

Chapter 3 Mechanical and Electrical Installation

Mechanical Installation

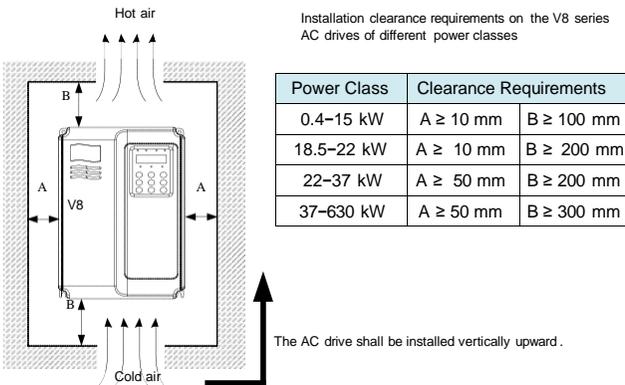
Installation Environment Requirements

Item	Requirements
Ambient temperature	-10°C to +50°C
Heat dissipation	Install the AC drive on the surface of an incombustible object, and ensure that there is sufficient space around for heat dissipation. Install the AC drive vertically on the support using screws.
Mounting location	Free from direct sunlight, high humidity and condensation
	Free from corrosive, explosive and combustible gas
	Free from oil dirt, dust and metal powder
Vibration	Less than 0.6 g Far away from the punching machine or the like
Protective enclosure	The V8 series AC drives of plastic housing are the whole unit built-in products operated through remote control and need to be installed in the final system. The final system must have the required fireproof cover, electrical protective cover and mechanical protective cover, and satisfy the regional laws & regulations and related IEC requirements.

Installation Clearance Requirements

The clearance that needs to be reserved varies with the power class of the V8, as shown in the following figure.

Figure 3-1 Clearance around the V8 for installation



The V8 series AC drive dissipates heat from the bottom to the top. When multiple AC drives are required to work together, install them side by side.

For application installing multiple AC drives, if one row of AC drives need to be installed above another row, install an insulation guide plate to prevent AC drives in the lower row from heating those in the upper row and causing faults.

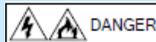
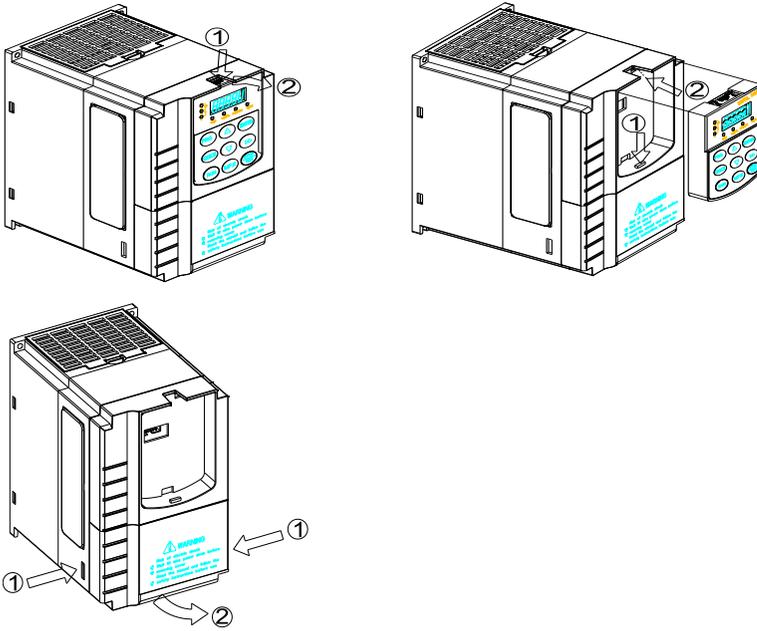
■ Installation Precautions

- 1) Reserve the installation clearances as specified in Figure 3-1 to ensure sufficient space for heat dissipation. Take heat dissipation of other parts in the cabinet into consideration.
- 2) Install the AC drives upright to facilitate heat dissipation. If multiple AC drives are installed in the cabinet, install them side by side. If one row of AC drives need to be installed above another row, install an insulation guide plate.
- 3) Use incombustible hanging bracket.
- 4) In scenarios with heavy metal powder, install the heatsink outside the cabinet, and ensure that the room inside the fully-sealed cabinet is as large as possible.

Removal of the Front Cover of the V8

For the V8 series AC drives, you need to remove the front cover and before wiring the main circuit and control circuit.

Figure 3-12 Removal of the front cover of the V8 (plastic housing)



Prevent the cover from falling off during the removal to avoid potential damage to the equipment or personal injury.

Electrical Installation

Description of Main Circuit Terminals

Description of Main Circuit Terminals of Three-phase AC drive

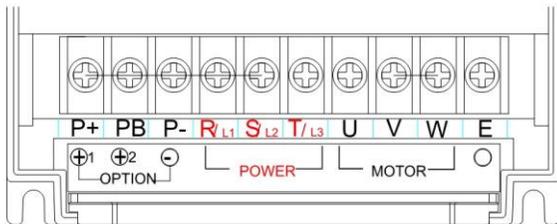


Table 3-1 Description of main circuit terminals of three-phase AC drive

Terminal	Name	Description
R, S, T	Three-phase power supply input terminals	Connect to the three-phase AC power supply
(+), (-)	Positive and negative terminals of DC bus	Common DC bus input point Connect the external braking unit to the AC drive of 18.5 kW and above (220 V) and 37 kW and above (other voltage classes).
(+), PB	Connecting terminals of braking resistor	Connect to the braking resistor for the AC drive of 15 kW and below (220 V) and 30 kW and below (other voltage classes).
P, (+)	Connecting terminals of external reactor	Connect to an external reactor.
U, V, W	AC drive output terminals	Connect to a three-phase motor.
\underline{E}	Grounding terminal	Must be grounded.

■ Precautions on the Wiring

1) Power input terminals R, S, T

- The cable connection on the input side of the AC drive has no phase sequence requirement.
- The specification and installation method of external power cables must comply with the local safety regulations and related IEC standards.
- Use copper conductors of a proper size as power cables according to the recommended values

2) DC bus terminals (+), (-)

- Terminals (+) and (-) of DC bus have residual voltage after the AC drive is switched off. After indicator CHARGE goes off, wait at least 10 minutes before touching the equipment. Otherwise, you may get electric shock.
- connecting external braking components for the AC drive of 18.5 kW and above (220 V) and 37 kW and above (other voltage classes), do not reverse poles (+) and (-). Otherwise, it may damage the AC drive and even cause a fire.
- The cable length of the braking unit shall be no longer than 10 m. Use twisted pair wire or pair wires for parallel connection.
- Do not connect the braking resistor directly to the DC bus. Otherwise, it may damage the AC drive and even cause fire.

3) Braking resistor connecting terminals (+), PB

- The connecting terminals of the braking resistor are effective only for the AC configured with the built-in braking unit.
- The cable length of the braking resistor shall be less than 5 m. Otherwise, it may damage the AC drive.

4) External reactor connecting terminals P, (+)

For the AC drive of 37 kW and above (220 V) and 75 kW and above (other voltage classes), remove the jumper bar across terminals P and (+) and install the reactor between the two terminals.

5) AC drive output terminals U, V, W

- The specification and installation method of external power cables must comply with the local safety regulations and related IEC standards.
- Use copper conductors of a proper size as power cables according to the recommended values in section 8.3.
- The capacitor or surge absorber cannot be connected to the output side of the AC drive. Otherwise, it may cause frequent AC drive fault or even damage the AC drive.
- If the motor cable is too long, electrical resonance will be generated due to the impact of distributed capacitance. This will damage the motor insulation or generate higher leakage current, causing the AC drive to trip in overcurrent protection. If the motor cable is greater than 100 m long, an AC output reactor must be installed close to the AC drive.

6) Terminal 

- This terminal must be reliably connected to the main earthing conductor. Otherwise, it may cause electric shock, mal-function or even damage to the AC drive.

- Do not connect the earthing terminal to the neutral conductor of the power supply.
- The impedance of the PE conductor must be able to withstand the large short-circuit current that may arise when a fault occurs.
- Select the size of the PE conductor according to the following table:

Cross-sectional Area of a Phase Conductor (S)	Min. Cross-sectional Area of Protective Conductor (Sp)
$S \leq 16 \text{ mm}^2$	S
$16 \text{ mm}^2 < S \leq 35 \text{ mm}^2$	16 mm^2
$35 \text{ mm}^2 < S$	S/2

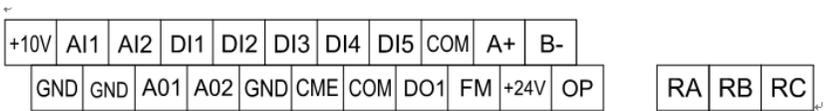
- You must use a yellow/green cable as the PE conductor.

7) Requirements on upstream protection device

- Install upstream protection device on the input power circuit. The protection device must provide the protections on overcurrent, short-circuit and electrical solution.
- When selecting the protective device, you should consider the current capacity of the power cable, system overload capacity and short-circuit capacity of the upstream power distribution of the equipment. Generally, make selection according to the recommended values in section 8.4.

Description of Control Circuit Terminals

Terminal Arrangement of Control Circuit



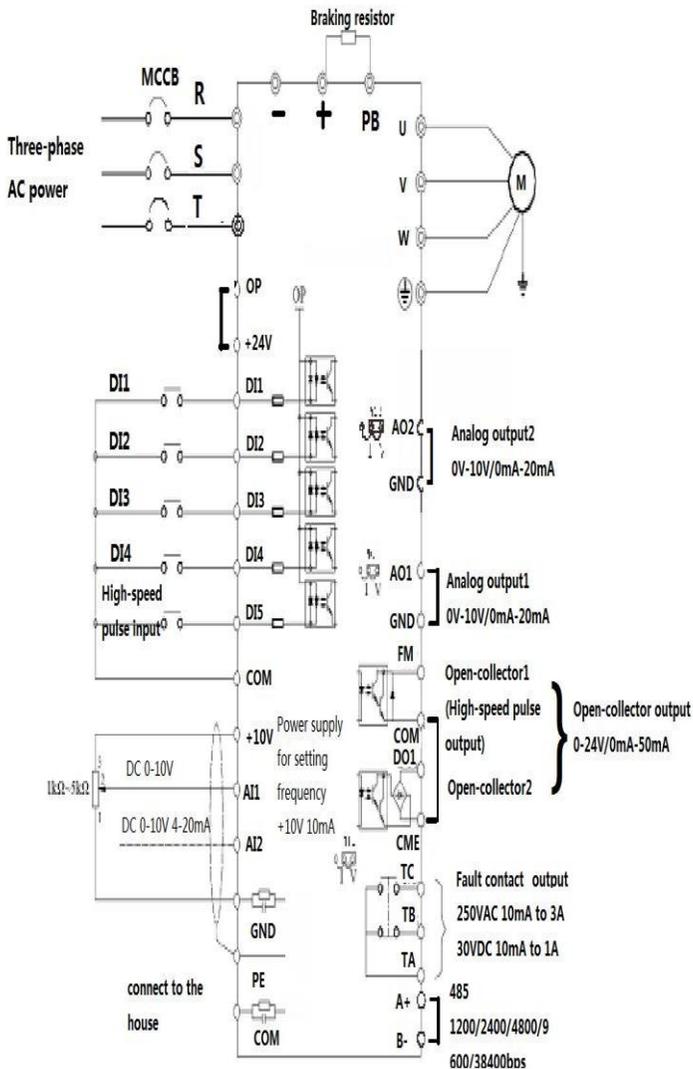
Description of Control Circuit Terminals Table 3-2 Description of control circuit terminals

Type	Terminal	Name	Function Description
Power supply	+10V-GND	External +10 V power supply	Provide +10 V power supply to external unit. Generally, it provides power supply to external potentiometer with resistance range of 1-5 kΩ. Maximum output current: 10 mA
	+24V-COM	External +24 V power supply Applying to Overvoltage Category II circuit	Provide +24 V power supply to external unit. Generally, it provides power supply to DI/DO terminals and external sensors. Maximum output current: 200 mA
	OP	Input terminal of external power supply	Connect to +24 V by default. When DI1-DI5 need to be driven by external signal, OP needs to be connected to external power supply and be disconnected from +24 V.

Type	Terminal	Name	Function Description
Analog input	AI1-GND	Analog input 1	Input voltage range: 0–10 VDC Impedance: 22 k Ω
	AI2-GND	Analog input 2	Input range: 0–10 VDC/4–20 mA, decided by jumper J8 on the control board Impedance: 22 k Ω (voltage input), 500 Ω (current input)
Digital input	DI1- OP	Digital input 1	Optical coupling isolation, compatible with dual polarity input Impedance: 2.4 k Ω Voltage range for level input: 9–30 V
	DI2- OP	Digital input 2	
	DI3- OP	Digital input 3	
	DI4- OP	Digital input 4	
	DI5- OP	High-speed pulse input	Besides features of DI1–DI4, it can be used for high-speed pulse input. Maximum input frequency: 100 kHz
Analog output	AO1-GND	Analog output 1	Voltage or current output is decided by jumper AO1. Output voltage range: 0–10 V Output current range: 0–20 mA
Analog output	AO2-GND	Analog output 2	Voltage or current output is decided by jumper AO2. Output voltage range: 0–10 V Output current range: 0–20 mA
Digital output	DO1-CME	Digital output 1	Optical coupling isolation, dual polarity open collector output Output voltage range: 0–24 V Output current range: 0–50 mA Note that CME and COM are internally insulated, but they are shorted by jumper externally. In this case DO1 is driven by +24 V by default. If you want to drive DO1 by external power supply, remove the jumper.
	FM- COM	High-speed pulse output	It is limited by P5-00 (FM terminal output mode selection). As high-speed pulse output, the maximum frequency hits 100 kHz. As open-collector output, its specification is the same as that of DO1
Relay output	RA-RB	NC terminal	Contact driving capacity: 250 VAC, 3 A, 24 VDC, 1 A
	RA-RC	NO terminal	
Communication	A+	485+	Velocity :1200/2400/4800/9600/38400bps At most for 127 sets paralleled but resistor needed
	B-	485-	Longest distance 500m(adopt standard twin transposition shield cables)

Wiring of AC Drive Control Circuit

Figure 3-14 Wiring mode of the AC drive control circuit



Note

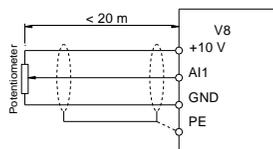
- All V8 series AC drives have the same wiring mode. The figure here shows the wiring of single-phase 220 VAC drive. © indicates main circuit terminal, while ○ indicates control circuit terminal.
- When the external operation panel is connected, the display of the operation panel on the V8 goes off.

Description of Wiring of Signal Terminals

1) Wiring of AI terminals

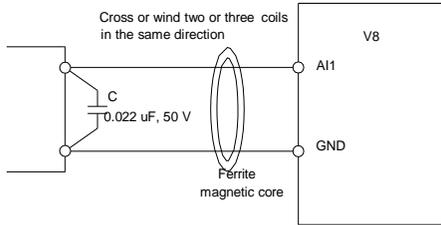
Weak analog voltage signals are easy to suffer external interference, and therefore the shielded cable must be used and the cable length must be less than 20 m, as shown in following figure.

Figure 3-15 Wiring mode of AI terminals



In applications where the analog signal suffers severe interference, install filter capacitor or ferrite magnetic core at the analog signal source.

Figure 3-16 Install filter capacitor or ferrite magnetic core

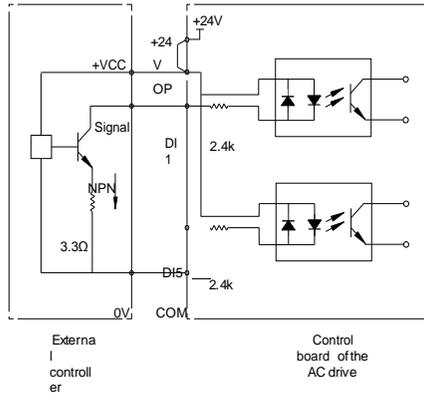


2) Wiring of DI terminals

Generally, select shielded cable no longer than 20 m. When active driving is adopted, necessary filtering measures shall be taken to prevent the interference to the power supply. It is recommended to use the contact control mode.

a. SINK wiring

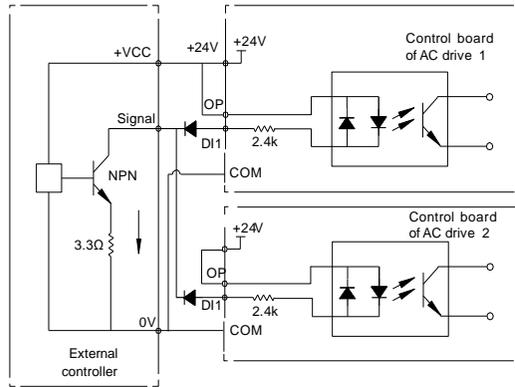
Figure 3-17 Wiring in SINK mode



This is the most commonly used wiring mode. To apply external power supply, remove jumpers between +24 V and OP and between COM and CME, and connect the positive pole of external power supply to OP and negative pole to CME.

In such wiring mode, the DI terminals of different AC drives cannot be connected in parallel. Otherwise, DI mal-function may result. If parallel connection (different AC drives) is required, connect a diode in series at the DI and the diode needs to satisfy the requirement: IF > 10 mA, UF < 1 V.

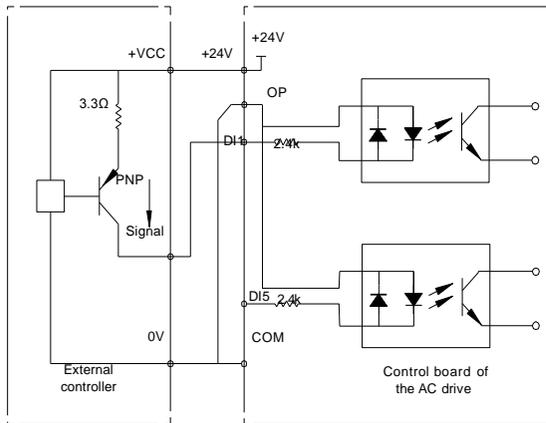
Figure 3-18 DI terminals connected in parallel in SINK mode



b. SOURCE wiring

In such wiring mode, remove the jumper between +24 V and OP. Connect +24 V to the common port of external controller and meanwhile connect OP to COM. If external power supply is applied, remove the jumper between CME and COM.

Figure 3-19 Wiring in SOURCE mode



3) Wiring of DO terminal

When the digital output terminal needs to drive the relay, an absorption diode shall be installed between two sides of the relay coil. Otherwise, it may cause damage to the 24 VDC power supply. The driving capacity is not more than 50 mA.

Note

Do not reverse the polarity of the absorption diode during installation, as shown in Figure 3-11. Otherwise, the 24 VDC power supply will be damaged immediately once there is digital output.

Figure 3-20 DO terminal wiring diagram

