

## Preface

### Product Introduction

The CM680 is a high-performance general-purpose inverter, featuring a book-type design across the entire series to meet more installation area requirements. The product is equipped with rich hardware configurations and powerful software performance, supporting a wide range of communication protocols and efficient control of various types of motors. It offers excellent drive performance and control functions, enabling applications in automation production equipment across industries such as metallurgy, lifting, machine tools, printing, wire drawing, glass, food, fans, and pumps.

This manual provides detailed information on installation dimensions, space design, detailed installation steps, connection requirements, wiring requirements, optional accessory installation requirements, and suggestions for addressing common EMC issues.

### More information

Document name	Content summary
CM680 Series General Purpose Inverter Quick Installation and Commissioning Manual	Introduces detailed content on product installation, wiring, commissioning, troubleshooting, function codes, fault codes, etc.
CM680 Series General Purpose Inverter Hardware Manual	Introduces the system composition, technical specifications, components, dimensions, optional accessories (installation accessories, cables, peripheral electrical components), expansion cards, as well as daily maintenance and care guidelines, and compliance with certifications and standards, etc., in detail.
CM680 Series General Purpose Inverter Installation Manual (this manual)	Introduces detailed content on installation dimensions, space design, detailed installation steps, connection requirements, wiring requirements, optional accessory installation requirements, and common EMC issue resolution suggestions, etc.
CM680 Series General Purpose Inverter Software Manual	Introduces detailed content about the product's functional applications, communication, fault codes, function codes, etc.
CM680 Series General Purpose Inverter Communication Manual	Introduces detailed content about the product communication expansion card's overview, composition, dimensions, installation, electrical connections, communication parameter configuration, fault codes, etc.

### Version Change Record

Revision Date	Release Version	Change Content
2024 - 04	Ver 1.0	First release of the manual.

### Manual Acquisition

This manual is not shipped with the product. To obtain an electronic PDF version, you can do so through the following methods:

Log in to the Changsha Riyi Electric official website ([www.cssunye.com](http://www.cssunye.com)), go to the "Download Center," search for keywords, and download.

### Warranty Statement

Under normal use conditions, if the product malfunctions or is damaged, we provide warranty service within the warranty period. After the warranty period, repair fees will be charged.

Within the warranty period, damage caused by the following situations will incur repair fees.

- Damage caused by not operating the product according to the manual.
- Damage caused by fire, water, abnormal voltage.
- Damage caused by using the product for non-standard functions.
- Damage caused by using the product beyond its specified range.
- Secondary damage caused by force majeure (natural disasters, earthquakes, lightning strikes) factors.

Service charges are calculated according to the manufacturer's uniform standards; if there is a contract, the contract takes precedence. For detailed warranty information, please refer to the 'Product Warranty Card'.

## Table of Contents

<b>Preface</b> .....	<b>1</b>
<b>Product Model Table</b> .....	<b>6</b>
<b>Precautions</b> .....	<b>7</b>
<b>1. Installation Preparation</b> .....	<b>9</b>
<b>1.1. Installation Procedure</b> .....	<b>9</b>
<b>1.2. Site Inspection</b> .....	<b>9</b>
<b>1.2.1. Installation Environment</b> .....	<b>9</b>
<b>1.2.2. Installation Space</b> .....	<b>9</b>
<b>1.3. Installation Tools</b> .....	<b>10</b>
<b>1.3.1. Mechanical Installation Tools</b> .....	<b>10</b>
<b>1.3.2. Wiring Tools</b> .....	<b>11</b>
<b>2. Overall Dimensions</b> .....	<b>12</b>
<b>2.1. C2 ~ C3 Overall Dimensions</b> .....	<b>12</b>
<b>2.2. C4 Overall Dimensions</b> .....	<b>12</b>
<b>2.3. C5 Overall Dimensions</b> .....	<b>12</b>
<b>2.4. C6 ~ C8 Overall Dimensions</b> .....	<b>13</b>
<b>2.5. C9 ~ C11 Overall Dimensions</b> .....	<b>14</b>
<b>3. Unpacking and Handling</b> .....	<b>15</b>
<b>3.1. Storage</b> .....	<b>15</b>
<b>3.2. Handling Before Unpacking</b> .....	<b>15</b>
<b>3.3. Packaging Inspection</b> .....	<b>16</b>
<b>3.4. Unpacking</b> .....	<b>16</b>
<b>3.5. Handling and Lifting After Unpacking</b> .....	<b>17</b>
<b>4. Mechanical Installation (C2 ~ C8 Models)</b> .....	<b>19</b>
<b>4.1. Wall-Mounted Installation</b> .....	<b>19</b>
<b>4.1.1. Pre-Installation Considerations</b> .....	<b>19</b>

---

<b>4.1.2. Cabinet Space Requirements</b> .....	19
<b>4.1.3. Back panel installation requirements</b> .....	20
<b>4.1.4. Cabinet cooling design</b> .....	20
<b>4.1.5. Wall mounting operation</b> .....	23
<b>4.2. Recessed installation</b> .....	<b>24</b>
<b>4.2.1. Installation operation</b> .....	24
<b>4.2.2. Installation dimensions</b> .....	28
<b>4.3. Removal and installation of cover plates</b> .....	<b>30</b>
<b>4.3.1. Cover plate removal</b> .....	30
<b>4.3.2. Cover plate installation</b> .....	32
<b>5. Mechanical installation (C9~C11 models)</b> .....	<b>34</b>
<b>5.1. Pre-installation precautions</b> .....	34
<b>5.2. Cooling design</b> .....	34
<b>5.3. Installation inside the cabinet</b> .....	35
<b>5.4. Removal and installation of cover plates</b> .....	<b>36</b>
<b>5.4.1. Remove the cover</b> .....	36
<b>5.4.2. Install the cover</b> .....	37
<b>5.5. Output reactor base</b> .....	37
<b>5.6. Input terminal box</b> .....	38
<b>6. Electrical installation</b> .....	<b>40</b>
<b>6.1. Pre-wiring inspection</b> .....	40
<b>6.2. Internal components introduction</b> .....	40
<b>6.3. Electrical wiring diagram</b> .....	41
<b>6.4. Main circuit wiring</b> .....	<b>41</b>
<b>6.4.1. Main circuit terminal description</b> .....	41

<b>6.4.2. Main circuit terminal dimensions and cable selection .....</b>	<b>44</b>
<b>6.4.3. Main circuit wiring requirements .....</b>	<b>45</b>
<b>6.4.4. Protection requirements .....</b>	<b>47</b>
<b>6.5. CONTROL CIRCUIT WIRING .....</b>	<b>48</b>
<b>6.5.1. Control Circuit Terminal Description .....</b>	<b>48</b>
<b>6.5.2. Control Circuit Terminal Wiring Instructions .....</b>	<b>49</b>
<b>6.5.3. Control Circuit Cable Selection and Wiring Requirements .....</b>	<b>51</b>
<b>6.6. GROUNDING .....</b>	<b>52</b>
<b>6.6.1. Main Circuit Grounding Requirements .....</b>	<b>52</b>
<b>6.6.2. Control Board Grounding Requirements .....</b>	<b>52</b>
<b>6.6.3. Single Equipment Installation Scenario .....</b>	<b>53</b>
<b>6.6.4. Multiple Equipment Installation Scenario .....</b>	<b>55</b>
<b>6.6.5. Cabinet System Grounding .....</b>	<b>55</b>
<b>7. Optional Accessories Selection .....</b>	<b>57</b>
<b>7.1. EMBEDDED INSTALLATION BRACKET .....</b>	<b>57</b>
<b>7.2. BOTTOM INSTALLATION BRACKET .....</b>	<b>57</b>
<b>7.3. INSTALLATION RAIL .....</b>	<b>57</b>
<b>7.4. OUTPUT REACTOR BASE .....</b>	<b>57</b>
<b>7.5. INPUT JUNCTION BOX .....</b>	<b>57</b>
<b>8. Common EMC Issues and Solutions .....</b>	<b>58</b>
<b>8.1. FALSE TRIPPING OF RESIDUAL CURRENT CIRCUIT BREAKERS .....</b>	<b>58</b>
<b>8.2. HARMONIC SUPPRESSION .....</b>	<b>59</b>
<b>8.3. CONTROL CIRCUIT INTERFERENCE .....</b>	<b>59</b>
<b>8.3.1. High-Speed Pulse Interference .....</b>	<b>59</b>
<b>8.3.2. General IO Signal Interference .....</b>	<b>59</b>

---

<b>8.4. COMMUNICATION INTERFERENCE .....</b>	<b>59</b>
<b>8.4.1. 485 and CAN Communication Interference .....</b>	<b>60</b>
<b>8.4.2. EtherCAT and Profinet Communication Interference .....</b>	<b>60</b>
<b>8.5. ENCODER FEEDBACK SIGNAL ERROR .....</b>	<b>60</b>

## Product Model Table

Relationship Between CM680 Inverter Models and Dimensions

External Structure	Inverter Model	Input Voltage (V)	Input Current (A)	Output Current (A)	Motor Rating (kW)	External Dimensions (W*H*D)	Mounting Hole Diameter S (mm)	Net Weight of Product (KG)
C2	CM680-4T4R0GB	Three-phase 380V ~ 480V Range: -15% ~ +10%	11.4	9.0	4.0	100*235*178	5	2
	CM680-4T5R5GB		16.7	13.0	5.5			
	CM680-4T7R5GB		21	17.0	7.5			
C3	CM680-4T011GB		32	25.0	11.0	118*320*200	6	3.5
	CM680-4T015GB		41	32.0	15.0			
C4	CM680-4T018GB		47	37.0	18.5	140*365*245	6	6
	CM680-4T022GB		56	45.0	22.0			
	CM680-4T030GB		72	60.0	30.0			
C5	CM680-4T037G(B)		88	75.0	37.0	180*430*260	7	13
	CM680-4T045G(B)		110	90.0	45.0			
C6	CM680-4T055G(B)		106	110.0	55.0	250*593*362	9	47.5
	CM680-4T075G(B)	139	152.0	75.0				
	CM680-4T093G(B)	165	176.0	93.0				
C7	CM680-4T110G(B)	190	210.0	110.0	270*640*370	10	49.5	
	CM680-4T132G(B)	230	253.0	132.0				
C8	CM680-4T160G	276	304.0	160.0	290*780*425	9	80.5	
	CM680-4T185G	314	340.0	185.0				
C9	CM680-4T200G	346	380.0	200.0	300*1101*506	14×17	121.5	
	CM680-4T220G	380	426.0	220.0				
	CM680-4T250G	435	465.0	250.0				
C10	CM680-4T280G	478	520.0	280.0	340*1248*545	17×20	167.5	
	CM680-4T315G	534	585.0	315.0				
	CM680-4T355G	598	650.0	355.0				
C11	CM680-4T400G	672	725.0	400.0	340*1389*545	17×20	207.5	
	CM680-4T450G	742	820.0	450.0				

## Precautions

### Safety Statement

1. This chapter explains the safety precautions that need to be observed for the correct use of this product. Before using this product, please read the user manual and correctly understand the information related to safety precautions. Failure to comply with the matters specified in the safety precautions may result in death, serious injury, or equipment damage.
2. The 'Hazard', 'Warning', and 'Caution' items in the manual do not represent all the safety precautions that should be followed; they only serve as supplements to all safety precautions.
3. This product should be used in an environment that meets the design specifications. Otherwise, it may cause malfunctions, and functional abnormalities or component damage due to non-compliance with relevant regulations are not covered by the product quality guarantee.
4. Our company will not be liable for any personal injury accidents or property damage caused by failure to comply with the contents of this manual or improper operation of the product.

### Definition of Safety

In this manual, safety precautions are divided into the following two categories:



**Hazard:** A situation that may result in serious injury or even death due to failure to operate as required;



**Caution:** A situation that may result in moderate injury, minor injury, or equipment damage due to failure to operate as required;

Please read this chapter carefully when installing, commissioning, and maintaining this system, and strictly follow the safety precautions specified in this chapter. Any injuries or losses caused by improper operation are not the responsibility of our company.

### Safety Precautions:

Usage Stage	Safety Level	Precautions
Before Installation	 Danger	If water ingress, missing parts, or damaged components are found in the control system upon unpacking, do not install! If the packing list does not match the actual items, do not install!
	 Note	When handling, lift and place gently; otherwise, there is a risk of damaging the equipment! Do not touch the components of the control system with your hands; otherwise, there is a risk of static damage!
During Installation	 Danger	Only trained personnel with electrical knowledge should operate. Non-professionals must not operate!
	 Note	Do not allow wire ends or screws to fall into the drive unit; otherwise, it may cause damage to the drive unit! Please install the drive in a location with minimal vibration and avoid direct sunlight.
When wiring	 Danger	It must be installed by a professional electrical engineer; otherwise, unexpected dangers may occur! Before wiring, ensure that the power supply is in a zero-energy state; otherwise, there is a risk of electric shock! Please ground the inverter correctly and in accordance with standards; otherwise, there is a risk of electric shock!
	 Note	Please follow the steps specified in the Electrostatic Discharge (ESD) prevention measures and wear an ESD wrist strap when performing wiring and other operations to avoid damaging the equipment or internal circuits of the product. When wiring the control circuit, use double-strand twisted shielded wire and connect the shielding layer to the grounding terminal of the product; otherwise, it may cause abnormal operation of the product.
Before Powering On	 Danger	Before powering on, please ensure that the product is installed properly, the wiring is secure, and the motor installation allows for reoperation. Before powering on, please confirm that the power supply meets the product requirements to avoid damaging the product or causing a disaster!
	 Note	It is strictly prohibited to open the cabinet door or protective cover plate, touch any terminal, or dismantle any device or component while the power is on, as there is a risk of electric shock! The inverter must have its cover plate securely fastened before it can be powered on; otherwise, there may be a risk of electric shock! Wire according to the connection methods provided in this manual; otherwise, accidents may occur!

Usage Stage	Safety Level	Precautions
After Powering On	 Danger	Do not open the cover plate after powering on. Otherwise, there is a risk of electric shock! Do not touch any input or output terminals of the inverter. Otherwise, there is a risk of electric shock!
	 Note	If parameter identification is required, be aware of the danger of injury from the rotating motor; otherwise, it may cause an accident! Do not arbitrarily change the manufacturer's parameters of the inverter; otherwise, it may cause damage to the equipment!
In operation	 Danger	Non-professional personnel should not test signals during operation; otherwise, it may cause personal injury or equipment damage! Do not touch the cooling fan or discharge resistor to check the temperature; otherwise, it may cause burns!
	 Note	During inverter operation, avoid dropping objects into the device; otherwise, it may cause equipment damage! Do not use contactors to control the start and stop of the drive, as this can cause equipment damage!
During maintenance	 Danger	Do not perform repairs or maintenance on the inverter without professional training, as this can result in personal injury or equipment damage! Do not perform maintenance or repairs on the equipment while it is powered, as there is a risk of electric shock! Confirm that the input power to the inverter has been disconnected for 10 minutes before performing maintenance or repairs, otherwise residual charges in the capacitors can cause harm to personnel! All plug-in modules must be inserted or removed only when the power is off! After replacing the communication module, it is necessary to set and check the parameters.

**Safety Signage**

To ensure safe operation, please strictly adhere to the safety signage attached to the device. Do not damage or remove the safety signage. The safety signage descriptions are as follows:

Safety Signage	Content Description
	<ul style="list-style-type: none"> <li>• Before using the product, carefully read the safety manual and operating instructions; otherwise, there is a risk of personal injury or product damage!</li> <li>• Do not touch the terminal parts or remove the cover plate when the power is on or within 10 minutes after the power has been cut off; otherwise, there is a risk of electric shock!</li> </ul>

## 1. Installation Preparation

### 1.1. Installation Procedure

- ① Check the installation site environment, installation space, and installation direction;
- ② Prepare installation tools, wiring tools, and accessories;
- ③ Packaging confirmation, unpacking inspection, and handling;
- ④ Mechanical installation, wall-mounted installation or embedded installation;
- ⑤ Electrical installation: pre-wiring inspection - remove cover plate - main circuit wiring - control circuit wiring - install cover plate - post-wiring inspection.

### 1.2. Installation site inspection

#### 1.2.1. Installation environment

To ensure and fully utilize the performance of this product and ensure long-term reliability, it should be stored in the following environmental requirements.

**Table 1-1 Environmental Requirements**

Environment	Conditions
Usage location	Indoor, not exposed to direct sunlight, free from dust, corrosive gases, flammable gases, oil mist, water vapor, dripping water, or salt
Elevation	No derating required below 1000m, derate by 1% for every 100m above 1000m, maximum operating altitude is 3000m, contact the manufacturer if exceeding 3000m
Ambient Temperature	-10° C to +50° C (derate use when ambient temperature is between 40° C to 50° C)
Humidity	< 95% RH, no condensation
Vibration	< 5.9m/s <sup>2</sup> (0.6g)
Storage Temperature	-20° C to +60° C
Pollution Degree	2

#### 1.2.2. Installation Space

Depending on the power rating of the inverter, different installation and spacing should be reserved around the inverter during installation.

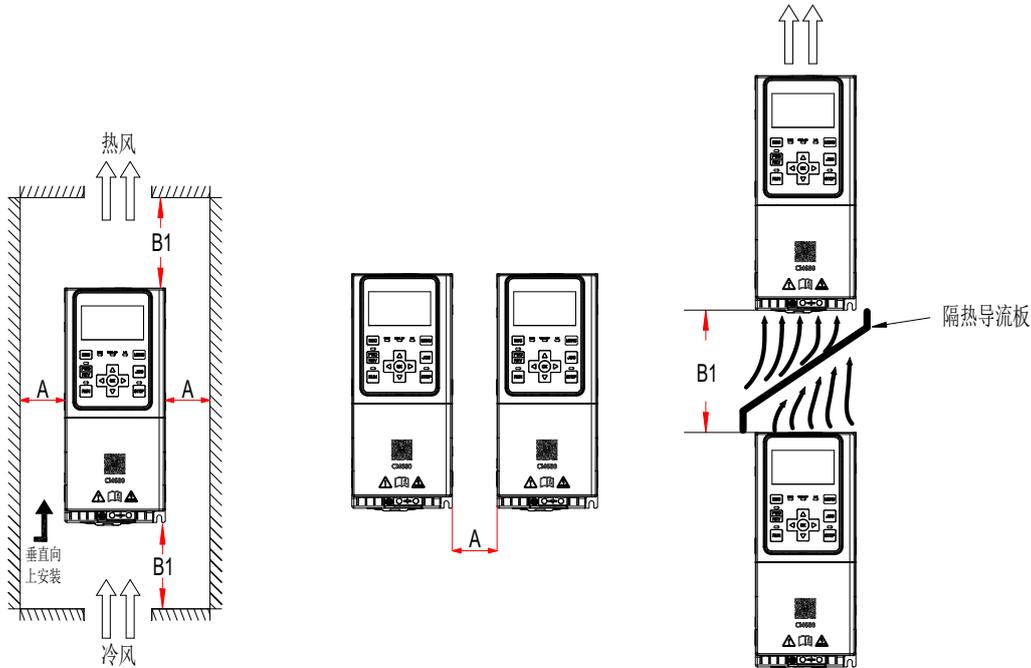


Figure 1-1 C2 ~ C8 Models Installation Diagram

Figure 1-2 C2 ~ C8 Top and Bottom Arrangement Installation Diagram

Table 1-2 4 ~ 185kW Installation Space Requirements

Installation Space Requirements		
Power Rating	Dimensional	
4kW ~ 15kW	A ≥ 10	B1 ≥ 100

18kW ~ 30kW	A ≥ 10	B1 ≥ 150
37kW ~ 45kW	A ≥ 30	B1 ≥ 200
55kW ~ 185kW	A ≥ 100	B1 ≥ 300

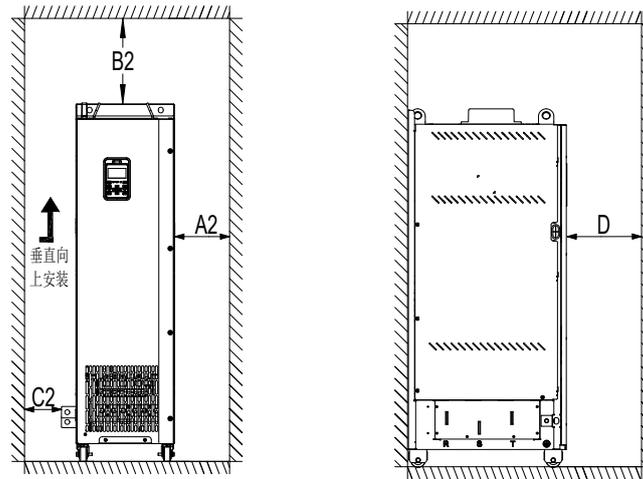


Figure 1-3 C9 ~ C11 Models Installation Diagram

Table 1-3 200 ~ 450kW Installation Space Requirements

Installation Space Requirements				
Power Rating	Dimensional Requirements (mm)			
200kW ~ 450kW	A2 ≥ 10	B2 ≥ 250	C2 ≥ 20	D ≥ 20

Installation Notes:

- 1) Please install the inverter vertically to facilitate heat dissipation upwards, but do not invert it. If there are multiple inverters in the cabinet, it is best to install them side by side, aligning the top of the machines when installed side by side. If vertical installation is necessary, refer to the illustration in Figure 1-2 for installing insulating deflector plates to prevent overheating of upper devices due to heat from lower devices;
- 2) Follow the installation space requirements as shown in Figures 1-1 and 1-3 to ensure the cooling space for the inverter. However, consider the heat dissipation of other components within the cabinet during layout;
- 3) The mounting bracket must be made of flame retardant material;
- 4) For applications involving metal dust, it is recommended to install the radiator outside the cabinet. At this time, the fully sealed internal space of the cabinet should be as large as possible.
- 5) When installing the inverter of this series, please install it in a vertically upward position. Do not install it in a horizontal, side-lying, or inverted position. If vertical placement is required, avoid applying force to the side of the machine or placing the machine on an inclined surface. The product is relatively large and heavy, and if the tilt exceeds 5°, it may tip over, which could result in the machine falling.

### 1.3. Installation Tools

#### 1.3.1. Mechanical Installation Tools

See the following table for mechanical installation tools.

Table 1-4 Mechanical Installation Tools Table

Tool Name	Description
Electric Drill and Drill Bits	Used for drilling mounting holes on the installation surface when mechanically installing the equipment.
Nut Wrench or Socket Wrench	Used for tightening or loosening screws during inverter installation.
Slotted and Phillips (2.5 to 6 mm) Screwdrivers	Used for tightening or loosening screws during inverter installation.
Torque Wrench	Used for tightening or loosening screws during inverter installation.
Pry Bar	Used to pry open the inverter cover or cover plate for easy installation or removal.
Hoist	Used to lift the inverter during installation.
Tape Measure	Used to measure the mounting dimensions and verify them during inverter installation.
Gloves	Gloves should be worn during inverter installation to prevent static electricity.
Bottom Mounting Bracket (Optional Accessory)	When installing the inverter inside the cabinet, the bottom mounting bracket is used to secure the inverter within the cabinet.
Mounting Rail (Optional Accessory)	When installing the inverter inside the cabinet, the mounting rail is connected to the bottom mounting bracket, and the inverter is smoothly pushed into the cabinet along the mounting rail.
Screw	Secure the inverter to the mounting surface.

The specifications and quantities of screws required for mechanical installation are shown in the table below.

CM680 Inverter Installation Manual  
Installation Preparation

Table 1-5 Screw Specifications and Quantities

Installation Method	Screw Specification	Quantity (PCS)	Description
Wall-Mounted Installation	Purchase according to the product mounting hole diameter	4	For fixing the device to the wall
Embedded Installation	Purchase according to the product mounting hole diameter	4	For fixing the device to the back of the control cabinet
Installation inside cabinet (C9~C11)	M6 self-tapping screw	6	For fixing the bottom mounting bracket to the bottom of the cabinet.
	M6 nut	2	For connecting the mounting rail to the bottom mounting bracket.

### 1.3.2. Wiring Tools

When wiring the main circuit terminals, consider the size of the terminals, select appropriate tools for wiring, and secure them tightly. See the table below for detailed wiring installation tool requirements.

Table 1-6 Main Circuit Terminal Wiring Installation Tool Requirements

Inverter Model	Recommended Fasteners	Tool
C2	M3.5 Combination Screw (Included with Terminal)	Slotted Screwdriver (No. 3 Blade)
C3	M4 Combination Screw (Included with Terminal)	Slotted Screwdriver (No. 3 Blade)
C4	M6 Combination Screw (Included with Terminal)	Slotted Screwdriver (No. 3 Blade)
C5	M6 Combination Screw (Included with Terminal)	Slotted Screwdriver (No. 3 Blade)
C6	M10 Bolt, Spring Washer, Spring Washer	Socket Wrench (13mm Socket)
C7	M10 Bolt, Spring Washer, Flat Washer	Socket Wrench (19# Socket), Extension Bar (250mm)
C8	M12 Bolt, Spring Washer, Flat Washer	Socket Wrench (19# Socket), Extension Bar (250mm)
C9	M12 Bolt, Spring Washer, Flat Washer	Socket Wrench (19# Socket), Extension Bar (250mm)
C10	M16 Bolt, Spring Washer, Flat Washer	Socket Wrench (19# Socket), Extension Bar (250mm)
C11	M16 Bolt, Spring Washer, Flat Washer	Socket Wrench (24# Socket), Extension Bar (250mm)

## 2. Overall Dimensions

### 2.1. Overall Dimensions of C2 ~ C3

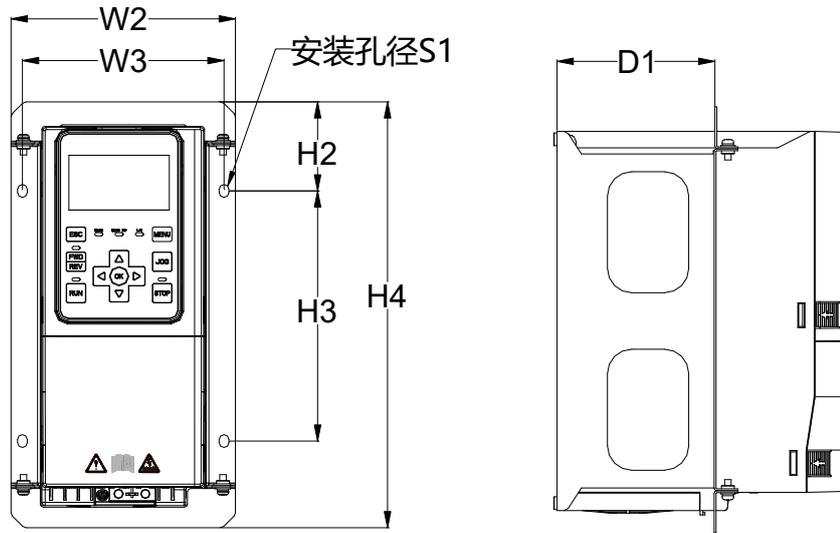


Figure 2-1 (C2~C3) 380V(4T) Plastic Enclosure and Mounting Dimensions Schematic Diagram for Below 15kW

### 2.2. Overall Dimensions of C4

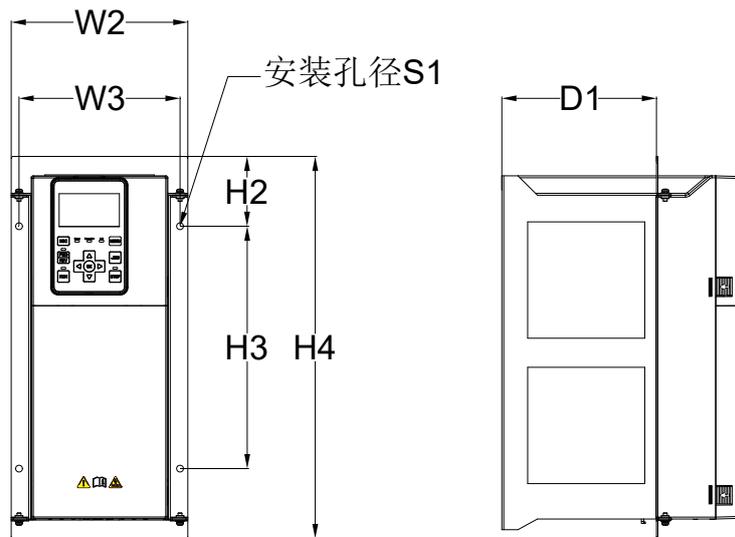


Figure 2-2 (C4) 380V(4T) Plastic Enclosure and Mounting Dimensions Schematic Diagram for 18.5~30kW

### 2.3. C5 Overall Dimensions

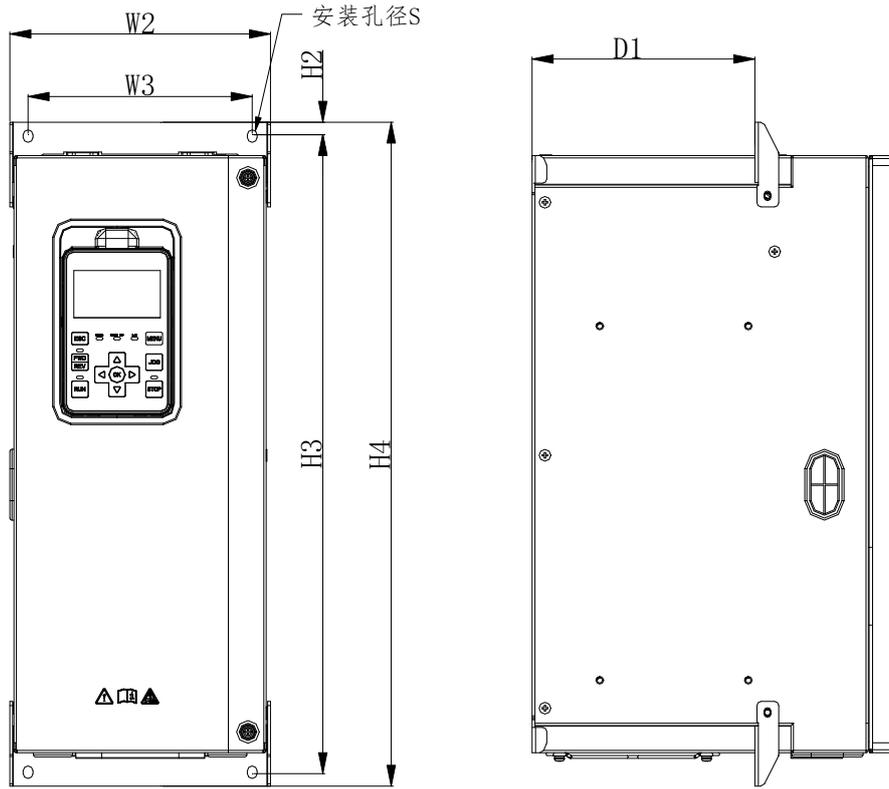


Figure 2-3 (C5) 380V(4T) 37~45kW Sheet Metal Enclosure Dimensions and Mounting Dimensions Schematic

Table 2-1 CM680-C2~C5 Overall Dimensions and Mounting Hole Dimensions (mm)

External Structure	W	W1	W2	H	H1	H2	D	B	Mounting Hole Diameter S	OH1 (Wiring Hole)	OH2 (Wiring Hole)	Net Weight
C2	100	84	86	235	224	225	178	5	5	35*10	10*10	2kg
C3	118	100	102	320	307	308	200	6	6	35*10	10*10	3.5kg
C4	140	122	115	365	354	354	245	5.5	6	36*12	30*12	6kg
C5	180	158	158	430	416	416	260	7.5	7	46*23	85*30	13kg

#### 2.4. Overall Dimensions of C6~C8

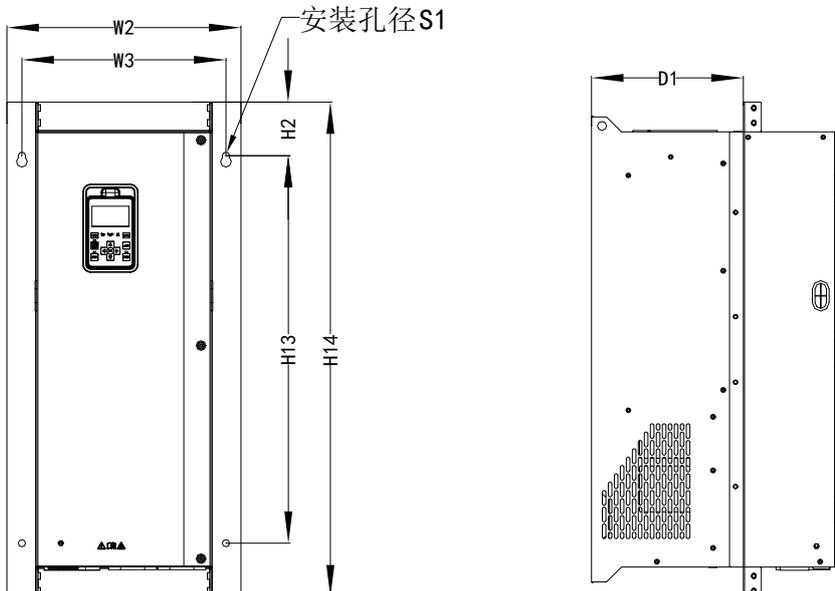


Figure 2-4 (C6~C8) 380V(4T) 55~185kW Inverter External Dimensions and Mounting Dimensions Schematic Diagram

Table 2-2 CM680-C6~C8 External Dimensions and Mounting Hole Dimensions (mm)

External Structure	W	W1	H	H1	H2	D	D1	Mounting Hole Diameter S1	S2	S3	OH1	OH2	OH3	Net Weight
C6	250	170	593	573	553	362	15	9	14	15	70*80	Φ30	46*23	47.5kg
C7	270	180	640	620	600	370	15	10	15	15	70*80	85*38	46*23	49.5kg
C8	290	190	780	764	730	425	17.5	9	14	15	70*80	85*38	46*23	80.5kg

## 2.5. C9~C11 Overall Dimensions

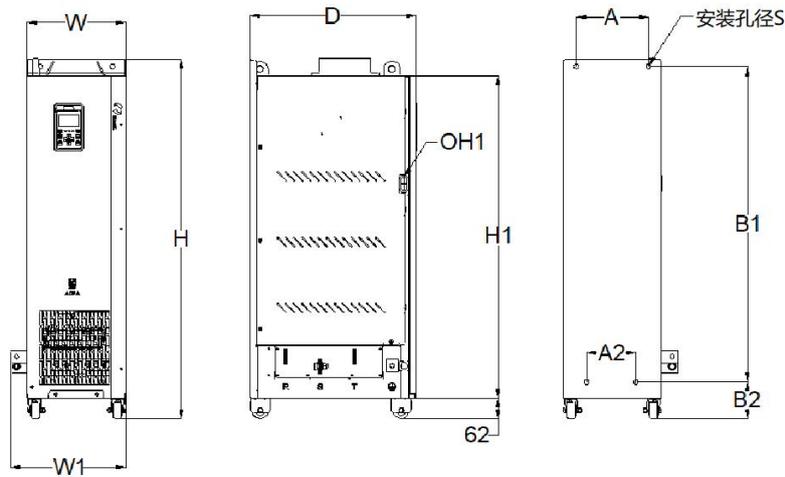


Fig. 2-5 (C9~C11) 380V(4T) 200~450kW Inverter External Dimensions and Mounting Dimensions Schematic Diagram

Table 2-3 CM680-C9~C11 External Dimensions and Mounting Hole Dimensions (mm)

External Structure	W	H	W1	D	H1	A1	B1	B2	A2	OH1	Mounting Holes	Net Weight
C9	300	1101	350	506	990	220	968	112	150	46*23	14*17	121.5kg
C10	340	1248	390	545	1135	246	1111	115	147	46*23	17*20	167.5kg
C11	340	1389	400	545	1286	246	1262	115	180	46*23	17*20	207.5kg

### 3. Unpacking and Handling

#### 3.1. Storage

1. When storing the product for a long period, try to keep the original packaging intact. If necessary, cover it or take other appropriate measures to protect the device from contamination and environmental effects.
2. Do not expose the inverter to harsh environments such as dust, sunlight, corrosion, flammable gases, grease, humidity, moisture, or vibration.
3. The storage temperature for this device should be maintained between  $-20^{\circ}\text{C}$  and  $+60^{\circ}\text{C}$ , and the ambient temperature should not change drastically.
4. For inverter products that have been stored for a long time, it is necessary to power them on at least once every 6 months. The power-on time should be at least 5 hours to prevent the degradation of electrolytic capacitors. At the same time, the input voltage must be gradually increased to the rated value using a voltage regulator or consult Riyechi Technical Support.

#### 3.2. Handling Before Unpacking

Transportation Precautions:

1. For C2 ~ C5 models, the product is small in size and light in weight, allowing for manual handling;
2. For C6 ~ C11 models, appropriate lifting tools such as forklifts or cranes must be used. When using a forklift to transport the product, if the product is packed in a cardboard box, it must be secured on a pallet and transported together. When using a crane for transportation, the product must also be secured on a pallet for lifting. Due to the weight of the product, operators of forklifts and cranes must undergo safety training. When selecting transportation equipment, ensure that the load-bearing capacity of the equipment exceeds the weight of the product.

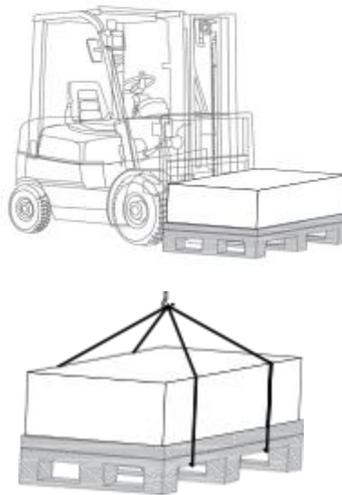


Figure 3-1 Schematic Diagram of Equipment Lifting

3. For C9 ~ C11 models, the equipment is heavy and has a high center of gravity; it must not be placed on a slope with an angle greater than 5 degrees. The location where the equipment is placed must be a flat, solid, and sufficiently strong surface to support the weight of the equipment.
4. The equipment can only be transported in the manner indicated on the packaging box; it must not be transported upside down or laid flat, as shown in the following figure.

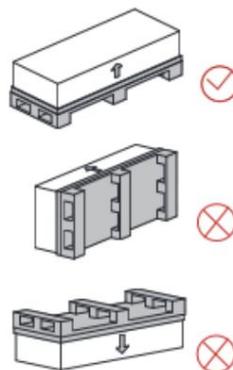


Figure 3-2 Equipment Placement Diagram

5. Since the device is very heavy, appropriate lifting tools must be used, and operators must be trained.
6. Cabinet equipment can be moved using forklifts and cranes; the load capacity of the handling equipment must exceed the weight of the cabinet equipment.
7. When transporting with a forklift, the cabinet equipment must be secured on a wooden pallet. If the cabinet still needs to be transported, do not remove the equipment from the pallet. Adjust the spacing between the forklift tines (the spacing should be more than half the length of the cabinet).
8. Due to weight and length reasons, when lifting and transporting the equipment, it is necessary to use the lifting beam (or lifting ring) fixed on the top of the cabinet and the wooden pallet under the cabinet to transport the equipment. The crane's lifting rope must pass through the pallet at the bottom of the cabinet equipment for lifting, and the lifting height must not exceed 0.3m.
9. Hydraulic trucks are prohibited from long-distance handling or traveling on sloping roads.
10. When moving, support is required on both sides.

### 3.3. Packaging Confirmation

Upon receiving the goods, please carefully check if the packaging type is uniform original factory packaging, if there is any damage to the packaging, and if the delivery note matches the actual items. If any shortage or damage is found, immediately notify the transportation company. If the product is damaged, do not connect the device. You must confirm whether the electrical safety performance has been compromised before proceeding with any operations. Please consult Riyechi Technical Support.

C2 ~ C11 models packaging list

1. For C2 ~ C5 models, cardboard box packaging is used.
2. For C6 ~ C11 models, wooden box packaging is used.

The specific packaging components are as follows:

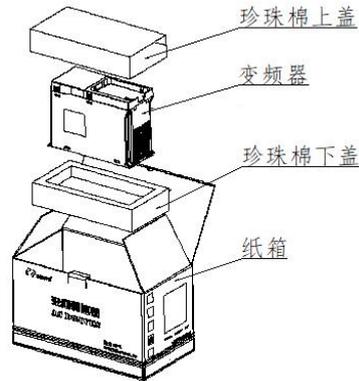


Figure 3-3 C2 ~ C5 models packaging list

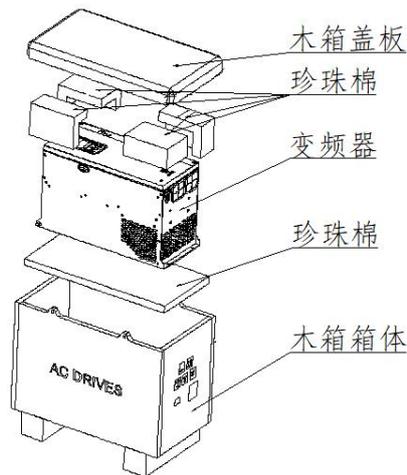


Figure 3-4 C6 ~ C8 models packaging list

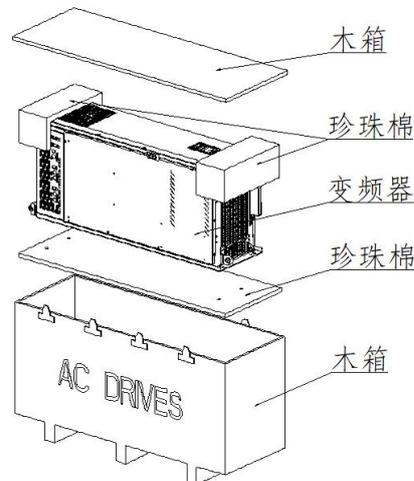


Figure 3-5 C9 ~ C11 models packaging list

### 3.4. Unpack the package

The relevant manuals and accessories are placed in different compartments within the box. The steps to remove the packaging are as follows:

1. Remove all cable ties and open the box lid.
2. Remove all packing materials.

3. Remove the device.
4. Cut the plastic film wrapping straps on the device.
5. Ensure there are no signs of damage.
6. Dispose of or recycle the packaging according to local regulations.

**Description**

The disposal of packaging materials must comply with local regulations.

**3.5. Handling and lifting after unpacking**

For C2 ~ C5 models, the device is small in size and light in weight, allowing for manual handling; for C6 ~ C11 models, an appropriate lifting device must be used.

Weight of the inverter	Personnel required for handling
<15kg	1 person
≥ 15kg	More than 2 people and use appropriate lifting equipment

**Precautions for handling and lifting:**

1. When handling this product, comply with local regulations.
2. To prevent injury, do not lift the inverter by its cover plate or outer casing; before lifting, ensure that all screws are securely tightened. Otherwise, loose screws may cause the inverter to fall, resulting in personal injury.
3. For C9 ~ C11 models, when securing the inverter, ensure that the four wall-mounting holes on the back of the inverter are firmly connected to the installation beam.
4. Since the device is lying flat, it needs to be upright first before lifting and handling.
5. When using a crane for handling, the load capacity of the handling equipment must exceed the weight of the device.
6. Before vertical lifting, ensure that the inverter's top cover plate, terminals, and other components are securely fastened with screws. Otherwise, product falling can cause personal injury accidents.
7. When lifting the inverter with a lifting rope, do not allow the inverter to experience excessive vibration or impact. Otherwise, product falling can cause personal injury accidents.
8. During the process of lifting the inverter with a lifting rope, do not allow the inverter to tip over, nor should it remain suspended for an extended period. Otherwise, product falling can cause personal injury accidents.

**C6~C8 models**

**Lifting steps for C6 ~ C8 models:**

1. Hook the lifting rope's hook onto the auxiliary lifting rings (2) at the top of the device. It is recommended that the lifting angle be above 45 degrees, and the lifting height should not exceed 0.3m.



Figure 3-6 Lifting Schematic Diagram

2. Slowly wind up the lifting rope using the crane, confirm that the lifting rope is taut, then lift the device.
3. Slowly lower the device, pause when it has descended to a certain height, then gently place it on the ground or installation surface, and install the device onto the control cabinet.

**C9~C11 models**

**Lifting procedures for C9 ~ C11 models:**

1. Use the lifting rings to hook onto the lifting fixtures at the top and bottom of the device, remove the device from the packaging box, and lay it flat on the ground. Do not apply force to the positive and negative busbar terminals.

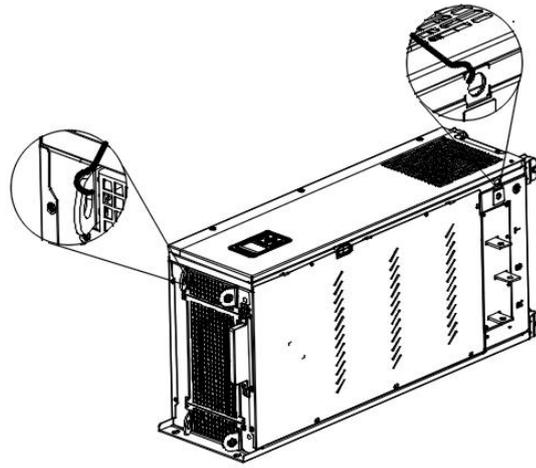


Figure 3-7 Lifting Schematic Diagram

2. Use the lifting rope to hook onto the lifting lugs at the top of the device (note to lift diagonally), slowly raise the device to an upright position, and then install it inside the cabinet.



When placing vertically, avoid applying force to the sides of the machine or placing the machine on an inclined surface. The product is large in size and heavy in weight (nearly 200kg). If the tilt exceeds 5°, it is very likely to tip over, which may cause the machine to fall.

## 4. Mechanical Installation (C2 ~ C8 models)

For C2 ~ C8 models, wall-mounted installation and embedded installation are supported.

### 4.1.1. Wall-Mounted Installation

Before installing the inverter in the control cabinet, cabinet design must be carried out to ensure that the device has sufficient installation space and cooling space, including:

1. Cabinet space requirements
2. Back panel design
3. Cabinet cooling design

### 4.1.2. Precautions Before Installation

1. Before performing the installation, ensure that the installation location has sufficient mechanical strength to support the weight of the equipment.
2. During installation, cover the top of the equipment with cloth or paper to prevent metal shavings, oil, water, etc., from entering the interior of the equipment when drilling. If foreign objects enter the equipment, it may cause equipment failure. After the work is completed, remove these cloths or papers. If it continues to be placed on top, the ventilation will become poor, leading to abnormal heating of the device.
3. The installation space must ensure that the device has sufficient cooling space, and consider the heat dissipation of other components inside the cabinet. For details, please refer to the 'Single Unit Installation' section in '1.2.2 Installation Space'.
4. Please install the device vertically upwards to facilitate the upward dissipation of heat. If there are multiple devices in the cabinet, please install them side by side. In cases where installation is required above and below, please install an insulating deflector plate. For details, please refer to the 'Vertical Row Installation' section in '1.2.2 Installation Space'.
5. When using a mounting bracket, the material must be flame retardant.
6. For applications involving metal dust, it is recommended to use an installation cabinet that completely encloses the device to isolate it from the metal dust. The fully sealed cabinet space should be as large as possible; in this case, it is recommended to install the radiator outside the cabinet.
7. Tighten all screws to the specified torque. Otherwise, there may be a risk of fire or electric shock.
8. Do not place flammable or explosive items near the device.

### 4.1.3. Cabinet Space Requirements

For C2 ~ C8 models, the recommended installation method is multi-layer installation. The minimum spacing required between two layers is shown in the table below, and it is required to install an insulating deflector plate on the lower layer inverter.

Table 4-1 Minimum Guaranteed Spacing for Multi-Layer Installation

Item	C2~C3	C4	C5	C6~C8
S1	≥ 100mm	≥ 150mm	≥ 200mm	≥ 300mm
S2	≥ 100mm	≥ 150mm	≥ 200mm	≥ 300mm
.....	≥ 100mm	≥ 150mm	≥ 200mm	≥ 300mm
Sn	≥ 100mm	≥ 150mm	≥ 200mm	≥ 300mm

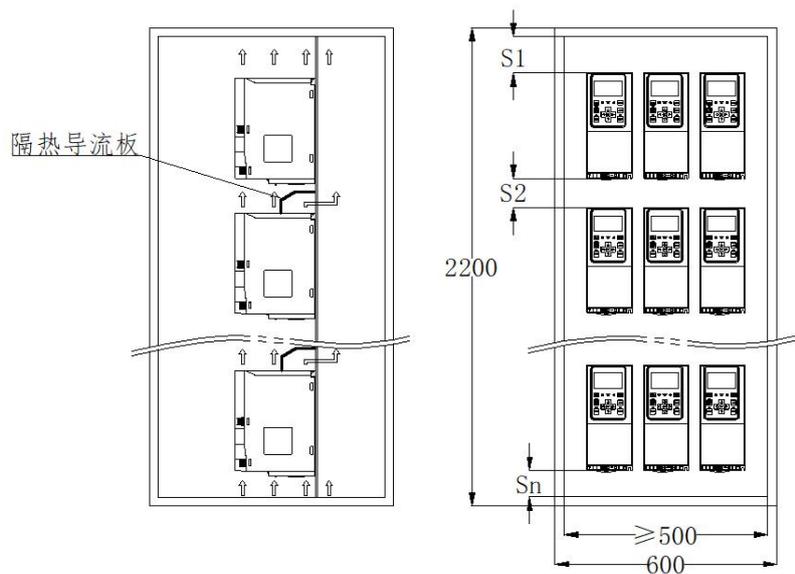


Figure 4-1 Minimum Guaranteed Space for Multi-Layer Installation

#### Description

When installing the fan, pay attention to the air intake direction to ensure that air is drawn from inside the cabinet and expelled outward, avoiding the situation where hot air cannot be discharged, which could cause the inverter to overheat or be damaged. The distance between the blower top cover and the fan outlet should be at least 200mm; otherwise, it may affect the cooling performance of the fan.

4.1.4. Back Panel Installation Requirements

1. Thickness and Stiffness Requirements for Back Panel Installation

To avoid damage to the inverter during transportation and ensure its normal operation, the back panel must have sufficient stiffness and strength, with a thickness of no less than 2mm. When necessary, reinforcement of the back panel is required, and it is recommended to weld transverse stiffeners on the back of the back panel, as shown in the following figure.

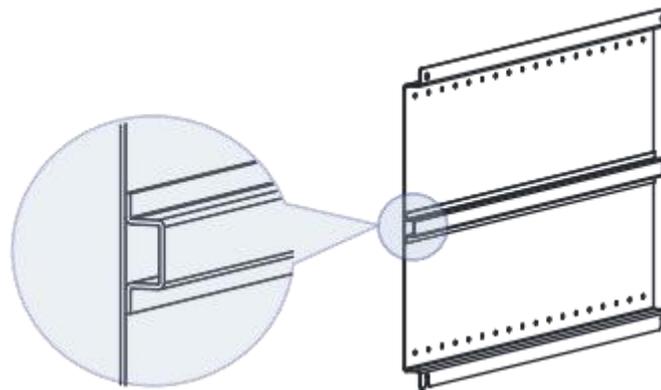


Figure 4-2 Schematic Diagram of Welding Transverse Stiffeners on the Back of the Back Panel

2. Installation Hole Manufacturing Requirements

a. During back panel processing, installation holes can be pre-manufactured. Please refer to the 'Overall Dimensions' section for the installation hole dimensions.

b. To avoid damage to the inverter during transportation, the installation screws cannot be fixed only on the back panel; it is necessary to press rivet nuts or add independent nuts on the back of the back panel, ensuring as much thread engagement and strength as possible.

4.1.5. Cabinet Heat Dissipation Design

1. Cabinet Door Panel Heat Dissipation Design

The inverter is cooled by a built-in fan. To ensure sufficient cooling air enters the cabinet, a sufficiently large air intake should be provided on the cabinet door panel.

When designing the cabinet air intake, consider that warm air rises, so the air intake position should be at least 50mm below the inverter's air intake, as shown in the figure below.

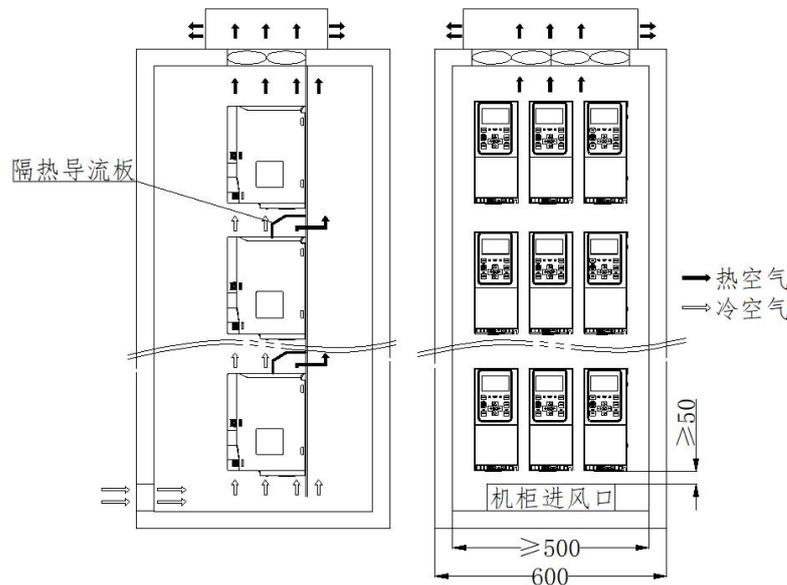


Figure 4-3 Schematic Diagram of Cabinet Air Intake Opening Position



In situations where multiple devices are installed in a single cabinet, using fans to blow air into the cabinet's air intake from outside can cause disorder in the airflow distribution inside the cabinet, thereby affecting the overall cooling effect. Therefore, fans should not be installed at the cabinet's air intake to blow air into the cabinet.

After the inverter enters the cabinet, refer to the table "Minimum Effective Area of Cabinet Air Intake" for the minimum effective area of the air intake.

Table 4-2 Minimum Effective Area of Cabinet Air Intake

Inverter	Minimum Effective Area of Cabinet Air Intake (Unit: cm <sup>2</sup> )
C2	38
C3	38

Installation (C2 ~ C8 models)

C4	50
C5	70
C6	224
C7	264
C8	288

"Minimum Effective Area of Cabinet Air Intake" applies only to a single inverter. When there are multiple inverters in the cabinet, the above intake area should be accumulated as the total intake area. For example, if there are 8 C2 units and 2 C4 units in the cabinet, the minimum effective area of the cabinet air intake should be  $8 \times 38 + 2 \times 50 = 404 \text{ cm}^2$ .

If a filter mesh is installed at the air intake, the intake resistance will significantly increase, and the intake area needs to be increased to 1.2 to 1.5 times the value stated in the table.

The "Minimum Effective Area of Cabinet Air Intake" refers to the effective ventilation area, which is the actual perforated area of the perforated region; effective area = perforated region area  $\times$  perforation rate.

2. Top Exhaust Design

To ensure the inverter is adequately cooled, the hot air inside the cabinet should be able to smoothly exhaust to the outside. When designing the cabinet, passive ventilation or active ventilation can be used.

a. Passive Ventilation (Direct Exhaust)

Passive ventilation utilizes the characteristic of hot air rising to guide the exhaust from the inverter out through the top exhaust port of the cabinet.

Passive ventilation can easily cause hot air to accumulate at the top of the cabinet, raising the temperature in that area. At the air intake of the cabinet, the suction effect of the inverter's fan creates a lower air pressure. Therefore, inside the cabinet, there is a pressure difference between the exhaust port and the air intake, forming an airflow. This airflow will force the hot air at the exhaust port to flow towards the air intake, thus being sucked back into the inverter again, causing a significant increase in the temperature of the inverter, which is detrimental to its performance.

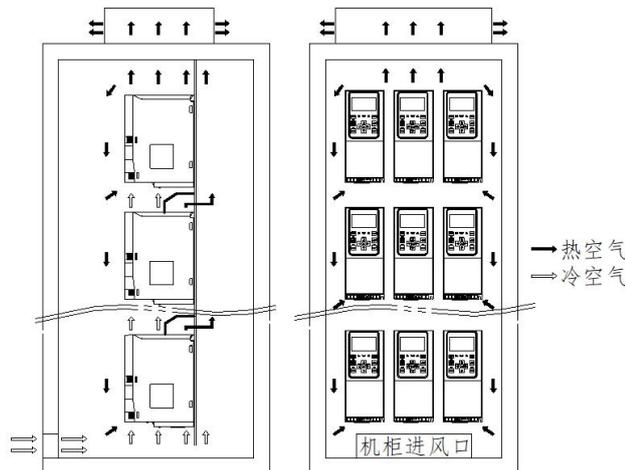


Figure 4-4 Schematic Diagram of Hot Air Recirculation in a Cabinet with Passive Ventilation (Without Isolation Device)

Therefore, for cabinets with passive ventilation, an isolation device must be used to prevent hot air recirculation, as shown in the figure below. The isolation device can be made of sheet material or exhaust ducts.

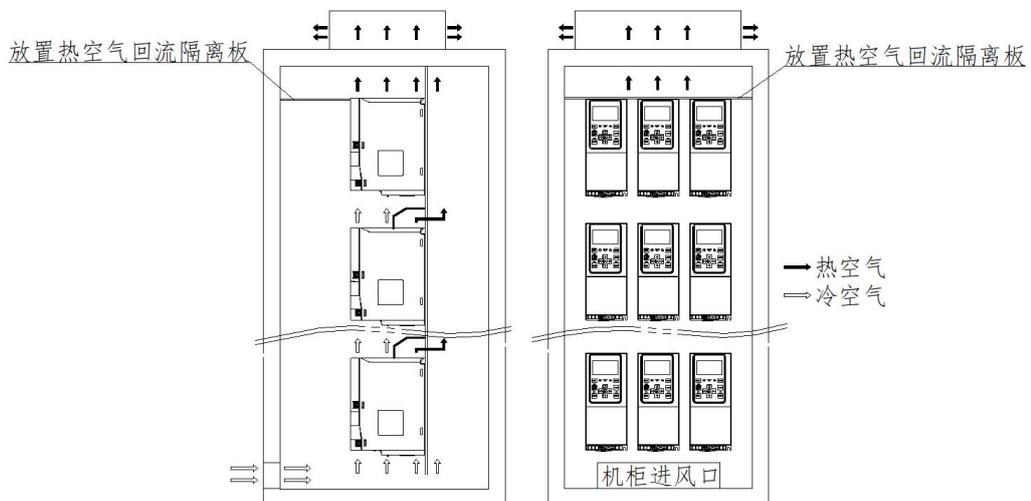


Figure 4-5 Schematic Diagram of Hot Air Recirculation in a Cabinet with Passive Ventilation (with Isolation Device)

The temperature at the inverter's exhaust port is higher, and its density is lower compared to the air intake. To ensure that the hot air inside the cabinet can be smoothly discharged to the outside, when using passive ventilation, the minimum effective area of the cabinet exhaust port should refer to the table "Minimum Effective Area of Exhaust Port for Cabinet Passive Ventilation" below.

Table 4-3 Minimum Effective Area of Exhaust Port for Cabinet Passive Ventilation

Inverter	Minimum Effective Area of Exhaust Port for Cabinet Passive Ventilation (Unit: cm <sup>2</sup> )
C2	60
C3	60
C4	80
C5	113
C6	358
C7	423
C8	460

The 'Minimum Effective Ventilation Area of the Cabinet Outlet for Passive Ventilation' applies only to a single inverter; when there are multiple inverters in the cabinet, the above area must be accumulated as the total outlet area.

If a filter mesh is installed at the outlet, the exhaust resistance will significantly increase, and the exhaust area should be increased to 1.2 to 1.5 times the value specified in the table.

The effective ventilation area in the 'Minimum Effective Ventilation Area of the Cabinet Outlet for Passive Ventilation' refers to the actual perforated area of the perforated region, where effective area = perforated region area × perforation rate.

### b. Active Ventilation

Active ventilation involves installing fans at the top of the cabinet to draw hot air out of the cabinet. Active ventilation is a commonly used method of exhaust.

To ensure that the hot air inside the cabinet can be smoothly discharged, the total airflow of the system fans must not be less than the sum of the airflow of all inverters in the cabinet. Refer to the table below for the cooling air volume required by the CM680.

Table 4-4 Inverter Cooling Air Volume

Inverter Power	Inverter Cooling Airflow CFM
4.0~7.5kW	79.5
11~15kW	105.5
18~30kW	230.5
37~45kW	230.5
55~93kW	465.5
110~132kw	506
160~185kw	579
Note: 1 CFM=0.02832 m <sup>3</sup> /min	

### 3. Cabinet Fan Design

Steps for Selecting Cabinet Fans:

1. Calculate the total cooling air volume required for all inverters based on the 'inverter cooling air volume'.
2. Determine the maximum air volume value (Q<sub>max</sub>) of the cabinet fans.
3. Determine the specifications and quantity of the fans based on the maximum air volume value (Q<sub>max</sub>).

Where:

Maximum cabinet air volume = (1.3 to 1.5 times) total cooling air volume

Maximum cabinet air volume = (1.6 to 2.2 times) total cooling air volume (when the cabinet outlet is equipped with screens, louvers, etc.)

#### Description

The selected fan airflow should not be less than the maximum airflow Q<sub>max</sub>; when a single fan cannot meet the requirement, multiple fans can be used in parallel.

Common fan airflow specifications are shown in the figure below.

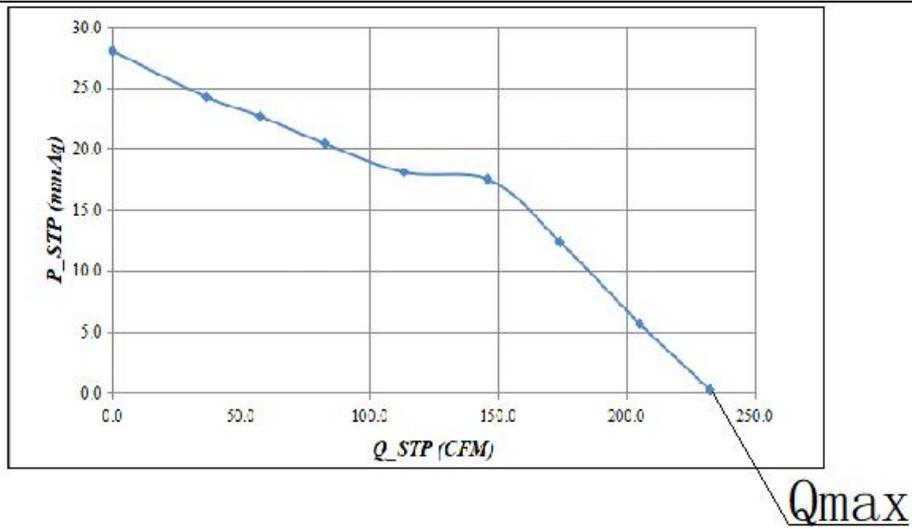


Figure 4-6 Schematic Diagram of Qmax for a System Fan

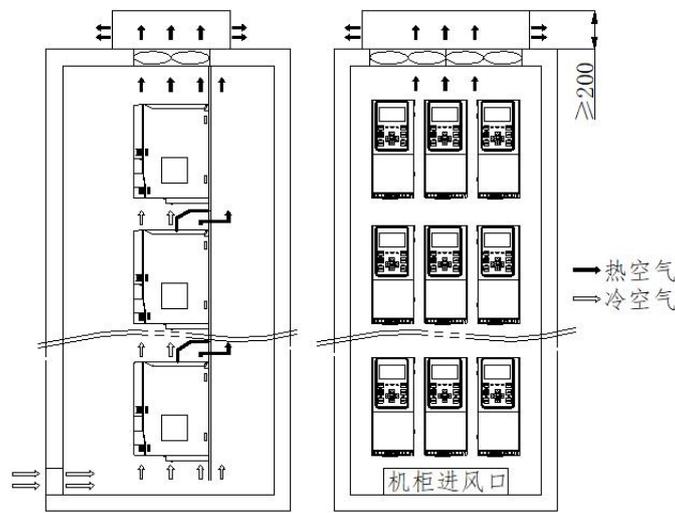


Figure 4-7 Cabinet Exhaust System



When installing the fan, pay attention to the air intake direction to ensure that air is drawn from inside the cabinet to the outside, avoiding the inability to expel hot air, which could cause the device to overheat or be damaged.

The distance between the blower top cover and the fan outlet should be at least 200mm, as shown in the figure below; otherwise, it will significantly affect the fan's cooling performance.

**4.1.6. Wall-Mounted Installation Operation**

Refer to Chapter 2 for the location and diameter of the wall-mounted installation holes in the overall dimensions.

When performing wall-mounted installation, it is prohibited to only fix the two topmost fixing nuts of the device; otherwise, prolonged operation may result in the fixed part falling off due to uneven force distribution.

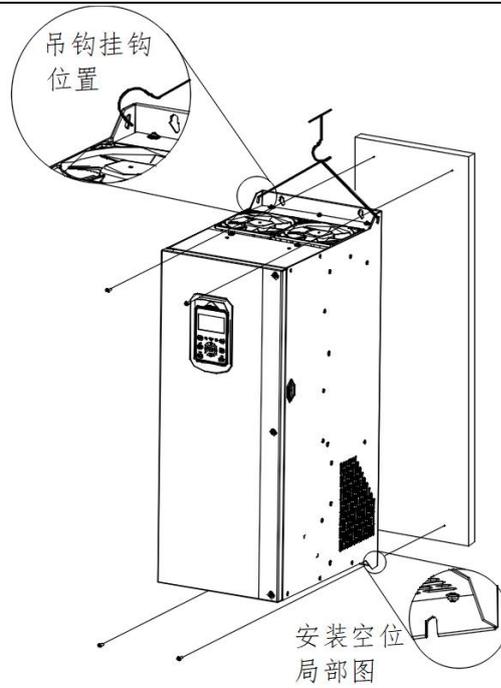


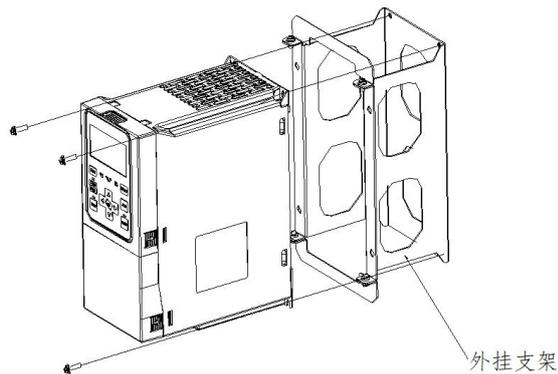
Figure 4-8 Schematic Diagram of Wall-Mounted Installation for C2~C8 Models

## 4.2. Embedded Installation

### 4.2.1. Installation Operation

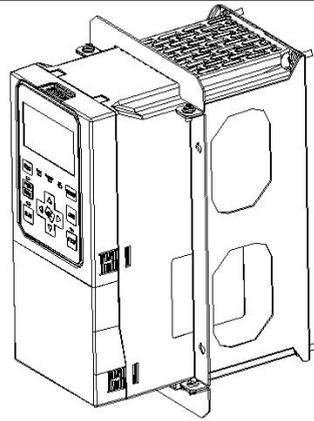
#### 1. For C2~C4 Models

- a. Slide the bracket onto the body of the machine and tighten the bracket fixing screws at the rear of the body.

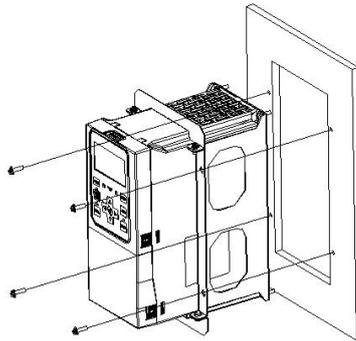


The completed bracket installation is shown in the figure below.

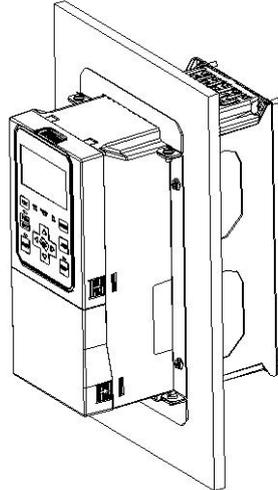
## Installation (C2 ~ C8 models)



b. Secure the entire unit with the installed bracket to the mounting panel of the control cabinet.

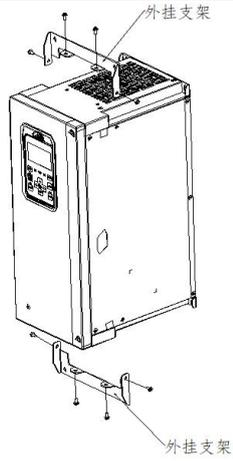


After completing the embedded installation, it should look as shown in the figure below.

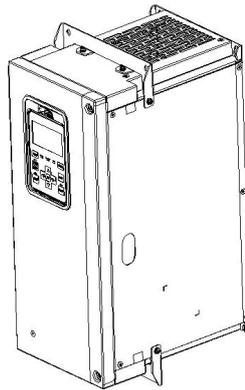


## 2. For C5 models

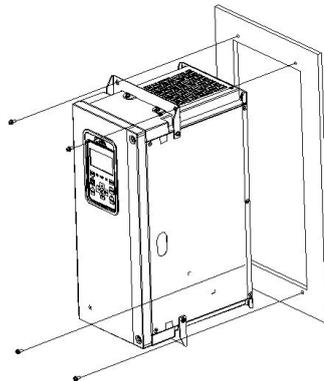
a. Secure the external mounting brackets to the top and bottom of the unit separately.



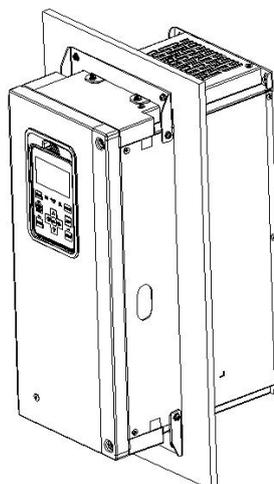
The completed bracket installation is shown in the figure below.



b. Secure the entire unit with the installed bracket to the mounting panel of the control cabinet.



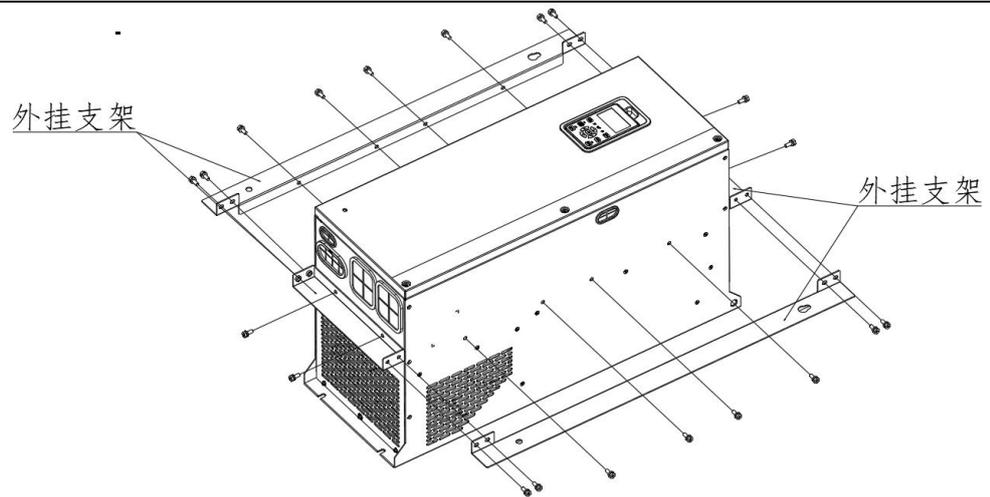
After completing the embedded installation, it should look as shown in the figure below.



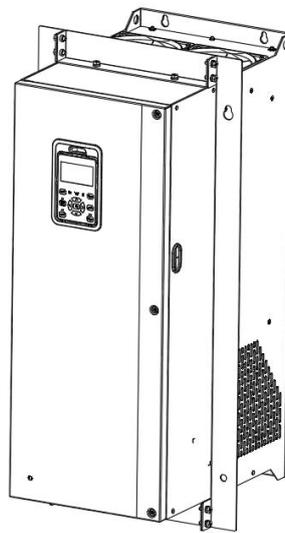
**3. For C6 to C8 models**

a. Secure the external mounting brackets to all four sides of the unit separately.

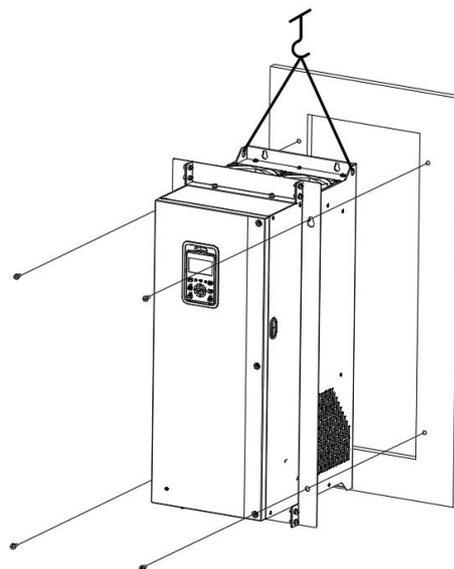
Installation (C2 ~ C8 models)



The completed bracket installation is shown in the figure below.



b. Install from the front of the control cabinet, securing the entire unit to the back panel of the control cabinet.



The completed embedded installation is shown in the figure below.



4.2.2. Mounting Dimensions

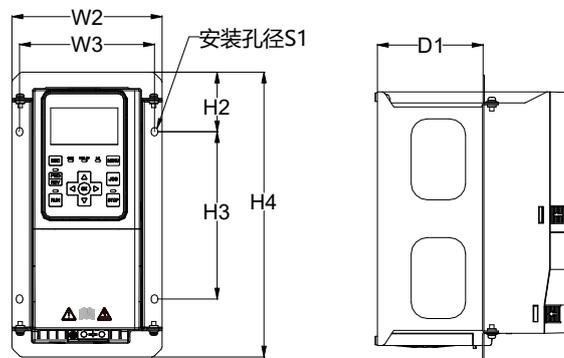


Figure 4-9 (C2 to C3) CM680-4T Inverter Dimensions for Units Below 15kW

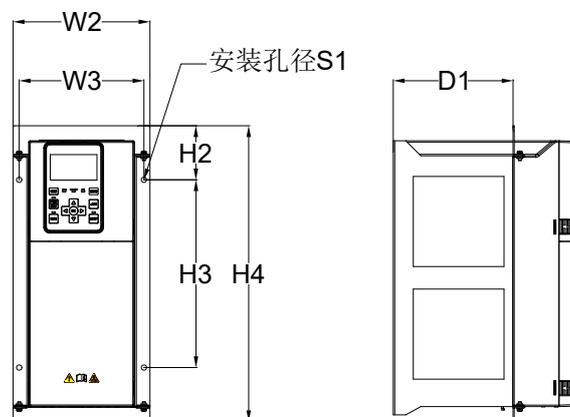


Figure 4-10 (C4) CM680-4T Inverter Dimensions for Units 18.5 to 30kW

Installation (C2 ~ C8 models)

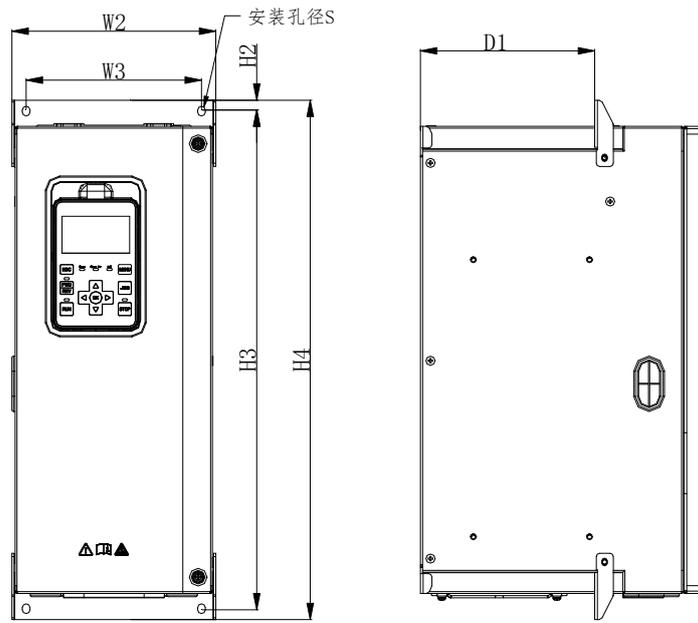


Figure 4-11 (C5) CM680-4T Inverter 37~45kW Dimension Diagram

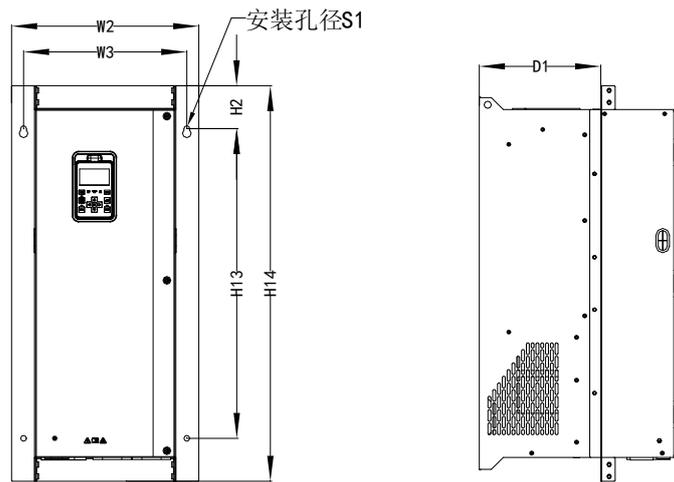


Figure 4-12 (C6~C8) CM680-4T Inverter 55~185kW Dimension Diagram

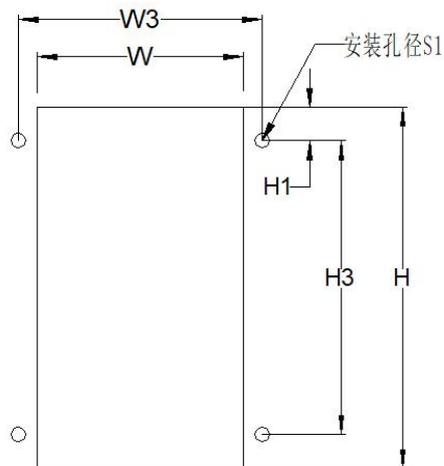


Figure 4-13 Wall-Mount Installation Diagram

Table 4-5 CM680 Inverter Wall-Mount Opening Dimensions and Mounting Hole Positions Below 185kW (mm)

Inverter Model	Mounting Hole Positions			Wall-Mount Opening Dimensions		Mounting Hole Diameter S1(mm)
	W3(mm)	H1(mm)	H3(mm)	H(mm)	W(mm)	
CM680-4T4R0 GB	124	41.5	155	241	108	φ5
CM680-4T5R5 GB						
CM680-4T7R5 GB						
CM680-4T011G B	142	43.5	240	327	126	φ6
CM680-4T015G B						
CM680-4T018G B	165	53.5	250	368	148	φ7
CM680-4T022G B						
CM680-4T030G B						
CM680-4T037G (B)	160	11	458	440	185	φ7
CM680-4T045G (B)						
CM680-4T055G (B)	287	22	553	597	254	φ10
CM680-4T075G (B)						
CM680-4T093G (B)						
CM680-4T110G (B)	300	72	500	644	274	φ10
CM680-4T132G (B)						
CM680-4T160G	330	67	650	784	294	φ10
CM680-4T185G						

### 4.3. Removing and Installing the Cover Plate

When performing control circuit wiring, if it involves jumper operations, PG card connection, or function expansion card connection, the cover plate needs to be removed first. When removing the cover plate, hold it with both hands and carefully lift the lower part of the cover plate to prevent it from falling off; otherwise, it may cause damage to the equipment or injury to personnel. After completing the wiring work, the cover plate must be reinstalled.

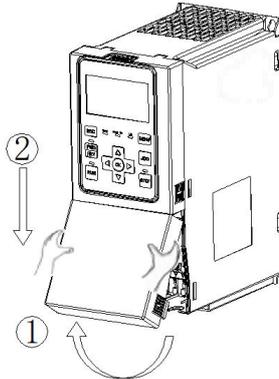
Note: Before removing the cover plate, ensure that the machine has been powered off for more than 10 minutes.

#### 4.3.1. Cover Plate Removal

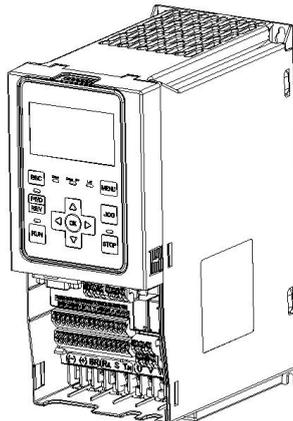
1. For C2~C4 models, cover plate removal
  - a. Use a tool to push the lower panel hooks inward (operate both sides simultaneously).



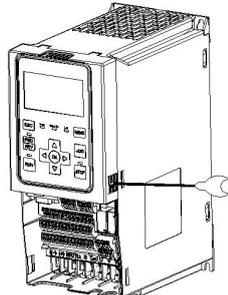
b. Hold the lower panel with both hands, lift the lower part of the lower panel (as shown in ①), and pull it down to remove the lower panel (as shown in ②).



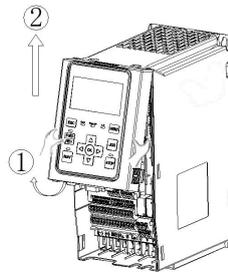
The appearance after removing the lower panel is as shown below.



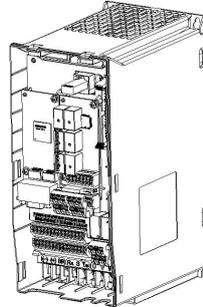
c. Use a tool to push the upper panel hooks inward (operate both sides simultaneously).



d. Hold the upper panel with both hands, lift the lower part of the upper panel (as shown in ①), and pull it up to remove the upper panel (as shown in ②).

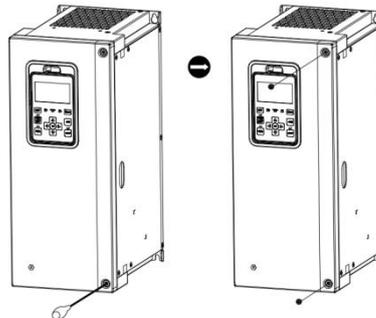


The appearance after completing the cover plate removal is as shown below.

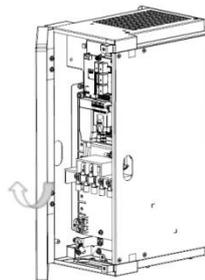


2. Cover Plate Removal for C5~C8 Models

a. Use a screwdriver to remove the fixing screws on the cover plate (C5~C7 models have two fixing screws, C8 has three fixing screws).



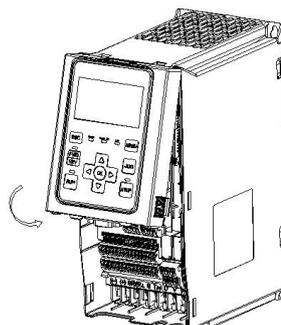
b. Open the cover plate from the right side.



4.3.2. Cover Plate Installation

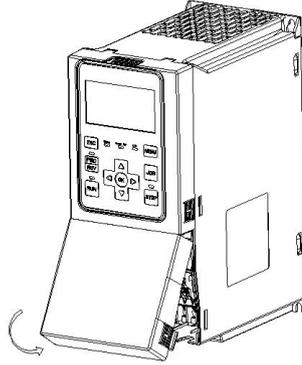
1. Cover Plate Installation for C2~C4 Models

a. Hold the top panel with both hands, and snap the clips on the upper edge of the top panel into the slots on the top of the enclosure. Align the top panel, then press down along the arrow direction to snap the lower edge of the top panel into the slots on the enclosure.



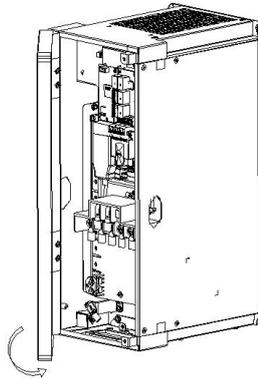
## Installation (C2 ~ C8 models)

b. Hold the bottom panel with both hands, and snap the clips on the upper edge of the bottom panel into the corresponding slots on the top panel. After aligning the lower panel, press down along the arrow direction to snap the clips into the cabinet slots.

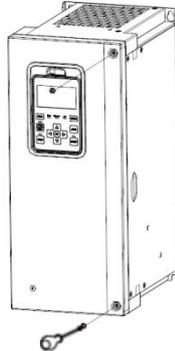


## 2. Cover plate installation for C5~C8 models

a. Push the cover plate closed on the right side and ensure it is tightly attached.



b. Install the fixing screws (two fixing screws for C5~C7, three fixing screws for C8), and tighten them with a screwdriver.



## 5. Mechanical Installation (C9 ~ C11 models)

For C9~C11 models, cabinet installation is supported.

### 5.1. Precautions Before Installation

1. Before installation, you must first install the bottom mounting bracket and mounting rail inside the cabinet, and design an installation beam for securing the device. The installation beam must have reserved holes for fixing. Please reserve space inside the cabinet for the copper busbar connection operations on the side of the device.
2. By using the mounting rail and the four casters at the bottom of the device, the operations of moving the device into and out of the cabinet can be achieved. Make sure to align the device's casters with the rail before pushing in or pulling out. For safety, please arrange for two people to work together to complete the operation of moving the device in and out of the cabinet.
3. The installation space must ensure that the device has sufficient radiator space. When reserving space, consider the heat dissipation conditions of other components inside the cabinet.
4. When it is necessary to push the device into or pull it out of the cabinet, it must be done with the cooperation of two people. After the device is pushed into the cabinet, make sure to remove the cardboard from the device's air outlet to prevent overheating faults due to blocked airflow.
5. When installing inside the cabinet, a wind deflector must be installed at the top of the cabinet to prevent the cooling airflow of the CM680 from circulating within the cabinet. Ventilation holes must also be opened in the lower part of the cabinet door.
6. The cabinet frame should be 2200×800×600 or 2200×800×800 (unit: mm, including a 200mm high cabinet ventilation top cover). To ensure the installation of the cabinet, a 100mm high cabinet base must be added.
7. When installing the device in an enclosed cabinet or enclosure, use cooling fans or air conditioning units to provide adequate cooling to keep the intake temperature below 50°C. Otherwise, it may lead to overheating or fire.
8. When performing installation work, please cover the top of the device with cloth, paper, or similar materials to prevent metal shavings, oil, water, etc., from entering the interior of the device. If foreign objects enter the device, it may cause equipment failure. After completing the work, please remove these cloths or papers. If it continues to be placed on top, the ventilation will become poor, leading to abnormal heating of the device.
9. When using a mounting bracket, the material of the mounting bracket must be flame retardant.
10. For applications involving metal dust, it is recommended to use an installation cabinet that can completely enclose the device, isolating the device from metal dust. At this time, the fully sealed cabinet space should be as large as possible; in such cases, it is recommended to install the radiator outside the cabinet.
11. Tighten all screws to the specified torque. Failure to do so may result in fire or electric shock hazards.
12. Do not place flammable or explosive items near the device.

### 5.2. Heat Dissipation Design

The installation layout inside the cabinet for C9~C11 models must consider cooling space, and an exhaust fan should be installed at the top of the cabinet to ensure adequate heat dissipation within the cabinet.

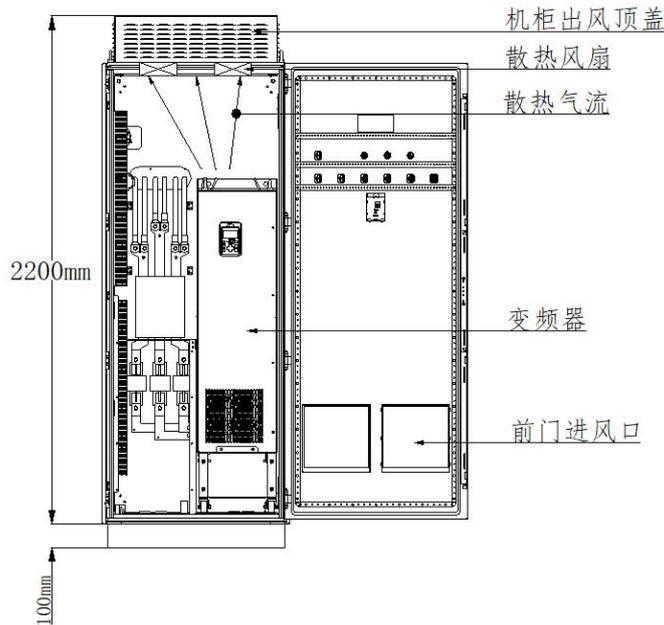


Figure 5-1 Schematic Diagram of Top Fan Exhaust Cabinet (Cabinet Top with Exhaust Fan)

Table 5-1 Heat Dissipation Parameters for Top Fan Exhaust Cabinet

Model	Actual Effective Area of Cabinet Air Intake (cm <sup>2</sup> )	Recommended Cabinet Fan Airflow (CFM)	Recommended Fan Static Pressure (mm-H <sub>2</sub> O)	Number of Fans
C9	384	397.5	52.5	3
C10	384.5	530	105.6	2
C11	522.8	530	105.6	3

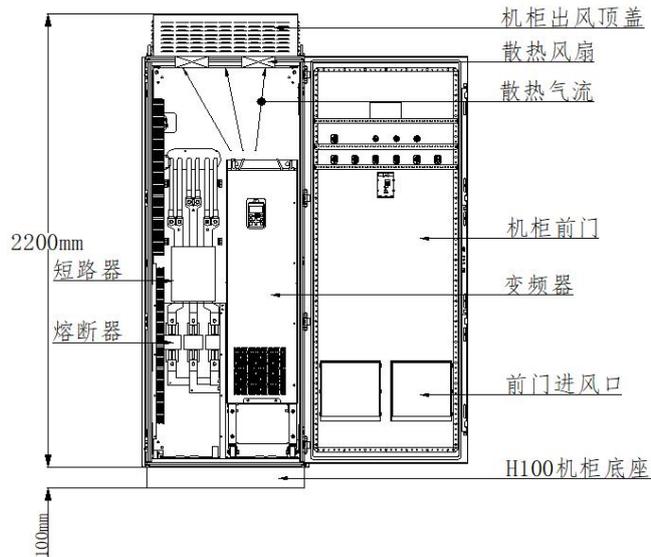


Figure 5-2 Recommended Cabinet Layout

### 5.3. Installation Inside Cabinet

#### Operating Procedures

##### 1. Install Bottom Bracket.

Use 6 M6 self-tapping screws to secure the mounting bracket to the base of the nine-fold profile cabinet frame as shown in the figure below. The bottom mounting bracket is an optional accessory; please purchase it separately if needed, refer to Chapter 7 for specific model numbers in the accessories list.

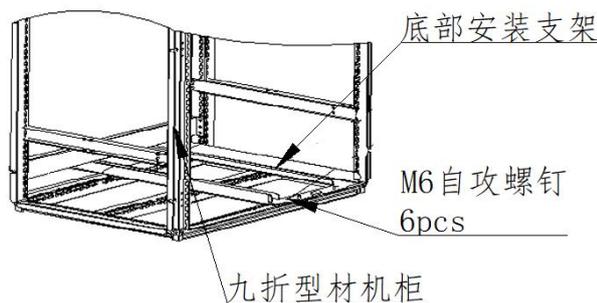


Figure 5-3 Schematic Diagram of Bottom Mounting Bracket Installation

If the cabinet used by the customer is not a nine-fold profile cabinet, the fixing holes for the mounting bracket need to be drilled and assembled on-site.

2. Align the two round holes at the front end of the mounting rail with the press-fit screws on the mounting bracket, and align the rail's slot with the bent part of the mounting bracket. Finally, secure them together with two M6 nuts as shown in the figure below. The mounting rail is an optional accessory; please purchase it separately according to your needs, and refer to Chapter 7 for specific models in the list of optional accessories.

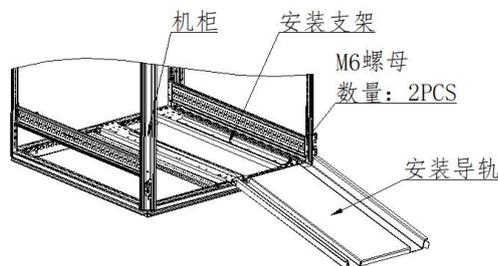


Figure 5-4 Schematic Diagram of Mounting Rail Installation Inside Cabinet

3. If an output reactor is to be installed as an option, please install the output reactor and the output reactor base in advance; If an output reactor is not to be installed, please install the output reactor base in advance to ensure sufficient space at the bottom of the inverter. For specific installation procedures, refer to Section '5.5 Output Reactor Base'.

##### 4. Remove the inverter cover plate.

For detailed instructions on removing the cover plate, see 'Removing the Cover Plate.' After removing the cover plate, the installation auxiliary handles on the inverter will be exposed.

##### 5. Align the inverter's feet with the mounting rail and gently push it into the cabinet.

During installation, use an installation assist rope to prevent the inverter from tipping over when pushing in/pulling out, and it is recommended to operate with two people.

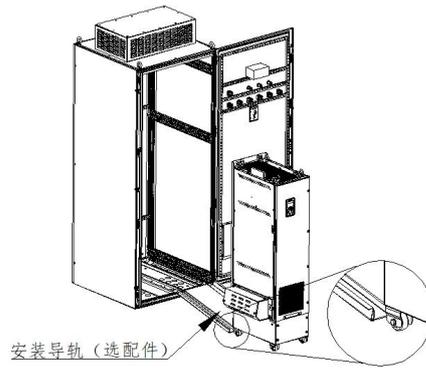


Figure 5-5 Schematic Diagram of Wheel Alignment with Mounting Rail

6. Remove the installation assist rope, and secure the four mounting holes on the back of the inverter with screws to fix it to the installation beam inside the cabinet.

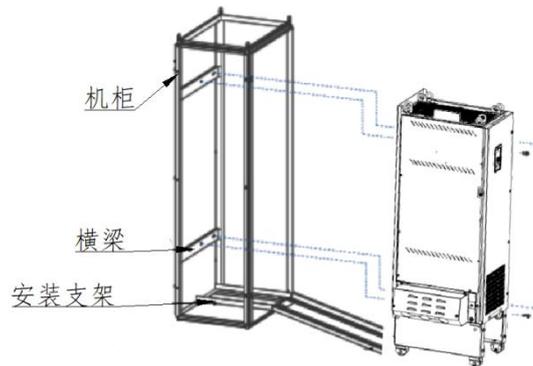


Figure 5-6 Schematic Diagram of Fixing to Installation Beam

7. After confirming that the installation is secure, remove the mounting rail.

8. When installing the inverter inside the cabinet, cover the top of the device with cloth or paper to prevent metal shavings, oil, water, etc., from entering the device during drilling. If foreign objects enter the device, they may cause equipment failure. After completing the work, remove these cloths or papers. If it continues to be placed on top, the ventilation will become poor, leading to abnormal heating of the device.

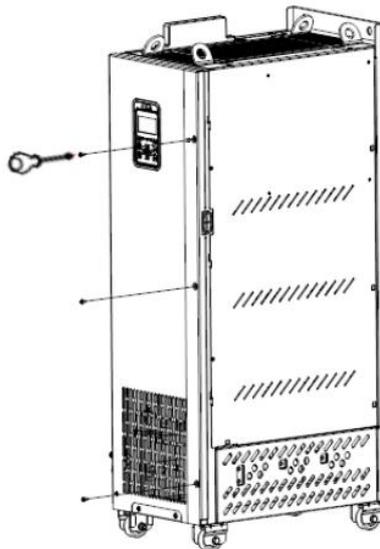
### 5.4. Removing and Installing the Cover Plate

When performing control circuit wiring, if it involves jumper operations, PG card connection, or function expansion card connection, the cover plate needs to be removed first. When removing the cover plate, hold it with both hands and carefully lift the lower part of the cover plate to prevent it from falling off; otherwise, it may cause damage to the equipment or injury to personnel. After completing the wiring work, the cover plate must be reinstalled.

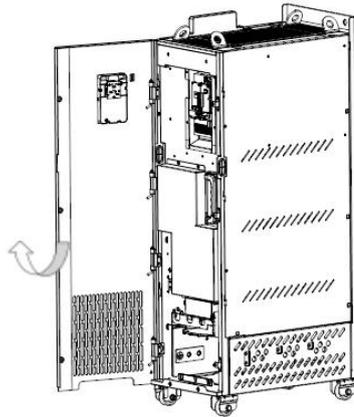
Note: Before removing the cover plate, ensure that the machine has been powered off for more than 10 minutes.

#### 5.4.1. Remove the Cover Plate

1. Use a screwdriver to remove the fixing screws on the cover plate (C9 has three fixing screws, C10~C11 have four fixing screws).



2. Open the cover plate from the right side.

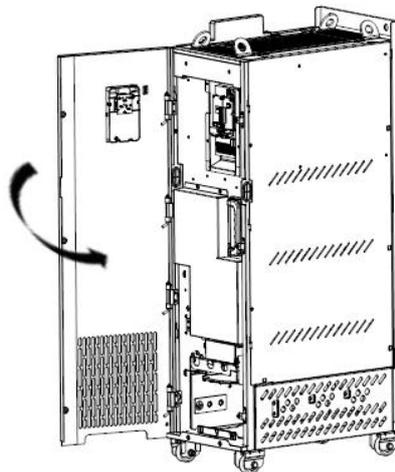


#### 5.4.2. Install the Cover Plate

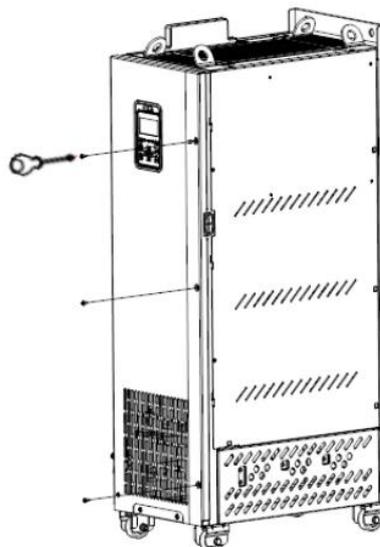
Before installation, the cover plate must be removed first, then proceed with the main circuit and control circuit wiring. After completing the wiring work, the cover plate needs to be reinstalled.

##### Operating Procedures

1. Push the cover plate closed on the right side and ensure it is tightly attached.



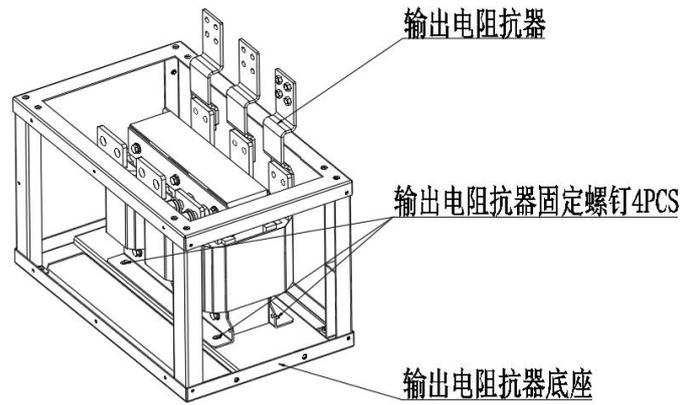
2. Install the fixing screws (C9 has three fixing screws, C10~C11 have four fixing screws), and tighten them with a screwdriver to complete the installation of the cover plate.



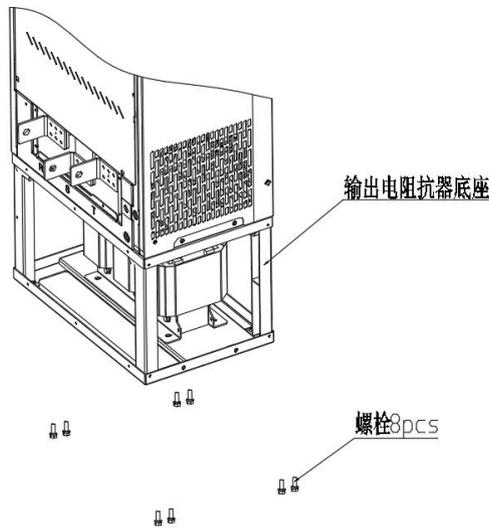
#### 5.5. Output Reactor Base

C9~C11 support the installation of output reactors. The output reactor base is an optional accessory; refer to Chapter 7 “Selection of Optional Accessories” for specific models. The installation procedure for the output reactor base is as follows.

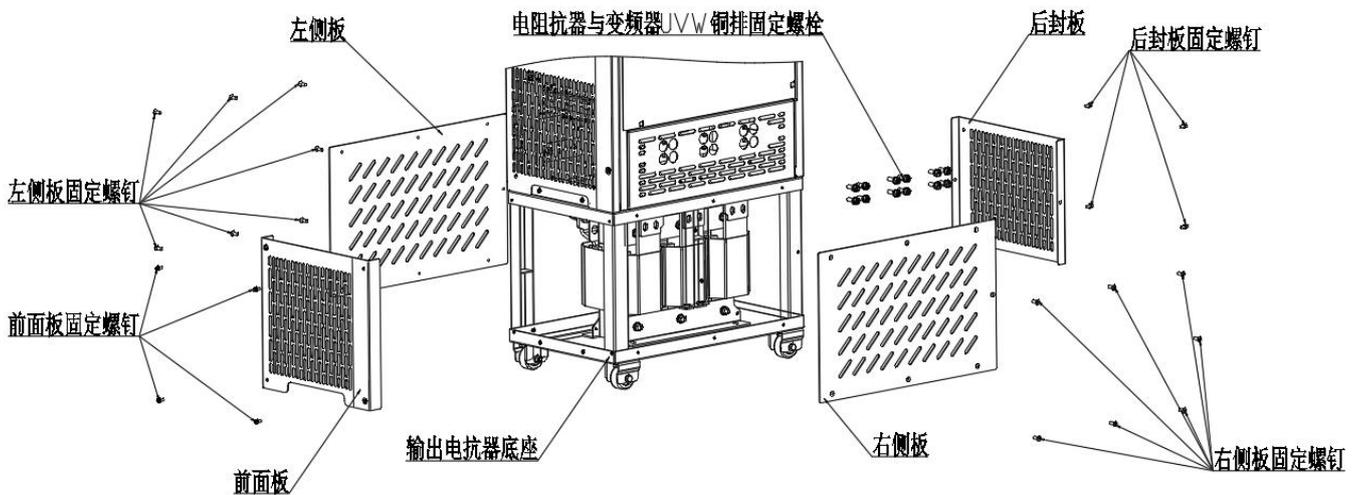
1. Secure the output reactor to the lower end plate using four bolts.



2. Remove the castor assembly from the bottom of the inverter and install it on the corresponding position of the output reactor base.
3. Fix the output reactor base to the original castor assembly mounting position at the bottom of the inverter using eight M8×20 bolts.



4. Fix the side panels, front panel, and rear cover plate to the columns using screws, and secure the output reactor copper busbar to the inverter's UVW copper busbar with 12 bolts.

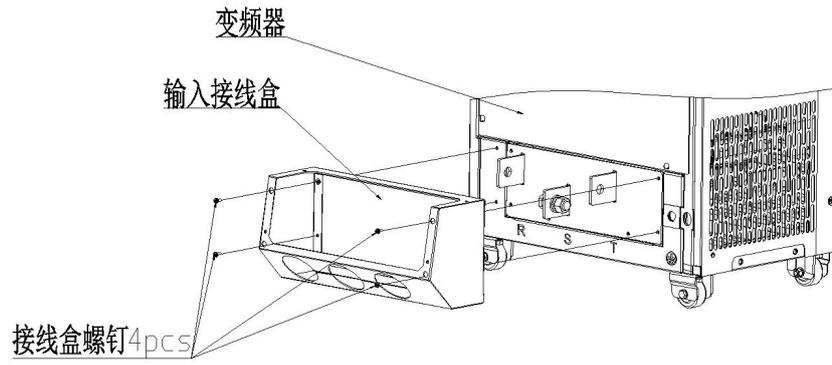


### 5.6. Input Junction Box

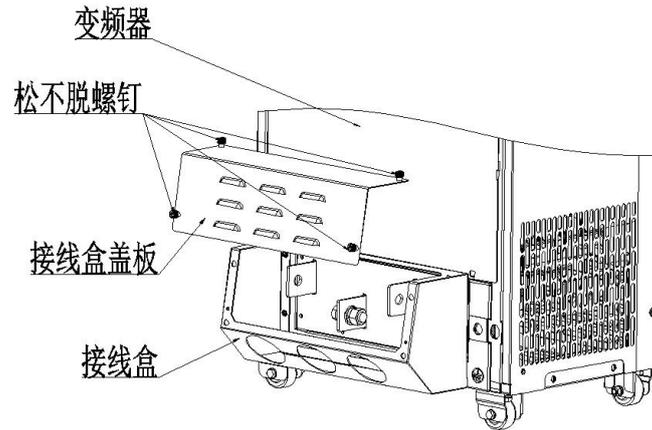
C9~C11 support optional installation of an input junction box, which is an optional accessory. Refer to Chapter 7 “Selection of Optional Accessories” for specific models. The installation procedure for the input junction box is as follows.

Installation (C9 ~ C11 models)

1. Secure the input junction box to the inverter using 4 M4 screws.



2. After connecting the input cables, fix the cover plate to the junction box using the four captive screws that come with the cover plate.



## 6. Electrical Installation

### 6.1. Pre-wiring Inspection

1. It is strictly prohibited to perform wiring while the power supply is connected. Please ensure that all circuit breakers are in the OFF state. Otherwise, there is a risk of electric shock.

2. After disconnecting the power supply on both the input and output sides, wait for 10 minutes until the power indicator light is completely off before starting work.

3. The user is responsible for complying with the technical regulations recognized in their country and other regional regulations when installing and connecting motors, cabinet equipment, and other components. Particular attention should be paid to regulations concerning cable size, fuses, grounding, circuit breaking, isolation, and overcurrent protection.

4. If the fuse in the current branch has tripped, the fault current may have been interrupted. To reduce the risk of fire and electric shock, inspect the conductive parts and other components of the device and replace any damaged parts. After the fuse has tripped, identify and eliminate the cause of the trip.

### 6.2. Introduction to Internal Components

After removing the cover plate, the positions of the internal components are as shown in the following figure.

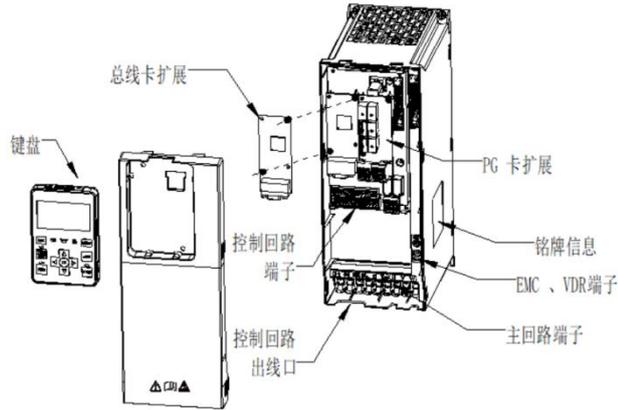


Figure 6-1 Schematic Diagram of Product Components (C2~C4)

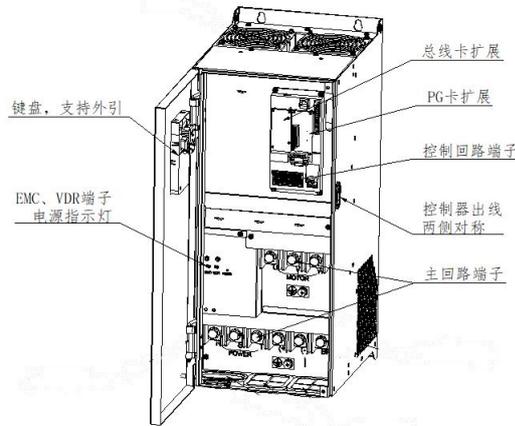


Figure 6-2 Schematic Diagram of Product Components (C5~C8)

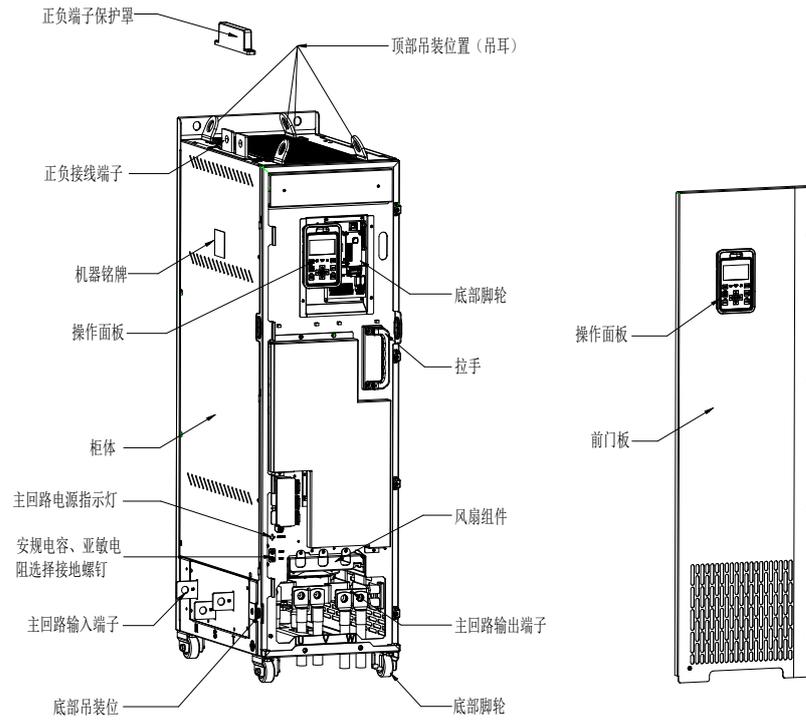


Figure 6-3 Schematic Diagram of Product Components (C9~C11)

### 6.3. Electrical Wiring Diagram

Refer to the 'CM680 Inverter Hardware Manual' for the electrical wiring diagram.

### 6.4. main circuit wiring

#### 6.4.1. Main Circuit Terminal Description

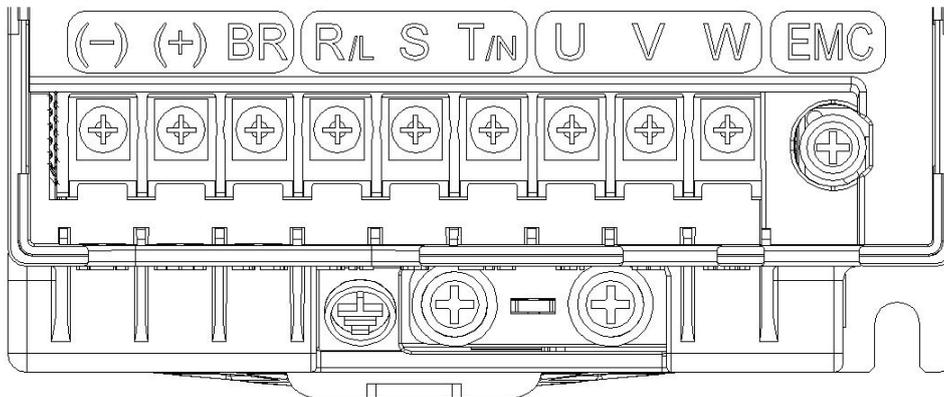


Fig. 6-4 Main Circuit Wiring Terminals for C2 (4.0~7.5kW)

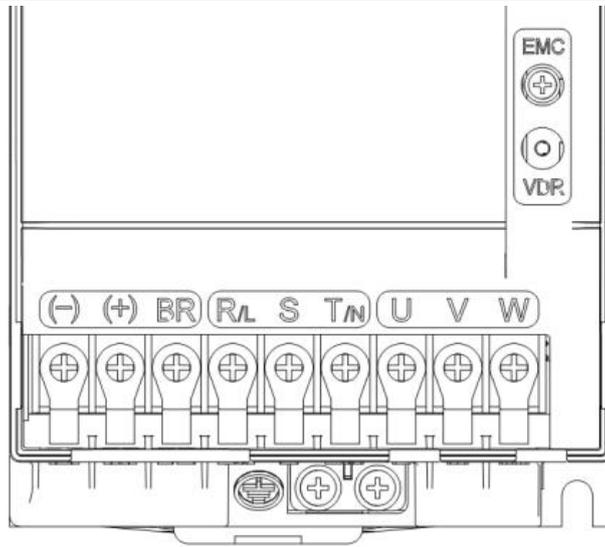


Fig. 6-5 Main Circuit Wiring Terminals for C3 (11~15kW)

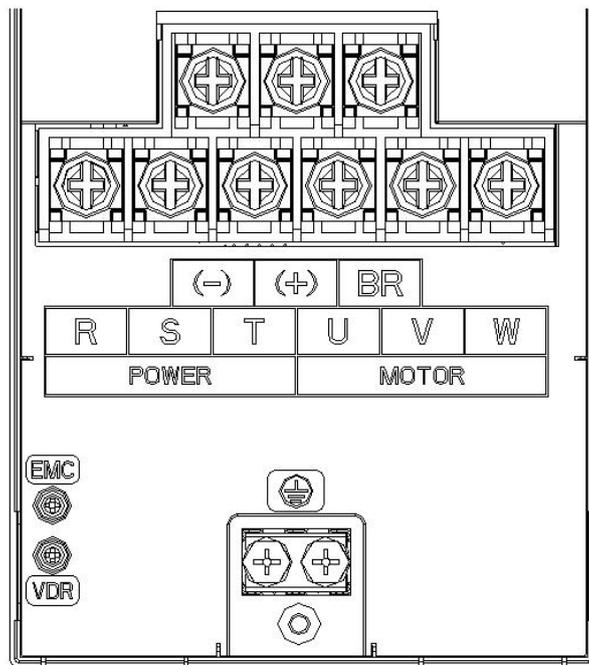


Fig. 6-6 Main Circuit Wiring Terminals for C4 (18~30kW)

CM680 Inverter Installation Manual  
Electrical Installation

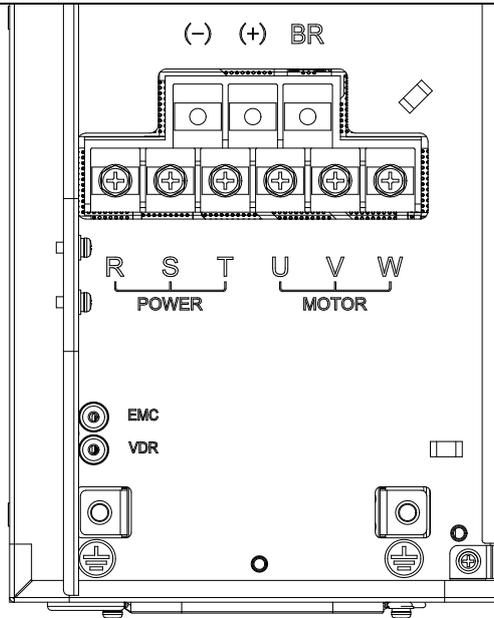


Fig. 6-7 Main Circuit Wiring Terminals for C5 (37~45kW)

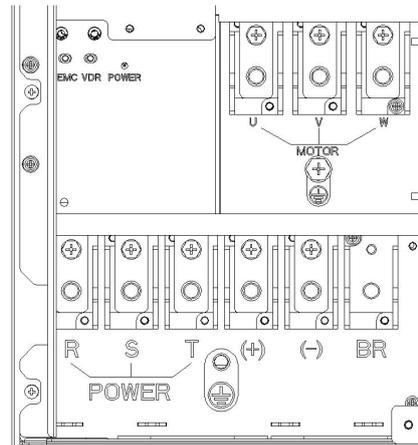


Fig. 6-8 Main Circuit Wiring Terminals for C6~C7 (55~132kW)

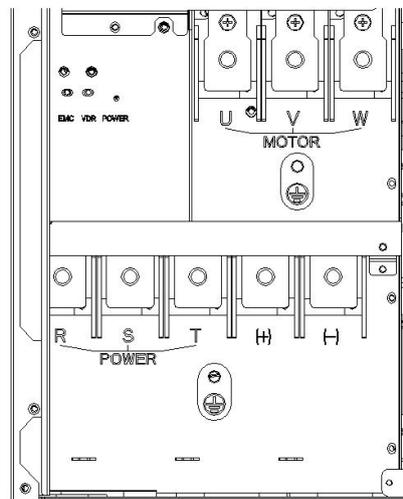


Fig. 6-9 Main Circuit Wiring Terminals for C8 (160~185kW)

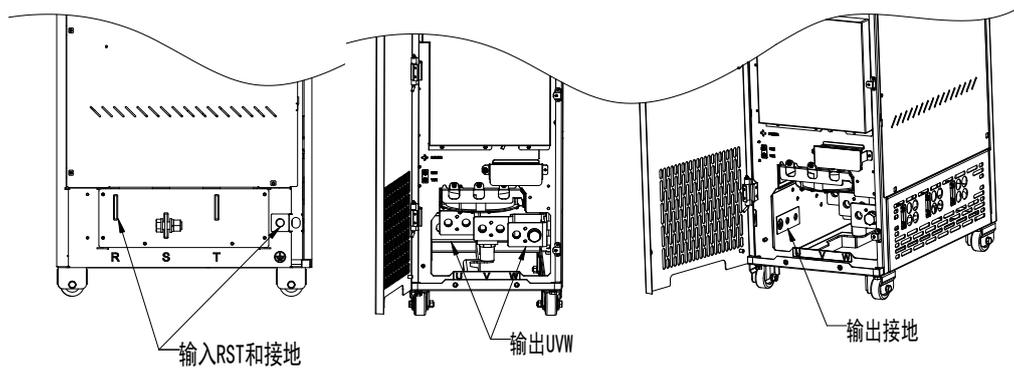


Fig. 6-10 Main Circuit Wiring Terminals for C9~C11 (200~450kW)

Table 6-1 Main Circuit Terminal Marking Description

Terminal Marking	Name	Description
R, S, T	Three-phase Power Input Terminals	AC Input Three-Phase Power Connection Point
(+), (-)	DC Bus Positive and Negative Terminals	Common DC Bus Input Point
(+), BR	Braking Resistor Connection Terminals	160kW ~ 450kW Without Braking Option
U, V, W	Inverter Output Terminals	Connect to Three-Phase Motor
	Grounding Terminal	Grounding Terminal

**6.4.2. Main Circuit Terminal Size and Cable Selection**

For the selection of power cable size, please comply with the regulations and requirements of each country or region. IEC cable selection reference principles are as follows:

- a. Comply with IEC60034-17 and IEC 60364552 standards or equivalent national standards;--
- b. Use PVC or other high-temperature resistant copper conductor cables.

Note: 1. The operating environment temperature for power cables should be  $\leq 40^{\circ}\text{C}$ , and the surface temperature of the cable should be  $\leq 70^{\circ}\text{C}$ . (When the ambient temperature exceeds  $40^{\circ}\text{C}$ , or the cable surface temperature is below the cable's rated minimum value, please contact the manufacturer.)

- 2. It is recommended to use symmetrical cables with copper mesh shielding.
- 3. If the recommended cable specifications for peripheral devices or options exceed the applicable cable specifications of the product, please contact us.

To meet EMC standard requirements, it is strongly recommended to use cables with a shielding layer. Common shielded cables come in three-conductor and four-conductor types. When using a three-conductor shielded cable, an additional separate PE line is required, and the shielding layer must be grounded. The requirements for shielded cables are as follows:

- a. The shielding layer of the shielded cable should be composed of coaxial copper braiding.

To enhance the shielding effectiveness and conductivity, the density of the braiding should be greater than 90%.

Table 6-2 Recommended Wires and Terminal Lugs for Inverters

Inverter Model	RST/UVW Recommended Wires and Terminal Lugs		Recommended Grounding Wires and Terminal Lugs		Screw Specification	Torque (Nm)
	Wire (mm <sup>2</sup> )	Terminal Lug Model	Wire (mm <sup>2</sup> )	Terminal Lug Model		
CM680-4T4R0GB	2.5	TNR24M-	2.5	TNR24M-	M4	1.2
CM680-4T5R5GB	2.5	TNR24M-	2.5	TNR24M-	M4	1.2
CM680-4T7R5GB	4	RV3.5-4	4	RV3.5-4	M4	1.2
CM680-4T011GB	6.0	TNR5.5-5	6	TNR5.5-5	M5	2.8
CM680-4T015GB	10	RNB8-4	10	RNB8-4	M5	2.8
CM680-4T018GB	10	GTNR10-6	10	GTNR10-6	M6	4.8
CM680-4T022GB	16	GTNR16-6	16	GTNR16-6	M6	4.8
CM680-4T030GB	16	GTNR16-6	16	GTNR16-6	M6	4.8
CM680-4T037G(B)	25	GTNR25-6	25	GTNR25-6	M6	4.8

CM680 Inverter Installation Manual  
Electrical Installation

Inverter Model	RST/UVW Recommended Wires and Terminal Lugs		Recommended Grounding Wires and Terminal Lugs		Screw Specification	Torque (Nm)
	Wire (mm <sup>2</sup> )	Terminal Lug Model	Wire (mm <sup>2</sup> )	Terminal Lug Model		
CM680-4T045G(B)	35	GTNR35-8	25	GTNR25-6	M8/M6	13/4.8
CM680-4T055G(B)	50	GTNR50-8	25	GTNR25-6	M8/M6	13/4.8
CM680-4T075G(B)	70	GTNR70-12	35	GTNR35-8	M12/M8	35/13
CM680-4T093G(B)	95	GTNR95-12	50	GTNR50-8	M12/M8	35/13
CM680-4T110G(B)	120	GTNR120-12	70	GTNR70-12	M12	35
CM680-4T132G(B)	150	GTNR150-12	95	GTNR95-12	M12	35
CM680-4T160G	185	GTNR185-12	95	GTNR95-12	M12	35
CM680-4T185G	185	GTNR185-12	95	GTNR95-12	M12	35
CM680-4T200G	2×120	GTNR120-12	120	GTNR120-12	M12	35
CM680-4T220G	2×150	GTNR150-12	150	GTNR150-12	M12	35
CM680-4T250G	2×150	GTNR150-12	150	GTNR150-12	M12	35
CM680-4T280G	2×150	GTNR150-12	150	GTNR150-12	M12	35
CM680-4T315G	2×150	GTNR150-12	185	GTNR185-12	M12	35
CM680-4T355G	2×185	GTNR185-12	185	GTNR185-12	M12	35
CM680-4T400G	2×240	GTNR240-16	240	GTNR240-16	M16	85
CM680-4T450G	2×240	GTNR240-16	240	GTNR240-16	M16	85

**6.4.3. Main Circuit Wiring Requirements**

**Main Circuit Wiring Requirements**

- a. The ground wire must be securely connected to the grounding terminal;
- b. BR, ()、 (+) terminals are for specific functions and cannot be used for other purposes.-
- c. The control circuit is a safety extra low voltage circuit, isolated from other circuits with reinforced insulation. Please ensure that the control circuit is not connected to other circuits.
- d. Be careful not to allow foreign objects to enter the wiring section of the terminal block.
- e. Control wires must not be soldered.
- f. Tighten the screws according to the specified torque.
- g. If using an electric tool to tighten the terminal screws, set a reasonable torque; otherwise, it may damage the terminal screws.
- h. Do not tighten the terminal screws at an angle greater than 5 degrees; otherwise, it may damage the terminal screws.

**Main Circuit Wiring Requirements**

The inverter power input lines and motor cables can generate strong electromagnetic interference, which can cause the inverter control signals to malfunction due to strong electromagnetic interference. Therefore, it is recommended that the input and output power cables and control circuits do not run parallel over long distances. If it is unavoidable to have them running parallel, the distance between the main circuit cables and signal cables should be more than 50 cm.

Note: Common main circuit cables include input RST lines, output UVW lines, DC bus, and braking cables;

Signal cables include IO signal lines, communication lines, and encoder lines.

Cable trays must maintain good contact between them, and the cable tray enclosures must be well grounded. A well-grounded metal cable tray can ensure equipotentiality of the equipment.

The inverter and motor, including any optional filters and reactors, must be well connected to the system (machine or installation). At grounding points, paint should be removed for proper grounding, and after installation, anti-corrosion treatment should be applied; non-grounded parts should be protected with spray coating and should make good contact with the cabinet.

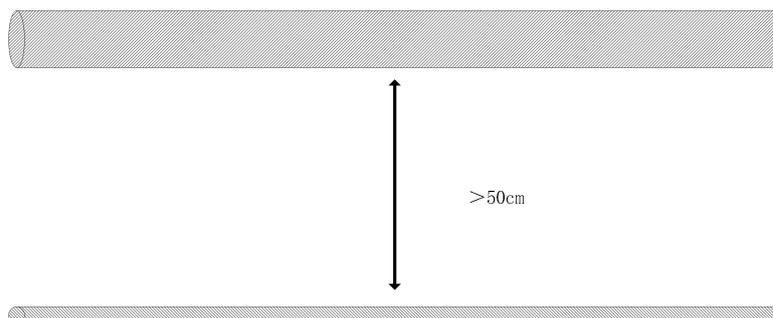


Figure 6-11 Wiring Diagram

**Wiring in IT or Delta Networks**

In IT networks or delta network systems, disconnect the EMC optional grounding screw; otherwise, it may cause equipment damage or even personal injury.

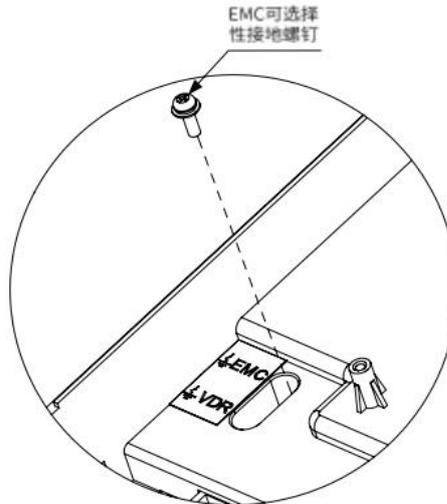


Figure 6-12 Disconnect EMC Optional Grounding Screw

**Shielded Cable Shield Requirements**

It is recommended to use shielded cables for power cables, and the shield must be connected to the PE terminal with a 360° ground connection. Do not twist the cable end shield into a small tail that is exposed.

**Motor Cable Length Requirements**

When the inverter operates, due to the rapid switching of power transistors, a large du/dt will be generated at the output end. When the motor cable is too long-term high du/dt can lead to insulation breakdown and bearing damage of the motor. To avoid this risk, please refer to the following recommendations:

- a. Use motors that meet the IEC6003425 IVIC B technical specifications, or use motors with high insulation withstand voltage.-
- b. The cable length between the inverter and the motor must not exceed the requirements specified in Table 2-4.
- c. An output reactor may be required in certain situations.

Please select and connect cables of appropriate length according to the cable length requirements in this table.

Table 6-3 Cable Length Table

Inverter Model	Rated Output Current (A)	Without Output AC Reactor		With Output AC Reactor Installed	
		Shielded Cable (m)	Unshielded Cable (m)	Shielded Cable (m)	Unshielded Cable (m)
CM680-4T4R0GB	9.0	50	75	75	115
CM680-4T5R5GB	13.0	50	75	75	115
CM680-4T7R5GB	17.0	50	75	75	115
CM680-4T011GB	25.0	50	75	75	115
CM680-4T015GB	32.0	50	75	75	115
CM680-4T018GB	37.0	50	75	75	115
CM680-4T022GB	45.0	50	75	75	115
CM680-4T030GB	60.0	50	75	75	115
CM680-4T037G(B)	75.0	50	75	75	115
CM680-4T045G(B)	90.0	50	75	75	115
CM680-4T055G(B)	110.0	50	75	75	115
CM680-4T075G(B)	152.0	50	75	75	115
CM680-4T093G(B)	176.0	50	75	75	115
CM680-4T110G(B)	210.0	50	75	75	115
CM680-4T132G(B)	253.0	50	75	75	115
CM680-4T160G	304.0	50	75	75	115

CM680 Inverter Installation Manual  
Electrical Installation

Inverter Model	Rated Output Current (A)	Without Reactor	Output AC	With Output AC Reactor Installed	
		Shielded Cable (m)	Unshielded Cable (m)	Shielded Cable (m)	Unshielded Cable (m)
CM680-4T185G	340.0	50	75	75	115
CM680-4T200G	380.0	50	75	75	115
CM680-4T220G	426.0	50	75	75	115
CM680-4T250G	465.0	50	75	75	115
CM680-4T280G	520.0	50	75	75	115
CM680-4T315G	585.0	50	75	75	115
CM680-4T355G	650.0	50	75	75	115
CM680-4T400G	725.0	50	75	75	115
CM680-4T450G	820.0	50	75	75	115

**Terminal Lug Recommendations**

The terminal lugs recommended in the table below are the GTNR series and BC series from Suzhou Yuanli.

Table 6-4 Appearance Diagrams of Various Series Terminal Lugs

Series	Appearance Diagram
GTNR Series	
TNR Series	
RV Series	
RNB Series	

**6.4.4. Protection Requirements**

**Main Circuit Cable Protection Requirements**

A heat shrink tube must be added over the copper tube and cable core part of the main circuit cable terminal lug, ensuring that the tube completely covers the cable conductor part, as shown in the figure below.

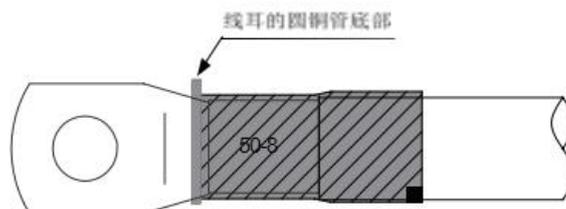


Figure 6-13 Schematic Diagram of Heat Shrink Tube on Cable Conductor

**Requirements for Upstream Protective Devices**

1. Suitable protective devices must be installed on the input power lines, which should provide overcurrent protection, short-circuit protection, and isolation protection functions.
2. When selecting protective devices, consider factors such as the main circuit cable current capacity, system overload capability requirements, and the short-circuit capacity of the upstream distribution equipment. Generally, please select according to the recommended values in the peripheral electrical component selection guide.

**6.5. Control Circuit Wiring**

**6.5.1. Control Circuit Terminal Description**

The control circuit terminal layout is shown in the following figure:

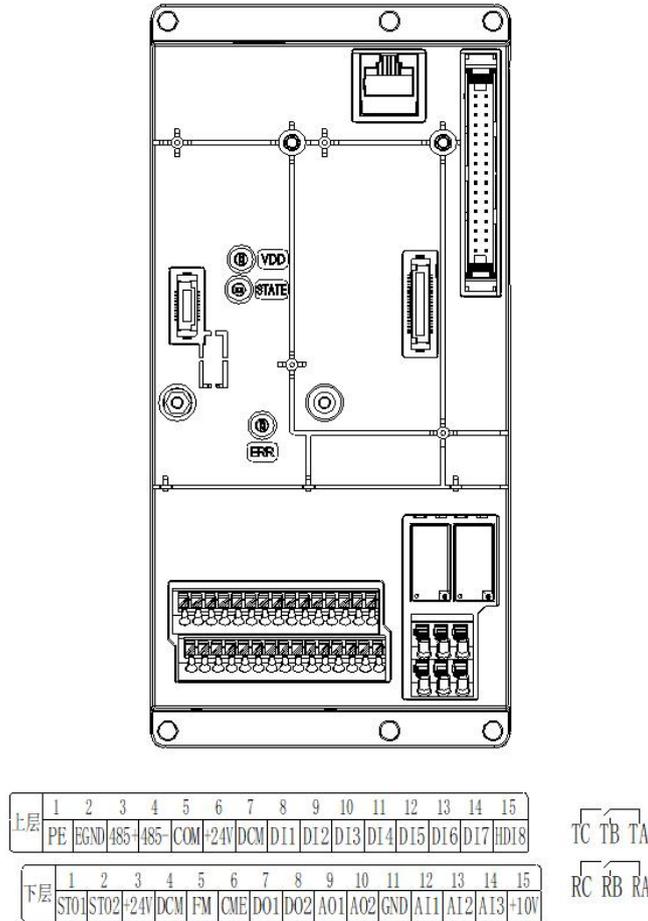


Figure 6-14 Control Circuit Terminal Layout Diagram

Control Terminal Function Description:

Table 6-5 Control Circuit Terminal Function Description

Category	Terminal Symbol	Terminal Name	Function Description
Power Supply	+24V-DCM	External +24V Power Supply	Provides +24V power externally, generally used as the working power supply for digital input/output terminals and external sensors, Maximum output current: 200mA
Analog Input	AI1-GND	Analog Input Terminal 1	1. Input range: DC 0 ~ 10V/0 ~ 20mA/4 ~ 20mA, configured by the customer. 2. Input impedance: 10kΩ when voltage input, 500Ω when current input.
	AI2-GND	Analog Input Terminal 2	
	AI3-GND	Analog Input Terminal 3	

CM680 Inverter Installation Manual  
Electrical Installation

Category	Terminal Symbol	Terminal Name	Function Description
Digital Input	DI1-COM	Digital Input 1	1. Optocoupler isolation, compatible with bipolar input 2. Input impedance: 3kΩ 3. Voltage range for DI1 ~ DI7 level input: 9~30V; Voltage range for HDI8 level input: 15 ~ 30V; 4. HDI8 can be used as a high-speed input port. Default built-in power supply, NPN type (Sink)
	DI2-COM	Digital Input 2	
	DI3-COM	Digital Input 3	
	DI4-COM	Digital Input 4	
	DI5-COM	Digital Input 5	
	DI6-COM	Digital Input 6	
	DI7-COM	Digital Input 7	
	HDI8-COM	Digital Input 8	
Analog Output	AO1-GND	Analog Output 1	Software Configuration for Current Output or Voltage Output Output Voltage Range: 0~10V Output Current Range: 0~20mA
	AO2-GND	Analog Output 2	
Digital Output	DO1-CME	Digital Output 1	Optocoupler Isolation, Bipolar Open Collector Output Output Voltage Range: 0~48V Output Current Range: 0~50mA
	DO2-CME	Digital Output 2	
High-Speed Digital Output	FM-DCM	High-Speed Digital Output	Optocoupler Isolated Output Output Voltage Range: 0~24V Output Current Range: 0~30mA Maximum Output Frequency: 100KHz
Functional Safety	STO1	STO1	S1~DCM / S2~DCM Rated Input Voltage: +24 VDC ± 10 %; Maximum Input Voltage: +30 VDC Rated Input Current: 6.8mA ± 10 % Note: When the STO function is not used, S1 and S2 can be shorted with +24V to disable the STO function
	STO2	STO2	
Communication Interface	485+ -485-	Modbus Communication Interface	Modbus Communication Interface
	EGND	485GND	485GND
PE	PE	PE	Signal Wire Shield Ground Terminal
Relay Output 1	TA-TB	Normally Closed Terminal	Single Relay Output Capacity: 250Vac/3A(NO); 250Vac/3A(NC); 250Vac/2A(NO)estimate cosφ=0.4; 250Vac/1.2A(NC)estimate cosφ=0.4; 30Vdc/3A(NO) 30Vdc/2A(NC)
	TA-TC	Normally Open Terminal	
Relay Output 2	RA-RB	Normally Closed Terminal	Single Relay Output Capacity: 250Vac/3A(NO); 250Vac/3A(NC); 250Vac/2A(NO)estimate cosφ=0.4; 250Vac/1.2A(NC)estimate cosφ=0.4; 30Vdc/3A(NO) 30Vdc/2A(NC)
	RA-RC	Normally Open Terminal	
Keyboard Extension Cable Interface	J6	External Keyboard Interface	Supports external keyboard, the keyboard can support function copying, using standard network cable for extension.

Note:

1. When the ambient temperature exceeds 23°C, derating is required; for every 1°C increase in ambient temperature, the output current decreases by 1.8mA. At an ambient temperature of 40°C, the maximum output current is 170mA; when the user shorts COM and 24V, the current on the DI terminal must also be considered.

2. Users should select 500Ω or 250Ω impedance based on the load capability of the signal source, which is determined by the maximum output voltage of the signal source. For example, if using 500Ω impedance, it must be ensured that the maximum output voltage of the signal source is not less than 10V to ensure that AI2 can measure a current of 20mA.

### 6.5.2. Control Circuit Terminal Wiring Instructions

Signal Input Terminal Wiring Instructions:

**AI Analog Input Terminals**

Due to the weak analog voltage signals being particularly susceptible to external interference, shielded cables are generally required, and the wiring distance should be as short as possible, not exceeding 20m, as shown in Figure 2-16. In cases where analog signals are severely interfered with, a filter capacitor or ferrite core should be added on the side of the analog signal source.

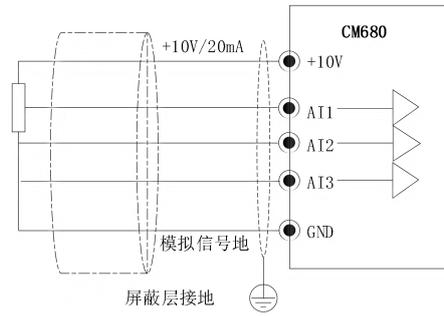


Figure 6-15 Schematic Diagram of Analog Input Terminal Wiring

**DI Digital Input Terminals:**

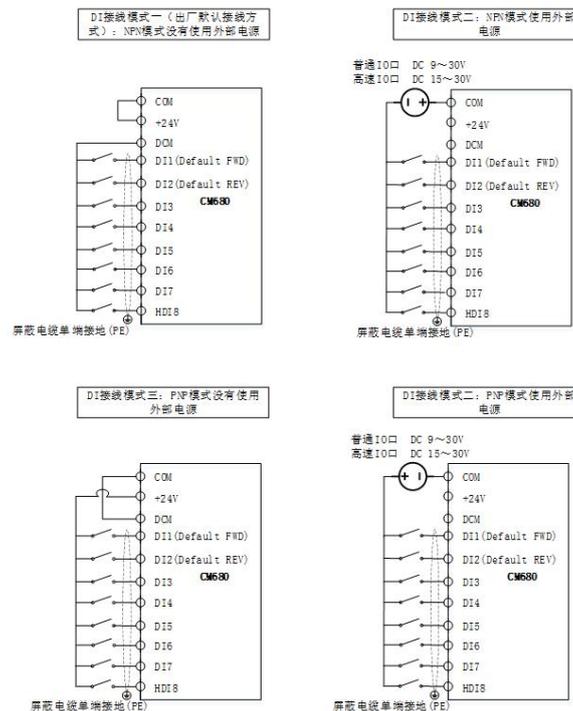


Figure 6-16 Digital Input Terminal Wiring Diagrams for Four Different Modes

Note: When using an external power supply, the standard IO ports (DI1 ~ DI7) require an external power supply range of 9~30V, and the high-speed IO port (HDI8) requires an external power supply range of 15~30V.

Generally, shielded cables should be used, and the wiring distance should be as short as possible, not exceeding 20 meters.

When using active drive mode, necessary filtering measures must be taken to prevent power supply crosstalk.

It is recommended to use contact control method.

**DO Digital Output Terminals:**

When digital output terminals need to drive relays, a snubber diode should be installed across the relay coil, with a driving capability not exceeding 50mA. Otherwise, it can easily cause damage to the DC 24V power supply.

Note: The polarity of the snubber diode must be correctly installed as shown in the figure below. Otherwise, when the digital output terminal has an output, the DC 24V power supply will immediately be damaged.

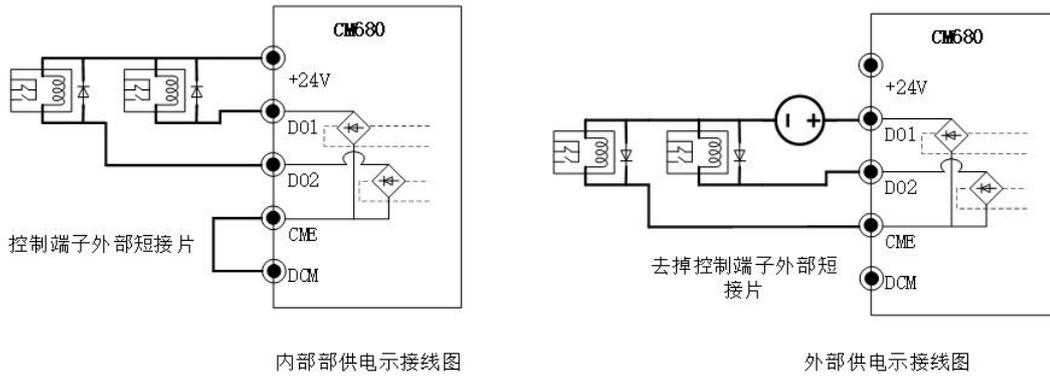


Figure 6-17 Schematic Diagram of Digital Output Terminal DO Wiring

**Relay Output Terminal Wiring:**

Inductive loads (relays, contactors, and motors) cause voltage spikes when the current is interrupted. Use surge arresters on relay contacts and install suppression circuits, such as surge arresters, RC suppression circuits, diodes, etc., on inductive loads to ensure minimal interference during shutdown, as shown in the following figure.

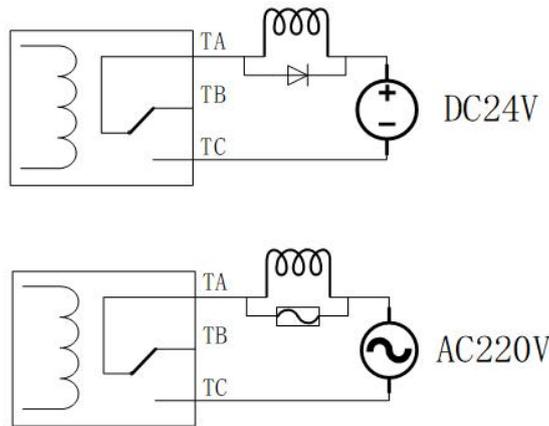


Figure 6-18 Recommended Circuit for Relay Inductive Load

**6.5.3. Selection and Wiring Requirements for Control Circuit Cables**

**Description**

Control circuit cable wiring should be carried out according to the requirements of EN 60204-1 standard.

**Selection Requirements**

To ensure that the control circuit is not affected by strong interference noise in the surrounding environment, it is recommended to use shielded cables with a shielding layer. The shielding layer should be reliably connected to the equipment at both ends using signal shielding brackets for a 360° connection. Different analog signals should use separate shielded cables, and digital signal lines are recommended to use shielded twisted pairs.

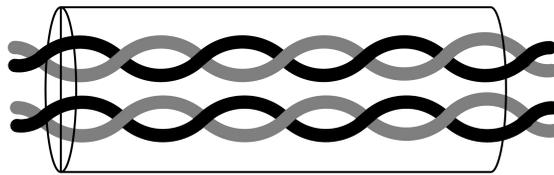


Figure 6-19 Shielded Twisted Pair Schematic

**Grounding Requirements for Analog Terminal Shields**

Analog voltage signals are susceptible to external interference, so shielded cables are generally required, and the wiring distance should be as short as possible, not exceeding 20m. In situations where certain analog signals are severely interfered with, it is necessary to add filter capacitors or ferrite cores on the side of the analog signal source. It is recommended that the shielding layer of the shielded cable be grounded 360°.

**Requirements for connecting encoder signal lines**

When installing the PG card and wiring the encoder, it is only necessary to connect the shield of the encoder signal line to the PE terminal on the PG card, thereby achieving the connection between the shield of the signal line and the PE grounding point of the inverter, thus completing the grounding of the signal line shield. The requirements for connecting the encoder cable are as follows:

1. During on-site installation and debugging, it is necessary to route the encoder cables and power cables in different conduits; it is strictly prohibited to bundle the encoder cables with the power cables, otherwise, encoder interference issues will occur.
2. It is recommended to use shielded twisted pair cables. For differential encoders, the twisted pairs must be wired differentially, and the shielding should be 360° connected to the inverter's grounding terminal (PE terminal).

3. For some large equipment where the inverter is far from the motor (motor cable length 10m), due to the influence of parasitic inductance in the cable, the grounding impedance of the encoder cable shield will increase. In this case, the encoder shield can be left unconnected to the inverter's grounding terminal (PE terminal).

**Wiring Requirements for IO Signals**

IO signals include analog input AI, analog output AO, digital input DI, digital output DO, and relay output signals. Please disconnect the main power supply and ensure that the inverter's power indicator light is off before operating or wiring the IO terminals.

Note: If the inverter's enclosure has a lightning warning symbol (as shown in Figure 2-21), wait for the longer of the warning time or the time it takes for the light to go out.

To avoid interference with IO signals, keep the IO signal lines at least 50cm away from the main circuit wiring (RST, UVW) and other power lines (or electrical lines).

Keep the relay output terminal wiring at least 30cm away from other IO signal lines to prevent misoperation of the inverter and machinery.

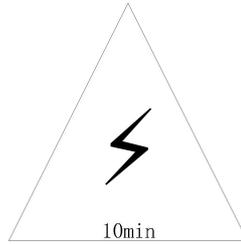


Figure 6-20 Lightning Warning Symbol

**6.6. Grounding**

**6.6.1. Main Circuit Grounding Requirements**

To ensure the product is correctly grounded, please observe the following precautions:

- (1) To prevent electric shock, be sure to ground the grounding terminal. For methods of grounding, please comply with the relevant electrical regulations of each country or region.
- (2) To prevent electric shock, confirm that the protective earthing conductor meets technical specifications and local safety standards, and keep the grounding wire as short as possible. The leakage current of the product may exceed 3.5 mA, therefore, according to EN 61800-5-1 standard, the cross-sectional area of the protective earthing conductor should refer to the table below.--
- (3) When using multiple devices, follow the instructions for grounding all devices. Incorrect grounding of devices can lead to malfunction.
- (4) This product is equipped with an optional VDR grounding screw. When performing a dielectric strength test, it is essential to disconnect the VDR grounding screw before testing; otherwise, there is a risk of test failure.
- (5) The protective earthing conductor must use yellow-green copper cable and must not be connected in series with circuit breakers or other switching devices.
- (6) The grounding terminal must be reliably earthed; otherwise, it may cause abnormal operation or damage to the equipment. The grounding terminal must not be shared with the power neutral (N) terminal.
- (7) It is recommended to install on a conductive metal surface to ensure that the entire conductive base of the device is in good contact with the installation surface.
- (8) The fixing of the grounding screw must be done according to the recommended torque to avoid loose or overly tight fixation of the protective earthing conductor.

Table 6-6 Ground Cable Cross-sectional Area

Main Cable Cross-sectional Area (mm <sup>2</sup> )	Minimum Ground Wire Cross-sectional Area (mm <sup>2</sup> )
S ≤ 16	S
16 < S ≤ 35	16
35 < S	S/2

**6.6.2. Control Board Grounding Requirements**

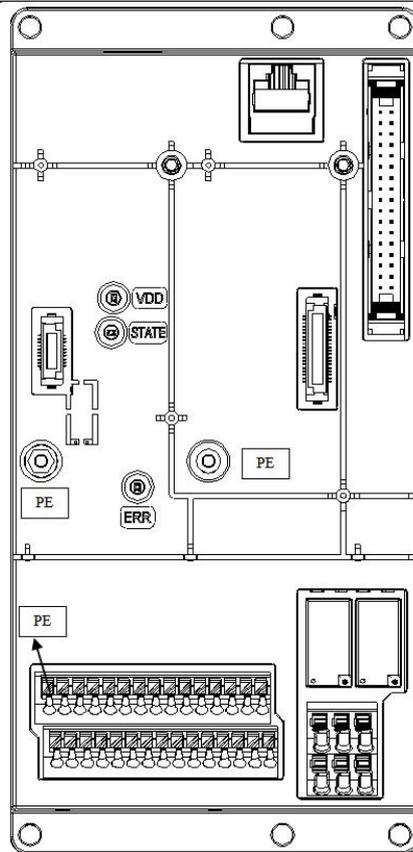


Figure 6-21 Control Board Grounding Position

### 6.6.3. Single Device Installation Scenario

Single Machine Installation Grounding Diagram:

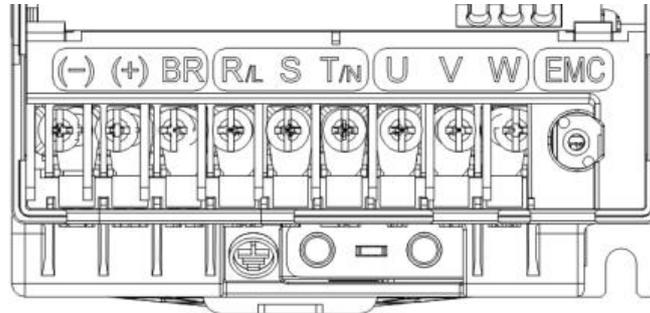


Figure 6-22 4.0~7.5kW Grounding Point Diagram

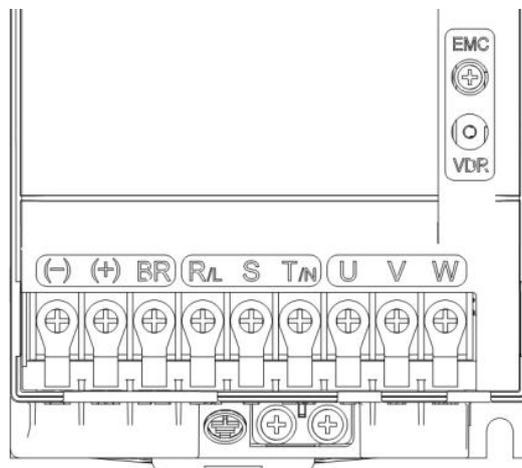


Figure 6-23 11~15kW Grounding Point Diagram

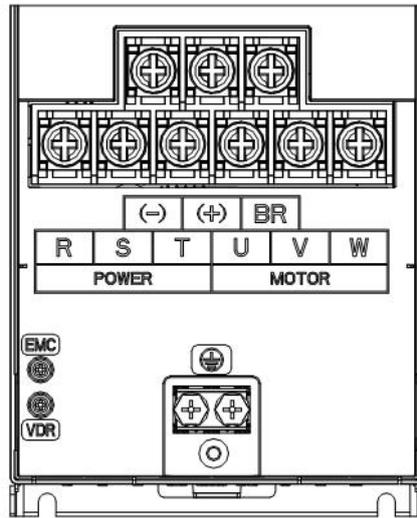


Figure 6-24 18.5~30kW Grounding Point Diagram

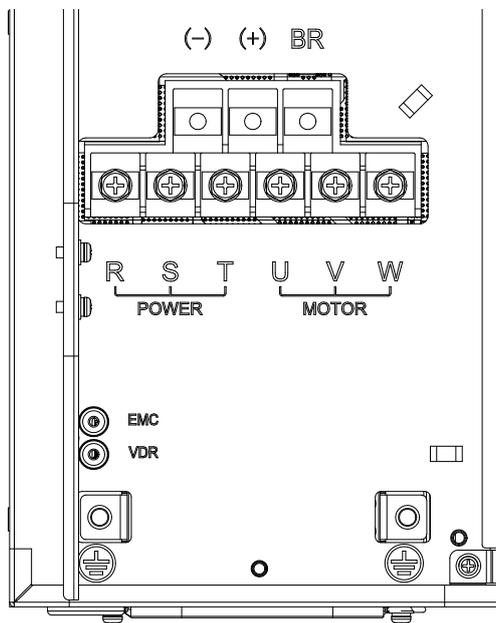


Figure 6-25 37~45kW Grounding Point Diagram

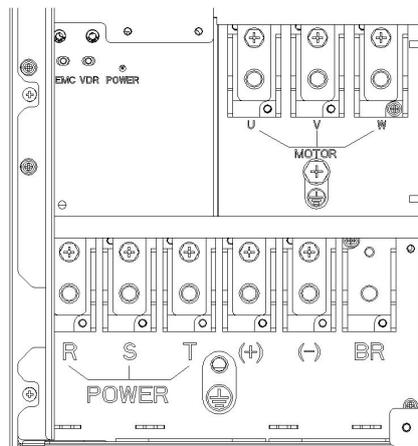


Figure 6-26 55~132kW Grounding Point Diagram

CM680 Inverter Installation Manual  
Electrical Installation

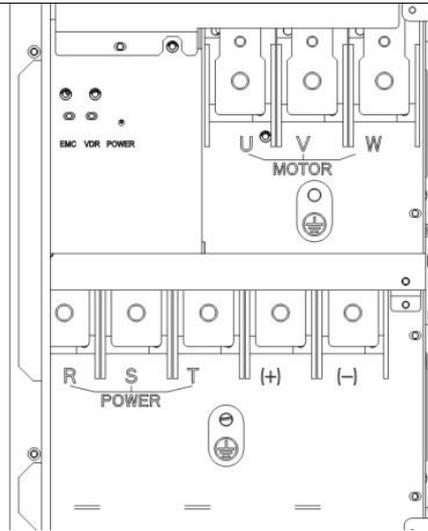


Figure 6-27 160~185kW Grounding Point Diagram

6.6.4. Multi-device Installation Scenario

When multiple devices are installed side by side in the cabinet, the grounding diagram is shown as follows.

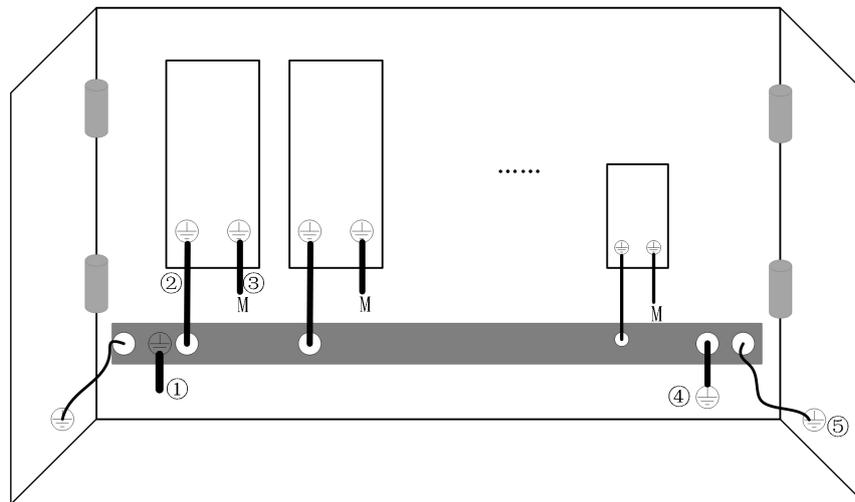


Figure 6-28 Multi-unit Installation Grounding Diagram

Table 6-7 Multi-unit Installation Grounding Description

No.	Wiring Description
①	Connect the PE cable of the input power supply to the grounding busbar of the control cabinet
②	Connect the PE terminal of the main circuit input of the product to the grounding busbar of the control cabinet through a protective earthing conductor
③	Connect the PE cable and shield of the motor output to the output PE terminal of the product
④	Connect the grounding busbar of the control cabinet to the cabinet body and door through a protective earthing conductor

6.6.5. Cabinet System Grounding

The VFD control system is susceptible to electromagnetic interference. Besides the VFD's EMC design, there are numerous control and other weak electrical signals within the cabinet system, making cabinet layout a key focus area. Depending on the strength of interference signals inside the cabinet, the cabinet can be divided into multiple EMC zones or multiple cabinets, and devices should be installed in the corresponding areas according to the principles listed in the table below.

Table 6-8 Wiring Principles

No.	Wiring Principles
1	Please place control equipment and variable frequency drive equipment in two separate cabinets.

2	In a multi-cabinet system, cabinets should be connected using grounding wires with a cross-sectional area of at least 16mm <sup>2</sup> to achieve equipotential bonding between cabinets. Equipotential bonding should be performed between different areas within a single cabinet.
3	Within a cabinet, zoning should be done based on signal strength.
4	Equipment in different areas within the cabinet should be connected for equipotential bonding.
5	All communication lines (e.g., RS485) and signal cables led out from the cabinet must be properly shielded.
6	The power input filter in the cabinet should be placed near the cabinet's input interface.
7	After grounding connections are made, all grounding points in the cabinet should be treated to prevent rust and corrosion.

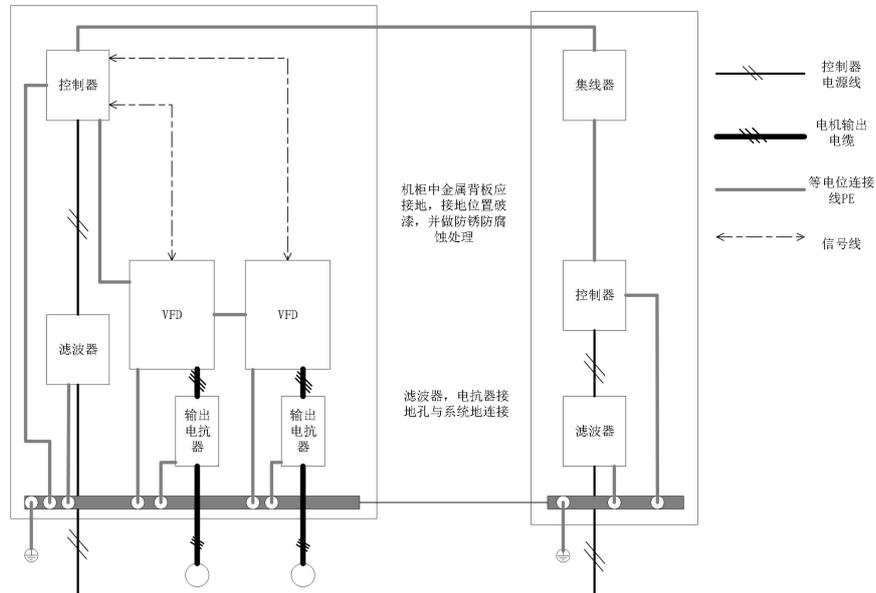


Figure 6-29 Schematic Diagram of Cabinet System Grounding

## 7. Selection of Optional Accessories

### 7.1. Embedded Installation Bracket

C2~C8 support embedded installation. The embedded installation bracket required for embedded installation is an optional accessory. The model numbers of the embedded installation brackets for various models of the CM680 inverter are shown in the table below.

Table 7 - 1 Model Numbers of Embedded Installation Brackets

Inverter Model	Embedded Installation Bracket Model
C2	CM680-5R5A-01-05
C3	CM680-11A-01-05
C4	CM680-022A-01-10
C4	CM680-30A-01-08
C6	CM680-055A-10
C7	CM680-110A-01-14
C8	CM680-160A-01-21

### 7.2. Bottom Mounting Bracket

C9~C11 support cabinet installation, and the bottom mounting bracket required for cabinet installation is an optional accessory. The bottom mounting bracket models for various CM680 inverter models are shown in the table below.

Table 7-2 Bottom Mounting Bracket Model Table

Inverter Model	Bottom Mounting Bracket Model	
C9	600 Deep Cabinet	CM530H-PLUS-01-40-04
	800 Deep Cabinet	CM530H-PLUS-01-40-06
C10		CM530H-PLUS-01-40-03
C11		CM530H-PLUS-01-40-03

### 7.3. Mounting Rail

C9~C11 support installation inside the cabinet. The mounting rail required for cabinet installation is an optional accessory. The mounting rail models for various models of the CM680 inverter are shown in the table below.

Table 7-3 Mounting Rail Model Table

Inverter Model	Mounting Rail Model
C9	CM530H-PLUS-01-40-05
C10	CM530H-PLUS-01-40-02
C11	CM530H-PLUS-01-40-02

### 7.4. Output Reactor Base

C9~C11 support the installation of output reactors. The output reactor base is an optional accessory. The output reactor base models for various models of the CM680 inverter are shown in the table below.

Table 7-4 Output Reactor Base Model Table

Inverter Model	Output Reactor Base Model
C9	CM680-200A-01-22
C10	CM680-400A-1-20
C11	CM680-400A-1-20

### 7.5. Input Junction Box

C9~C11 support optional installation of an input junction box. The models of the input junction boxes for various models of the CM680 inverter are shown in the following table.

Table 7-5 Input Junction Box Model Table

Inverter Model	Input Junction Box Model
C9	CM530H-PLUS-200A-01-20
C10	CM680-280A-01-18
C11	CM530H-PLUS-400A-01-20

## 8. Common EMC Issues and Resolution Suggestions

### 8.1. Incorrect Operation of Residual Current Circuit Breaker

When a residual current circuit breaker is used with the equipment and there is a malfunction, please resolve it according to the following methods.

Table 8 - 1 Strategies for Dealing with Leakage Current

Trip Leakage Protection Phenomenon	Influencing Factors	Solutions
Instantaneous Trip Leakage Protection Upon Power-On	Poor Interference Resistance of Leakage Protection	1. Use a leakage protection circuit breaker of the recommended brand. 2. It is recommended to replace it with a leakage protection circuit breaker with a higher operating current. 3. Move the unbalanced load to the front end of the leakage protection circuit breaker. 4. Try disconnecting the EMC screw or the grounding terminal of the external EMC filter to reduce the capacitance to ground at the input end.
	Leakage Protection Operating Current Too Low	
	Unbalanced Load Connected After Leakage Protection	
	Large Capacitance to Ground Before the Inverter	
Trip during operation due to leakage protection	Poor Interference Resistance of Leakage Protection	1. Use a leakage protection circuit breaker of the recommended brand. 2. If it is a single inverter, confirm that the EMC screw is tightened tightly; If multiple inverters are used, try disconnecting the optional EMC grounding screws, as shown in “8 - 1 Disconnecting Optional EMC Grounding Screws” . 3. Install a simple filter on the input side of this product, and wind ferrite cores around the LN and RST lines near the leakage protection device, as shown in “8 - 2 Diagram of Installing Simple Filter and Ferrite Cores on Input Side” . 4. Replace with a residual current circuit breaker with a higher rated tripping current. 5. Appropriately reduce the carrier frequency under the premise of ensuring performance requirements. 6. Reduce the length of the motor cable.
	Leakage Protection Operating Current Too Low	
	Unbalanced Load Connected After Leakage Protection	
	The distributed capacitance to ground of the motor cable, motor, etc., is too large.	

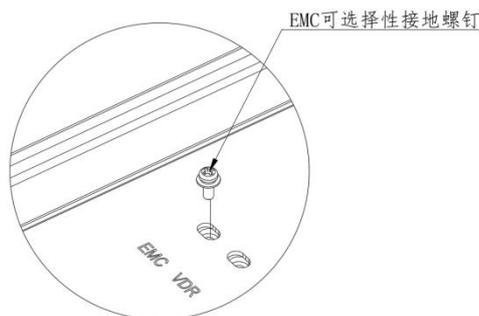


Figure 8-1 Disconnect the optional EMC grounding screw

Issues and Resolution Suggestions

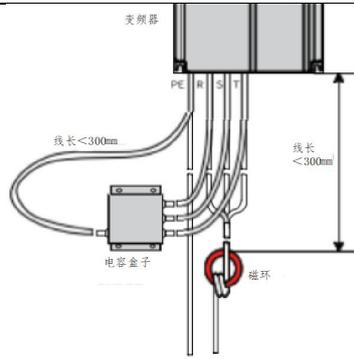


Figure 8-2 Schematic diagram of installing a simple filter and ferrite core on the input side

**8.2. Harmonic Suppression**

To suppress higher harmonic currents of this product, improve the power factor, and ensure that the product meets the standard requirements, an AC input reactor needs to be installed on the input side of the equipment.

**8.3. Control Circuit Interference**

**8.3.1. High-speed Pulse Interference**

Please make corrections according to the table below.

Step	Solutions
1	Use shielded twisted pair wire and ground both ends
2	Connect the motor housing to the inverter PE terminal
3	Connect the inverter's PE terminal to the grid PE
4	Add an equipotential bonding wire between the higher-level machine and the inverter
5	Maintain a distance of at least 30cm between signal cables and power cables
6	Add a ferrite core to the signal cable, or wind it 1-2 turns
7	Add a ferrite core to the inverter's output UVW, winding it 2-4 turns
8	Use shielded power cables, and ensure the shielding layer is well grounded

**8.3.2. Common IO signal interference**

This product is a high-interference device; during use, interference phenomena may occur due to issues with wiring, grounding, etc. When interference occurs between this device and other equipment, the steps in the following table can be used for rectification.

Step	Solutions
1	Use shielded cable for IO signal lines, connect the shielding layer to the PE terminal
2	Reliably connect the motor PE to the inverter PE terminal, and connect the inverter PE terminal to the grid PE
3	Add an equipotential bonding wire between the higher-level machine and the inverter
4	Add a ferrite core to the inverter's output UVW, winding it 2-4 turns
5	Increase the capacitance filter for low-speed DI, recommend a maximum of 0.1uF
6	Increase the capacitance filter for AI, recommend a maximum of 0.22uF
7	Add a ferrite bead or ferrite ring to the signal line, wind 1-2 turns
8	Use shielded power cables, and ensure the shielding layer is well grounded

**8.4. Communication Interference**

**8.4.1. 485 and CAN Communication Interference**

Please make corrections according to the table below.

Step	Solutions
1	Add 120 $\Omega$ termination resistors at both ends of the bus
2	Replace with multi-core shielded twisted pair cable, ground the shielding layer at both ends
3	Keep the communication cable and power cable separated by at least 30cm
4	For multi-node communication, wiring should be done using a daisy chain method
5	For multi-node communication, add an equipotential bonding wire between nodes
6	Add magnetic beads on both sides of the communication cable, or wind 1-2 turns
7	Add a ferrite core to the inverter's output UVW, winding it 2-4 turns
8	Use shielded power cables, and ensure the shielding layer is well grounded

**8.4.2. EtherCAT and Profinet communication interference**

Please make corrections according to the table below.

Step	Solutions
1	Whether the communication network cable meets the specifications of shielded Category 5e cable
2	Check if there is any looseness or poor contact at the communication port
3	Keep the communication cable and power cable separated by at least 30cm
4	For multi-node communication, add an equipotential bonding wire between nodes
5	The maximum allowable cable length between two nodes is 100 meters
6	Add magnetic beads on both sides of the communication cable, and wind 1-2 turns
7	Add a ferrite core to the inverter's output UVW, winding it 2-4 turns
8	Use shielded power cables, and ensure the shielding layer is well grounded

**8.5. Encoder feedback signal error**

Please make corrections according to the table below.

Step	Solutions
1	Run encoder cables and power cables in separate conduits to avoid bundling them together
2	When the inverter is far from the motor (motor cable 10m), try disconnecting the encoder shield at the inverter side from the grounding terminal (PE terminal)
3	Add a ferrite core or clip to the encoder signal cable near the inverter side
4	Add a ferrite core to the inverter's output UVW, winding it 2-4 turns
5	Use shielded power cables, and ensure the shielding layer is well grounded