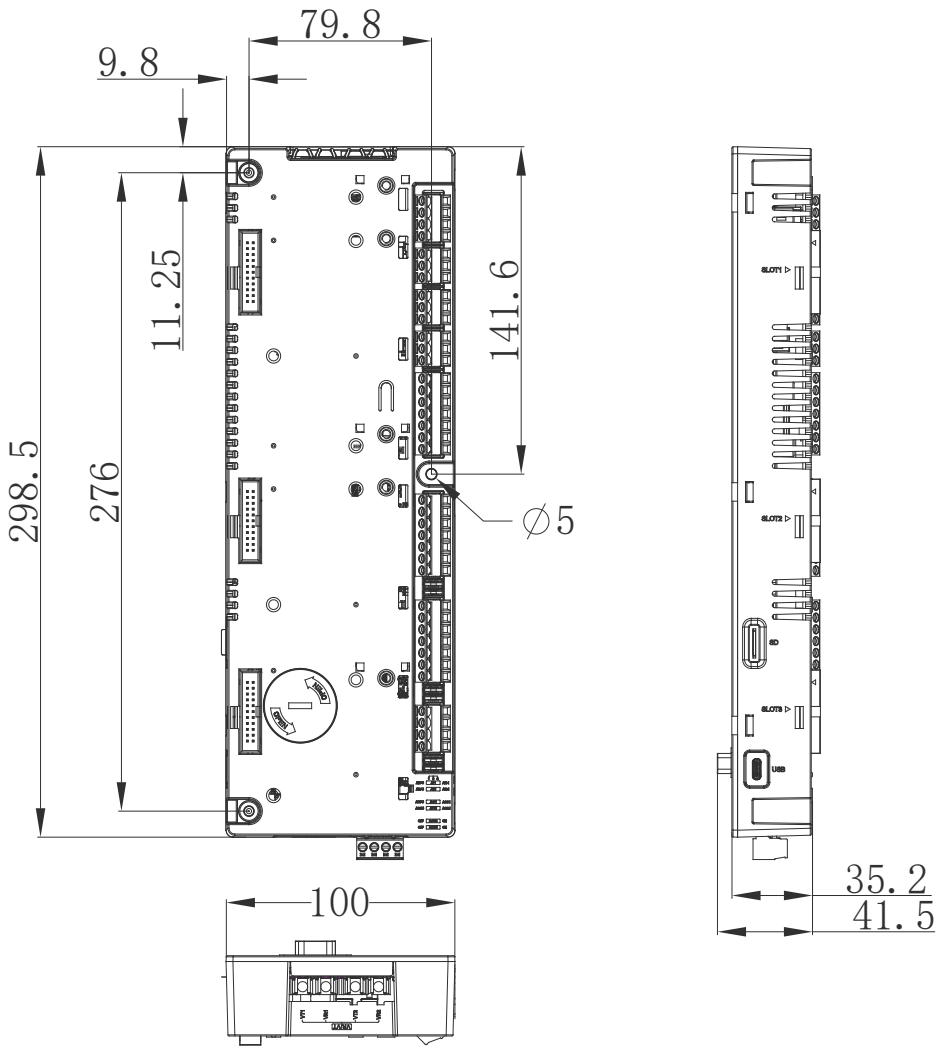


Figure 5-3 VCU Dimensions (mm)

5.4.3 Installation Space Requirement

To ensure smooth VCU installation, maintain clearance between the VCU's upper and lower sections, the cabinet and its components as illustrated below. The VCU must be installed on the conductive metal mounting surface to ensure that the whole conductive bottom of the VCU is well overlapped with the mounting surface.

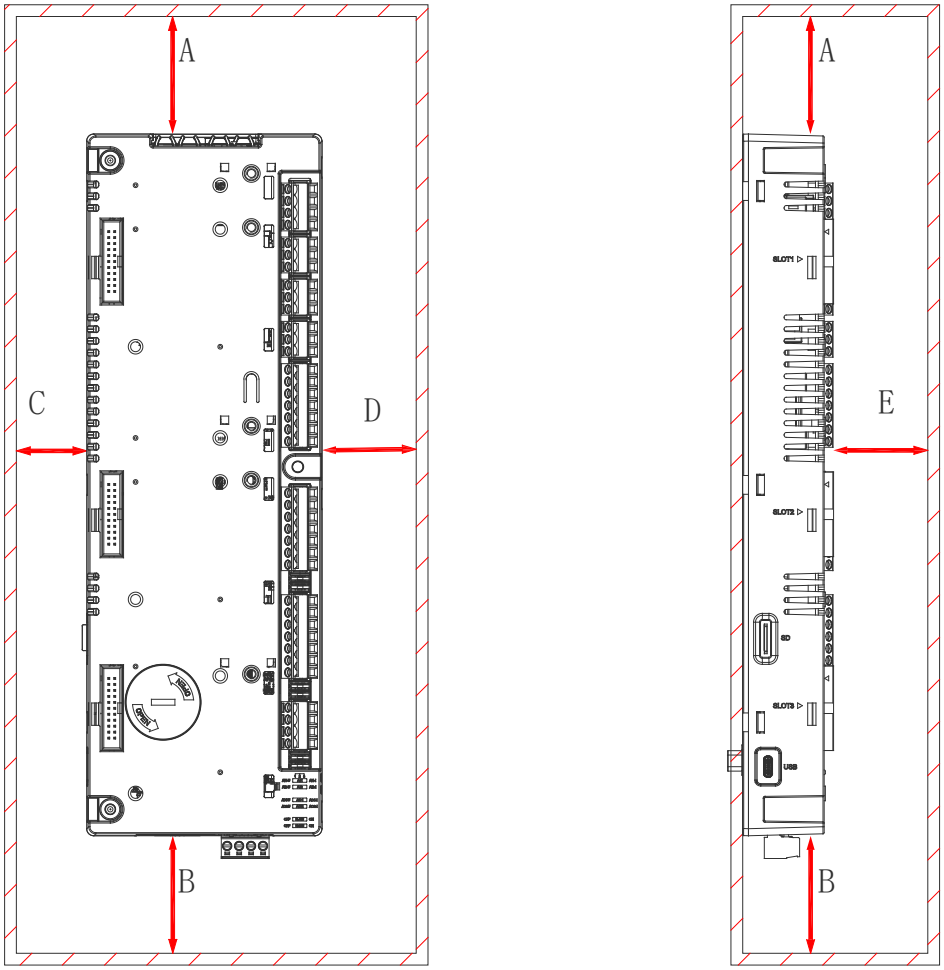


Figure 5-4 Installation Space Requirement

VCU module installation space requirements (mm):

Table 5-4 Installation Space Requirements

A	B	C	D	E
≥100	≥100	≥30	≥50	≥60

5.4.4 Installation Steps

1. Align the VCU vertically with the 2 positioning holes on the metal mounting plate.

2. Use the 1 # Phillips screwdriver to install the fixing screws on the VCU as shown in the following figure.

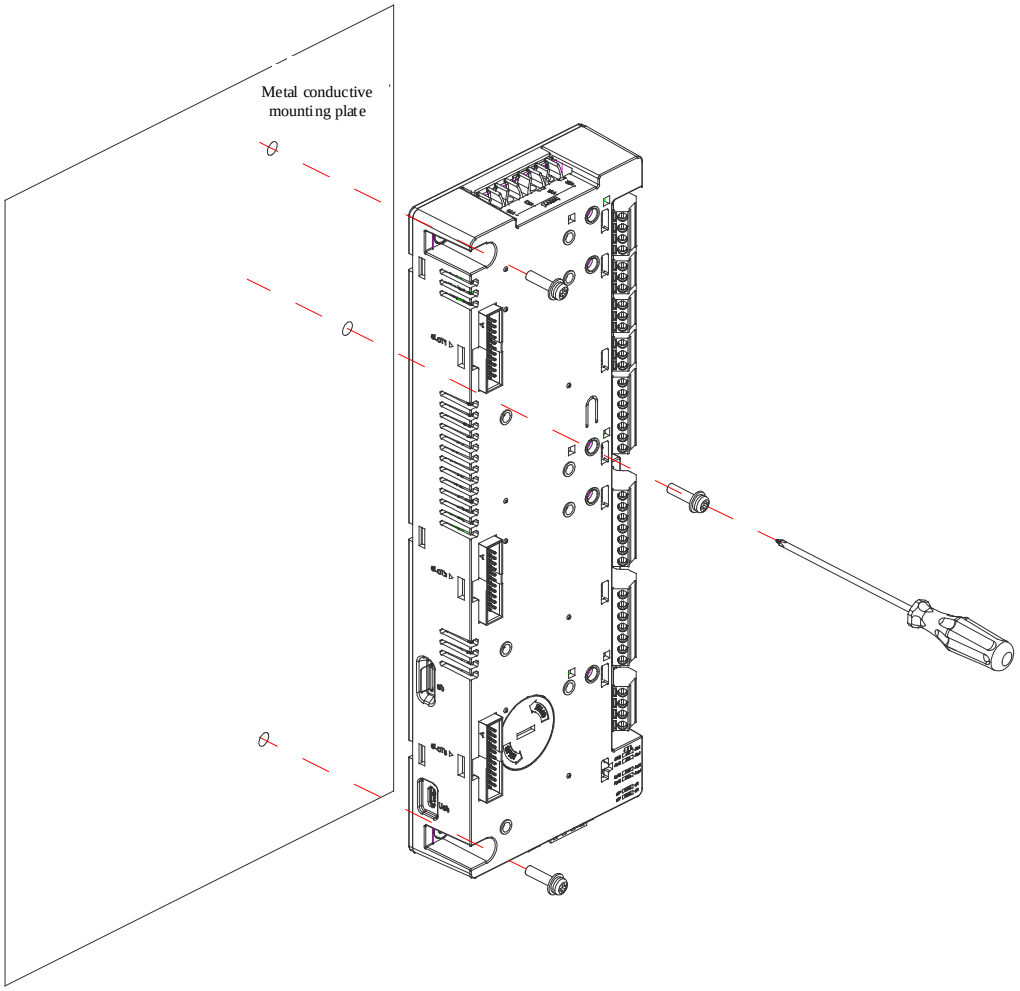


Figure 5-5 VCU Installation

5.5 VCU Control Module Port Overview

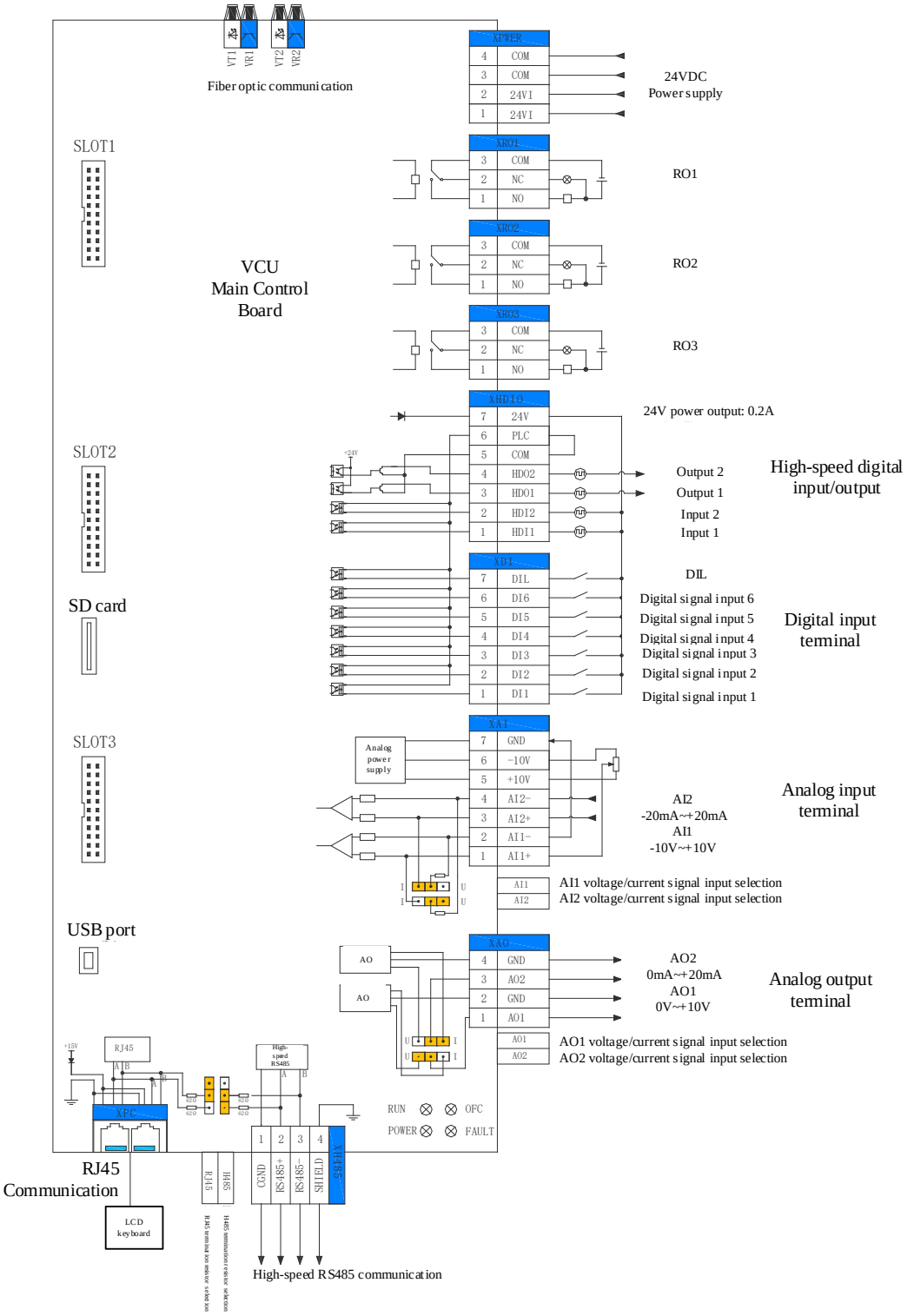


Figure 5-6 VCU Control Module Ports

5.5.1 VCU Standard Ports

Table 5-5 Terminal Description

Name	Terminal	Description
Input power supply	XPWER: 24VI	VCU power supply
Digital input	XDI: DI1~DI6, DIL	Input type: relay contact, NPN or PNP
High-speed Digital Input	XHDIO: HDI1, HDI2	Input type: NPN or PNP
High-speed Digital Output	XHDIO: HDO1, HDO2	Output type: open collector
Analog input	XAI: AI1, AI2	Input type: current or voltage, jumper selection
Analog output	XAO: AO1, AO2	Output type: current or voltage, jumper selection
Relay output	XRO1, XRO2, XRO3	Relay output: normally open and normally closed and common points
High-speed 485	XH485	High-speed RS485, the jumper selects the bus matching resistor
Fiber optic communication	VR, VT	Communicate with rectifier/inverter power module
RJ45	XPC	IOP-10-800 communication, the definition of two terminals is exactly the same, and multiple VCU cascades can be realized; connecting cable < 3m

5.5.2 VCU Wiring Port Description

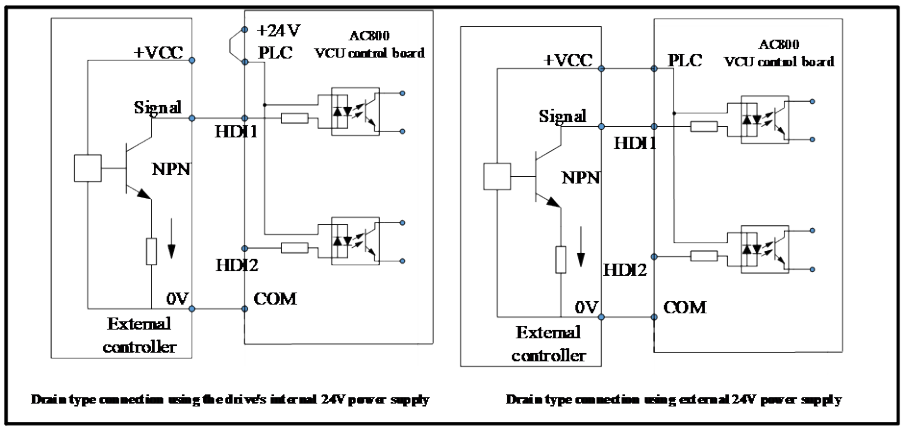
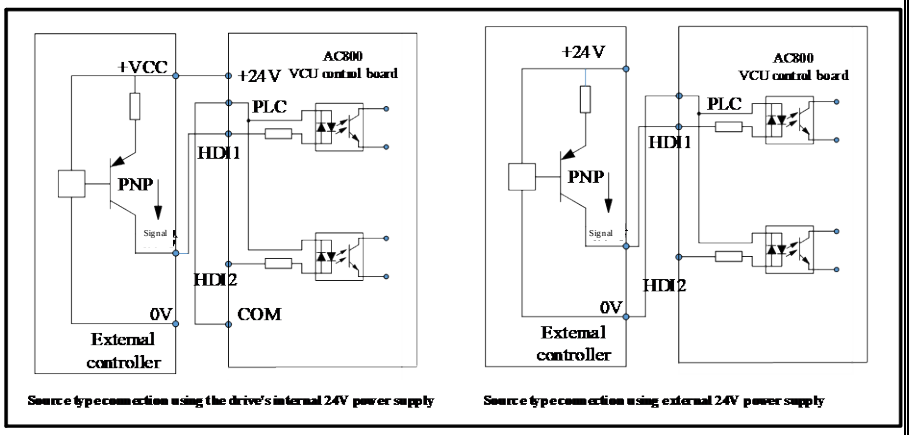
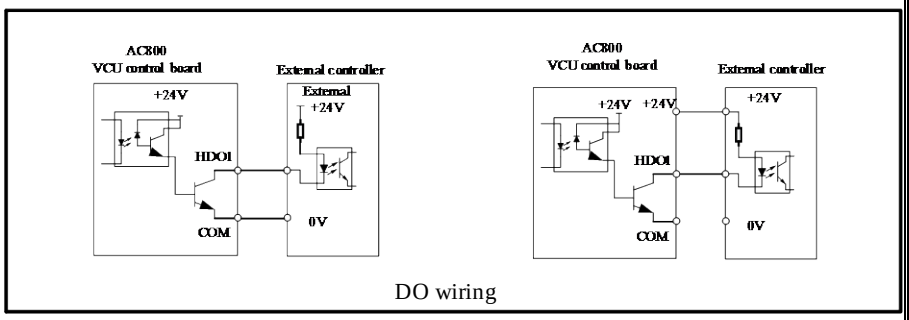
Table 5-6 Wiring Port Description

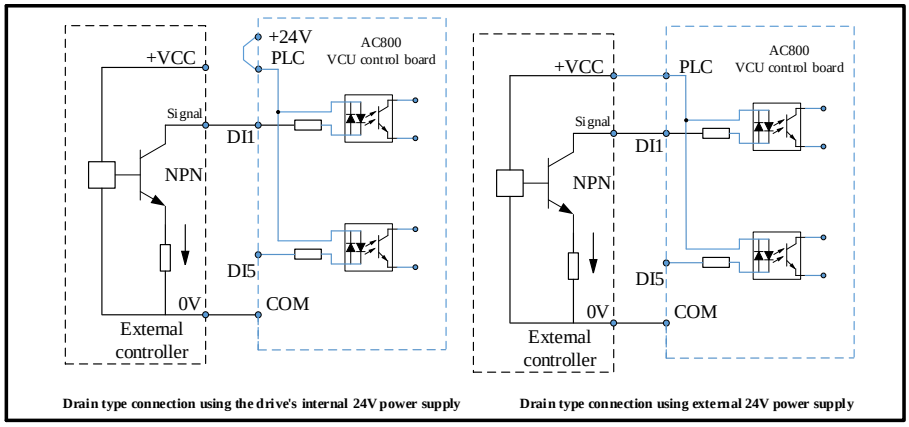
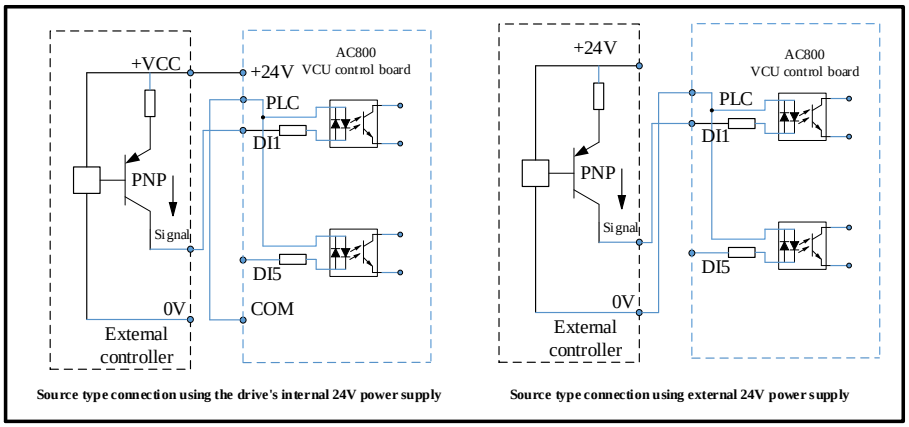
No.	Name	Description
1	XAO port	2-channel AO with short-circuit caps; the output signal type setting: as the voltage-type output when it is shorted to AO-U, as the current-type output signal when it is shorted to AO-I
2	XAI port	2-channel AI with short-circuit caps; the input signal type setting: as the voltage-type input when it is shorted to AI-U, as the current-type input when it is shorted to AI-I
3	XDI port	7-channel DI
4	XHDIO port	2-channel high-speed DI, DO
5	XRO3 port	Relay output, output type: passive normally open and normally closed contacts
6	XRO2 port	Relay output, output type: passive normally open and normally closed contacts
7	XRO1 port	Relay output, output type: passive normally open and normally closed contacts
8	XPWER port	VCU control module power supply terminal
9	Power supply indicator	Fault indicator in VCU running
10	XPC communication port	Intelligent panel connection port
11	XH485 port	High-speed 485 communication port, VeiLink high-speed communication RS485 terminal, several product units master-slave configuration networking
12	VR/VT port	Fiber optic transceiver port
13	SLOT1	Function module expansion port
14	SLOT2	Function module expansion port
15	SLOT3	Function module expansion port
16	Mirco SD card slot	VCU comes standard with Mirco SD card with a capacity of 8GB
17	USB interface	Program burning port

5.5.3 VCU Control Module Port Description

Table 5-7 VCU Control Module Port Description

No.	Definition	Description
XPWER	/	Input power terminal
1	24VI	Input power supply 24.0 VDC ± 10% 2.0 A
2	24VI	
3	COM	
4	COM	
XRO1	/	RO1
1	NO	Output type: passive normally open and normally closed contacts Contact parameters: 250VAC/30VDC 2A
2	NC	
3	COM	
XRO2	/	RO2
1	NO	Output type: passive normally open and normally closed contacts Contact parameters: 250VAC/30VDC 2A
2	NC	
3	COM	
XRO3	/	RO3
1	NO	Output type: passive normally open and normally closed contacts Contact parameters: 250VAC/30VDC 2A
2	NC	
3	COM	
XHDIO	/	HDIO I/O terminal
1	HDI1	24V logic level: "0" <5V; "1" >15V Rin: 2.0kohm Input type: NPN, PNP Input voltage range: 0VDC~30VDC Input frequency range: 0kHz~100kHz Imax: 15mA
2	HDI2	
3	HDO1	Output type: oc Output frequency: 0kHz~100kHz Output voltage range: 0VDC~26.4VDC Imax: 20mA
4	HDO2	
5	COM	24V output grounded

6	PLC	DI and HDI common terminal, optional to connect COM or 24V
7	24V	DI-DO power supply 24.0 VDC ± 10% 0.2A
8	   XHDIO digital I/O wiring
XDI	/	DI terminal
1	DI1	24V logic level: "0" <5V; "1" >15V Rin: 2.0kohm Input type: NPN, PNP, relay contact Hardware filter: 0.04ms Imax: 15mA
2	DI2	
3	DI3	
4	DI4	
5	DI5	
6	DI6	
7	DIL	Digital interlock or general DI; technical parameters are the same as the general DI

8	  DI terminal wiring

XAI	/	AI terminal
1	AI1+	Current input: -20mA~+20mA, Rin: 500ohm Voltage input: -10V~+10V, Rin: 200kohm Differential input: -30V~+30V Sampling interval per channel: 0.25ms Hardware filter: 0.25ms Resolution: 11bit+sign bit Tolerance: 1% of full-scale range
2	AI1-	
3	AI2+	
4	AI2-	
5	+10V	+ 10V ± 10%; -10V ± 10%; Rload: 1kohm~10kohm
6	-10V	
7	GND	
XAO	/	AO terminal:
1	AO1	Output range: 0mA~20mA, Rload≤500ohm; 0V~10V, Rload≥10kohm Resolution: 11bit+sign bit Accuracy: 2% of full-scale range
2	GND	
3	AO2	
4	GND	

XH485	/	VEILINK high-speed communication RS485 terminal, several drive units master-slave configuration networking
1	CGND	R485 bus, 5V standard level Bus matching impedance: 124ohm Max. communication rate: 5Mbps Max. number of nodes: 32 (without repeater) Max. transmission distance: 10m
2	RS485+	
3	RS485-	
4	SHIELD	
XPC	/	IOP communication RS485 terminal (standard Ethernet dual RJ45 terminals)
4\12	GND	Power reference grounded
1\2\3\9\10\11	NC	No connection
5\13	+15V	RS485 communication interface power
8\16	A+	RS485 bus, standard level Bus matching resistance: 124ohm Max. communication rate: 4Mbps Max. number of nodes: 32 (without repeater) Max. transmission distance: 100m
7\15	B-	
Jumper cap		
AI1		AI1 selects voltage (1-2)\ current (2-3) signal input
AI2		AI2 selects voltage (1-2)\ current (2-3) signal input
AO1		AO1 selects voltage (1-2)\ current (2-3) signal output
AO2		AO2 selects voltage (1-2)\ current (2-3) signal output
H485		VeiLink communication matching resistance selection (2-3)
RJ45		RS485 communication network port matching resistance selection (2-3)
Connection terminal of optional module		
SLOT1	SLOT selection 1	Directly install function modules in SLOT1, SLOT2 and SLOT3, the addresses are A1, B1 and C1. SLOT1, SLOT2, SLOT3 can be used with VOFE-30 optical fiber expansion module, VFE-10 function expansion module to achieve an additional three SLOT expansion, the addresses are A1, A2, A3, and B1, B2, B3, as well as C1, C2, C3, respectively.
SLOT2	SLOT selection 2	
SLOT3	SLOT selection 3	

Mirco SD		
SD CARD	Micro SD card	The VCU is equipped with Micro SD card, which is used to store the relevant real-time data of the control module to monitor and analyze the power module. Data will be stored to Micro SD card.
Fiber optic connection terminal		
VR1	Fiber optic receiver	Fiber optic receiver; reserved; can be connected with VSVM-10/20 voltage sampling module, VFE-10 function expansion module
VT1	Fiber optic transmitter	Fiber optic transmitter, reserved, can be connected with VSVM-10/20 voltage sampling module, VFE-10 function expansion module
VR2	Fiber optic receiver	Fiber optic receiver; should be connected with the rectifier/inverter power module
VT2	Fiber optic transmitter	Fiber optic transmitter, should be connected with the rectifier/inverter power module
Signal indicator		
POWER	POWER indicator	Green indicator on: normal power supply □ Green indicator off: no power or abnormal power supply
RUN	RUN indicator	Green indicator on: normal running□ Green indicator off: shut down
FAULT	FAULT indicator	Red light on: fault□ Red light off: no fault
OFC	OFC indicator	Flashing/2.56s: communication disconnected Flashing/1.28s: normal communication Flashing/0.25s: abnormal communication

5.6 VPCU Parallel Control Module

VPCU is a parallel control module, which plays the “bridging” role in the system. The VPCU can swiftly receive and transmit the driving signals and the control signals from the VCU to each inverter module synchronously. It will also rapidly collect and upload the current, voltage and status information from each inverter module to the VCU. Additionally, the VPCU manages the synchronization, current equalization, reset, and start-stop functions of the paralleled inverter modules.

5.6.1 VPCU Standard Ports

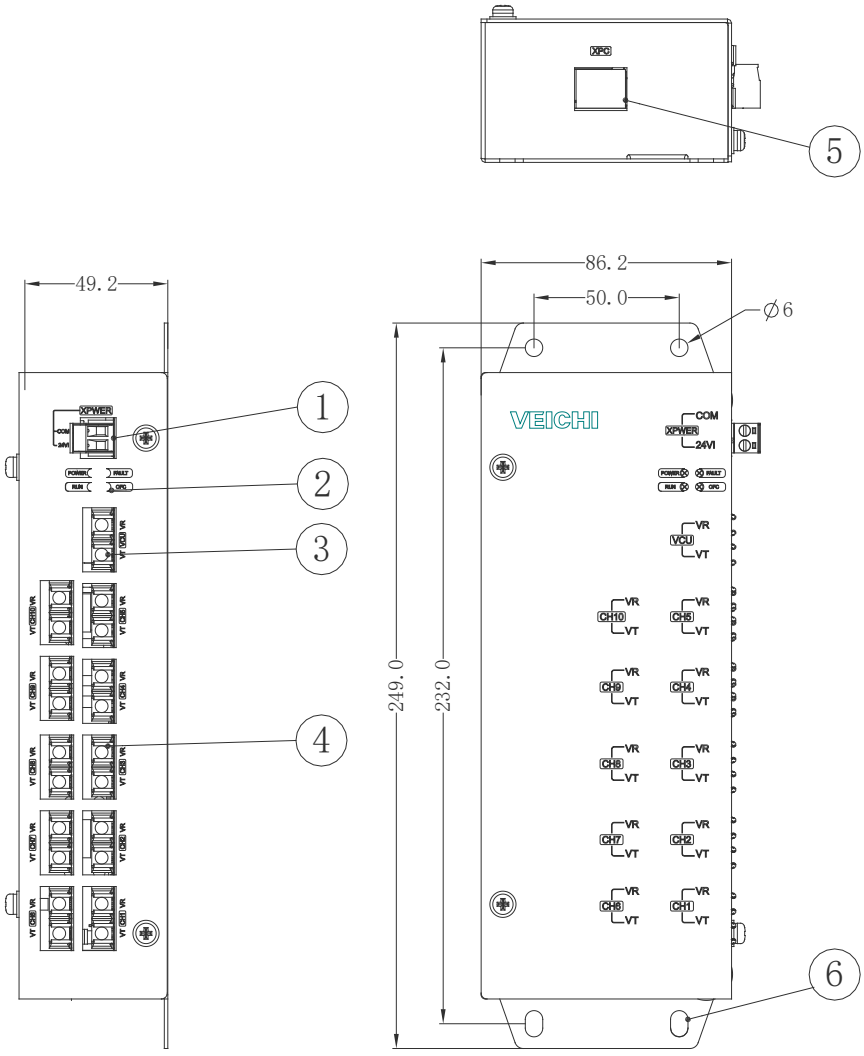


Figure 5-7 VPCU Schematic Diagram

Table 5-8 VPCU Description

No.	Name	Definition	Function
1	Input power supply	24V	External power supply, 24V ± 10% 0.5A
		COM	
2	indicator	FAULT	Running status and power supply indicator
		RUN	
		OFC	
		POWER	
3	Fiber optic transceiver	VR	Fiber optic communication, connected to VCU control module
		VT	
4	Fiber optic transceiver	CH1~CH10	Fiber optic communication, connected to rectifier/inverter module
5	LAN	XPC	Commissioning port, connected to intelligent panel
6	Fixing hole	-	Used for fixing VPCU module

5.6.2 LED Indicators

Table 5-9 LED Indicator Description

No.	Name	Status	Description
1	POWER	Green light on	Normal power supply to VPCU
		Off	No or abnormal power supply to VPCU
2	RUN	Green light on	Rectifier/inverter power module running
		Off	Rectifier/inverter power module shutdown
3	FAULT	Red light on	System failure
		Off	Normal system
4	OFC	Green light flashing/2.56s	OFC disconnected
		Green light flashing/1.28s	Normal OFC
		Green light flashing/0.25s	Abnormal OFC

5.6.3 VPCU Electrical Connection

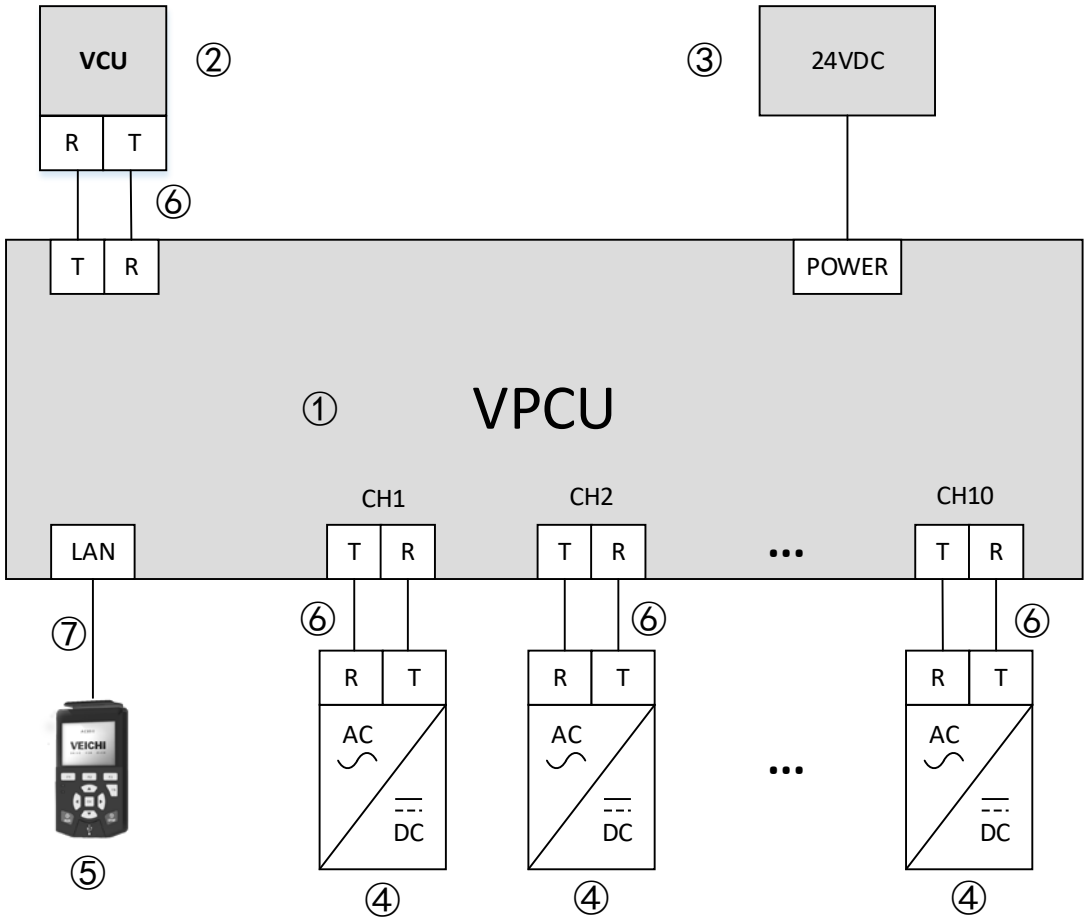


Figure 5-8 VPCU Electrical Connections

Table 5-10 VPCU Connection Description

No.	Name
①	VPCU parallel control module
②	VCU control module
③	External 24VDC power supply
④	Inverter module
⑤	Intelligent operation panel
⑥	Fiber optic
⑦	Network cable

5.7 VCU Function Application

5.7.1 Expansion Module for VCU

VCU can be used in conjunction with other functional modules to realize corresponding functions. See the details as below:

Table 5-11 Expansion Modules for VCU

No.	Name	Model	Description	Connection	Dimension (mm) (W*D*H)
1	IO expansion module	VIO-10	2AI\2AO\2DIO\1RO	SLOT	77*44*98.5
		VIO-20	4DIO\ 2RO	SLOT	77*44*98.5
2	Encoder signal detection module	VPG-10	TTL incremental encoder signal detection module	SLOT	77*44*98.5
		VPG-20	HTL incremental encoder signal detection module	SLOT	77*44*98.5
		VPG-30	Sine/Cosine encoder signal detection module	SLOT	77*44*98.5
		VPG-40	Rotary transformer signal detection module	SLOT	77*44*98.5
		VPG-50	UVW encoder signal detection module	SLOT	77*44*98.5
3	PROFIBUS-DP fieldbus module	VDP-10	PROFIBUS-DP bus	SLOT	77*44*70
4	PROFINET-IO industrial Ethernet module	VPN-10	PROFINET-IO industrial Ethernet	SLOT	77*44*70

5	CANopen fieldbus module	VCAN-10	CANopen bus	SLOT	77*44*70
6	Modbus RTU fieldbus	VMBR-10	Modbus RTU bus	SLOT	77*44*70
7	Modbus TCP industrial Ethernet module	VMBT-10	Modbus TCP industrial Ethernet	SLOT	77*44*70
8	EtherCAT industrial Ethernet module	VETC-10	EtherCAT industrial Ethernet	SLOT	77*44*70
9	EtherNet/IP industrial Ethernet module	VETN-10	EtherNet/IP industrial Ethernet	SLOT	77*44*70
10	Fiber optic expansion	VOFE-10	Can be extended with 1 pair of fiber optic ports	SLOT	77*44*70
		VOFE-20	Can be extended with 2 pair of fiber optic ports	SLOT	77*44*70
		VOFE-30	Can be extended with 3 pair of fiber optic ports	SLOT	77*44*70
11	Function expansion	VFE-10	Extended with 1 SLOT	Fiber optic	77*44*70
12	Parallel control module	VPCU-10	Support 2-5 modules in parallel	Fiber optic	86*49*249
		VPCU-20	Support 2-10 modules in parallel	Fiber optic	86*49*249

13	Synchronized voltage detection module	VSVM-10	AC voltage detection	Fiber optic	138*35*146
		VSVM-20	DC voltage detection	Fiber optic	138*35*146
14	Intelligent operation panel	IOP-10	Human-machine interaction, without Bluetooth module	RJ45	73*27*129
		IOP-20	Human-machine interaction, with Bluetooth module	RJ45	73*27*129

5.7.2 SLOT Expansion Application

The VCU application features multiple function modules that are directly plugged into the VCU's slots.

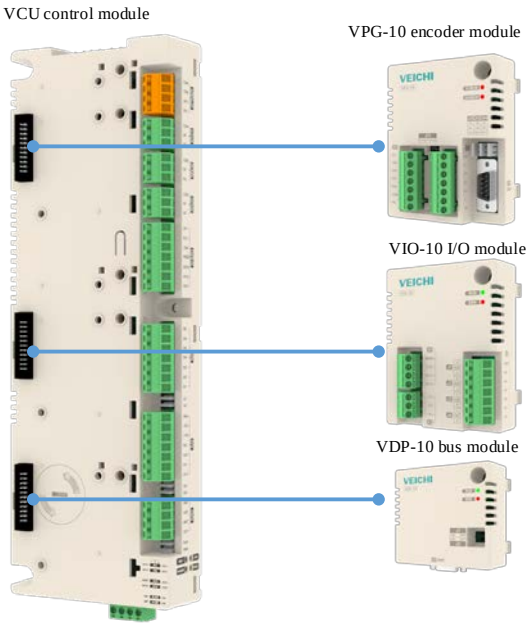


Figure 5-9 VCU Expands Application with SLOT

The VCU control module only has 3 slots. To add more modules, fiber optic expansion modules VOFE-10/20/30 can be used alongside VFE-10 expansion module, with each enabling the inclusion of an additional function module.

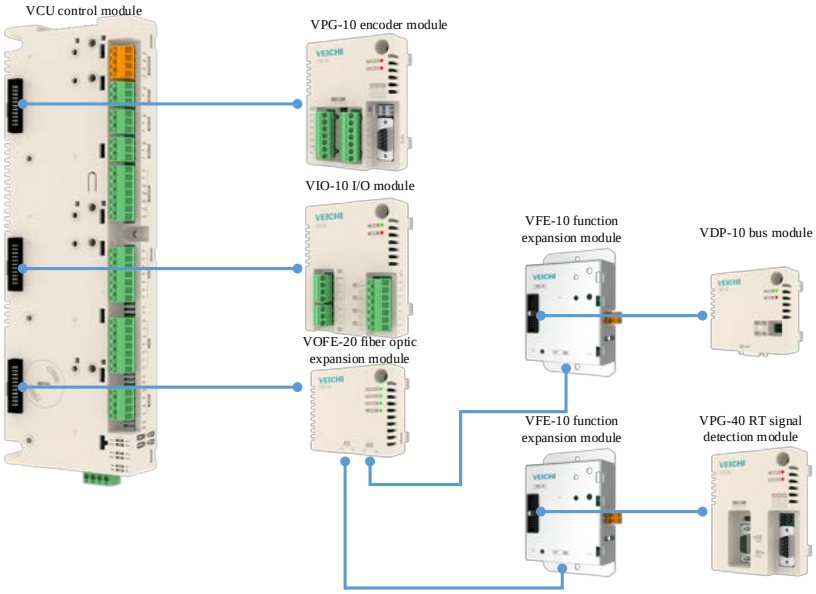


Figure 5-10 VCU Expands Slot with VFE-20

5.7.3 AI and AO in Temperature Detection

AI and AO can be used together to detect the signal from a temperature sensor for motor temperature detection. Either a single PT100 or 1~3 PT100s in series are supported. For AO, select the constant current output, and for AI, select the voltage signal input.

Do not ground the cable shield directly at both ends in use, please choose to ground one end and suspend the other end, or ground one end and ground the other end after it is connected to a capacitor in series.

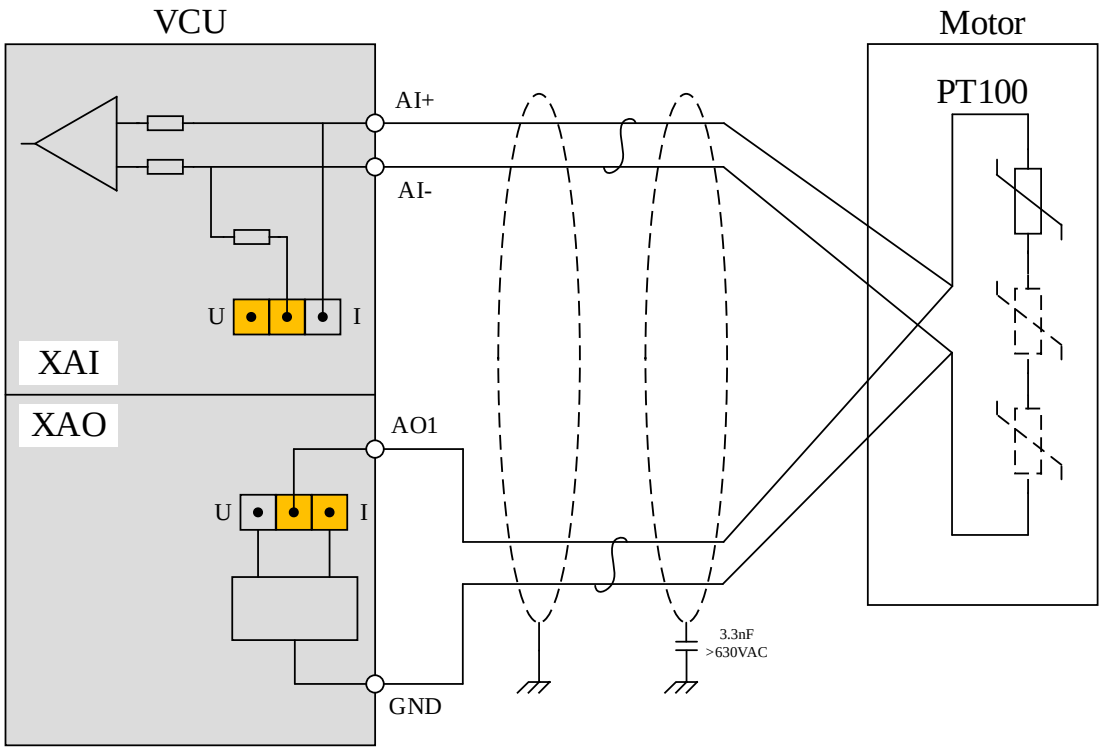


Figure 5-11 AI with AO to Detect Temperature

Chapter 6 Maintenance

6.1 Overview

This chapter mainly introduces the product maintenance related guidance:

● Safety guidance for basic operations related to the maintenance of inverter modules

● Operation guidance for product maintenance

● Operation guidance for product cleaning

● Guidance for component replacement

6.2 Pre-maintenance Safety Guidance

Installation and wiring instructions
 ● Non-professionals shall not perform maintenance on the product. ● This product's maintenance should be done by the trained professional with electrical knowledge. ● Operators should thoroughly read and understand the manual before maintenance, familiarizing themselves with the product details and strictly adhering to the guidelines provided. ● Note that the product's inverter module is live with high voltage, and ensure it's powered off before operation. ● Wait for at least 15 minutes after powering off the equipment. Once it has completely discharged, use a multimeter to verify that inverter module's DC output voltage is below 36VDC before proceeding with any further operations. ● The inverter module can still have dangerous voltage with an external power supply connected in which case the the main circuit breaker is off.

6.3 Product Inspection Guidance

The product consists of semiconductor devices, passive electronic devices, and motion devices, all of which have a service life, and even under normal operating conditions, some of the devices may change in characteristics or fail if their service life is exceeded. To prevent malfunction, preventive inspections and maintenance such as daily inspections, periodic inspections, and device replacement must be performed. It is recommended to check the machine every 3-4 months after installation. Please shorten the inspection period under these conditions:

- Environment with high temperature and high altitude;
- Frequent start and stop;
- Environment with large fluctuations in AC power and loads;
- Environment with excessive vibration or shock;
- Environment with dust, metal dust, salts, sulfuric acid and chlorine;
- Harsh preservation.

Daily inspection

To avoid damage to the drive and shortening of its service life, check the following items on a daily basis.

Item	Content	Solutions
Power supply	Check that the supply voltage meets the requirements and that there is no phase loss in the supply.	Follow the instructions on the nameplate.
Surroundings	Check whether the installation environment meets the requirements.	Confirm the source and handle it properly.
Cooling system	Check whether there is abnormal heating and discoloration of the drive and motor, and the working condition of the fan.	Check for overload, tighten screws, clean the heat sink, and ensure the fan is not blocked.
Motor	Check whether the motor has abnormal vibration or sound.	Tighten mechanical and electrical connections and lubricate mechanical parts.

Load	Check whether the output current of the drive is higher than the rated value of the motor and it runs for a certain period of time.	Confirm that overload has not occurred and that the product model is correct.

Note: Do not carry out work with the power supply on, as there is a risk of electric shock and death. Disconnect the power supply and make sure that the DC voltage in the main circuit has dropped to a safe level and wait for 15 minutes before any further operations.

Periodic inspection for main circuit

In general, it is appropriate to conduct periodic inspections every 3 to 4 months, however, please determine the actual inspection period for each machine based on its usage and working environment.

Item	Content	Solutions
Overall	● Insulation resistance check ● Environment check	● Tighten and replace defective parts ● Clean and improve the operating environment
Electrical connections	● Check the wires and connections for discoloration, and check the insulation for damages, cracks, or deterioration ● Check the connection terminals for wear, damage, loose connection ● Grounding check	● Replace the damaged wires ● Tighten the loose terminals and replace the damaged ones ● Measure the grounding resistance and tighten the corresponding grounding terminals
Mechanical connections	● Check for abnormal vibrations and noises, and loose fixing	● Tighten, lubricate, and replace defective parts
Semiconductor devices	● Check for dirt and dust ● Check for visible changes in appearance	● Clean the operating environment ● Replace damaged parts
Electrolytic capacitor	● Check for fluid leakage, discoloration, cracks, and exposed, expanded, ruptured, or leaked	● Replace damaged parts

Peripherals protection	● Appearance and insulation inspection of peripheral equipment	● Clean the environment and replace damaged parts
Printed circuit board	● Check for odor, discoloration, and severe rust, and whether connectors are correct and reliable	● Fasten connectors ● Clean the printed circuit board ● Replace the damaged printed circuit board
Cooling system	● Check the cooling fan for damage and blockage ● Check for dirt and dust on the radiating fin ● Check whether air inlet and exhaust ports are clogged	● Clean the operating environment ● Replace damaged parts
Panel	● Check the cooling fan for damage and blockage	● Replace damaged parts
Motor	● Check whether the motor has abnormal vibration or sound	● Tighten mechanical and electrical connections and lubricate the motor shaft

: Do not commence working while power is on, as it poses a risk of fatal electric shock. Please cut the power off and confirm that the DC voltage in the main circuit has dropped to a safe level. Then wait for 5 minutes before continuing.

6.4 Product Maintenance Guidance

All equipment and components possess a defined service lifespan. Adequate maintenance can extend this duration, but cannot repair existing damage. Please replace devices that are nearing or have reached their end-of-life as requirements.

Name	Life
Fan	3 years~5 years
Electrolytic capacitor	8 years
Printed circuit board	8 years~10 years

6.5 Component Replacement

6.5.1 Cabinet Filter Screen Replacement

Disassembly steps

1. Power off the cabinet and the fan.
2. Open the front door panel to 90° angle and use a screwdriver to remove the 2 M5 screws on the shutter fixing frame (A).
3. Raise the shutter fixing frame by 2 to 3 cm to remove it upwards from the bottom fixing slot (B) on the shutter.
4. Remove to clean (or replace) the filter screen behind the shutter.

Installation steps

1. Install the cleaned or new filter screen behind the shutter.
2. Snap the shutter fixing frame (A) into the fixing slot and tighten the screws on it.
3. Fix the two M5 screws.

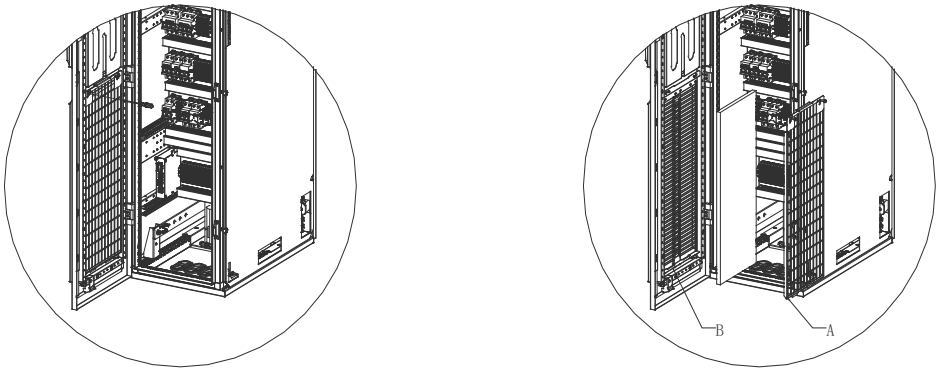


Figure 6-1 Cabinet Filter Screen Replacement

6.5.2 Fuse Replacement

Replacement steps

1. Disconnect the AC power supply of the drive cabinet, disconnect the precharge circuit fuse switch, then measure and ensure that the equipment has no voltage.
2. Open the cabinet door.
3. Remove the 4 M6 screws (B) on the cabinet top with a screwdriver and remove the cover plate.
4. Loosen (do not loosen completely to prevent nuts from falling into the module from below) M10/M12 screw (A) of the fuse and pull out the fuse with the screw.
5. Remove screws and check the fuse status. If the fuse burns, replace all fuses and tighten the screws. Screw tightening torque: up to 35N.m.
6. Install the cover plate and close the cabinet door in reverse order.

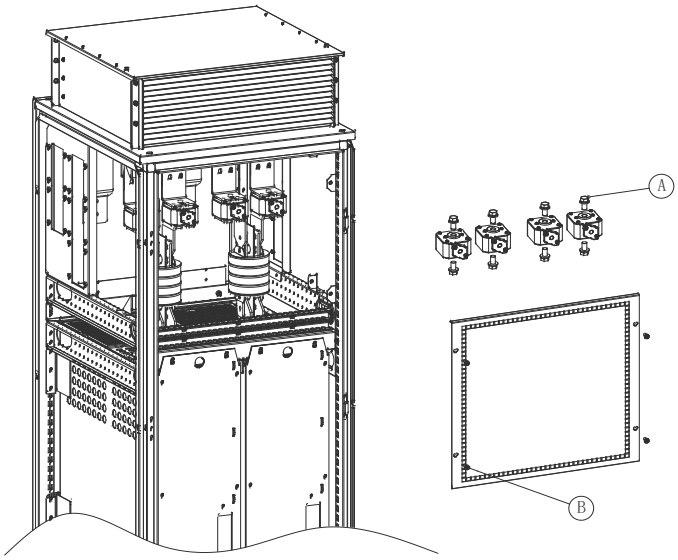


Figure 6-2 Fuse Replacement

6.5.3 Module Fan Replacement

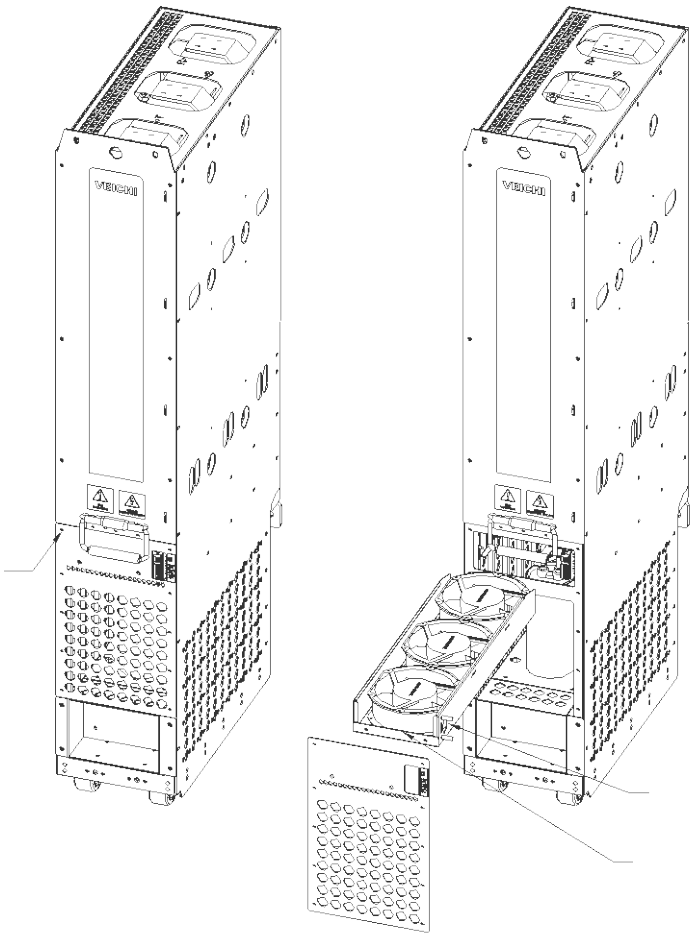


Figure 6-3 Module Fan Replacement

6.5.4 Fan Battery Replacement

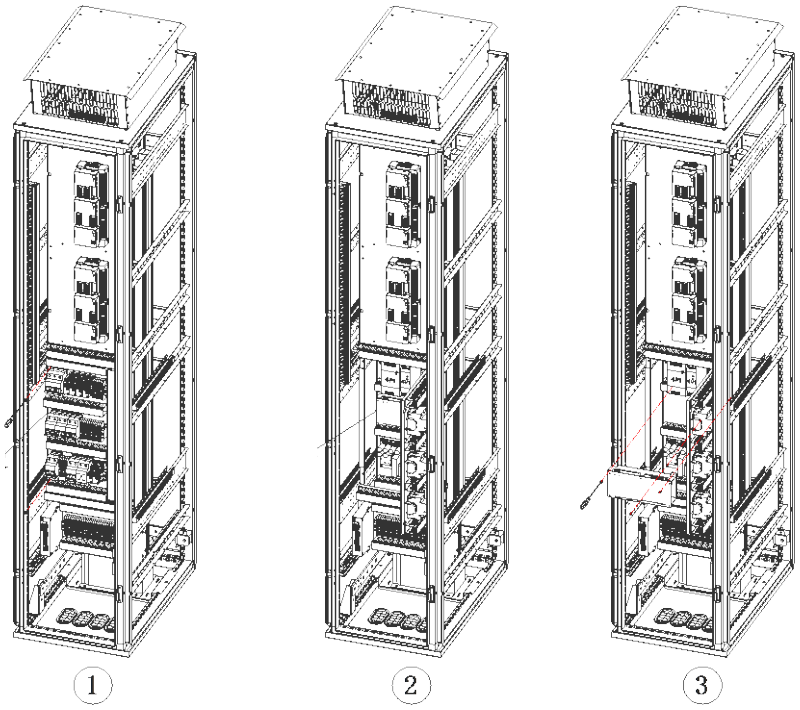


Figure 6-4 Fan Battery Replacement

Replacement steps

1. Disconnect the power to the cabinet unit and then the fan.
2. Open the front door panel and unscrew the 2 M4 screws from the lower front device mounting plate via a screwdriver.
3. Rotate the plate 90° counterclockwise as indicated in Figure 2.
4. Use a screwdriver to remove the three M4 screws securing the fan power supply, holding it with your other hand to prevent it from falling.

Install a new power supply and secure it. Reassemble the front lower device by following the steps in reverse.

6.5.5 VCU Battery Replacement and Mirco SD Card Removal

Steps

- Change the batteries
  1. Use the screwdriver to turn the battery cover 90° counterclockwise until the cover opensSee Illustration ① and ②.
  2. Remove the lid and replace it with a new VCU button cell.See Illustration ③ and ④.
  3. Close the lid and turn it clockwise 90° to tighten it.See Illustration ⑤, ⑥ and ⑦.
  4. Dispose the used batteries according to local disposal rules or applicable laws.

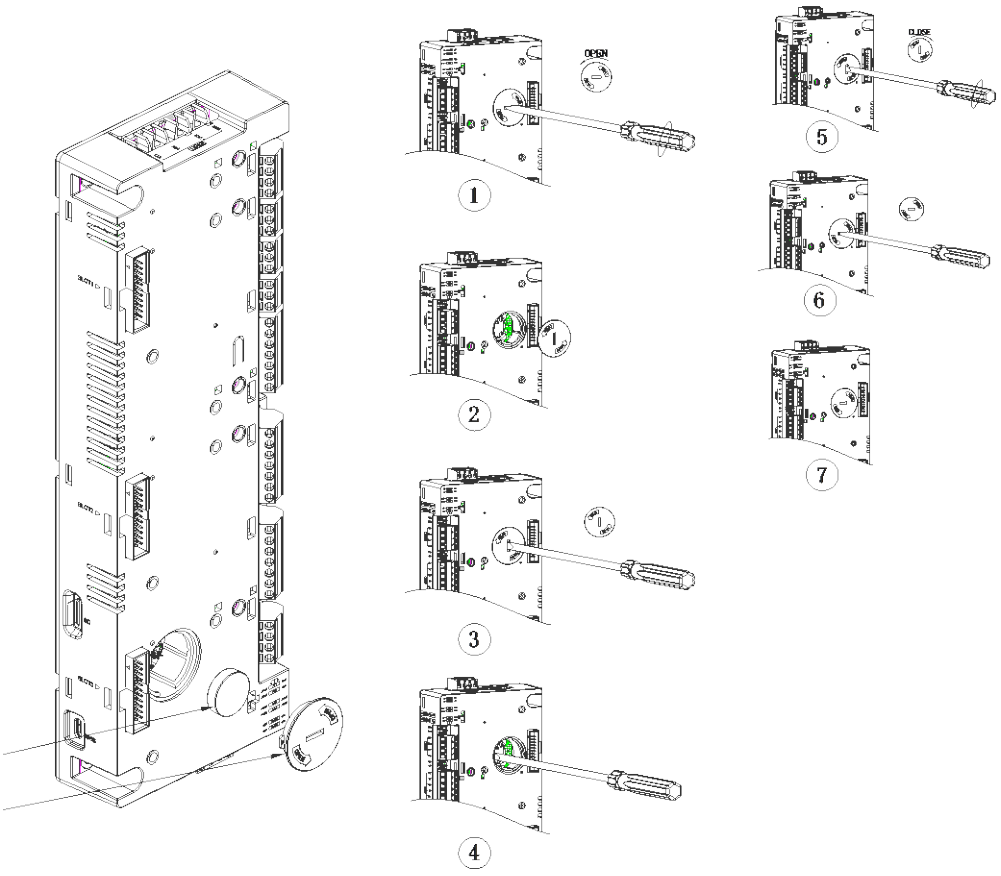


Figure 6-5 Battery Replacement

- Remove the Mirco SD memory card
  1. Refer to the illustration to insert the SD card holder as indicated by the notch on the Micro SD card.
  2. Ensure the there's a in-place feeling when inserting the Micro SD card and confirm that it is well inserted after installation. Otherwise, it will be abnormal due to poor contact.

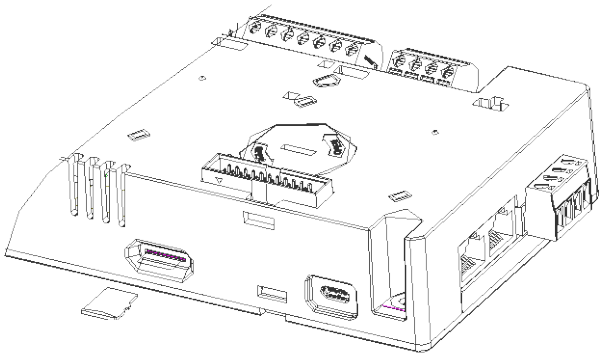


Figure 6-6 Remove the Mirco SD memory card

6.5.6 IOP-10-800 Battery Replacement and Mirco SD Card Removal

Steps

- Change the batteries

1. Loosen the back cover of the battery via tools or fingers as shown.

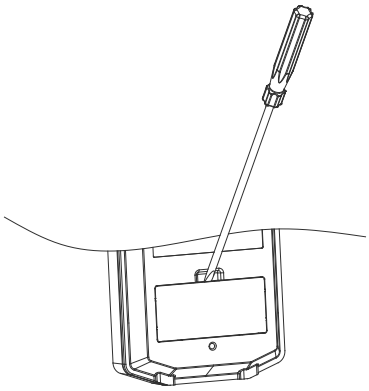


Figure 6-7 Step 1

2. Use nipper or a small screwdriver to pry out the battery in the direction as shown.

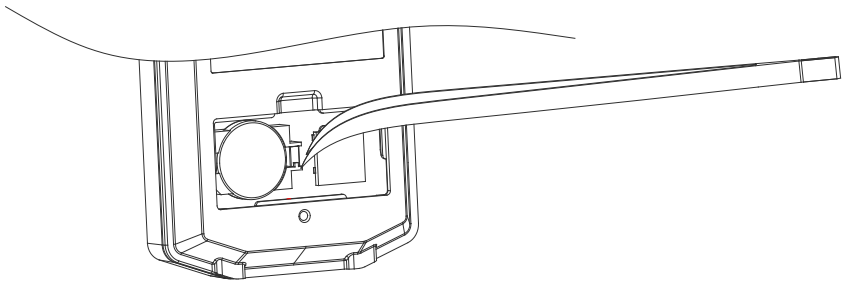


Figure 6-8 Step 2

3. Insert the battery into the B end of the holder first, followed by pressing down on the A end to secure it in place.

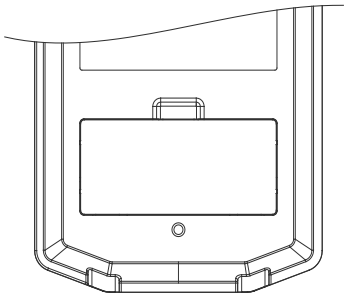


Figure 6-9 Step 3

4. Secure the battery cover to finalize battery replacement.

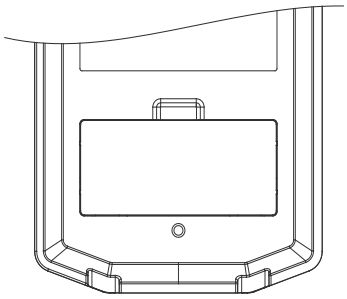


Figure 6-10 Step 4

- Remove the Mirco SD memory card

1. Loosen the back cover of the battery via tools or fingers as shown.

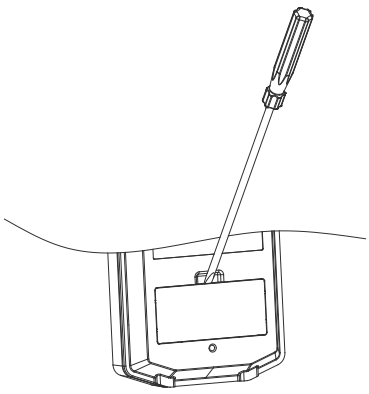


Figure 6-11 Step 1

2. The Micro SD card can be removed by panning the metal cover in level with a tool or finger as indicated (gentle downward pressure) to open the slot.

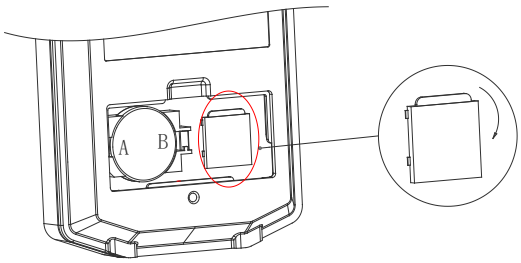


Figure 6-12 Step 2

3. The Mirco SD card can be inserted with a tool or finger by panning the metal card cover in the direction shown (gently pushing downward).

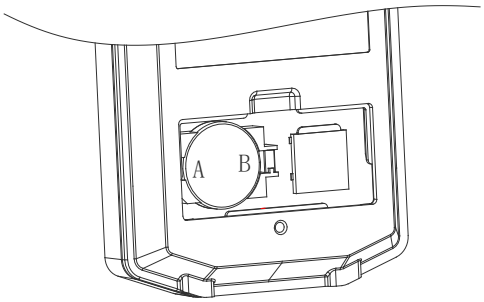


Figure 6-13 Step 3

4. Secure the battery cover to finalize Mirco SD card replacement.

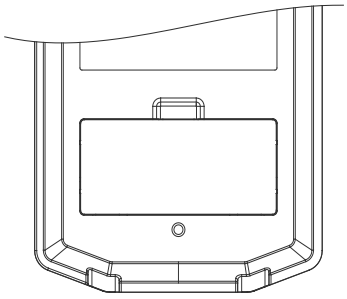


Figure 6-14 Step 4

Version Change Log

Date	Version	Content
2024.04	V1.0	First version issued

VEICHI

SUZHOU VEICHI ELECTRIC Co.,Ltd.

Address:No.1000 Songjia road,Wuzhong Economic and Technological Development Zone,Suzhou
Phone:+86-512-6617 1988
Facebook:https://www.facebook.com/veichiglobal/
Whatsapp:+86-138 2881 8903
E-mail:overseas@veichi.com Web:https://www.veichi.com/

Official Website

Version:2024 V1.0