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Grid-tie Transformerless Solar Inverter

M70A_260 / M50A_260

Operation and Installation Manual

English 1

简体中文 87

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1 Safety

1.1 Information of the Inverter

1.1.1 Legal Provisions

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This manual accompanies our product for use by the end users. The technical instructions and illustrations contained in this manual are to be treated as confidential and no part may be reproduced without the prior written permission of DELTA ELECTRONICS, INC. Service engineers and end users may not divulge the information contained herein or use this manual for purpose other than those strictly connected with correct use of the product. All information and specifications are subject to change without notice.

DELTA ELECTRONICS, INC. shall have no obligation to either personal injury and property damage claims hereinafter with respect to any actions -- (a) the product has been installed and/or repaired improperly; (b) the product has been misused without following the instructions on this user manual; (c) the product has failed due to incorrect unpacking.

1.1.2 Target Group

This - manual – is prepared for use by a well-trained technician for installing, commissioning, operation, and maintenance. The technician must have the following basic and advanced skills:

- Knowledge of the fundamentals of electricity, wiring, electrical components and electrical schematic symbols.
- Knowledge of how a solar inverter works and is operated.
- Training in the installation and commissioning of electrical devices and installations.
- Training in how to deal with the dangers and risks associated with installing and using electrical devices and installations.
- Compliance with this manual and all safety information.

1.2 General Safety

IMPORTANT SAFETY INSTRUCTIONS : SAVE THESE INSTRUCTIONS !



- Please read these instructions carefully and save them for later use.

To prevent personal injury and/or property damage, and also to ensure long term operation of the solar inverter, it is imperative this section be read carefully and all the safety instructions understood before using this inverter.

This user manual provides important instructions for Delta grid-tie transformerless solar inverter. The product is designed, tested, verified, and certified according to international safety requirements, certifications, and standards but precautions must be observed when installing and operating the product.

This product is suitable for both indoor and outdoor use.

ATTENTION : NO GALVANIC ISOLATION



- External insulation transformer shall be installed at grid side which is following to isolating between AC and PV array.
- The design of this inverter is transformerless. There is no isolation transformer between the AC and DC sides, i.e., the product does not require galvanic isolation. In order to function properly, any PV array connected must have its PV circuits isolated from ground, i.e., do not bond either side of the array to ground! If a grounded PV array is connected to the inverter, the error message INSULATION (E34) will appear on the display.
- It is prohibited to reference the L1, L2, L3 or N terminal to ground; to do so will damage the inverter and void the product warranty.

1.2.1 Condition of Use

- M70A_260 / M50A_260 is a transformerless solar inverter with 6 MPP tracking input, which converts the variable direct current generated by the solar array into a utility frequency grid-compliant balanced three-phase AC current and feeds it into the utility grid.
- The Photovoltaic modules used must be compatible with the inverter. PV modules with a high parasitic capacitance to ground may only be utilized if the capacitive coupling does not exceed 10 μ F.
- The inverter must only be operated in countries for which it is approved by Delta and the grid operator.

1.2.2 Symbols

This section describes the definition of the symbols in this manual. In order to prevent both personal injury and property damage, and to ensure long-term operation of the product, please read this section carefully and follow all the safety instructions while you use the product.

DANGER!



- This warning indicates an immediate hazard which will lead to death or serious injury.

WARNING !



- This warning indicates a hazardous condition which may lead to death or serious injury.

CAUTION !



- This warning indicates a hazardous condition which may lead to minor injury.

ATTENTION



- This warning indicates a condition of potential damage to property and/or the environment.

INFORMATION

- An exclamation mark enclosed in a double circle indicates additional important information is contained in the following section and the user should follow the instructions to prevent any hazards.

DANGER : ELECTRICAL HAZARD!!

- This warning indicates an immediate electrical hazard that unheeded can lead to death or serious injury.

CAUTION : HOT SURFACES, DO NOT TOUCH!

- This warning indicates a potential burn hazard.
- Use care when touching surfaces when operating the product.
- Do not perform any task until the product cools down sufficiently.



- This icon indicates that a prescribed time delay must elapse before engaging in an indicated action.
- Patientez le délai requis avant d'entreprendre l'action indiquée.



- This symbol indicates the location of an equipment grounding conductor (EGC) terminal.

2 Introduction

M70A_260 / M50A_260 transformerless 3Ø PV inverters are designed to enable the highest levels of efficiency and provide longest operating life by use of state-of-the-art high frequency and low EMI switchmode technology. It is suitable for outdoor use.

ATTENTION : NO GALVANIC ISOLATION



- This product utilizes a transformerless design, and is not provisioned with an isolation transformer, and therefore has no galvanic isolation between the DC and AC sides.

PV array circuits connected must be floating with respect to ground, i.e., must not be referenced (bonded) to ground.

If grounded PV arrays are connected to the inverter, the inverter will not connect to the grid and the error message INSULATION (E34) will appear.

- It is prohibited to connect terminals L1, L2, L3 or N to ground.

2.1 Valid Model

The user manual is valid for the following device types:

- M70A_260
- M50A_260

This user manual must be followed during installation, operation, and maintenance.

Delta reserves the right to make modifications to the content and technical data in this user manual without prior notice.

2.2 Product Overview

The components are shown as **Figure 2-1**.

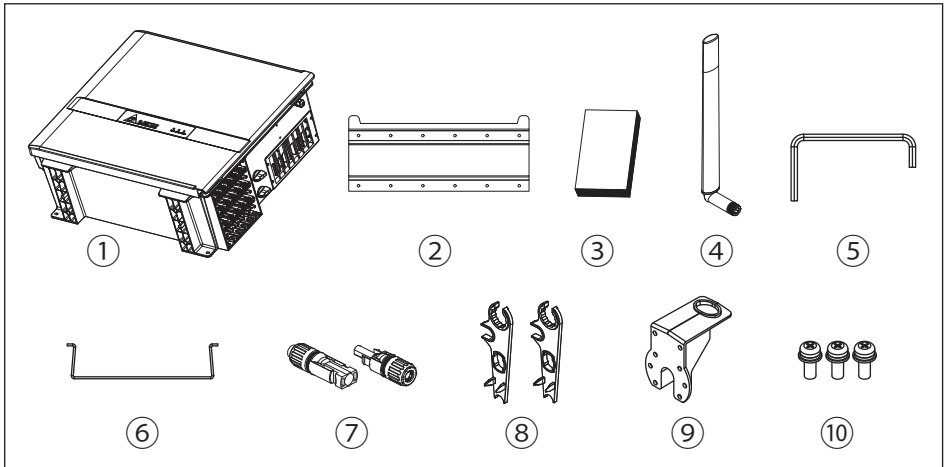


Figure 2-1: Components

Table 2-1: Packing list

M70A_260 / M50A_260			
	Object	Qty	Description
1	Delta Solar Inverter	1 pc	Solar inverter
2	Mounting Bracket	1 pc	Wall mounting bracket (Material: Aluminum/Thickness: 3mm)
3	User Manual	1 pc	Important instructions for solar inverter. Safety instructions should be followed during installation and maintenance.
4	SUB_1G Antenna	1 pc	Antenna for SUB_1G
5	Hexagon Driver (Installed on latch lock cover)	1 pc	Keep the door being open. Can unscrew the latch lock cover screw.
6	Protective Frame	6 pcs	Protect DC connectors
7	H4 Connector	18/12 pairs*	DC String inputs
8	H4 Wrench	2 pcs	To disconnect H4 connector
9	Antenna Bracket	1 pc	For fixing antenna
10	Screw	3 pcs	For assembling antenna bracket

* M70A_260: 18 pairs / M50A_260: 12 pairs

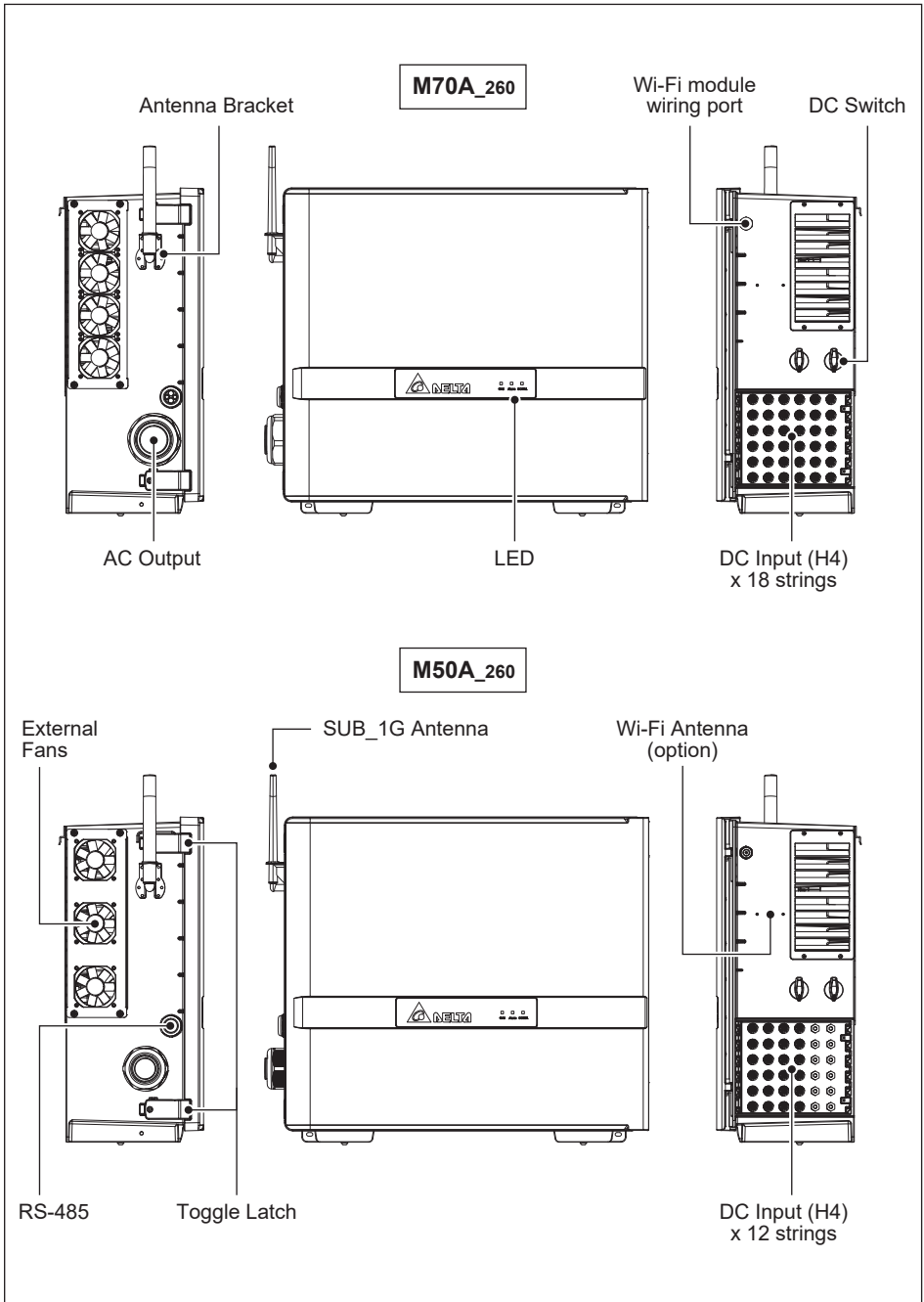


Figure 2-2: Overview

Figure 2-3 below, shows the certification and rating label.
Table 2-2 defines the symbol markings on this label.































































<p>M70A_260 </p> <p>Solar Inverter (太陽能變流器/光伏并网逆变器) P/N (料號/料号): RP103M260000</p> <p>DC Input 200~1000Vdc, MPPT 460~800Vdc (輸入/輸入) MAX. lsc: 26A*6 MPPT, 1000Vdc max MAX. lsc: 50A*6 MPPT</p> <p>AC Output 220/380Vvac, 230/400Vvac (輸出/輸出) 3P4W/3P3W, 50/60Hz 111.6A max, cosφ 0.8 ind ~ 0.8 cap 70kW/70kVA nom, 77kW/77kVA max</p> <p>IP Code (IP防護等級/防护等级): IP65 (Electronics電子部份/电子部份)</p> <p>Protective Class (防護等級/防护等级): I</p> <p>Over Voltage Category (過電壓等級/过电压等级): ACⅡ / DCⅡ</p> <p>Made in China</p> <p>VDE-AR-N 4105  Authorized representative Duka Electronics (Netherlands) B.V. Zandvoen 15, 2112 MZ Hoofddorp, The Netherlands</p> <p>     </p> <p>     </p>	<p>M70A_260 </p> <p>Solar Inverter (太陽能變流器/光伏并网逆变器) P/N (料號/料号): RP103M260100</p> <p>DC Input 200~1000Vdc, MPPT 460~800Vdc (輸入/輸入) MAX. lsc: 26A*6 MPPT, 1000Vdc max MAX. lsc: 50A*6 MPPT</p> <p>AC Output 220/380Vvac, 230/400Vvac (輸出/輸出) 3P4W/3P3W, 50/60Hz 111.6A max, cosφ 0.8 ind ~ 0.8 cap 70kW/70kVA nom, 77kW/77kVA max</p> <p>IP Code (IP防護等級/防护等级): IP65 (Electronics電子部份/电子部份)</p> <p>Protective Class (防護等級/防护等级): I</p> <p>Over Voltage Category (過電壓等級/过电压等级): ACⅡ / DCⅡ</p> <p>Made in China</p> <p>VDE-AR-N 4105  Authorized representative Duka Electronics (Netherlands) B.V. Zandvoen 15, 2112 MZ Hoofddorp, The Netherlands</p> <p>     </p> <p>     </p>
<p>M50A_260 </p> <p>Solar Inverter (太陽能變流器/光伏并网逆变器) P/N (料號/料号): RP1503M260000</p> <p>DC Input 200~1000Vdc, MPPT 390~900Vdc (輸入/輸入) Max. total lsc: 132A (26A*MPPT) Max. lsc: 50A*6 MPPT, 1000Vdc max.</p> <p>AC Output 220/380Vvac, 230/400Vvac (輸出/輸出) 3P4W/3P3W, 50/60Hz 83.4A max, cosφ 0.8 ind ~ 0.8 cap 50kW/50kVA nom, 55kW/55kVA max.</p> <p>IP Code (IP防護等級/防护等级): IP65 (Electronics電子部份/电子部份)</p> <p>Protective Class (防護等級/防护等级): I</p> <p>Over Voltage Category (過電壓等級/过电压等级): ACⅡ / DCⅡ</p> <p>Made in China</p> <p>VDE-AR-N 4105  Authorized representative Duka Electronics (Netherlands) B.V. Zandvoen 15, 2112 MZ Hoofddorp, The Netherlands</p> <p>     </p> <p>     </p>	<p>M50A_260 </p> <p>Solar Inverter (太陽能變流器/光伏并网逆变器) P/N (料號/料号): RP1503M260005</p> <p>DC Input 200~1000Vdc, MPPT 390~900Vdc (輸入/輸入) Max. total lsc: 132A (26A*MPPT) Max. lsc: 50A*6 MPPT, 1000Vdc max.</p> <p>AC Output 220/380Vvac, 230/400Vvac (輸出/輸出) 3P4W/3P3W, 50/60Hz 83.4A max, cosφ 0.8 ind ~ 0.8 cap 50kW/50kVA nom</p> <p>IP Code (IP防護等級/防护等级): IP65 (Electronics電子部份/电子部份)</p> <p>Protective Class (防護等級/防护等级): I</p> <p>Over Voltage Category (過電壓等級/过电压等级): ACⅡ / DCⅡ</p> <p>Made in China</p> <p>VDE-AR-N 4105  Authorized representative Duka Electronics (Netherlands) B.V. Zandvoen 15, 2112 MZ Hoofddorp, The Netherlands</p> <p>     </p> <p>     </p>

Figure 2-3: Rating label

Table 2-3: Rating label explanation

Symbol	Definition	
	<p>Danger to life through electric shock Potentially fatal voltage is applied to the inverter during operation. This voltage persists even 60 seconds after disconnection of the power supply. Never open the inverter. The inverter contains no components that must be maintained or repaired by the operator/installer. Opening the housing will void the warranty.</p>	
	<p>Beware of hot surface. This inverter can get hot during operation.</p>	 <p>Before working with the inverter, you must read the supplied manual and follow the instructions contained therein.</p>
	<p>This inverter is not separated from the grid with a transformer.</p>	
	<p>The housing of the inverter must be grounded if this is required by local regulations.</p>	 <p>WEEE marking The inverter must not be disposed of as standard household waste, but in accordance with the applicable electronic waste disposal regulations of your country or region.</p>

In the following pages, **Figures 2-4** illustrate the general layout of the chassis and wiring area. **Figure 2-5** and **Table 2-3**, provides a detailed description of each wiring area option.

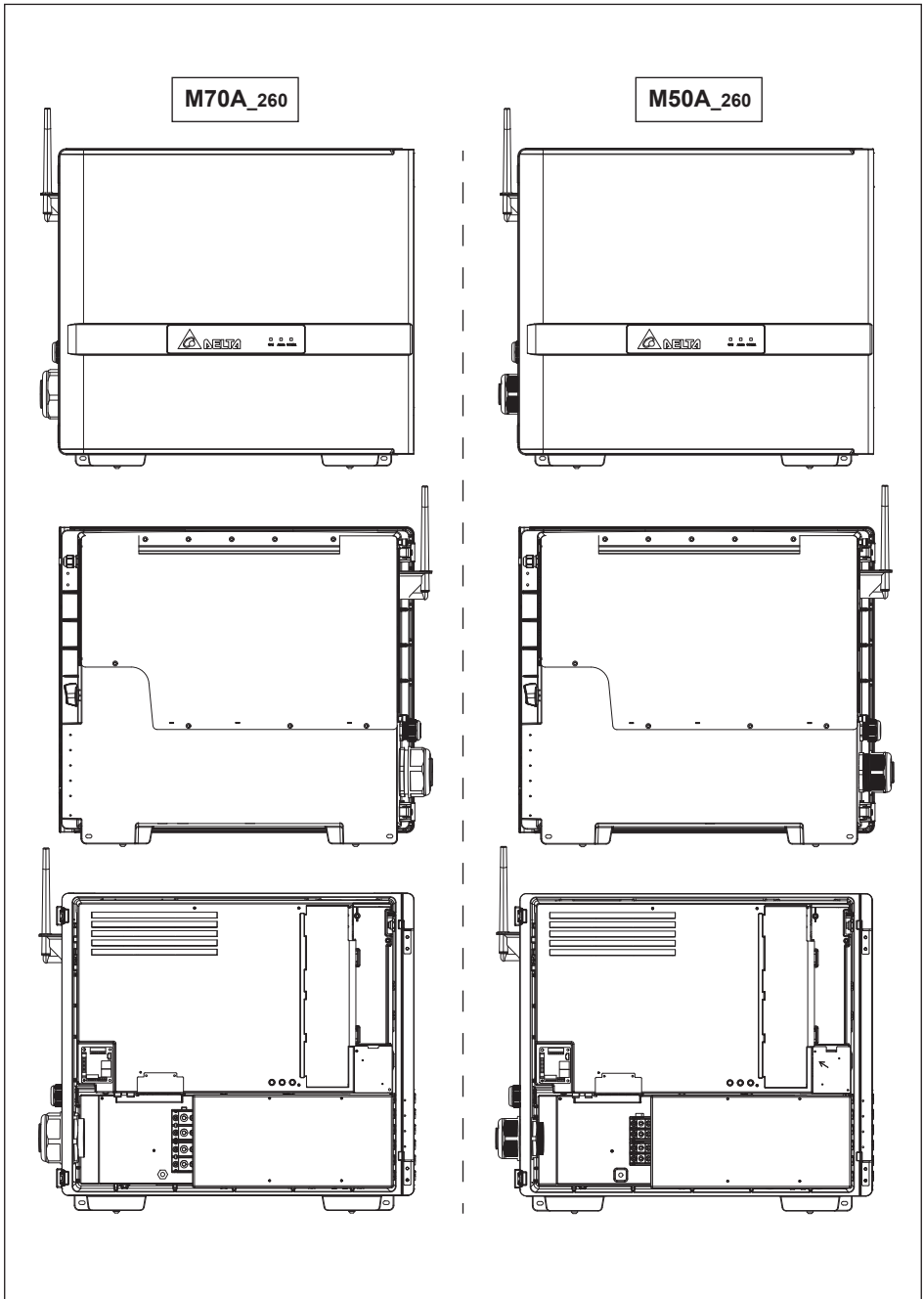


Figure 2-4: External/ internal view

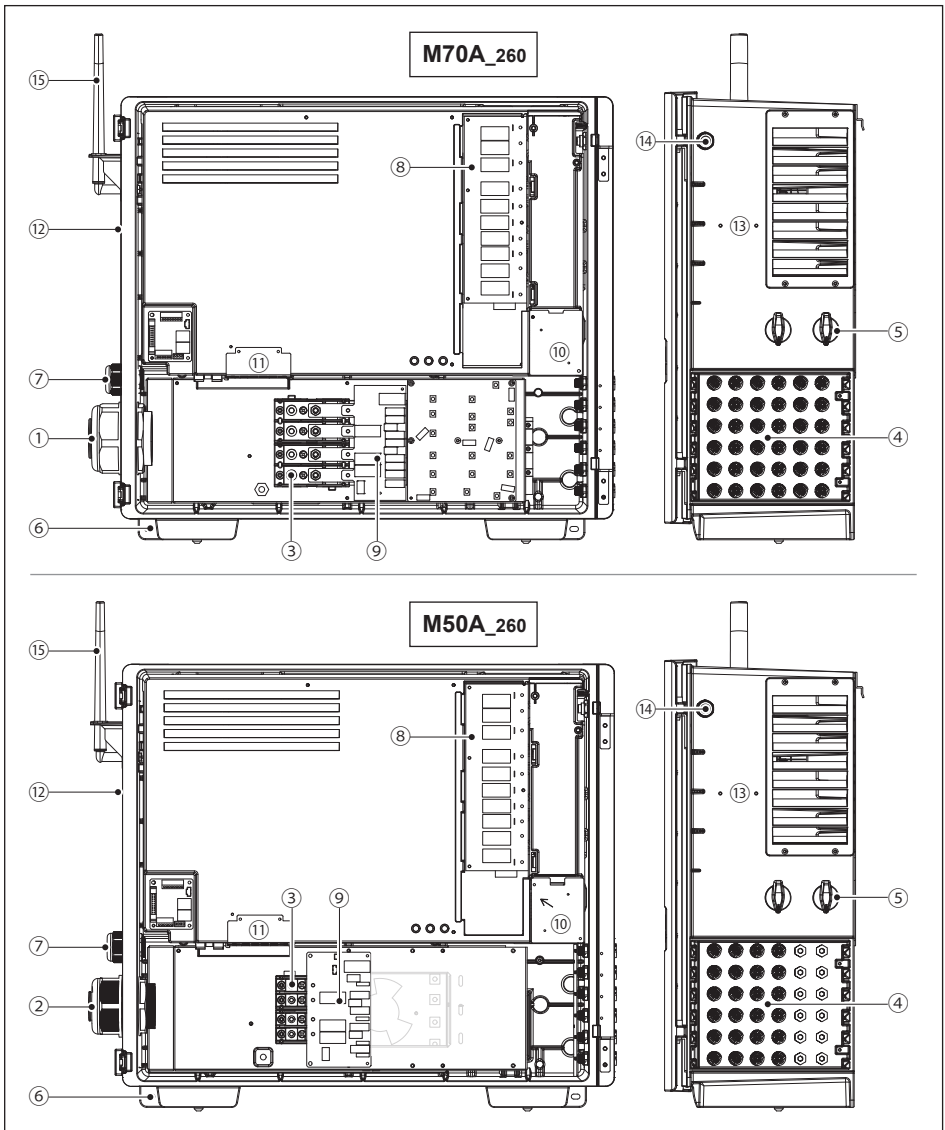


Figure 2-5: layout

Table 2-3: layout description

NO.	Component	NO.	Component	NO.	Component
1	2.8" cable opening for AC (M70A_260)	6	Grounding (M6 threaded stud)	11	Internal fan 2
2	2.5" cable opening for AC (M50A_260)	7	Communication port	12	Outer fan
3	AC terminal	8	Type II DC SPD	13	Wi-Fi (option)
4	H4 connectors	9	Type II AC SPD	14	Wi-Fi gland
5	DC switches	10	Internal fan 1	15	SUB_1G

3 Installation

CAUTION !



- In some locations, mounting the inverter in direct sunlight may cause the inverter to enter a thermal derating mode. To eliminate this concern, a shade structure over the inverter chassis may be necessary.

WARNING !



- Do not install the unit near or on flammable surfaces.
- Inverter must be mounted securely to a solid / smooth surface.

The chapter contains instructions for

- (1) Mechanical installation
- (2) Electrical Installation
- (3) Communication setup

Figure 3-3 provides the mechanical dimensions of the inverter.

3.1 Unboxing & Review

Unpacking the case, please follow the order of **Figure 3-1**.
It could be transported by 2 people (**Figure 3-2**) .

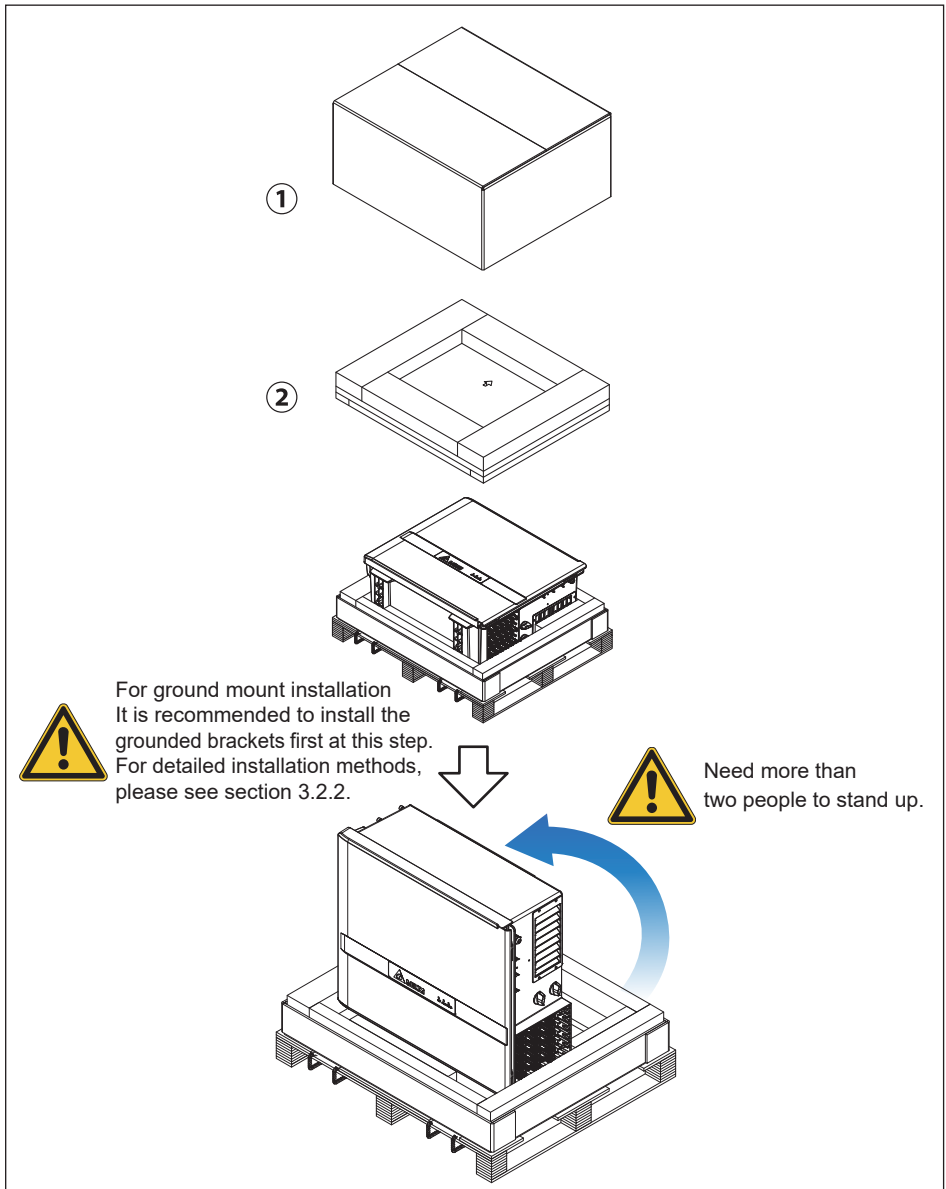


Figure 3-1: The step to unpacking the inverter

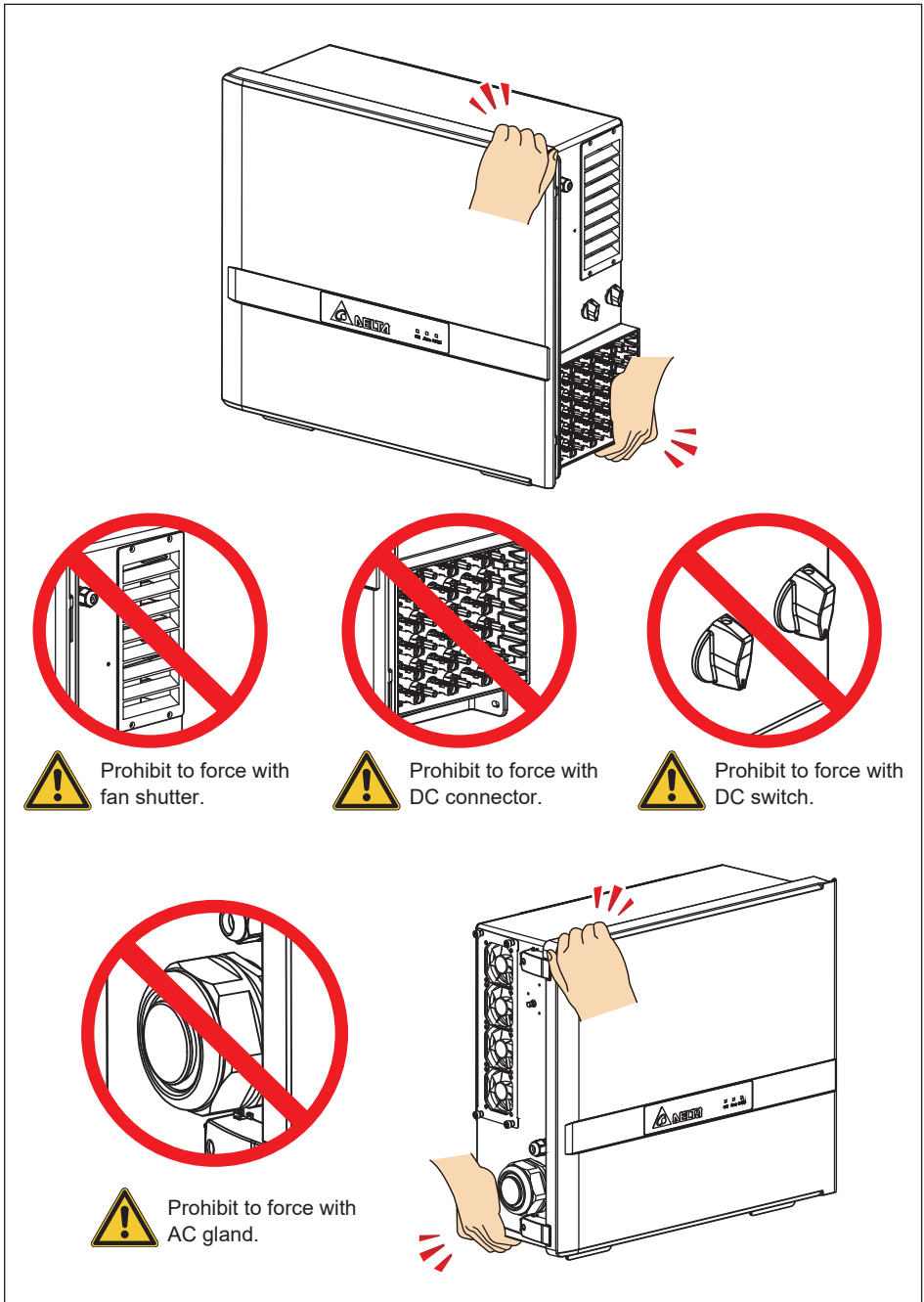


Figure 3-2: Handle position for handling

3.2 Mechanical Installation

This unit is designed to be wall-mounted per **Section 3.2.1** or ground mounted **Section 3.2.2**.

3.2.1 Vertical Wall Mount

Refer to **Figures 3-4** through **Figures 3-9**.

1. Ensure the surface to which the unit is to be mounted is sufficiently strong enough to carry the weight.
2. Orient the wall bracket (**Figure 3-4**) horizontally (perpendicular to the floor).
3. Secure the mounting bracket on the wall with 12 M6 screws. (**Figure 3-5**)
4. Hang the inverter on the wall mounting bracket.
5. Secure the inverter by 2 M6 screws on the position* shown as **Figure 3-5**.

* These are also grounding points for equipment grounding. (To ground the inverter, please refer to **Section 3.5.2**)

CAUTION !



- The mounting bracket shipped with the unit is specially designed and is the only certified mounting device for mounting the inverter.
- Secure the mounting bracket on the wall with 8 M6 screws.
- Failure to comply with following mounting instructions including permitted orientations and designated clearances may result in derated power output and may void the warranty.

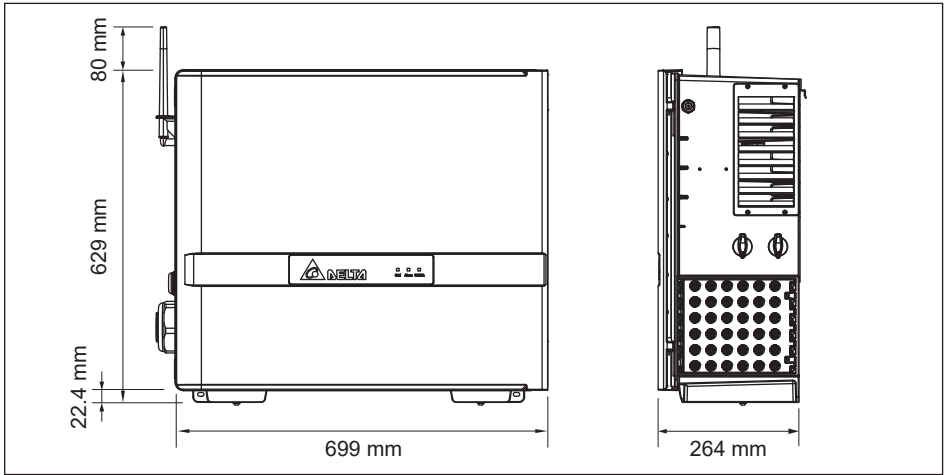


Figure 3-3: Inverter dimensions

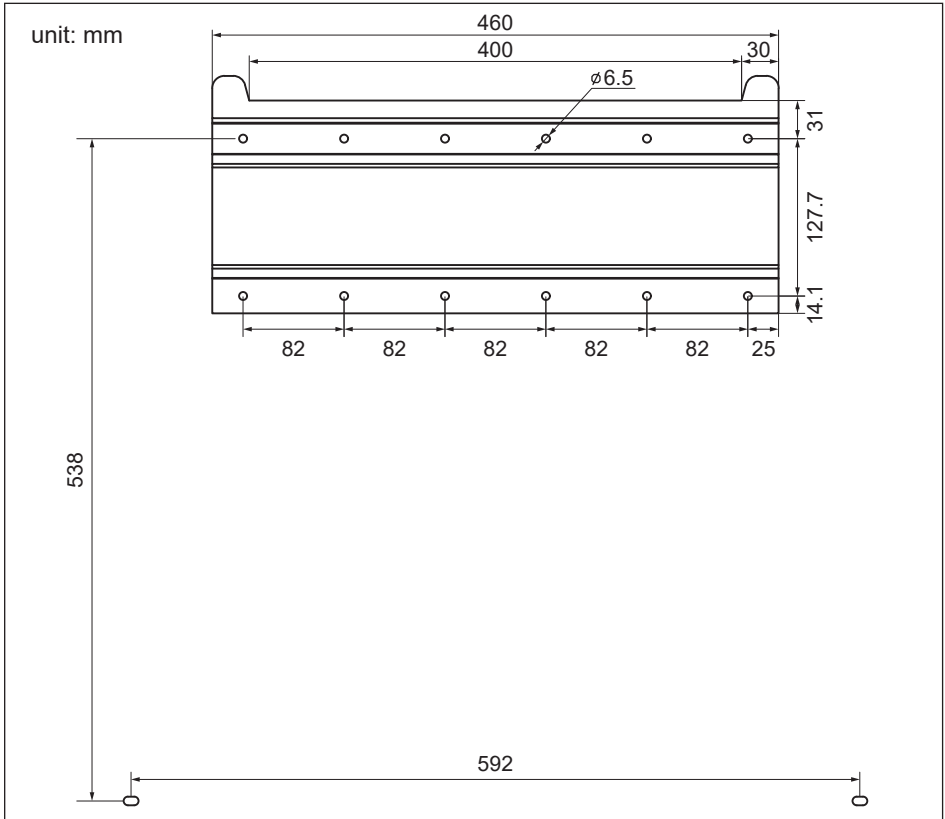
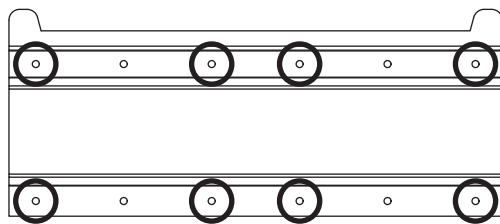


Figure 3-4: Mounting bracket dimensions



Required position of at least 8 screws for mounting bracket

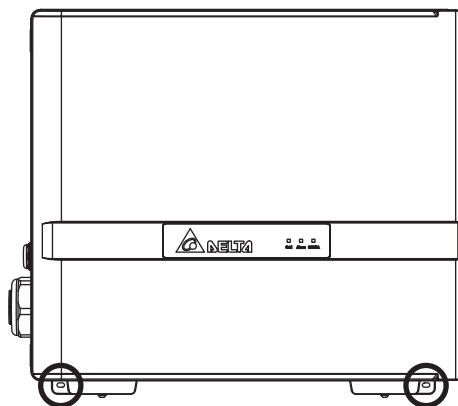


Figure 3-5: Positions of mounting screws

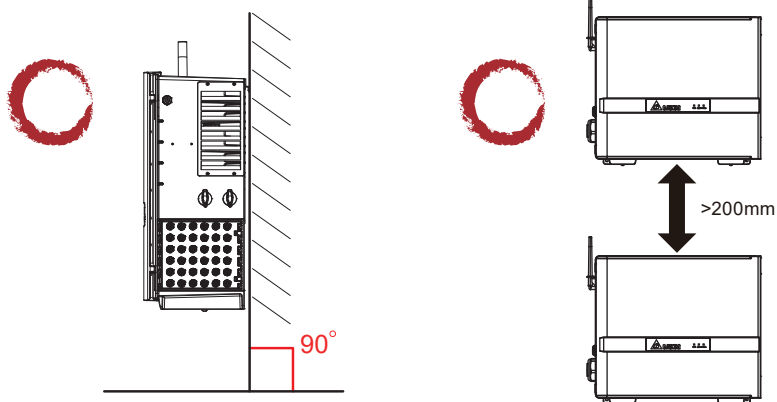


Figure 3-6: Permitted mounting positions

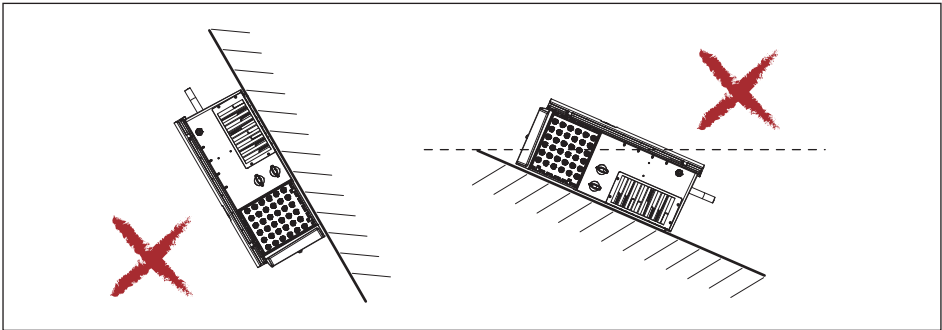


Figure 3-7: Prohibited mounting positions

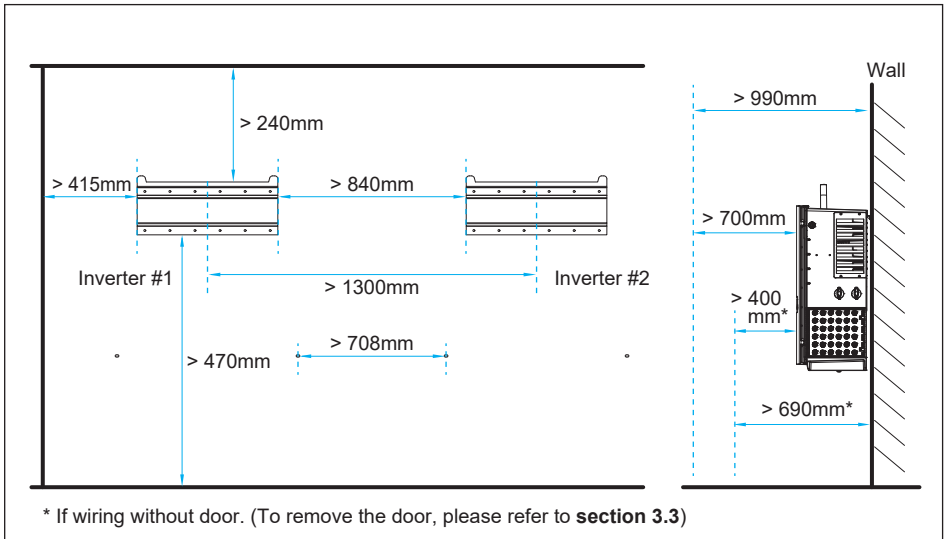
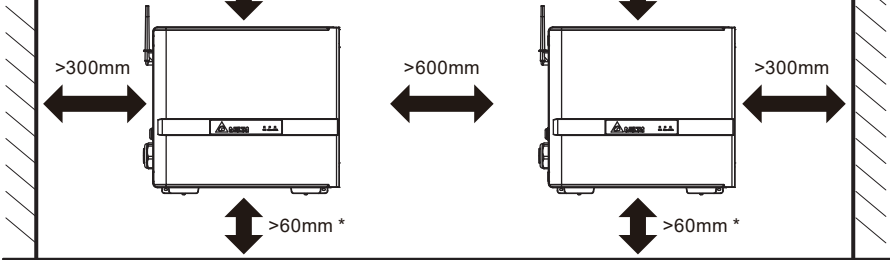


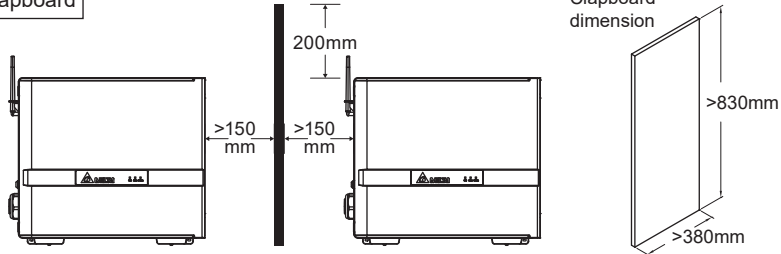
Figure 3-8: Required mounting clearances

Without Clapboard



* If the installation location has a risk of flooding or accumulated snow, please raise the appropriate height of the inverter.

Install Clapboard



Back to Back

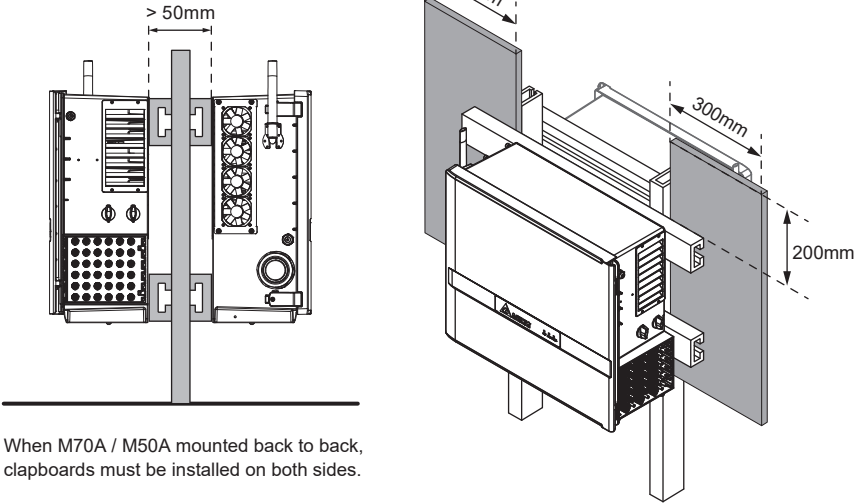


Figure 3-9: Separation distance of plural inverters

3.2.2 Ground Mount (Option)

Buy the spare parts of grounded brackets if ground mounted.

1. Ensure the grounded base to which the unit is to be mounted is sufficiently strong enough to carry the weight.
2. The grounded base horizontally (perpendicular to the floor), and mark required mounting hole locations per **Figure 3-11**.
3. Lock the grounded brackets to feet with 4 screws. (**Figure 3-10**)
4. Secure the grounded brackets on the grounded base with 4 M12 screws per **Figure 3-11**.
5. Ser the inverter on the ground mounting base.

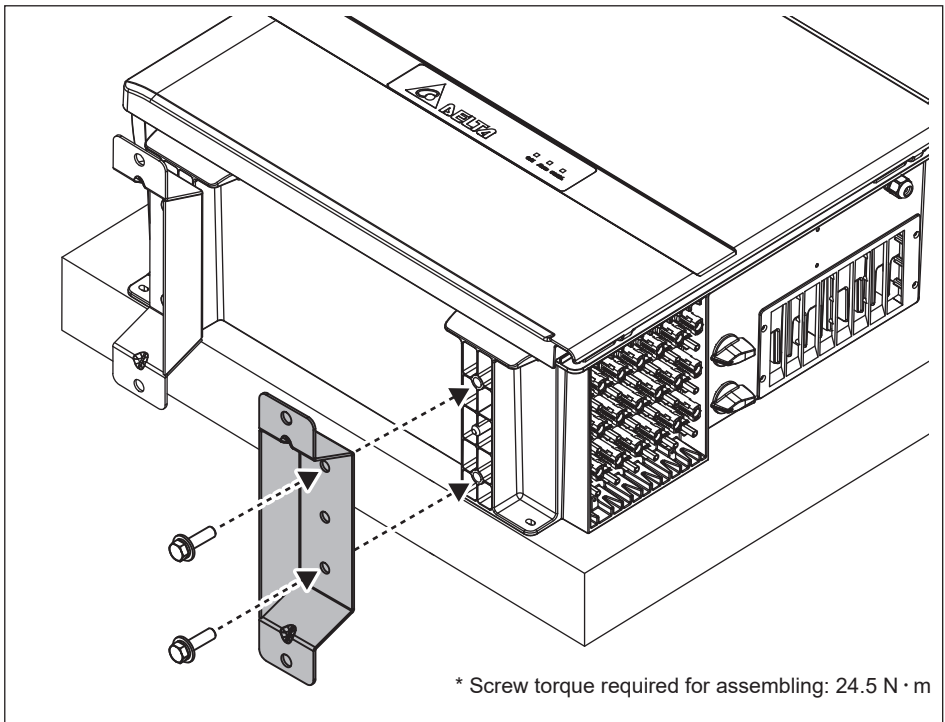
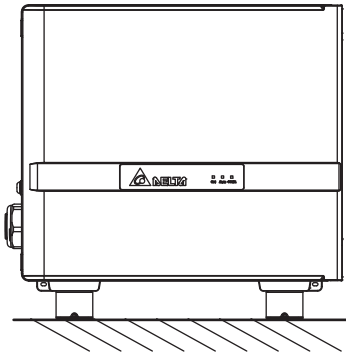
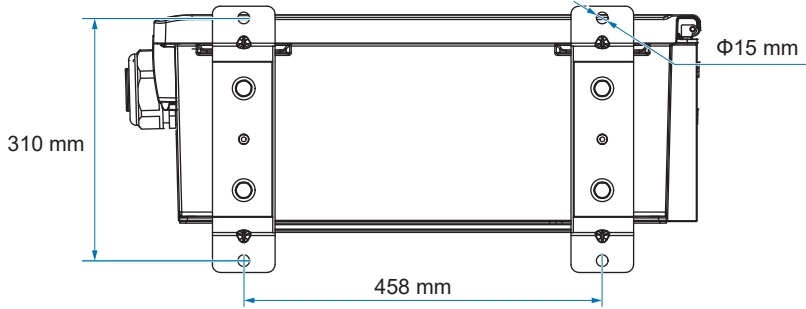
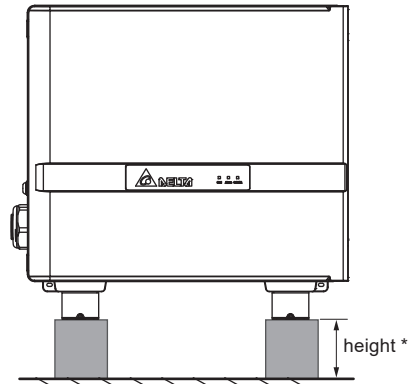


Figure 3-10 : Lock the grounded brackets to feet



or



* If the installation location has a risk of flooding or accumulated snow, please raise the appropriate height of the inverter.

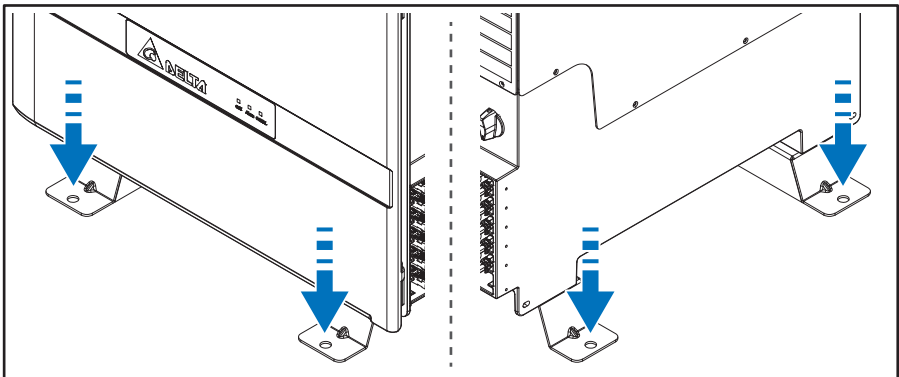


Figure 3-11: To secure inverter grounded brackets to ground-mounting base

3.3 Door

In order to ensure the normal long-term operation of the inverter, please follow the procedures in **Section 5.1** to open and close the door.

If the installation space is too narrow for the wiring operation, please remove the door according to **Figure 3-12**. After the wiring operation, please install the door onto the inverter and follow the procedures in **Section 5.1.2** to close the door.

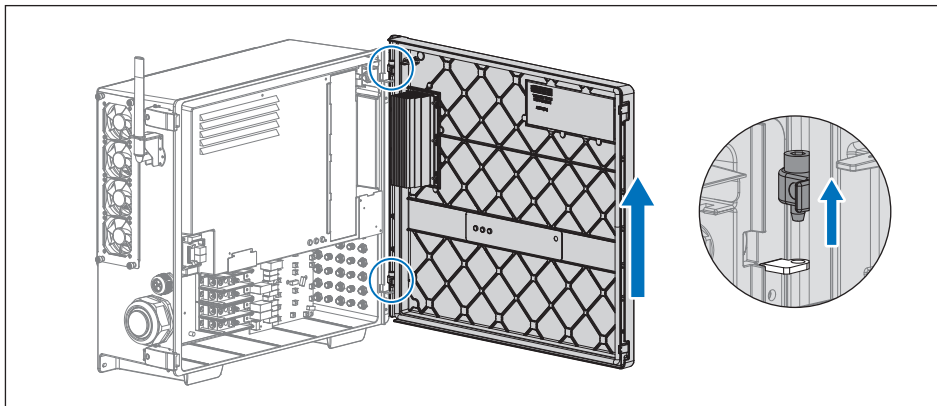


Figure 3-12: Remove the door

3.4 Electrical Installation for AC Wiring

DANGER : ELECTRICAL HAZARD!!



- To avoid shock hazard during cabling, insure any live grid connections are removed from the inverter.

WARNING !



- Code compliance is the installer's responsibility.
- Inverter warranty void if the DC input voltage exceeds 1100 Vdc.

CAUTION : INVERTER AND EQUIPMENT DAMAGE MAY OCCUR !



- Installation for AC terminal must meet the local electrical code.
- Failed to follow the instructions may damage AC cable.

CAUTION: WRONG AC WIRING !



- In order not to damage the components in the inverter, ensure the correct conductor is connected to the appropriate AC terminal on the inverter.

3.4.1 AC Grid Types and Connections

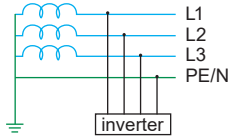
ATTENTION



The default AC Grid connection is 3Ø-3W. It can also connect 3Ø-4W with Neutral (N). The inverter will operate from the following grid connections without need of an external transformer:

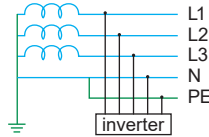
TNC system

230/400V



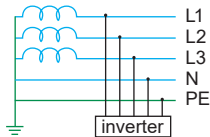
TNC-S system

230/400V



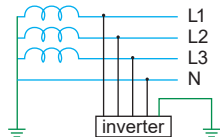
TNS system

230/400V



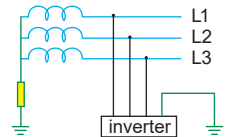
TT system

230/400V



IT system

230/400V



3.4.2 Required Protective Devices

It is recommended to install an upstream circuit breaker between AC side and inverter side for over current protection.

Model	Upstream circuit breaker
M70A_260	150A max.
M50A_260	125A max.

3.4.3 AC Wiring Preparation

- The cross-sectional area for each AC conductor is shown below.
- The information and notice of cable using is shown on next page.

Conductor cross-section:

M70A_260 -

Cu: 35 mm² (1 AWG) ~ 120 mm² (250 kcmil)

Al: 60 mm² (2/0 AWG) ~ 120 mm² (250 kcmil)

M50A_260 -

Cu: 16 mm² (4 AWG) ~ 60 mm² (2/0 AWG)

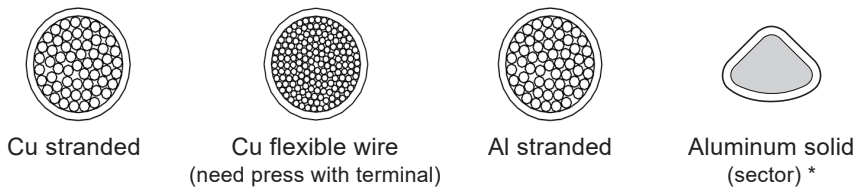
Al: 25 mm² (2 AWG) ~ 60 mm² (2/0 AWG)

Stripping length: 20mm

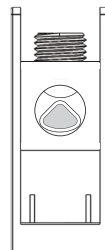


Figure 3-13: Size of AC conductors

M70A_260 / M50A_260 support Cu stranded, Cu flexible conductor, Al stranded wire, aluminum solid (include sector wire)



- Cu:
The Cu flexible wire need stamp with terminal, for the other model wiring with bear wire is available.
 - Al:
The oxide layer at the end of the terminal must be removed when connecting the aluminum wire. After removing the oxide layer, we recommended cost the neutral fat or acid-free, alkali-free vaseline on the end of the conductor and connect the conductor immediately. It's necessary to treat the oxide layer when reconnect the wire.
- * The sector wiring direction is shown as right figure.



WARNING !



- If not following the above pretreatment, the contact resistance will increase significantly which will lead to the excessive temperature rise, even catch fire.

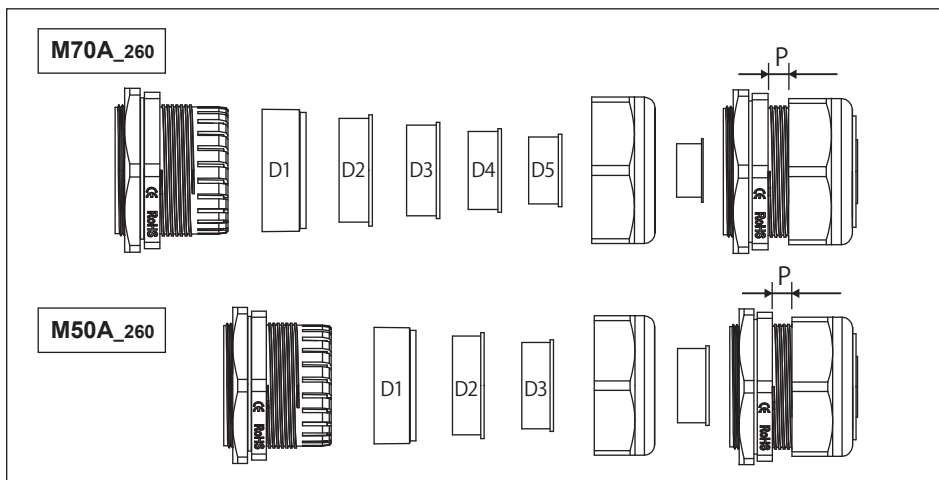


Figure 3-14: AC Gland with multiple inlet

Table 3-1: Cable size comparison table

M70A	Sizes of Cables (mm)		Torque (N·m)	Dimension of P (mm)
D1	51-57	2550 mm ²	8.5	7
D2	43-50	1962 mm ²	8.5	5
D3	36-43	1450 mm ²	8	5
D4	30-36	1017 mm ²	8.5	5
D5	26-30	706 mm ²	8.5	5

M50A	Sizes of Cables (mm)		Torque (N·m)	Dimension of P (mm)
D1	30.8-44.7	1570 mm ²	13	2
D2	26.8-35.4	984 mm ²	15	2
D3	21.9-27.6	598 mm ²	13	2

3.4.4 AC Side –Prewire Set-Up

Prior to installing conductors on terminal complete the following procedure to make terminals ready for connections.

For each of the AC terminals (L1, L2, L3, N):

Tighten/Lose nuts with 17mm socket. If an electric socket is utilized insure the torque setting is low enough to NOT OVER-TORQUE the screw. Once nut bottoms out, do not turn it any further.

NOTICE

Extreme temperature rise at the clamping point

If the contact resistance between the aluminum conductor and clamping point is too high, the clamping point can become very hot and even catch fire in extreme cases.



To ensure a safe and reliable contact, **always** perform the following work steps:

- ▶ Please select the Al wire size according to rules due to lower conductivity of Al.
- ▶ Keep the installation location as free as possible from moisture or corrosive atmospheres.
- ▶ Connect the aluminum cables quickly.
- ▶ Tighten the clamping screw in the clamping body with the maximum permissible tightening torque.

3.4.5 AC Wiring

Refer to **Figure 3-13** in **Section 3.4** for the procedure to prepare AC conductors for connection to the AC terminals. Ensure the AC conductors used are sized to the correct ampacity per NEC or other local code.

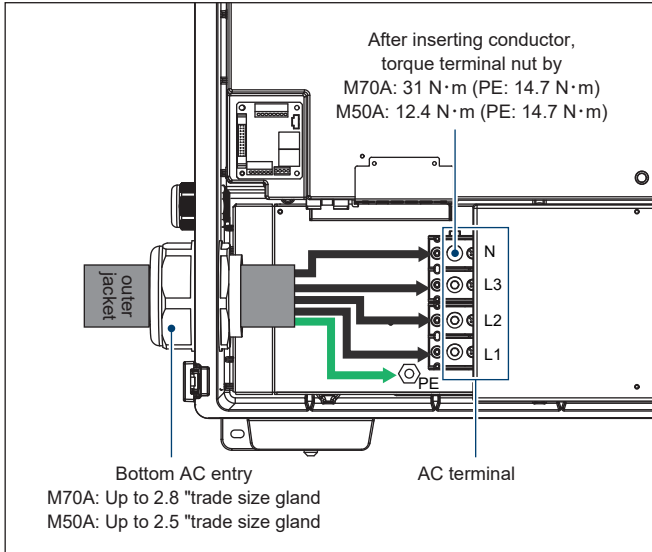


Figure 3-15: Location for AC terminal

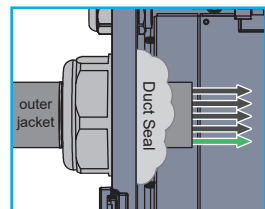
Figure 3-15 illustrates the location of the AC conduit entry and connections to the AC terminal block:

- Unscrew all AC terminal nits as noted in **Section 3.4.4**.
- Ensure the correct conductor is connected to the appropriate terminal.
- After conductor is inserted, use 8 mm hex wrench to tight L1, L2, L3, N terminal with the torque shown as **Figure 3-15**.

ATTENTION



Please seal the AC Gland from inside the case by using duct seal to prevent living creature or moisture enter the case.



3.5 Electrical Installation for DC Wiring

DANGER : ELECTRICAL HAZARD!!



- PV array converts sunlight into electric power with high DC voltage and high DC current which can cause dangerous electrical shock hazard!
- Use an opaque material to cover the PV array before wiring or cabling.
- Ensure the correct polarities are connected when DC cabling is applied.

WARNING !



- The risk of electric shock and fire exists because of high DC and AC voltages.
- Only PV modules that are listed with system voltage under 1100V are permitted for use.
- Ensure the two DC switches are placed in the "OFF" position, and the PV array is disconnected when DC conductors are connected.

CAUTION: DC SWICH ON/OFF !



- In order not to damage the components in the inverter, don't repeat to change the status of DC Switch quickly, the correct operation is waiting for the LED display show "green off and yellow flash" (No DC) or turn on the switch after 5 minute later.

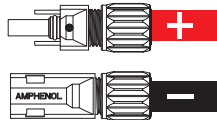
ATTENTION



- The PV Array current carrying conductors (positive or negative) must not be referenced to ground.

DANGER : ELECTRICAL HAZARD!!

- Before plug in the DC connectors, pay attention to the polar is correct. Reverse positive and negative voltage, inverter will probably damage.



ATTENTION



- Do not remove the waterproof plug for unused DC strings.

3.5.1 DC Wiring Installation

Please read the following instructions for connecting DC connector :

- Ensure the DC conductors used are Cu and sized to the correct ampacity per NEC or other local code
- Strip off all wires for 6.5~7.5 mm.
- The cross-sectional area for each DC conductor is 12/10 AWG (4/6mm²) .

M70A_260 and M50A_260 use bulkhead mounted H4 type connectors for interconnecting string wiring to the inverter. Mating connectors (See **Figure 3-16**) are provided within the hardware bag.

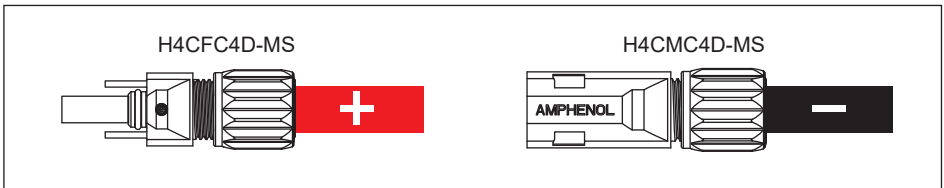



Figure 3-16: DC Wiring illustration

- Choose the DC string wire size based on NEC requirements or other local code.

DC wiring polarities are divided into positive and negative, and the layout of the connectors is shown in **Figure 3-17**.

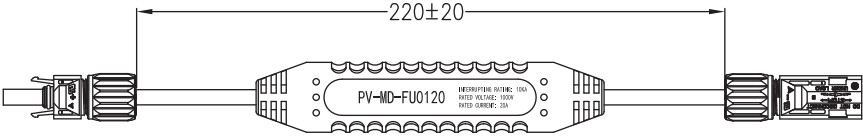
- After DC Wiring installing, insert the protective frame for DC connector and the method is shown in **Figure 3-18**.

ATTENTION



- According to the regulations, when each group of DC input is configured as 3 strings, the external fuse is required. Please contact Delta dealers.

MDFU-10-66-20-H4



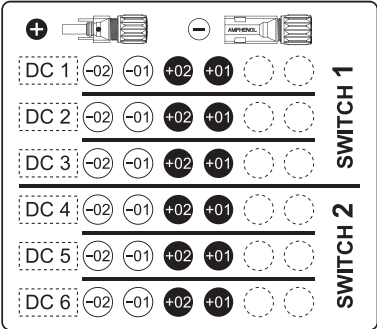
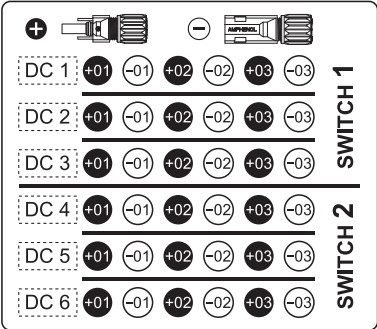
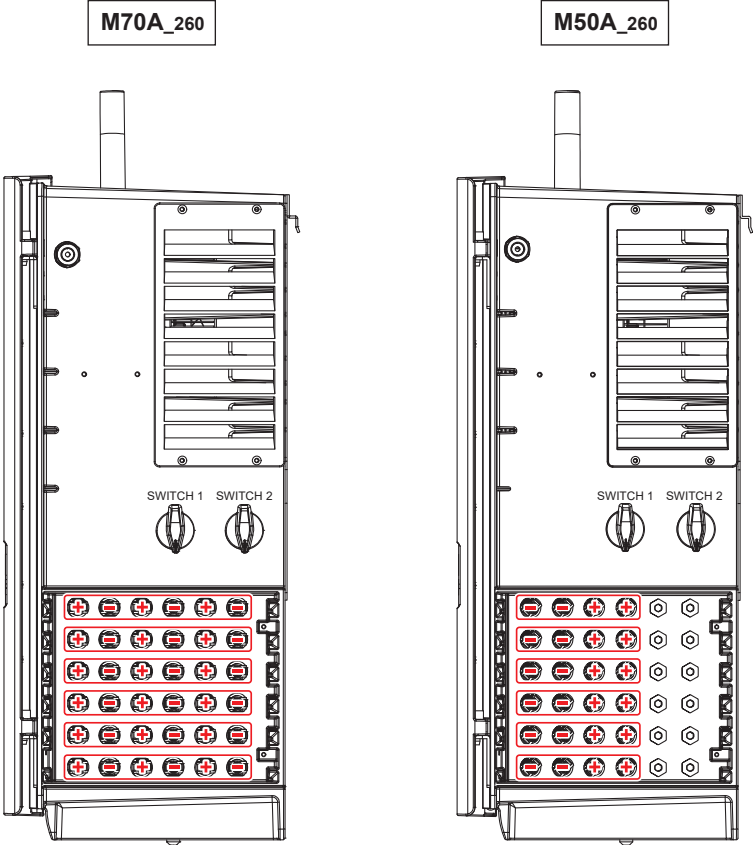


Figure 3-17: location of H4 connectors to connect array wiring (DC)

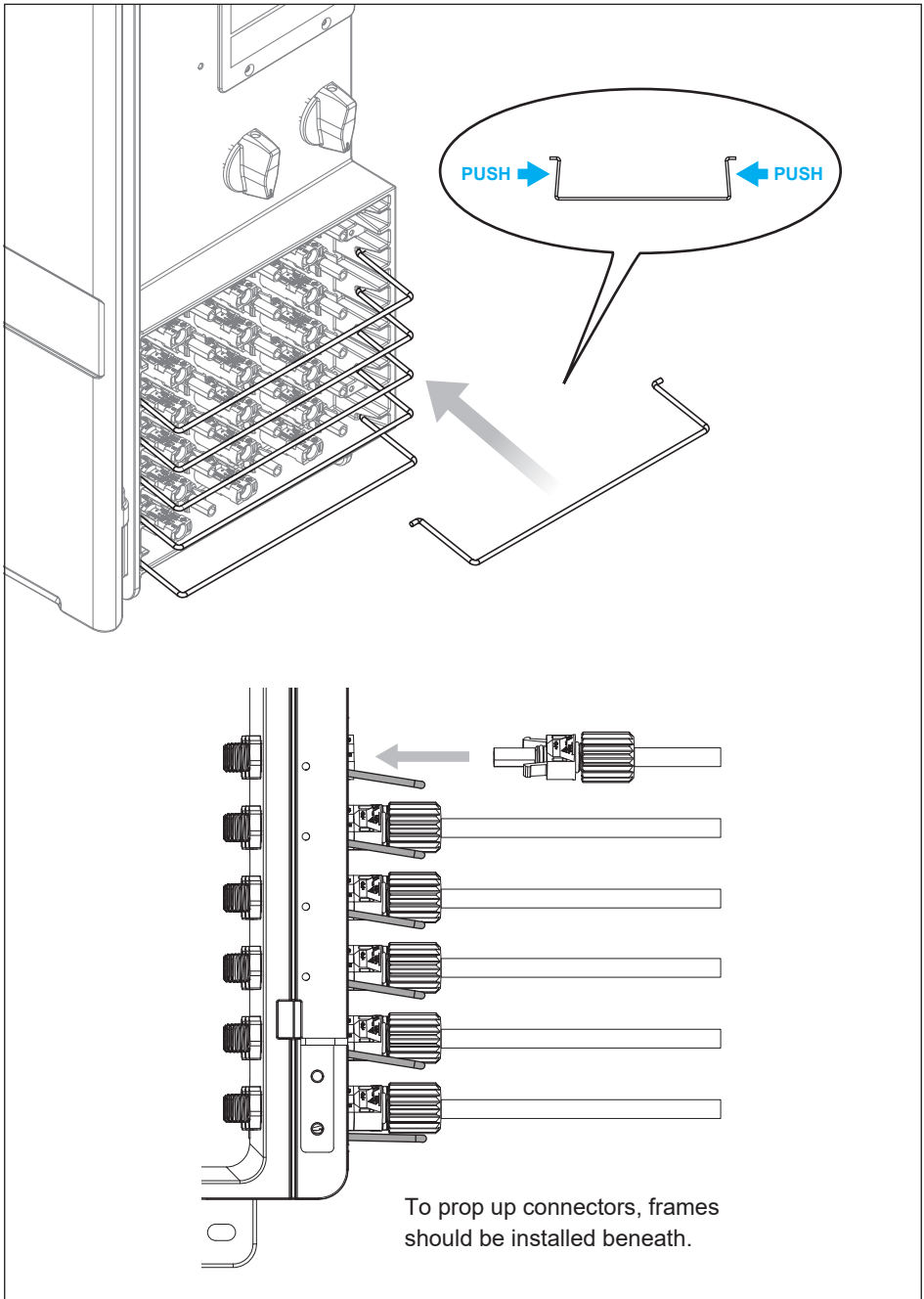


Figure 3-18: Installation methods for protective frame

3.5.2 Equipment Grounding

To ground the inverter, please crimp the grounding wire to ring terminal lug and fix it on the grounding point shown as **figure 3-19**.

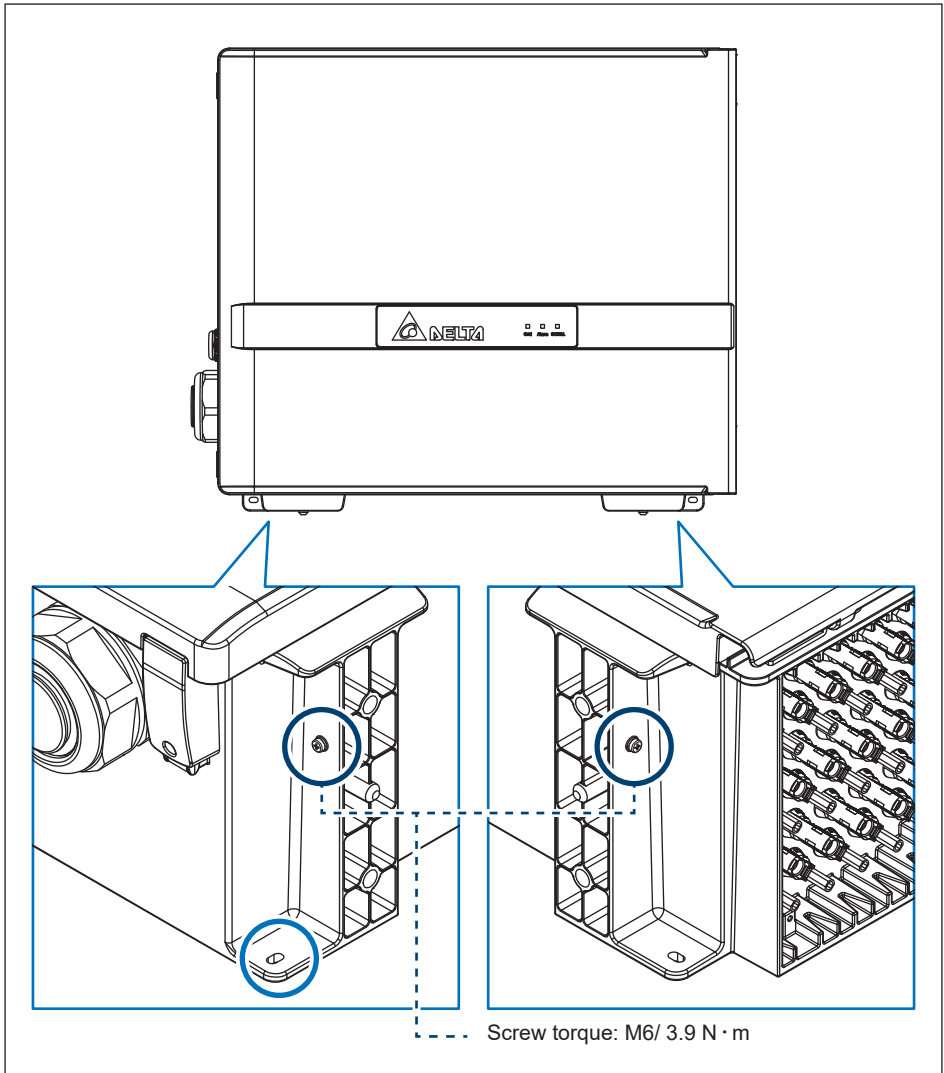


Figure 3-19: Mount the equipment grounding

3.6 Antenna

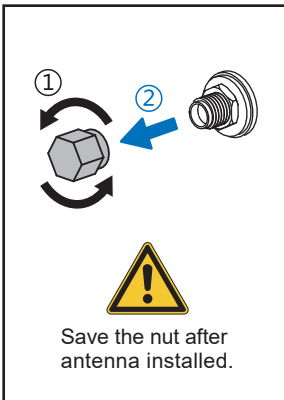
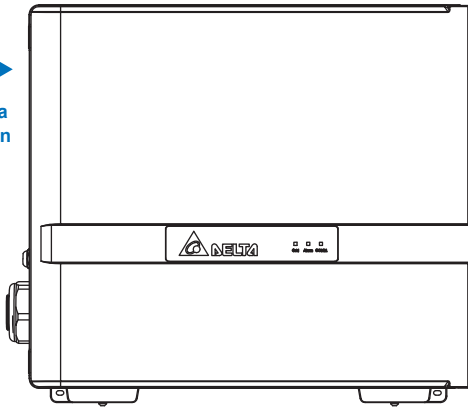
There is an antenna for SUB_1G, it must be installed with 1.2 N·m and some installation notice included antenna and bracket are shown in **Figure 3-20 ~ 3-22**.

ATTENTION

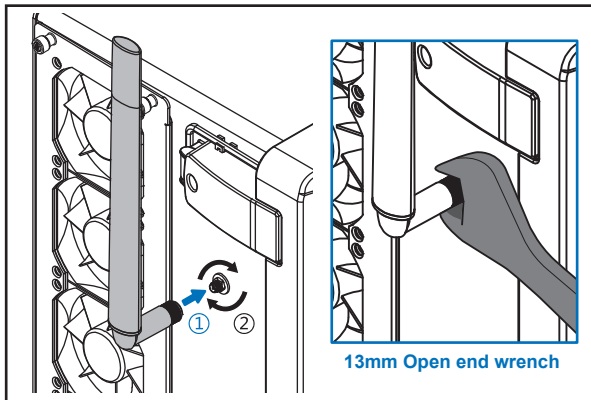


- Always keep nut and screws properly tightened on the case.
- Water leakage may cause serious damage.
- Contact DELTA service when lack for nut and screws.
- Store the nut for spare usage.


Antenna
Location



Remove the nut.



Use the wrench to lock antenna with 1.2 N·m torque.

Figure 3-20: Installation of antenna

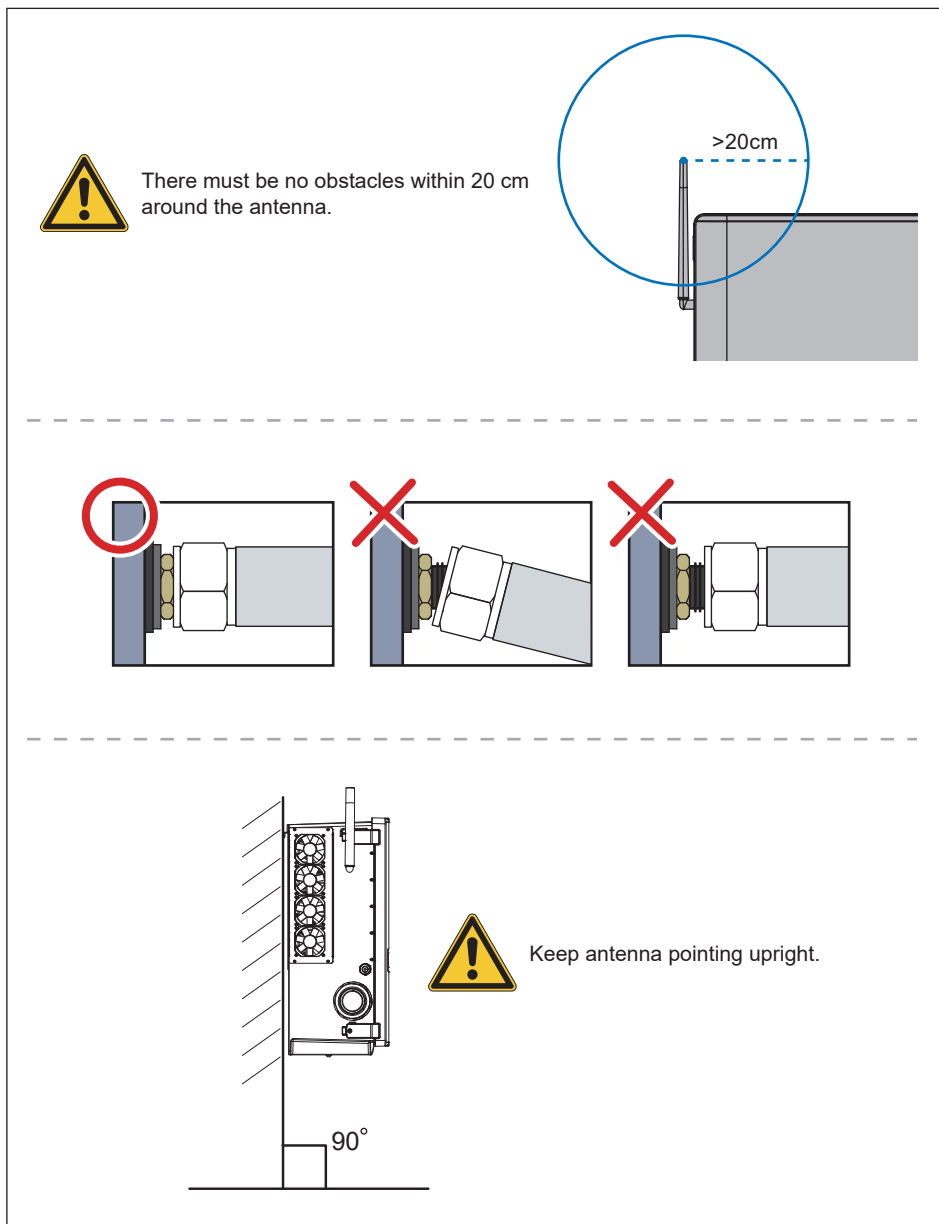


Figure 3-21: Attentions of installing antenna

1. Turn the antenna counterclockwise by about 45 degrees.
2. Put on the antenna bracket.
3. Turn the antenna to the proper position.
4. Tighten the 3 screws to antenna bracket.

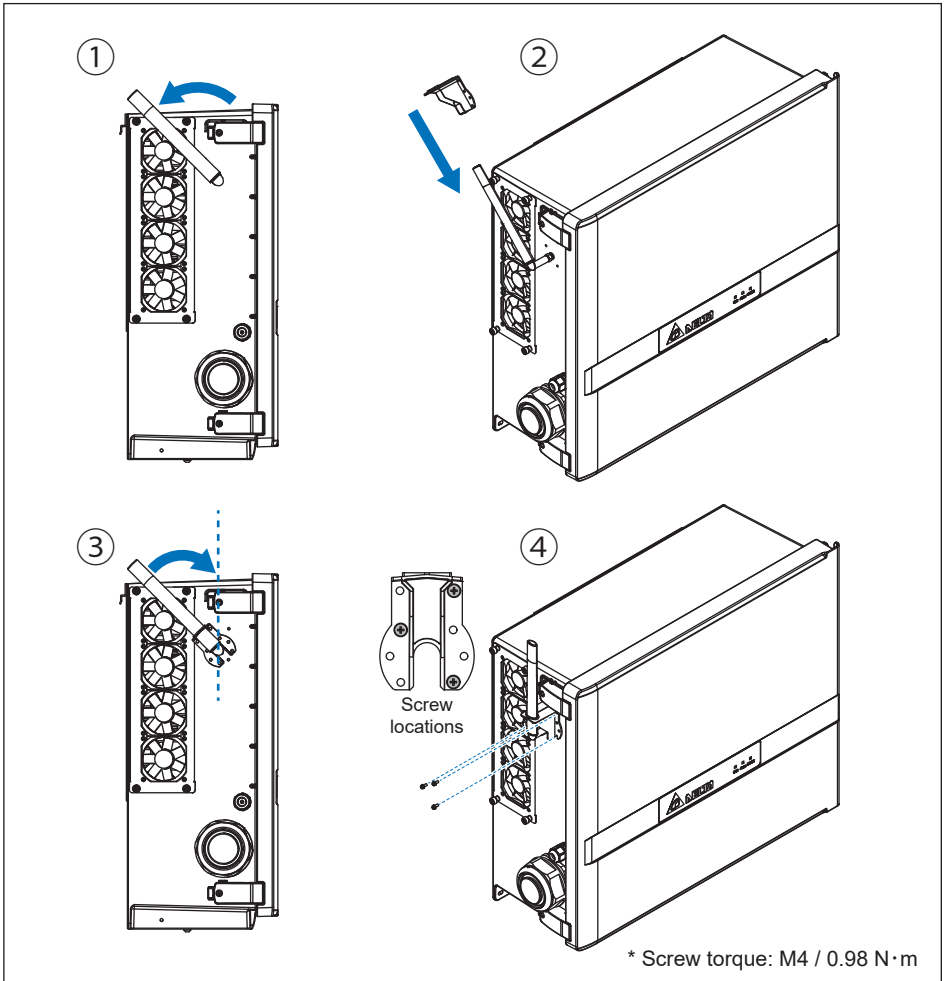


Figure 3-22: Install antenna bracket

ATTENTION



- Please refer Data Collector manual for connection of Data Collector.
https://mydeltasolar.deltaww.com/?p=product_manual



3.7 Communication Module Connections

The communication module is shown in **Figure 3-23**. It provides VCC, RS-485, dry contact, EPO, and Digital Input terminals for use in various applications. Details for each are presented below.

There's a 12VDC source between VCC & GND for use with external device.

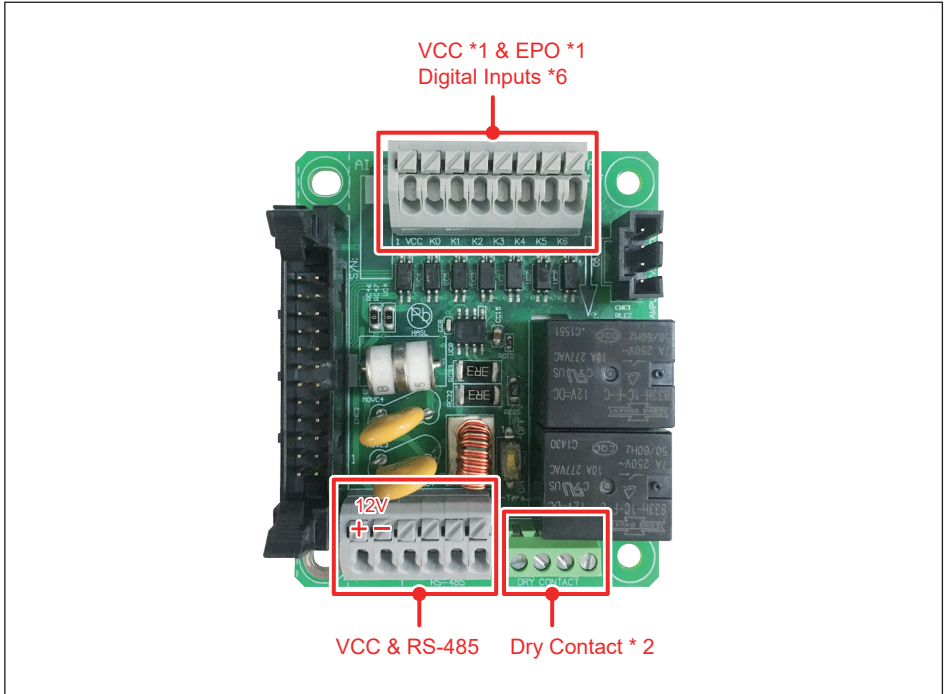


Figure 3-23: Communication Module Layout

Please refer to the chapter 5.1 and open the door, the communication module is at the circle that is shown in **Figure 3-24**.

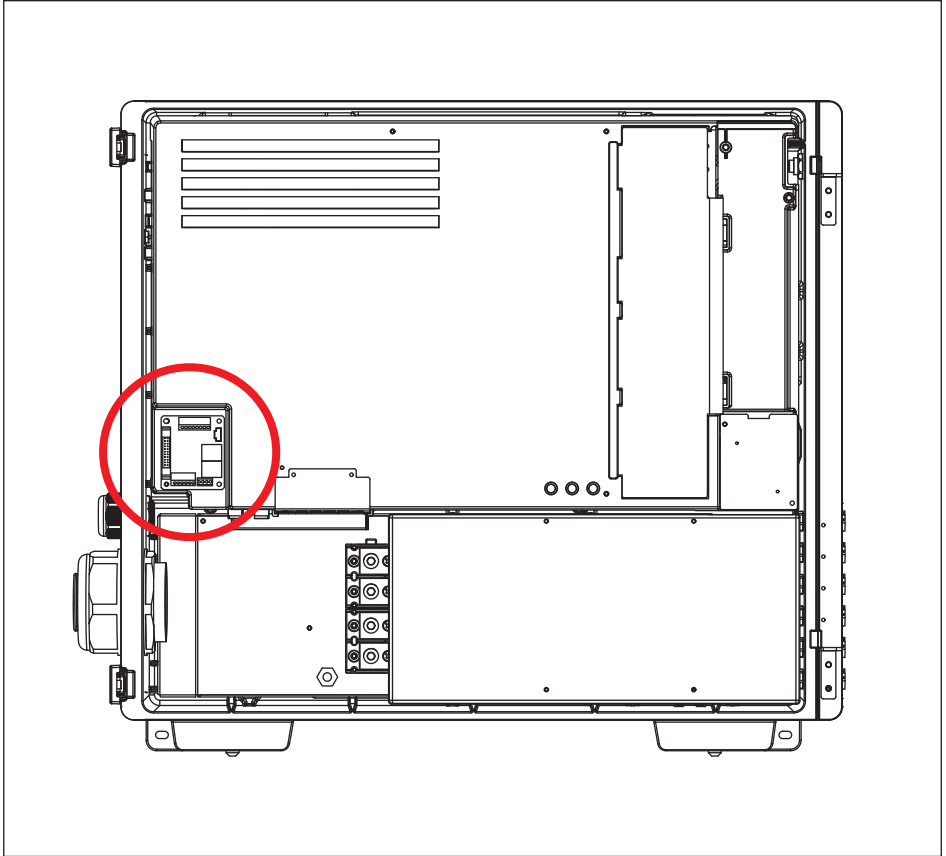


Figure 3-24: Location and access to Communication Module

3.7.1 RS-485 Connection

The pin definition for the RS-485 terminal block is shown in **Table 3-2**.

- Pins 1 and 2 provide a 12VDC / 0.5A bus for use with accessories.
- Pins 3 and 5 are both connected to the DATA+ input.
- Pins 4 and 6 are both connected to the DATA- input.

These connections allow easy daisy-chaining of multiple inverters.

A 120ohm bus termination resistor and associated control switch are located on the communication board (**Figure 3-25**). **Table 3-3** shows the switch function. Different RS-485 connection scenarios require different set up for the 120ohm bus termination resistor.

- When several inverters are cascaded (i.e., "daisy-chained") only the last inverter in the chain must have its bus termination resistor switched ON (**Figure 3-25**).
- If the length of any RS-485 bus is greater than 610m, the use of Belden 3105A cable (or eq.) is recommended to insure communication quality.

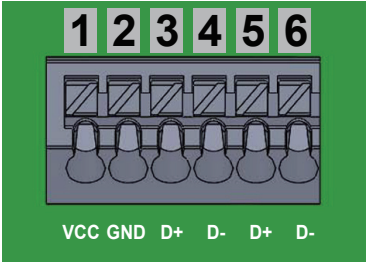
ATTENTION



- In order to have good transfer quality, twisted-pair wire is recommended to be used as communication cable.

Table 3-2: RS-485 Terminal block wiring

Pin	Function
1	VCC (+12V)
2	GND
3	DATA+
4	DATA-
5	DATA+
6	DATA-

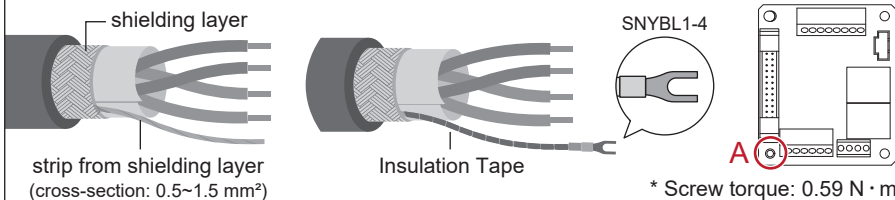


INFORMATION



When the RS-485 cable needs to be grounded, please follow the steps below.

1. strip a wire from the shielding layer and properly insulate it
2. crimp the insulated wire to the Y-type lug and fix it in position A



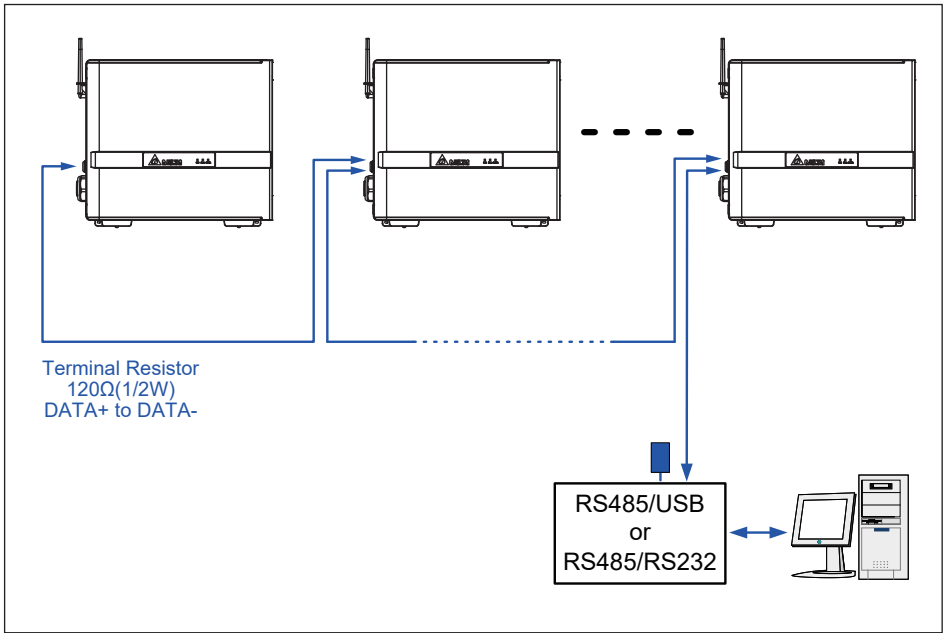


Figure 3-25: Multiinverter connection illustration

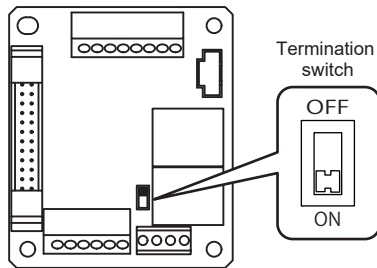


Table 3-3: Bus Termination switch settings

	Switch 1
ON	Terminal Resistor ON
OFF	Terminal Resistor OFF

3.7.2 EPO Function & Digital Input

The communication module has an Emergency Power Off function (EPO). Users can customize EPO function in APP or Delta Solar System (DSS).

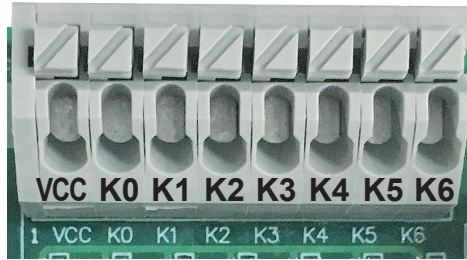


Figure 3-26: EPO function terminal block

Once enabled, the EPO function can be used to turn off the inverter via a NO relay contact connected across terminal [VCC & K0].

Additionally, a digital power reduction control is available that can be set to limit the inverter's available active output power. The control settings for this function are made by placing a hardware short (jumper or relay) between two terminals of the terminal block shown in **Table 3-4**, below.

Table 3-4: Definition of digital input & EPO function

Short terminals	Inverter's action
VCC & K0	Emergency power off (EPO)
VCC & K1	0% active power
VCC & K2	Maximum 30% rated power
VCC & K3	Maximum 60% rated power
VCC & K4	Maximum 100% rated power
VCC & K5	Reserved
VCC & K6	Reserved

3.7.3 Dry Contact Connection

M70A_260 and M50A_260 provide a dry control contact pair that may be used to control external devices based on the status of operation of the inverter.

The terminal block for this function is shown in **Figure 3-27**. The terminals marked in the figure identify the dry contact connection. The operation of the dry contact is normally open. The functionality of this contact can be customized by users via settings available in APP or DSS.

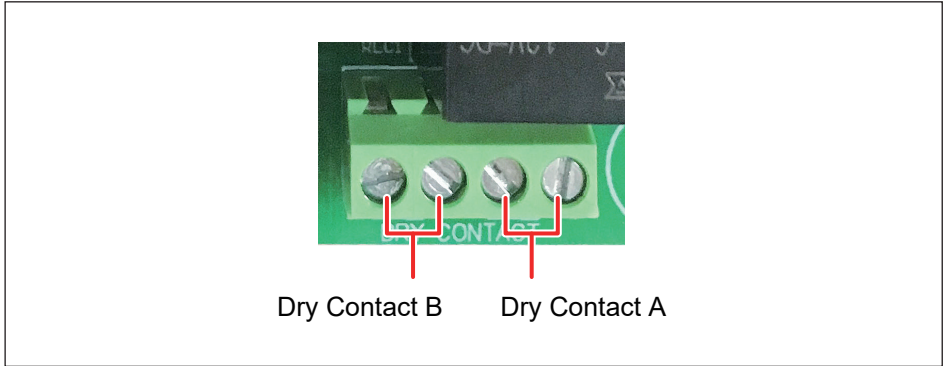


Figure 3-27: Dry Contact connection

3.8 On-Site Insulation Test

For customers who want to do on-site insulation test, please make sure:

1. The DC switches are in “OFF” position.
2. Apply one probe to the positions shown in **Figure 3-28**, the other to the ground. It might cause damages to the inverter if probes are applied to inappropriate positions.

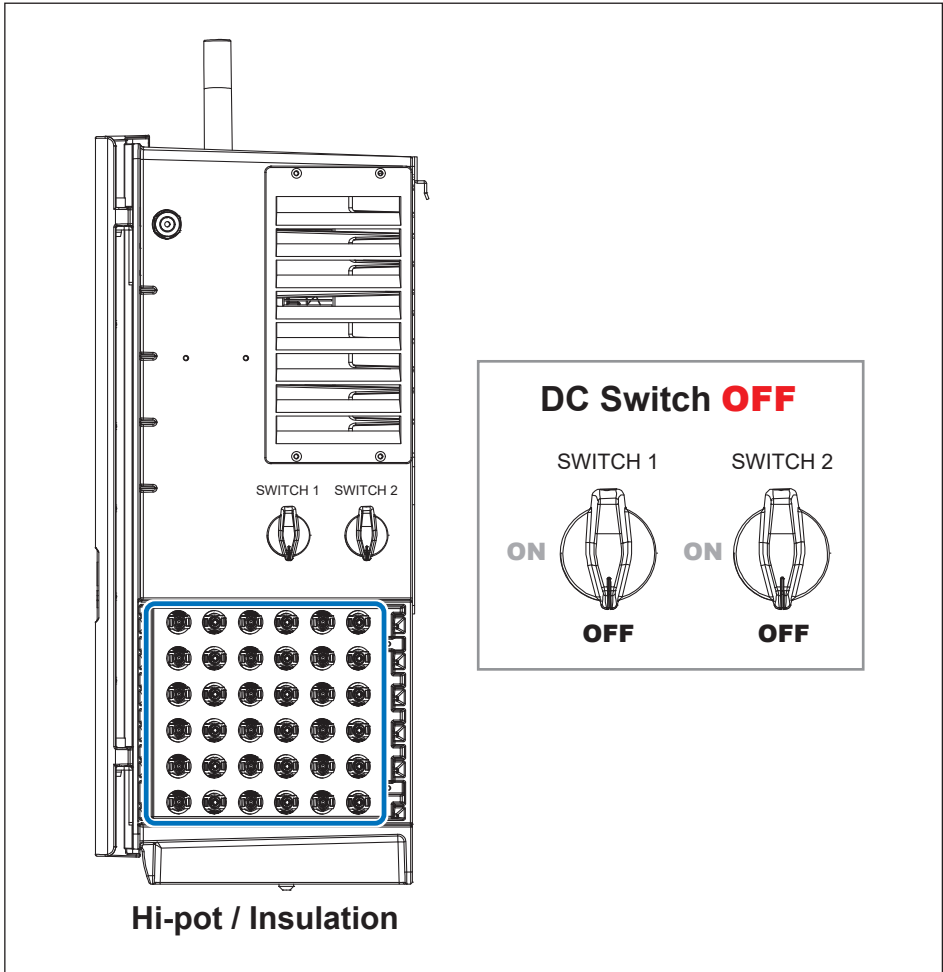


Figure 3-28: Precautions for on-site insulation test

4 Commissioning

CAUTION : HOT SURFACES, DO NOT TOUCH!



- Use care to avoid hot surfaces when operating the product!
- Do not perform any task until the unit cools down or appropriate personal protection gear is worn.

4.1 Display Operation Introduction

M70A_260 and M50A_260 with 3 LEDs allow visual display of the inverter's data and status as shown in **Figure 4-1**.

Please refer to **Table 4-1** for information as to the information provided by the LED indicators.

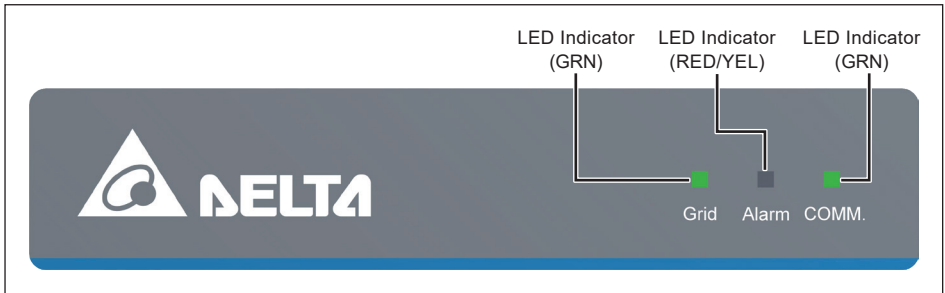


Figure 4-1: Front Panel Display

Table 4-1: LED indicator

Condition	Grid (Green)	Alarm (Red/Yellow)
Countdown	FLASH	OFF
On Grid	ON	OFF
Inverter Fault / Remote off	OFF	ON / OFF
Inverter Warning	ON (or OFF)	FLASH / OFF
Field Fault	OFF	OFF / ON
Field Warning	ON	OFF / FLASH
NO DC	OFF	OFF / FLASH SLOW
FW Upgrade	FLASH	FLASH / OFF
Standby	FLASH	OFF / FLASH
Check PV Power	FLASH FAST	OFF / FLASH FAST

*FLASH: ON 1s / OFF 1s

**FLASH FAST: ON 0.25s / OFF 0.25s

***FLASH SLOW : ON 5s / OFF 10s

Table 4-2: LED COMM. indicator

SUB_1G Condition	COMM. (Green)
Work	FLASH
Fault	OFF

* FLASH: ON 3s / OFF 2s

4.2 Auto ID Commission Tool

The Auto ID function could set all inverter IDs at monitoring center after wiring RS-485.

ATTENTION



Please download the software from the following website:
https://mydeltasolar.deltaww.com/dl_installer_guide.php?f=autoid



4.2.1 Auto ID Setting

Delta Auto ID Tool

COM Port: COM5

Open Port

Port Status: Port COM5 open succeeded

Inverter setting

Country ID:

Set Country

Sync time

Set ID

Serial Number	ID	Status
---------------	----	--------

Auto ID Setting

Inv num:

Scan Inverters

Open the software
1. Select COM Port and click **Open Port**

Delta Auto ID Tool

COM Port: COM5

Open Port

Port Status: Port COM5 open succeeded

Inverter setting

Country ID:

Set Country

Sync time

Set ID

Serial Number	ID	Status
---------------	----	--------

Auto ID Setting

Inv num: 32

Scan Inverters

2. Enter the number of Inverters and press **Scan Inverters**

Delta Auto ID Tool

COM Port: COM5

Open Port

Port Status: Port COM5 open succeeded

Inverter setting

Country ID:

Set Country

Sync time

Set ID

Serial Number	ID	Status
0751850003n0	1	OK
07518500023n0	2	OK
07518500002n0	3	OK
07518500014n0	4	OK
07518500012n0	5	OK
07518500019n0	6	OK
07518500016n0	7	OK
07518500020n0	8	OK

Auto ID Setting

Inv num: 32

Scan Inverters

3. Show the inverter serial number and ID, and the status display OK is completed.

Figure 4-2: Steps of auto ID setting by tool



The numbers of ID setting less than amounts of inverter, status show False.

The screenshot shows the Delta Auto ID Tool interface. On the left, the 'COM Port' is set to 'COM5' and 'Port Status' is 'Port COM5 open succeeded'. The 'Auto ID Setting' section has 'Inv num:' set to '31'. A 'Scan Inverters' button is visible. On the right, a table displays the following data:

Serial Number	ID	Stat
07518500019W0	1	Fals
07518500009W0	2	Fals
07518500027W0	3	Fals
07518500008W0	4	Fals
07518500003W0	5	Fals
07518500003W0	6	Fals
07518500003W0	7	Fals
07518500004W0	8	Fals
07518500005W0	9	Fals
07518500005W0	10	Fals

A dialog box is overlaid on the table with the text: 'Found more than expected inverters, please check your inverter quantity'. A 'YES' button is at the bottom of the dialog.



The numbers of ID setting more than amounts of inverter, status show False.

The screenshot shows the Delta Auto ID Tool interface. On the left, the 'COM Port' is set to 'COM5' and 'Port Status' is 'Port COM5 open succeeded'. The 'Auto ID Setting' section has 'Inv num:' set to '32'. A 'Scan Inverters' button is visible. On the right, a table displays the following data:

Serial Number	ID	Stat
07518500011W0	1	Fals
07518500013W0	2	Fals
07518500001W0	3	Fals
07518500015W0	4	Fals
07518500020W0	5	Fals
07518500000W0	6	Fals
07518500000W0	7	Fals
07518500000W0	8	Fals
07518500000W0	9	Fals
07518500000W0	10	Fals

A dialog box is overlaid on the table with the text: 'Only 31 inverters found! Please check your 485 connection!'. A 'YES' button is at the bottom of the dialog.

Figure 4-3: False of auto ID setting by tool

4.2.2 Set ID

To adjust the ID order, please follow the settings below.

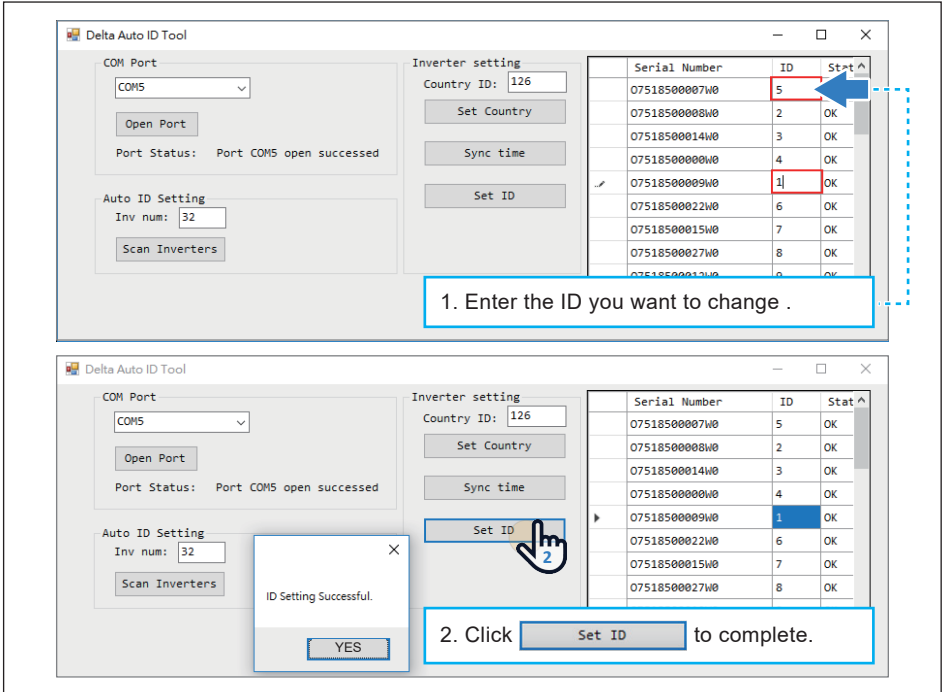


Figure 4-4: Steps of set ID



The wrong ID setting of overlapping.

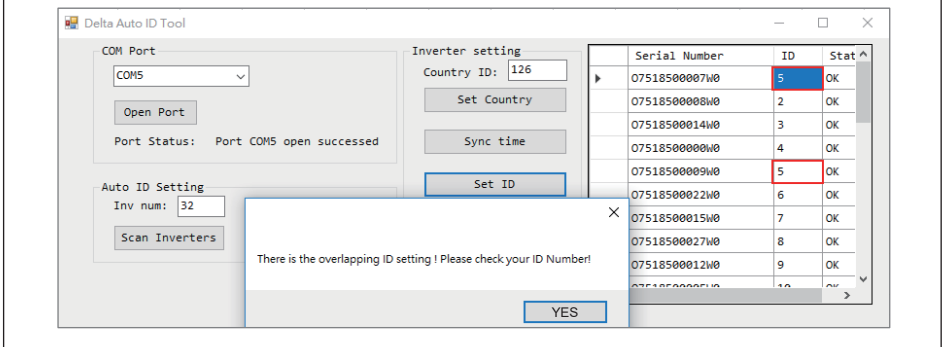


Figure 4-5: False of set ID

4.2.3 Set Country

Set country by the AUTO ID.

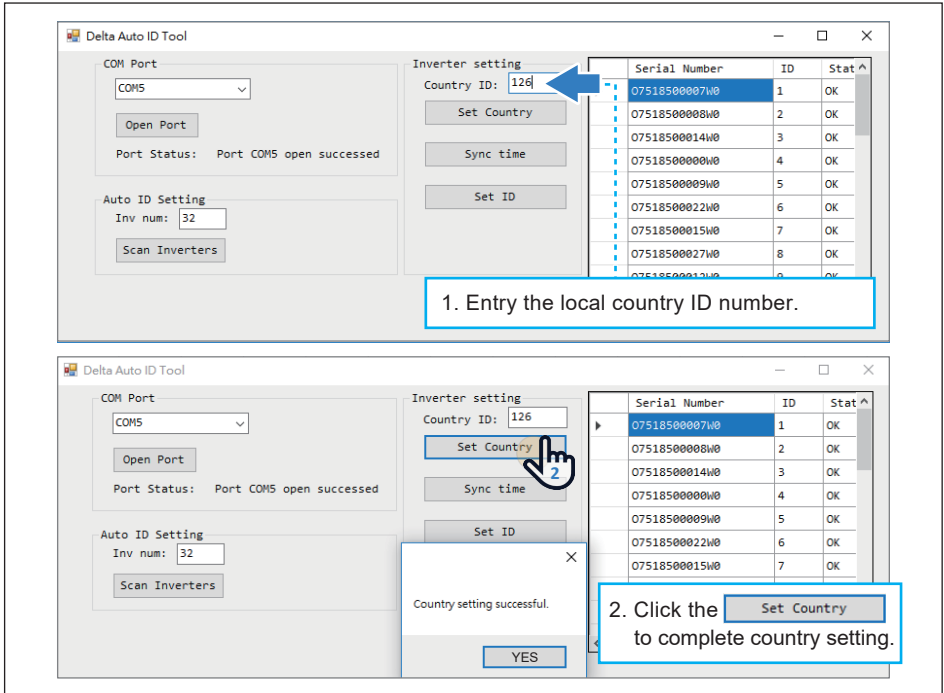


Figure 4-6: Steps of set country

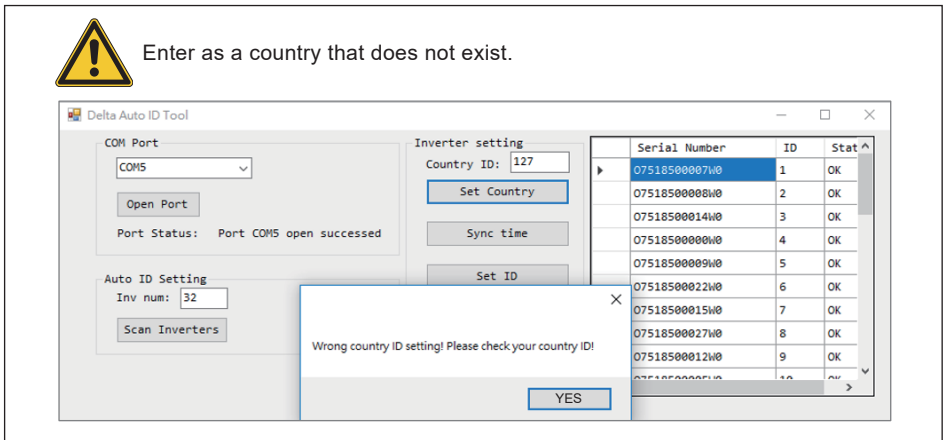


Figure 4-7: False of set country

4.2.4 Synchronize time

Synchronize time by Auto ID tool.

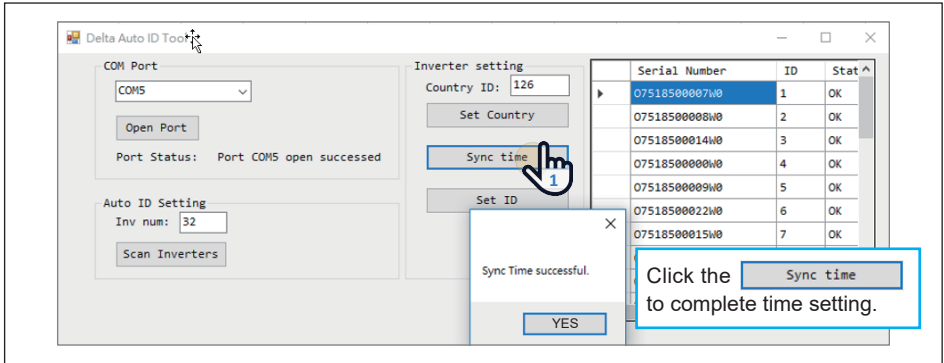


Figure 4-8: Steps of synchronize time

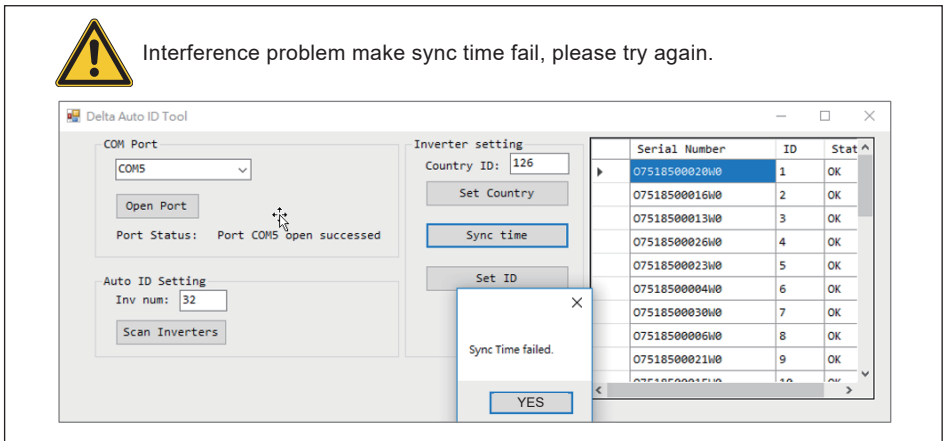


Figure 4-9: False of synchronize time

4.3 Delta Function Setting

Delta offers two settings: DSS and APP (MyDeltaSolar)

Please go to the following link to refer to the setting method manual.

DSS:

https://mydeltasolar.deltaww.com/manual/eng/SUB_1G/DSS.pdf



APP (MyDeltaSolar):

https://mydeltasolar.deltaww.com/?p=product_manual

Data Collector > PPM DC1_100 Operation and Installation Manual



5 Maintenance

Please check the unit regularly. If there are any impaired or loose parts, please contact your solar installer. Ensure that there are no fallen objects in the path of the heat outlet.

WARNING !



- Prior to beginning any maintenance procedures outside AC breaker and DC switch off to avoid risk of electrical shock!

5.1 Open and Close the Door

In order to guarantee proper long-term operation of the inverter, the following procedures must be followed to open and close the door, refer to **Figure 5-1**.

To fix door by hexagon driver per **Figure 5-2**.

5.1.1 Open Door

- Do not attempt to open the door under raining condition.
- Switch DC and AC power off and wait until LED display turns off.
- Remove the three screws on the antenna bracket.
- Turn the antenna and bracket counterclockwise by about 45 degrees.
- Take out the hexagonal wrench on the latch lock cover.
- Loosen 1 screw on the latch lock cover and open its.
- Use care not to contaminate the door's gasket and mating surfaces.

After opening the door, do not leave the door opened for long periods of time.

5.1.2 Close Door

Before closing the door:

1. Ensure mating surfaces and gasket are clean.
2. The gasket is properly located and aligned in its mounting slot.

When closing the door:

1. Install in reverse order according to **5.1.1** and lock on the latch locks.
2. Fully tighten the door screws to 2.45 N · m of torque.

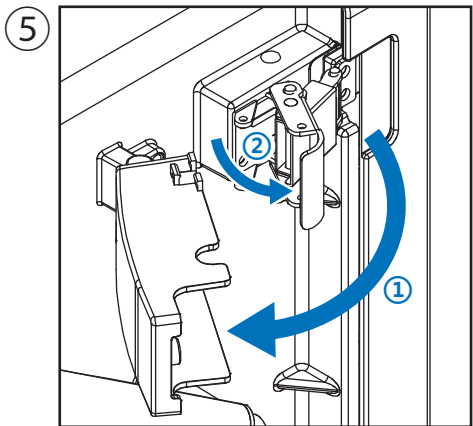
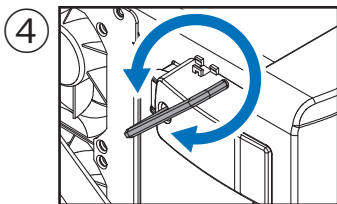
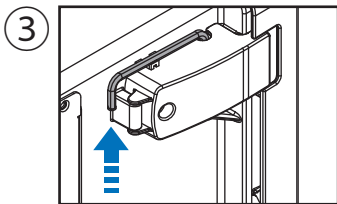
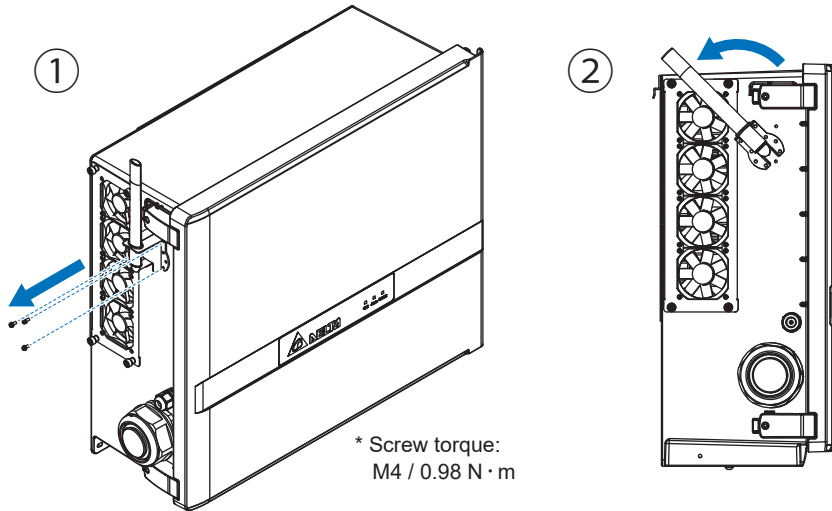
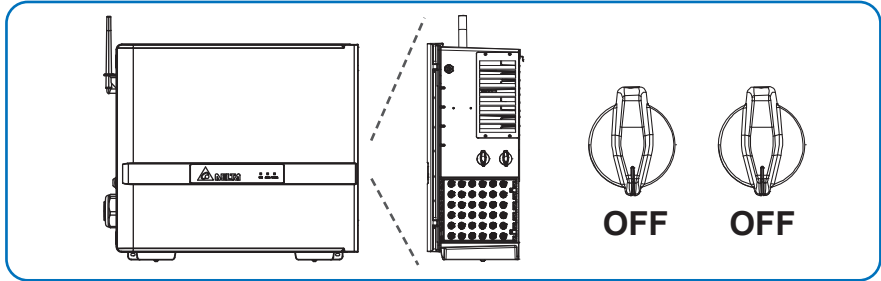


Figure 5-1: Open and close the door

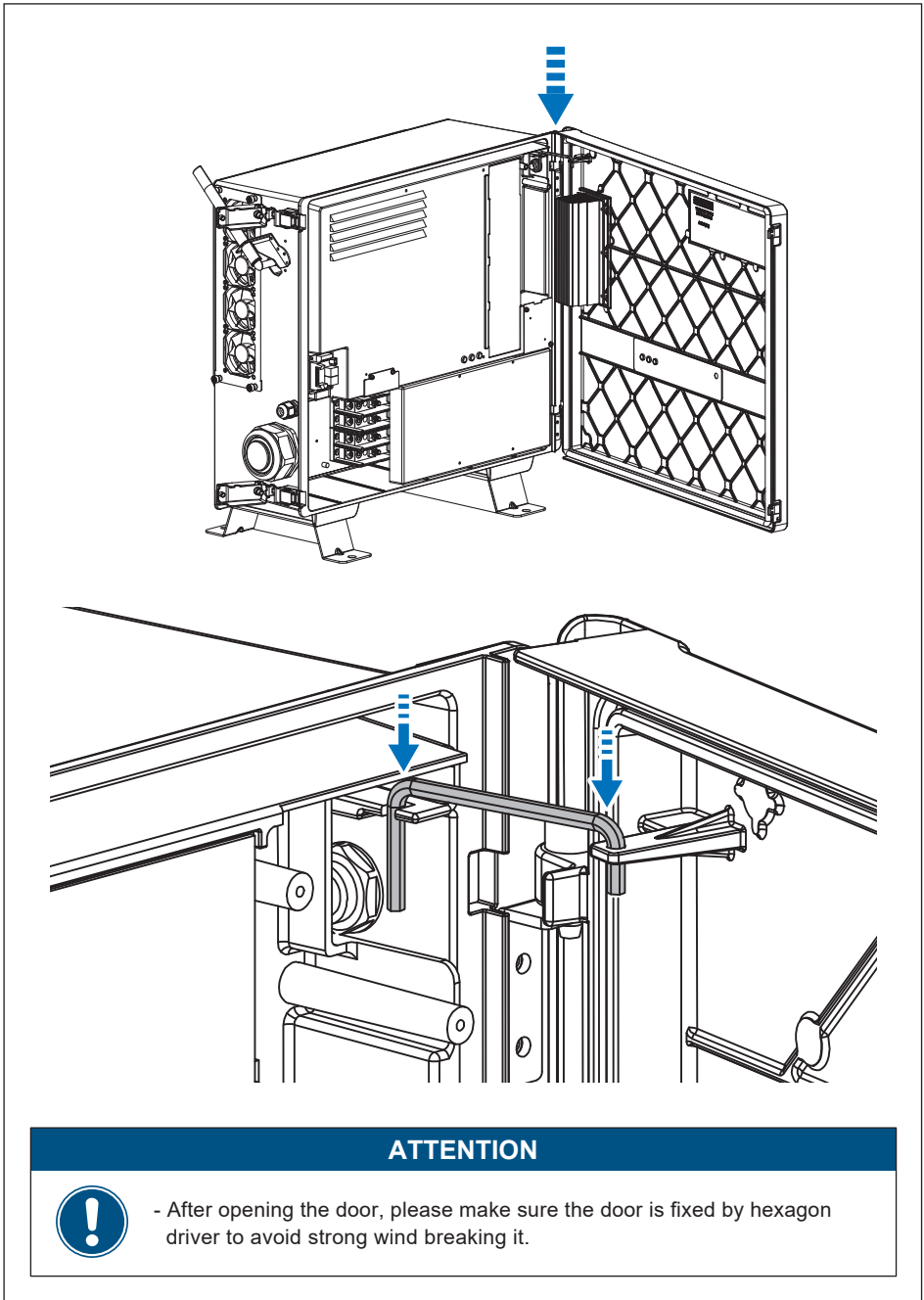


Figure 5-2: To secure door by hexagon driver

5.2 Replacement of Surge Protection Devices (SPD)

M70A_260 and M50A_260 have the surge protection device (SPD) at both AC and DC side as shown in **Figure 5-3**.

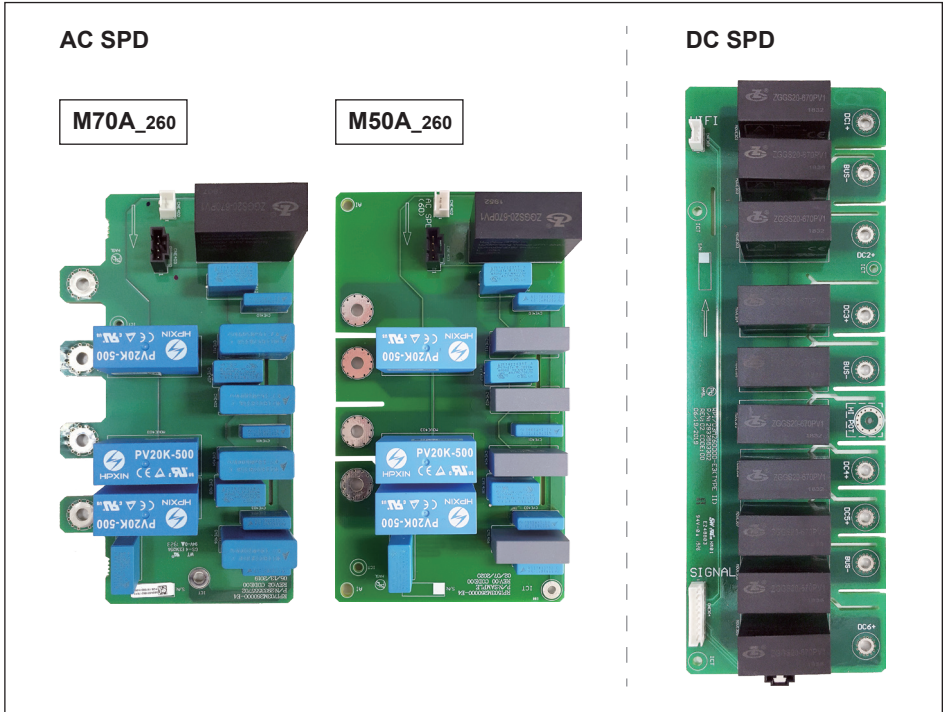


Figure 5-3: AC and DC SPD modules

Surge protection devices (SPD) are designed to protect sensitive circuit elements of the inverter from damage caused by lightning and other electrical transients/surges, as such they are sacrificial components and periodically, may need replacement.

The SPDs are located in the inverter.

If a warning message “AC Surge” or “DC Surge” appears on APP and DSS, follow the procedure below to replace the SPD.

- Determine which SPD unit is damaged. See **Figure 5-4**.

AC SPD/DC SPD: Show on the corner of the LED panel.



Figure 5-4: Display Indicating AC and DC SPD failure

- Accessing the door
 1. Switch DC and AC power off and wait until LED display turns off.
 2. **To access the door, use procedure found in Section 5.1.1**
Do not leave the door opened for long periods of time.

- Changing the SPD modules - use the following procedure:
The AC and DC SPD units are located as shown in **Figure 5-5**.

- **To remove the defective AC SPD (Figure 5-6)**
 1. Remove 4 self-retaining screws on the A cover. (screw torque: 0.8 N·m)
 2. Disengage the 2 signal wiring connectors from the AC SPD PCB.
(4-pin x 1, 2-pin x 1)
 3. Remove 4 self-retaining screws which connect to AC terminal from AC SPD PCB.
 4. Remove 2 self-retaining screws on the right side and left side of PCB.
 5. Lift and remove the entire AC SPD PCB and replace with new unit.
 6. Install the new AC SPD using the above procedure in reverse order.
Tighten the 6 screws to a torque value shown in **Figure 5-6**.

- **To remove the defective DC SPD (Figure 5-7)**
 1. Remove B cover.
 2. Disengage Signal, fan and Wi-Fi (option) wiring connectors from the DC SPD PCB.
 3. Disengage A & G self-retaining screws from the DC SPD PCB.
 4. Lift and remove the entire DC SPD PCB and replace with new unit.
 5. Install the new DC SPD using the above procedure in reverse order.
Tighten the 12 screws to a torque value shown in **Figure 5-7**.

ATTENTION



- Please make sure the copper pillar is firmly tightened before reassembling the SPD board.

- Closing the door
To close the door, use the procedure found in Section 5.1.2

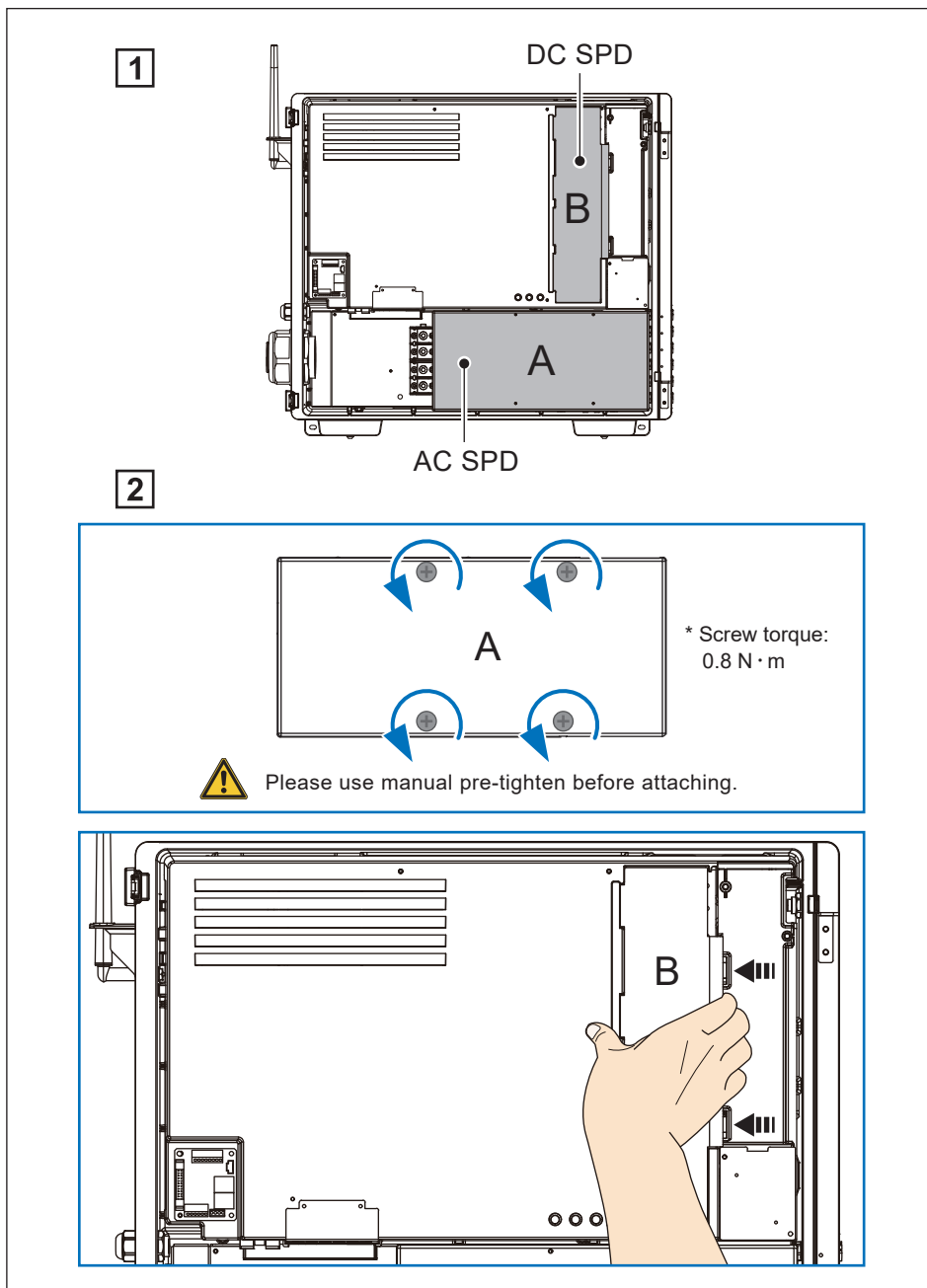


Figure 5-5: Steps of changing SPDs

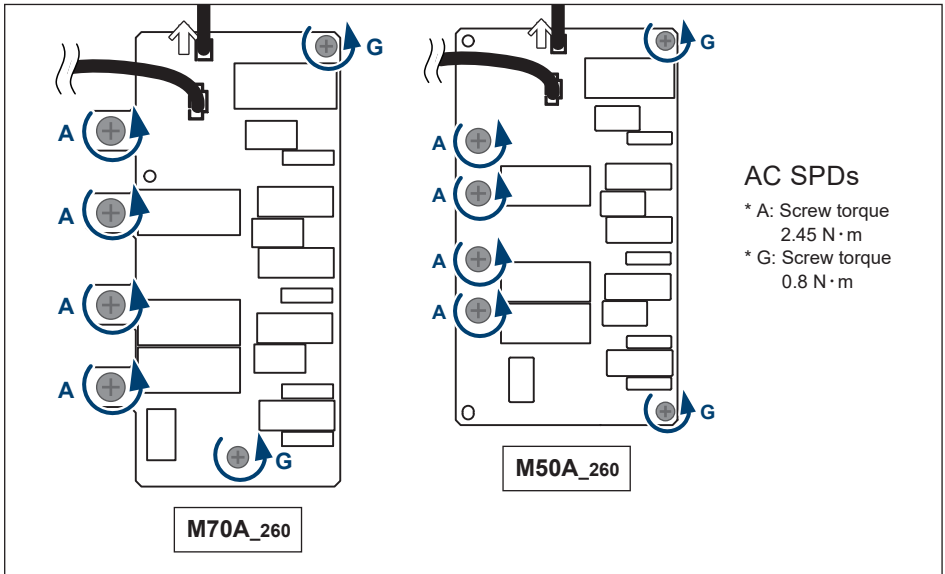


Figure 5-6: Remove wirings as connectors of AC SPD

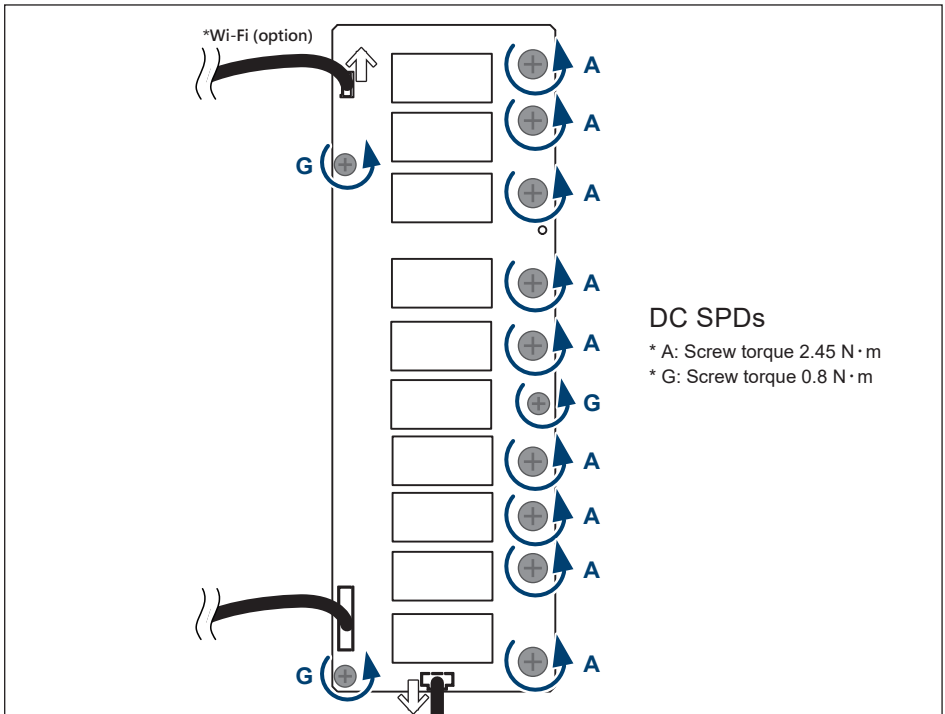


Figure 5-7: Remove wirings as connectors of DC SPD

5.3 External String Fuse For M70A_260

According to the regulations, when each group of DC input is configured as 3 strings, the external fuse is required. Please contact Delta dealers.

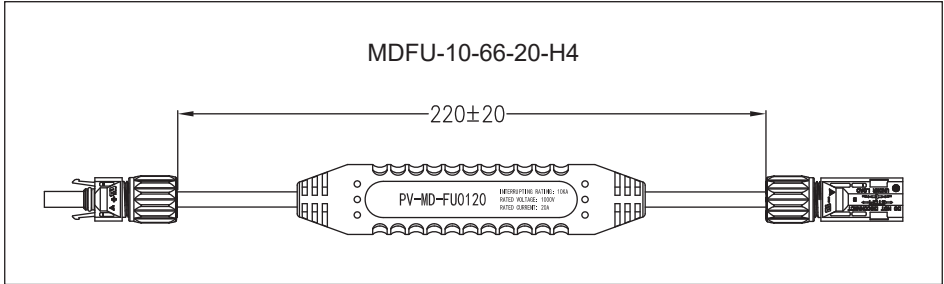


Figure 5-8: External String Fuse

5.4 Smart Fans Replacement and Filter Cleaning

M70A_260 and M50A_260 is provisioned with processor-controlled "smart fans" for cooling of the electronics. This section provides procedures for cleaning filters associated with these fans, and instructions for field replacement of the fans.

The fans utilized have high reliability ratings and coupled with use of processor controls provide a "smart" cooling system design with a long life. The system features tachometer detection of a failed fan, and generates a "FAN-FAIL" signal that is interfaced to the inverter control to trigger a FAN-FAIL alarm and places the inverter in a power de-rate mode as required for safe operation.

Depending upon the model, fans are installed at two locations within inverter:

- Power Module (PM) compartment
- Inside the inverter compartment

Figures 5-9, 5-10 illustrates the PM fan locations.

Figures 5-11, 5-12, 5-13 illustrates the internal fan 1 locations.

Figures 5-14, 5-15, 5-16 illustrates the internal fan 2 locations.

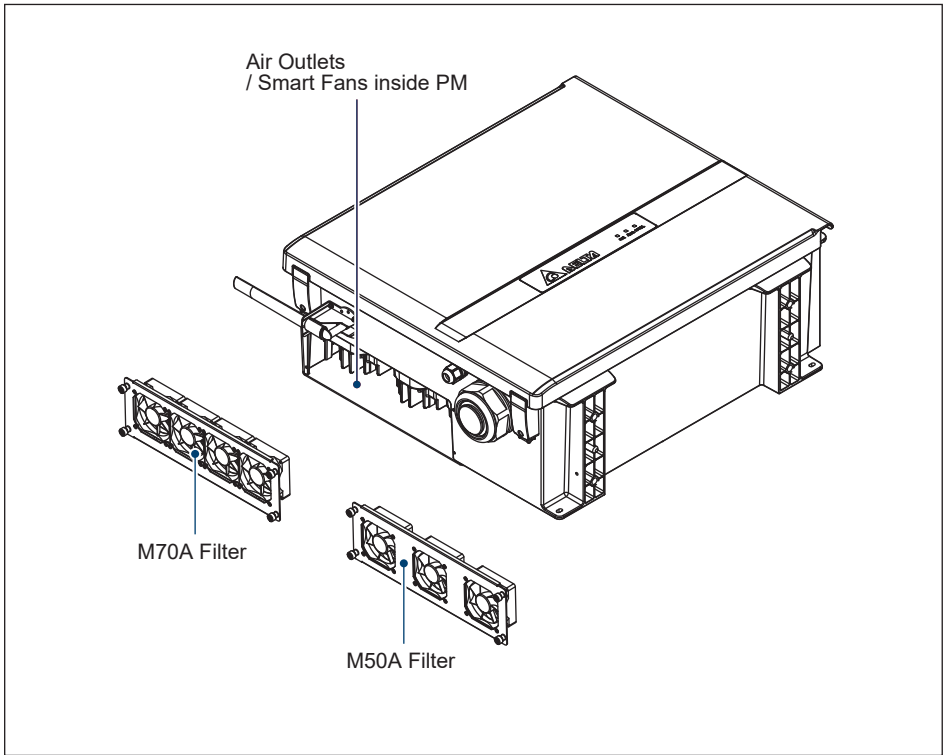


Figure 5-9: Smart Fans location on Power Module chassis

ATTENTION



- Periodic fan and filter cleaning is required to insure long life and reliability.
- The time period between cleanings depends on the quality of the environment.
 - Under normal duty use, Delta recommends smart fans and filters be cleaned every 4 months
 - For very dusty locations, it may be necessary to clean the fans and filters quarterly or monthly.

The cooling fans feature modular designs that make their removal for cleaning or replacement a simple task. As a result, the replacement of fans is also smart.

WARNING !

- Prior to beginning any maintenance procedures outside AC breaker and DC switch off to avoid risk of electrical shock!

5.4.1 Power Module (PM) Fan Tray

The inverter electronics are convection cooled. The primary equipment used for this function consists of a fan tray located in a plenum within the inverter. The PM electronics are isolated, and heat is transferred to the plenum airflow via a large heatsink.

The PM fan tray is modular and holds four smart fans that operate together and also provide redundancy; the inverter will operate to full power with four fans operating and will enter a power derating mode under failure of any fan. These fans are protected by air filters at the plenum air inlet and outlet.

Refer to **Figure 5-10** and follow the steps outlined below:

1.Remove four screws that secure inlet filter cover to case.

Check filter condition on this step and clean it if necessary.

For fan maintenance, continue to do following steps.

2.Unplug fan power connectors for each fan.

(To release snap-fit, press location A and location B from both side .)

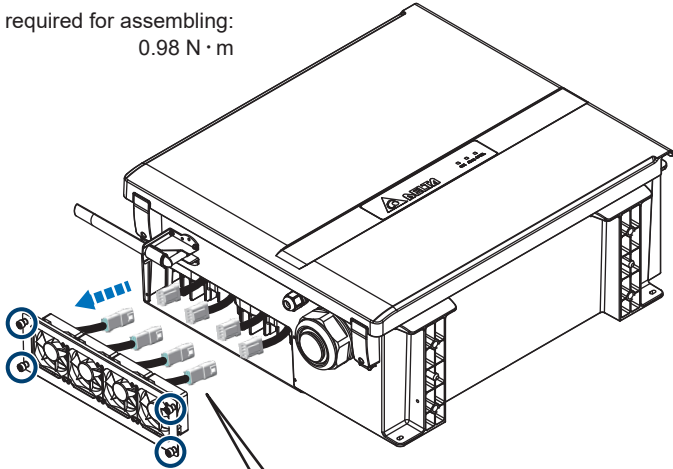
4.Pull fan tray out from PM chassis.

To disassemble fan , remove four screws that secure it to fan tray.

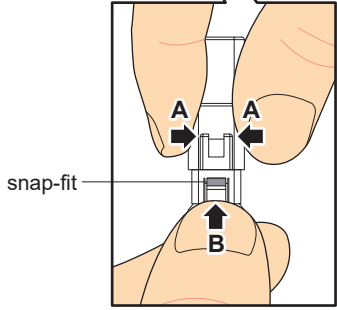
To reassemble reverse the order of the above procedure and tighten screws to torque values indicated in **Figure 5-10**.

* Screw torque required for assembling:
0.98 N · m

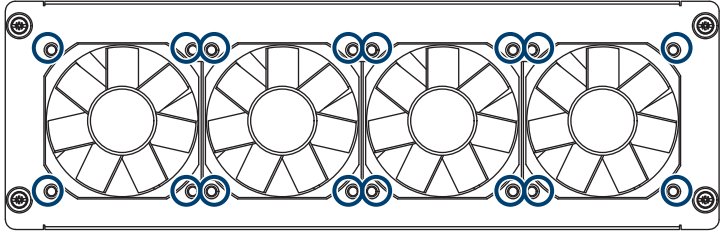
①



②



③



* Screw torque required for assembling: 0.6 N · m

Figure 5-10: Disassembling fan tray from PM chassis

5.4.2 Internal Fan 1

Procedure to remove Internal Fan 1

- (1) Remove the B cover.
- (2) Loosen two self-retaining screws shown in **Figure 5-11** and remove the fan cabinet.
- (3) Disconnect the power connector on the DC SPD board.
- (4) Lift the entire fan assembly. (shown in **Figure 5-12**)
- (5) Clean assembly or replace with a new fan. (shown in **Figure 5-13**)
- (6) Reassemble using a tightening torque of $0.8 \text{ N} \cdot \text{m}$.

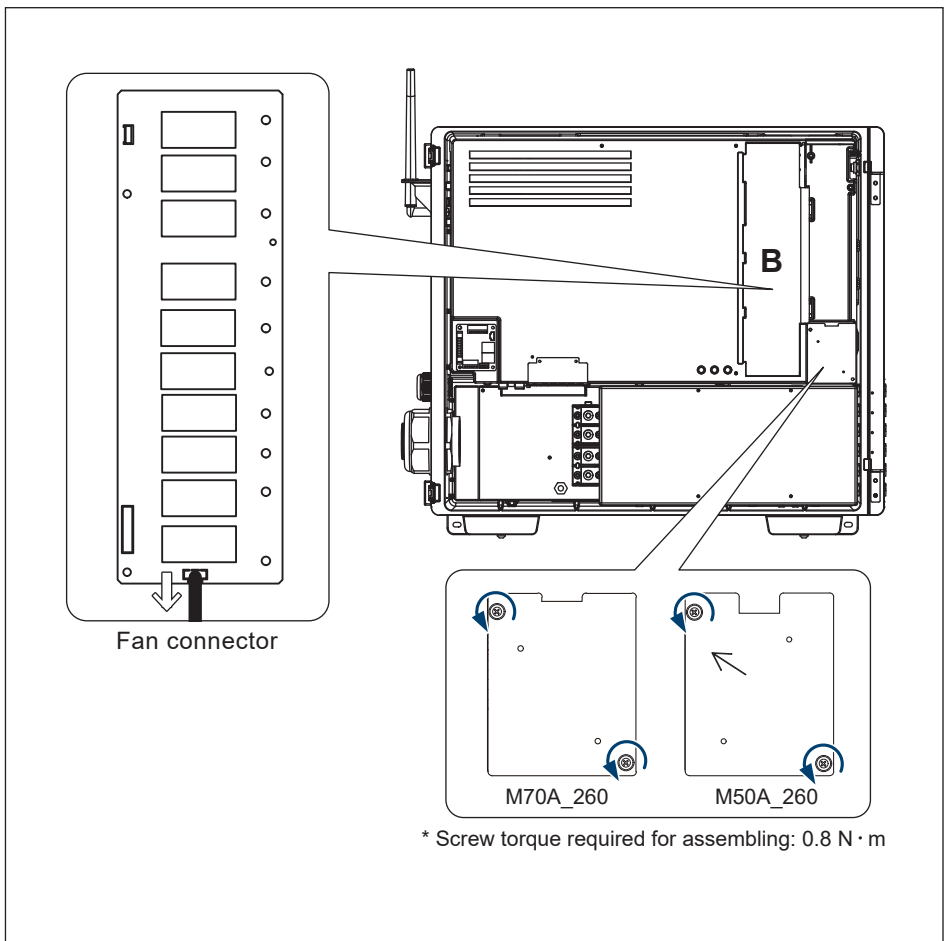


Figure 5-11: Internal fan 1 location & remove the shield cover

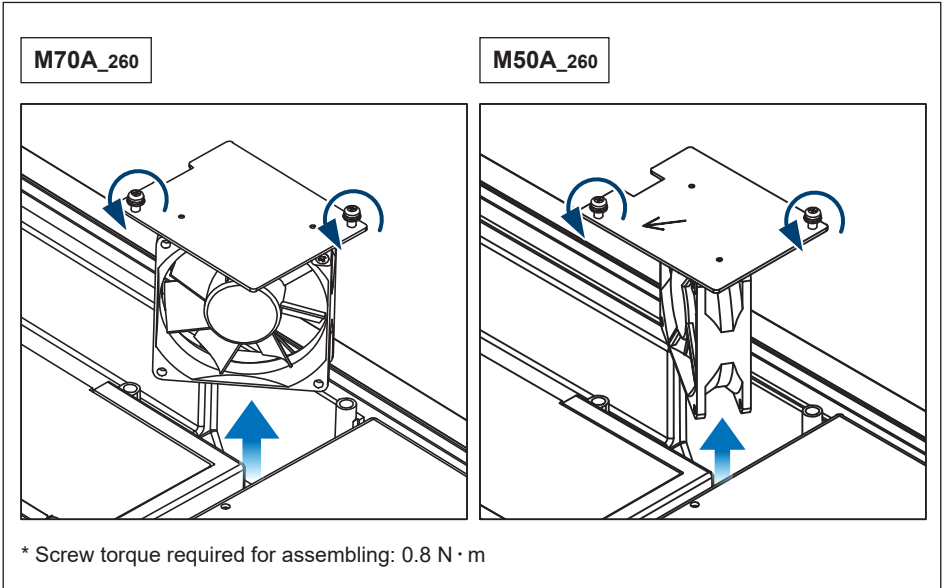


Figure 5-12: Take off the internal fan 1

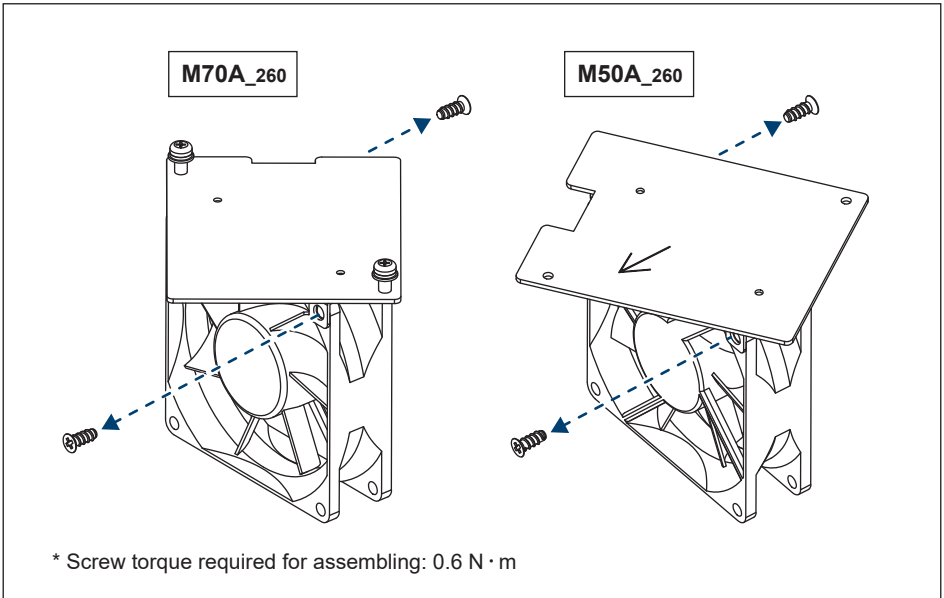


Figure 5-13: Replace with a new fan

5.4.3 Internal Fan 2

Procedure to remove Internal Fan 2

- (1) Loosen two self-retaining screws shown in **Figure 5-14** and remove the fan cabinet.
- (2) Disconnect the power connector on the comm. board.
- (3) Lift the entire fan assembly. (shown in **Figure 5-15**)
- (4) Clean assembly or replace with a new fan. (shown in **Figure 5-16**)
- (5) Reassemble using a tightening torque of 0.8 N · m.

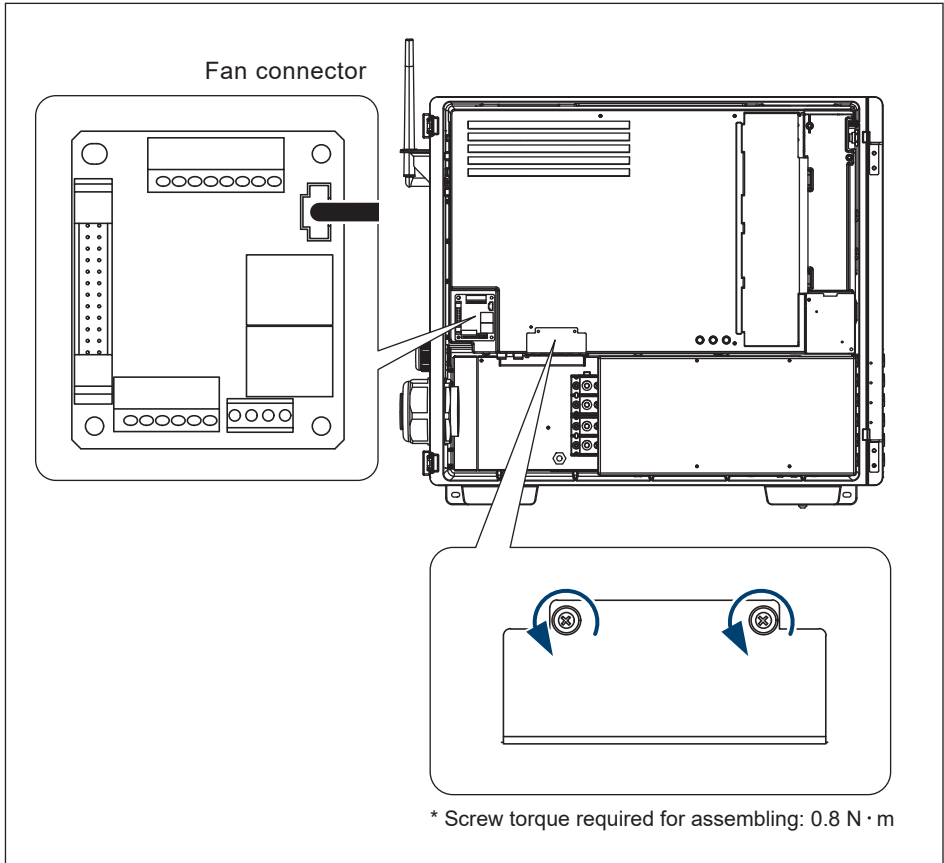


Figure 5-14: Internal fan 2 location & remove the shield cover

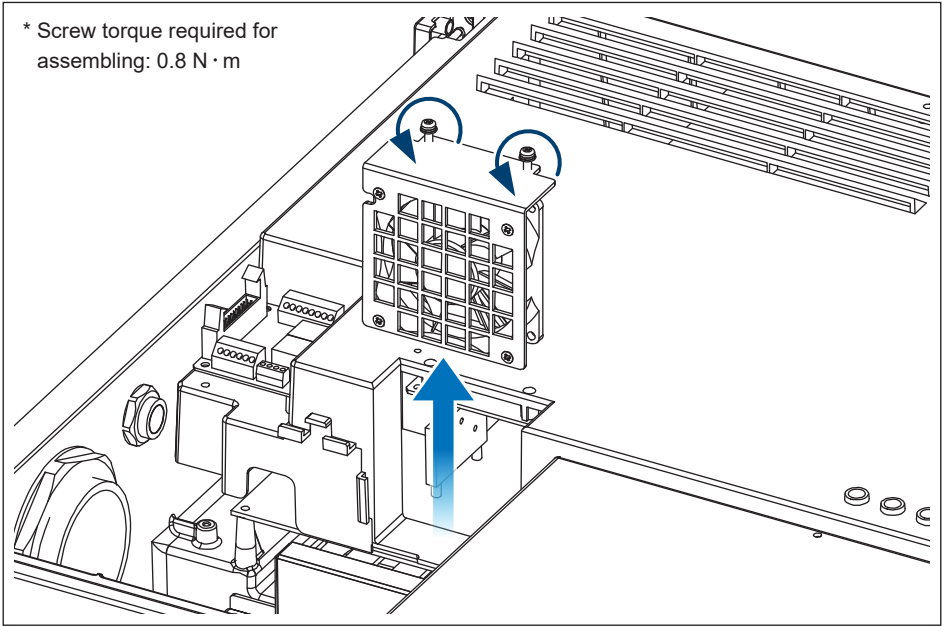


Figure 5-15: Take off the internal fan 2

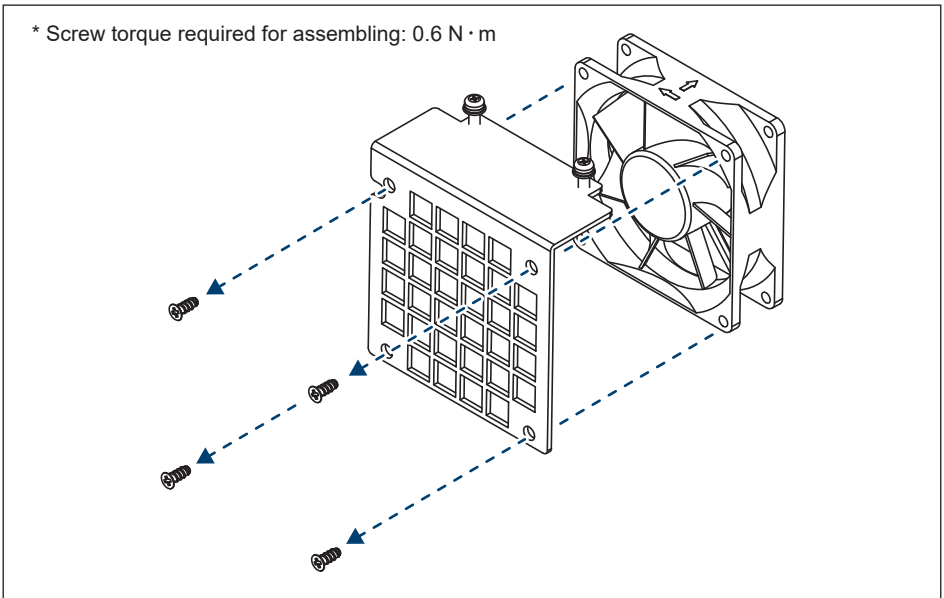


Figure 5-16: Replace with a new fan

5.5 De-Commissioning

When necessary to remove the inverter from active operation for maintenance or replacement, follow the instructions below.

DANGER : ELECTRICAL HAZARD!!



To avoid serious injury, please follow the procedure below.

- Switch off external AC circuit breaker or switch to disconnect the electrical grid from the inverter chassis.
- Switch off both DC switches to cease inverter operation.
- Use H4 wrench tool to disconnect each string from the chassis mounted H4 terminals. Remove array DC from chassis requires opening string level H4 connectors in order to break string continuity at the inverter H4 connectors are not intended for use as a load break switch, therefore:

Ensure inverter DC switches are open and there is no DC current flow.

■ RS-485 Communication module

1. Disconnect all communications wiring from the module terminals.
2. Remove wiring from communications board assembly.

CAUTION : HOT SURFACES, DO NOT TOUCH !



- Use care not to touch hot surfaces if the inverter is just shutting down.
- Do not perform any task until the product cool down sufficiently.

CAUTION : POSSIBLE INJURY !



M70A weighs more than 69 kg / M50A weighs more than 64 kg.

There is risk of injury if the inverter is carried incorrectly or dropped during transport or when attaching or removing it from the wall mounting bracket.

Personnel should wear suitable gloves to protect against injury and maintain firm control of the inverter chassis

ATTENTION



Do not leave loosen screws and nuts inside the case.

6 Error Message and Trouble Shooting

While Delta Electronics endeavors to build electronic products to very high standards of reliability, there will arise instances where the inverter may not operate properly. When such a condition is encountered, please follow the instructions in the Troubleshooting Guide (**Tables 6-1, 6-2, and 6-3**) to attempt to clear the fault. If it can't solve the problem, please contact customer service for technical support.

6.1 Error Codes (Field Fault)

Table 6-1A: Error Codes (Field Fault) and Messages

Message	Description	Action
AC Freq High (E01)	Grid frequency high	<ol style="list-style-type: none"> 1. Check the utility frequency 2. Check Grid code setting
AC Freq Low (E02)	Grid frequency low	<ol style="list-style-type: none"> 1. Check the utility frequency 2. Check Grid code & Grid setting
Grid Quality (E07)	Non-linear load in Grid and near to inverter	<i>If repeated occurrence, contact customer service for technical support</i>
AC phase abnormal (E08)	Wrong connection in AC terminal	Check the AC connection in accordance with the user manual
No Grid (E09)	<ol style="list-style-type: none"> 1. AC breaker is OFF 2. Disconnect in AC terminal 	<ol style="list-style-type: none"> 1. Check switch or AC breaker turn on 2. Check the connection in AC terminal and make sure it connects to inverter
AC Volt Low (E10)	Grid voltage low	<ol style="list-style-type: none"> 1. Check the utility voltage within the suitable range 2. Check Grid code & Grid setting 3. Check the connection in AC terminal
AC Volt High (E11, E13, E16, E18, E21, E23)	Grid voltage high	<ol style="list-style-type: none"> 1. Check the utility voltage within the suitable range 2. Check Grid code & Grid setting 3. Check the connection in AC terminal
DC Voltage High (E30)	Input voltage is over 1000Vdc	Modify the solar array setting, and make the Voc less than 1000Vdc
Insulation Fault (E34)	Insulation problem of PV array to ground	<ol style="list-style-type: none"> 1. Check if panel enclosure ground completely 2. Check if inverter ground completely 3. Check if the DC breakers get wet

6.2 Fault Codes (Inverter Fault)

Table 6-2A: Fault Codes (inverter fault) & Messages

Message	Description	Action
DC Injection (F01, F02, F03)	Utility waveform is abnormal	Contact customer service for technical support
Temperature High (F05)	One of inner ambient NTC and inverter module NTCs is over high temperature limit	Check the installation ambient and environment
Temperature Low (F07)	One of inner ambient NTC and inverter module NTCs is under low temperature limit.	Check the installation ambient and environment
Amb Temp Fault (F06)	The ambient NTC temperature >90 °C or <-30 °C	Contact customer service for technical support
Inverter Temp Fault (F10)	The inverter NTC temperature >98 °C or <-30 °C	Contact customer service for technical support
AC Sensor Fault (F15)	DSP Iac or Vac sensor circuit defective	1. Check the polarity of PV connection (if the error code comes along with W08) 2. Contact customer service for technical support
Vdc Sensor Fault (F16)	DSP Vdc sensor circuit defective	Contact customer service for technical support
Idc Sensor Fault (F17)	DSP Idc sensor circuit defective	1. Check the polarity of PV connection (if the error code comes along with W08) 2. Contact customer service for technical support
AC Sensor Fault (F18)	Red Iac or Vac sensor circuit defective	1. Check the polarity of PV connection (if the error code comes along with W08) 2. Contact customer service for technical support
Idc Sensor Fault (F19)	Red Idc or Vdc sensor circuit defective	Contact customer service for technical support

Table 6-2B: Fault Codes (inverter fault) & Messages

Message	Description	Action
Red COMM Fault (F22)	The internal communication connection is disconnected	Contact customer service for technical support
DSP COMM Fault (F23)	The communication connection is disconnected	Contact customer service for technical support
Ground Cur. High (F24)	Insulation problem of PV array to ground	1. Check the insulation of Solar inputs 2. Contact customer service for technical support
Iac Unbalance (F26)	1. Power line is disconnected inside the inverter 2. Current feedback circuit is defective	Check the connection in AC terminal
RCMU Fault (F27)	RCMU circuit is disconnected	Contact customer service for technical support
AC RLY Short (F28)	Grid relay short	Contact customer service for technical support
AC RLY Open (F29)	Grid relay open	Contact customer service for technical support
Bus Unbalance (F30)	Voltage unbalance of DC link	Restart inverter by DC switches
Bus Voltage High (F31,F33,F35)	Voc of PV array is over 1000Vdc	Restart inverter by DC switches
AC Current High (F36,F37,F38 F39,F40,F41)	Surge occurs during operation	Contact customer service for technical support
AC CT Fault (F42)	Phase R CT is defective	Contact customer service for technical support
AC CT Fault (F43)	Phase S CT is defective	Contact customer service for technical support
AC CT Fault (F44)	Phase T CT is defective	Contact customer service for technical support
AC Current High (F45)	AC current over range	Restart the inverter by DC switches

6.3 Warning Codes (Field Warning)

Table 6-3A: Warning Codes (Field warning) & Messages		
Message	Description	Action
DC Voltage Low (W01)	Input voltage is under the limit	Check the voltage connection to the inverter terminal
De-rating (W07)	<ol style="list-style-type: none"> Over temperature Power Limit function Power vs. Frequency function P(V) function Grid Voltage low Solar Voltage low Solar Voltage High Ramp up function 	<ol style="list-style-type: none"> Check the installation ambient and environment Check Grid Code & Grid setting Check the utility frequency on the inverter terminal Check the utility voltage on the inverter terminal 5-1. Check the utility voltage on the inverter terminal 5-2. Check reactive power setting Check the Solar voltage on the inverter terminal Check the Solar voltage on the inverter terminal Check Ramp up setting
String fault (W08)	<ol style="list-style-type: none"> DC Connectors polar is incorrect String current monitoring function is failure 	<ol style="list-style-type: none"> Check the polarity of PV connection Restart DC switch and AC breaker Contact customer service for technical support

6.4 Warning Codes (Inverter Warning)

Table 6-4A: Warning Codes (inverter warning) & Messages		
Message	Description	Action
Fan Fail (W11)	<ol style="list-style-type: none"> One or more fans are locked One or more fans are defective One ore more fans are disconnected 	<p>Ext Fan Fail</p> <ol style="list-style-type: none"> Remove the object that stuck in the fan(s) Check the connections of all fans Replace the defective fan(s) <hr style="border-top: 1px dashed black;"/> <p>Int Fan Fail</p> <p>Contact customer service for technical support</p>
DC SPD Fault (W17) AC SPD Fault (W18)	<ol style="list-style-type: none"> One or more SPD are defective One or more SPD are disconnected 	<ol style="list-style-type: none"> Replace the defective SPD Check the connections of SPDs

7 Technical Information

Table 7-1A: Specifications		
Model	M70A_260	M50A_260
DC Input		
Occasionally max. voltage	1100 V *1	
Operating Voltage Range	200 - 1000 V	
MPP Voltage Range (Full Power)	460 - 900 V *2	390 - 900 V *3
Start Voltage	> 250 V	
Rated Voltage	600 V	
Max. Input Current	Each MPPT: 26 A, Total: 156 A	Each MPPT: 26 A, Total: 132 A
Max. Input Power	Each MPPT: 15.7 kW, Total: 78.5 kW	Each MPPT: 11.7 kW, Total: 58 kW
Max. allowable array Isc	50A	
MPP Tracker	6	
Connection Type	2 strings/MPPT(fuse not required) 3 strings/MPPT(external fuses required) Amphenol H4 DC Connector	2 strings/MPPT(fuse not required) Amphenol H4 DC Connector
DC Switch	Built-in	
String Monitoring	Built-in	
Surge Protection	Type II SPD / Type I+II SPD(option)	
AC Output		
Rated Output Power	70kW	50kW
Max. Output Power	77kVA *4 (77kW when PF=1)	55kVA *5 (55kW when PF=1)
Max. Output Current	111.6A	83A
Rated Voltage	3 Ph 220 / 380V, 230 / 400V Y or Δ	
Operating Voltage Range	80% to 130% of Nominal AC Voltage	
Operating Frequency Range	50 / 60Hz ± 5Hz	
Power Factor	0.8 ind - 0.8 cap (Adjustable)	
Surge Protection	Type II SPD / Type I+II SPD(option)	
T.H.D	< 3%	
Night Time Consumption *6	< 3.5 W	

*1 The max withstand voltage is 1100Vdc. (inverter stop output when input is over 1000Vdc)
Model for Korea is 1000Vdc.

*2 Ambient < 35°C: 460 - 900V ; Ambient < 40°C: 460 - 800V ; Ambient < 50°C: 520 - 720V

*3 Ambient < 40°C: 390 - 900V ; Ambient < 50°C: 390 - 850V
Model for Korea is 390 - 800V.

*4 Ambient < 40°C

*5 Ambient < 40°C

Model for Korea is 50kVA (50kW when PF=1).

*6 Night time consumption with standby communication.

Table 7-1B: Specifications		
Model	M70A_260	M50A_260
Efficiency		
Peak efficiency	98.8 %	98.7 %
Euro efficiency	98.4 %	98.3 %
Information		
Communication Port	RS-485 / SUB_1G / Wi-Fi (optional)	
Regulation		
	IEC 62109-1/-2 EN 61000-6-2 EN 61000-6-3 VDE-AR-N 4105 VDE 0124-100	VDE-AR-N 4110 NB/T 32004: 2018 GB/T 19964: LVRT CNS 15382
General Data		
Operating Temp. Range	-25 to +60°C (Derating Above 50°C)	
Protection Level	IP65	IP66
Operating Elevation	< 4000 m	
Cooling	Smart fan air cooling	
Noise	67.3 dBA @1m, Amb25°C	65 dBA @1m, Amb25°C
Dimension (W x H x D)	699 x 629 x 264 mm	
Weight	69 kg	64 kg

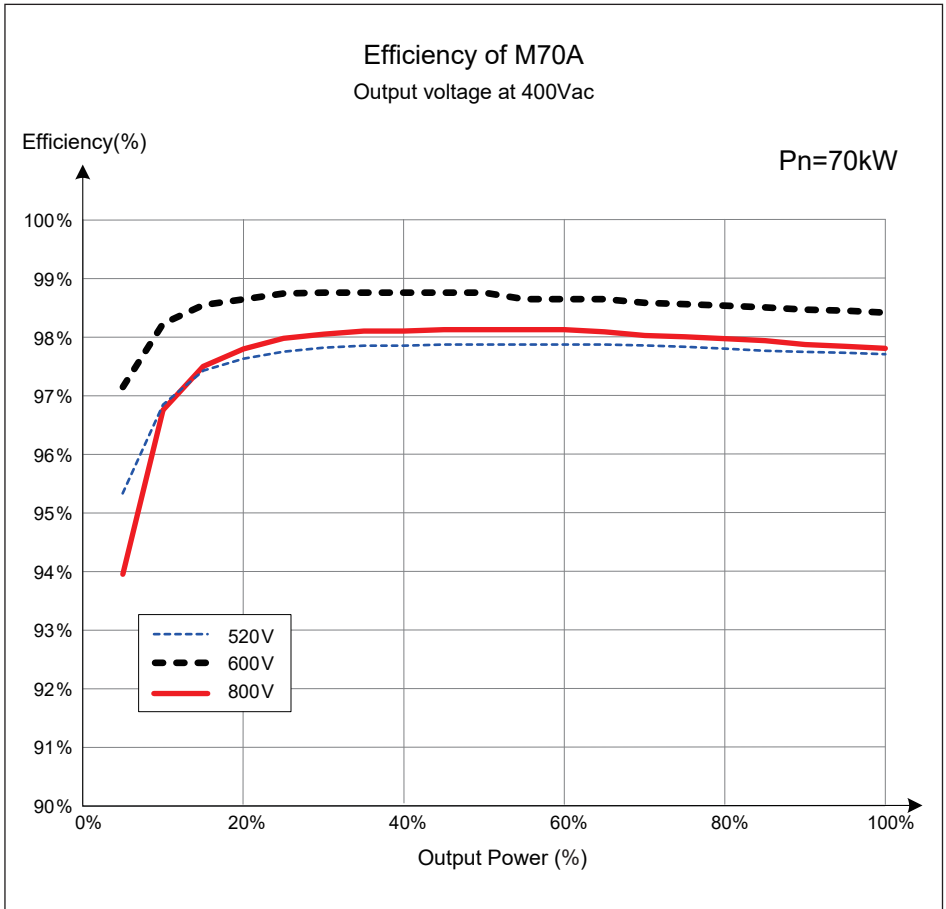


Figure 7-1: Efficiency Curve

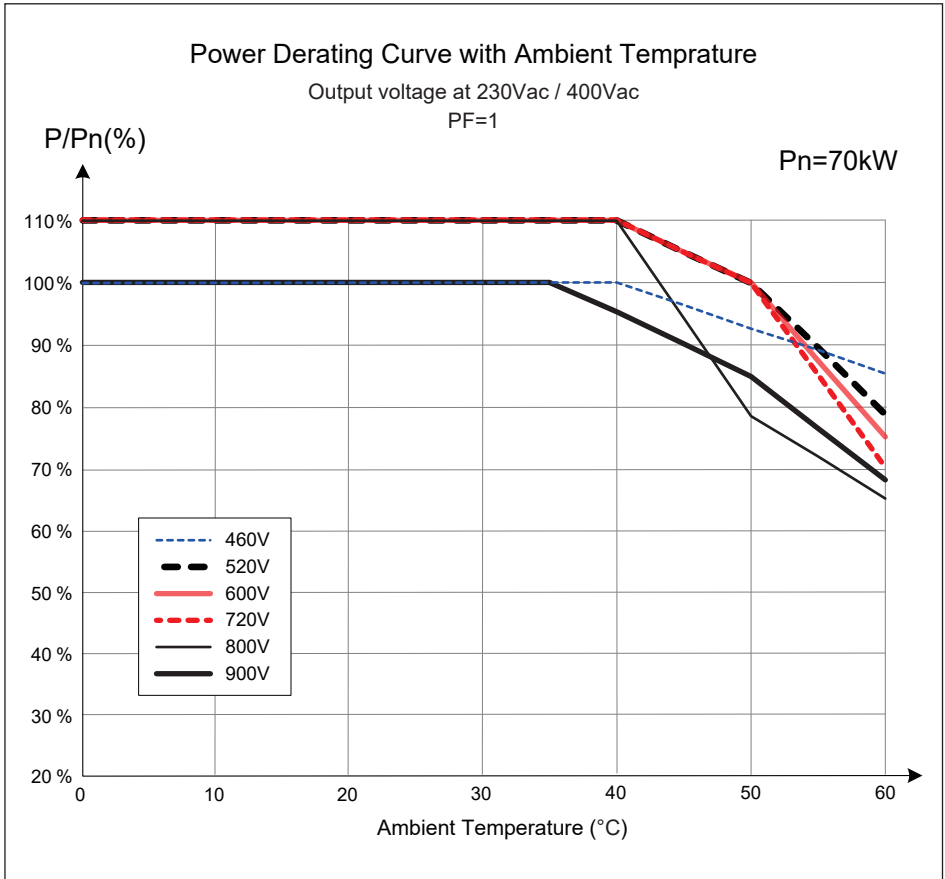


Figure 7-2: Power Derating Curve with Ambient Temperature (PF=1)

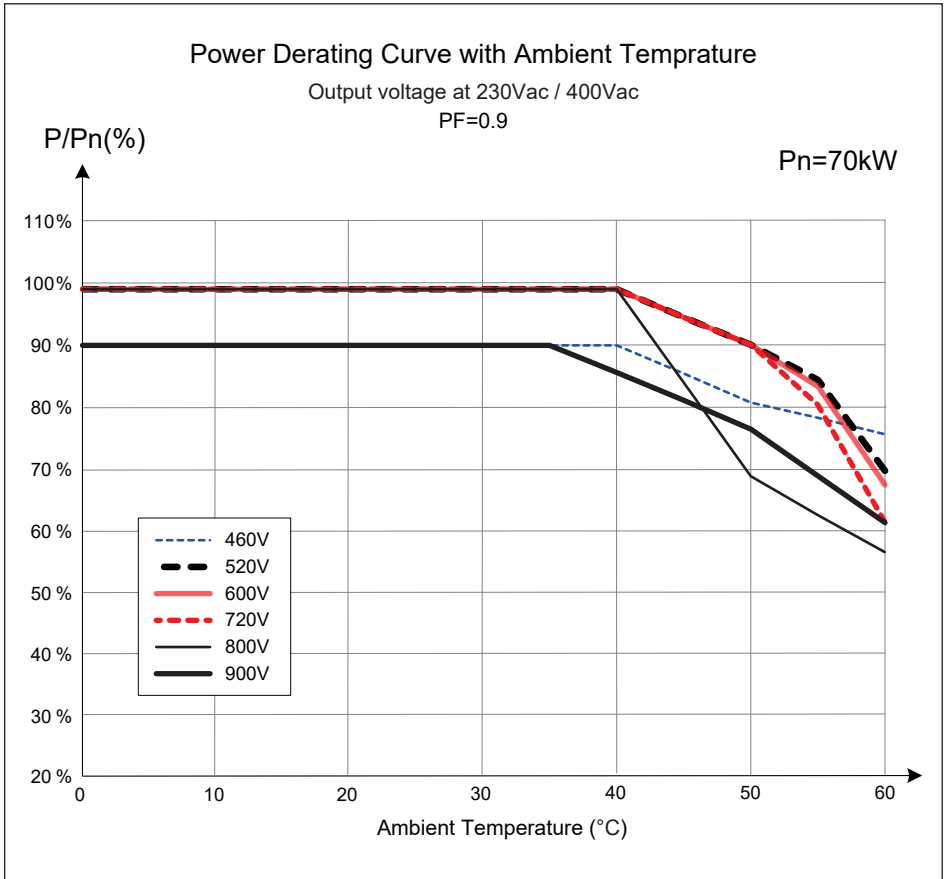


Figure 7-3: Power Derating Curve with Ambient Temperature (PF=0.9)

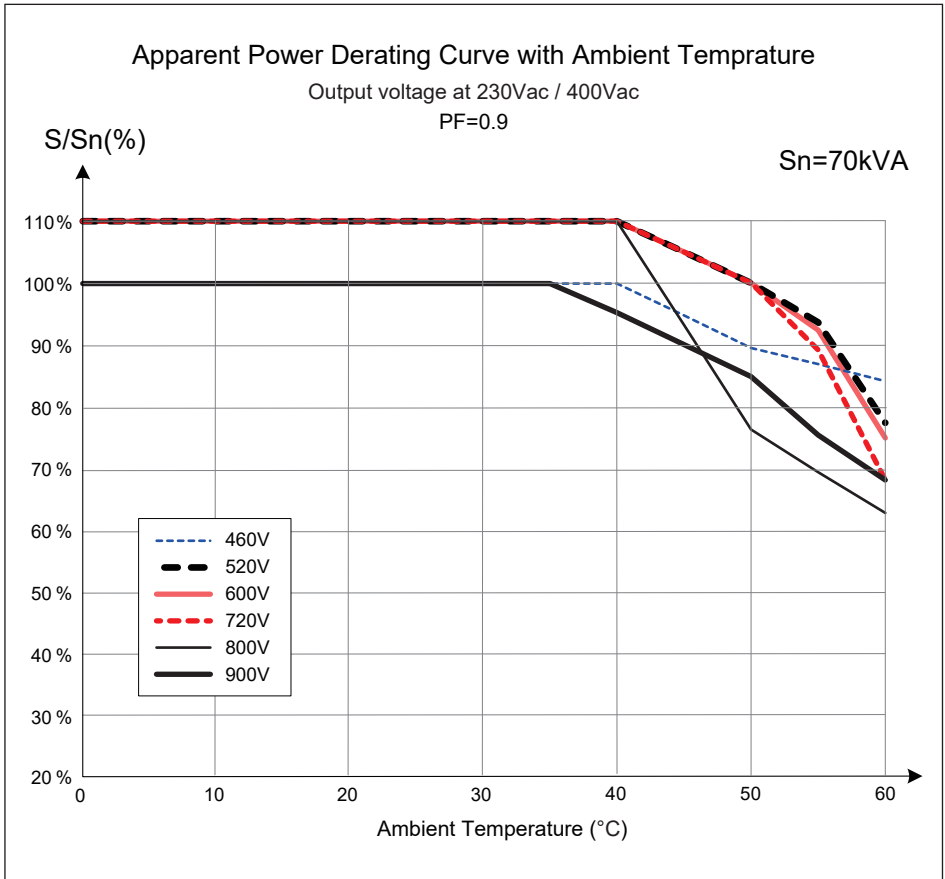
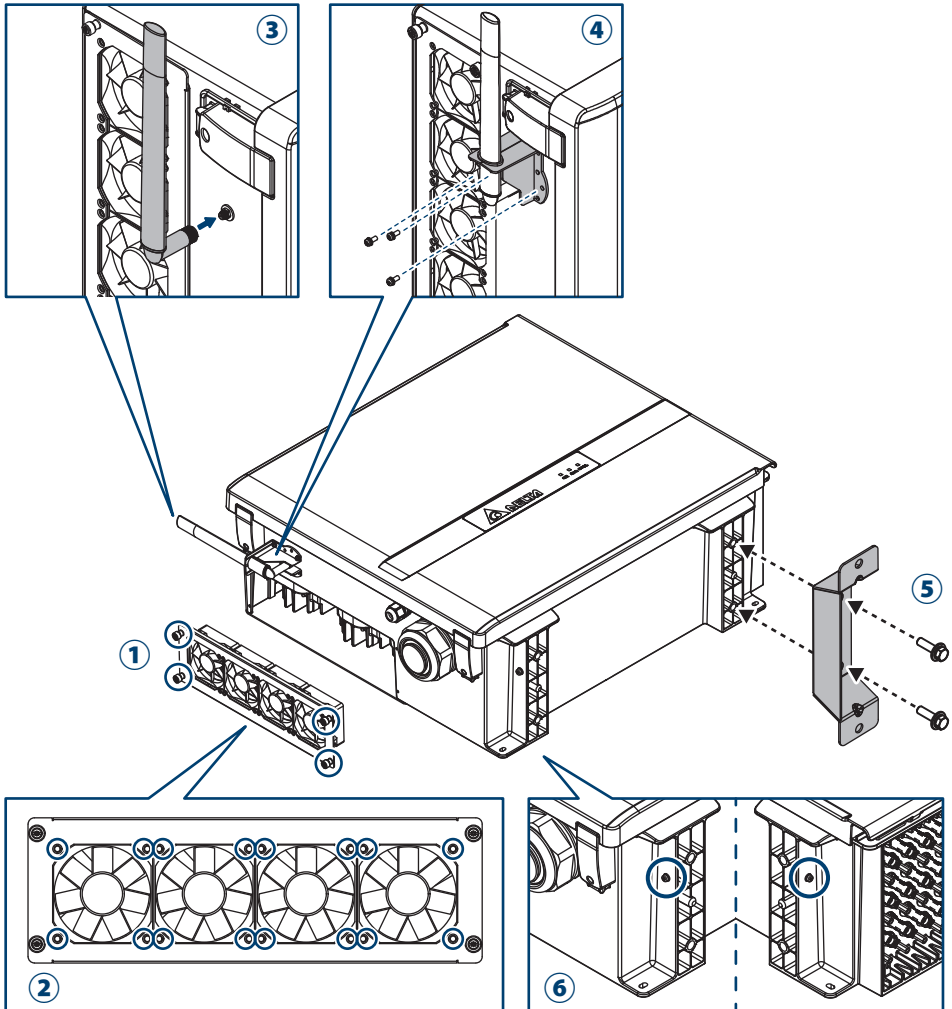


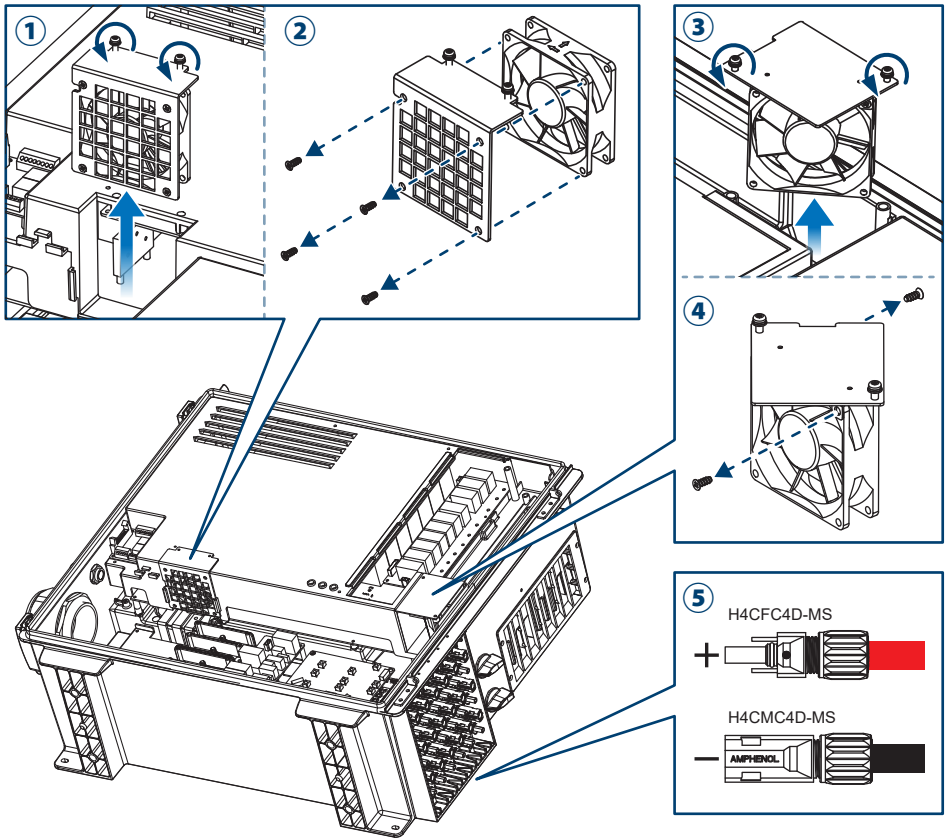
Figure 7-4: Apparent Power Derating Curve with Ambient Temperature (PF=0.9)

Appendix: Assembly Note



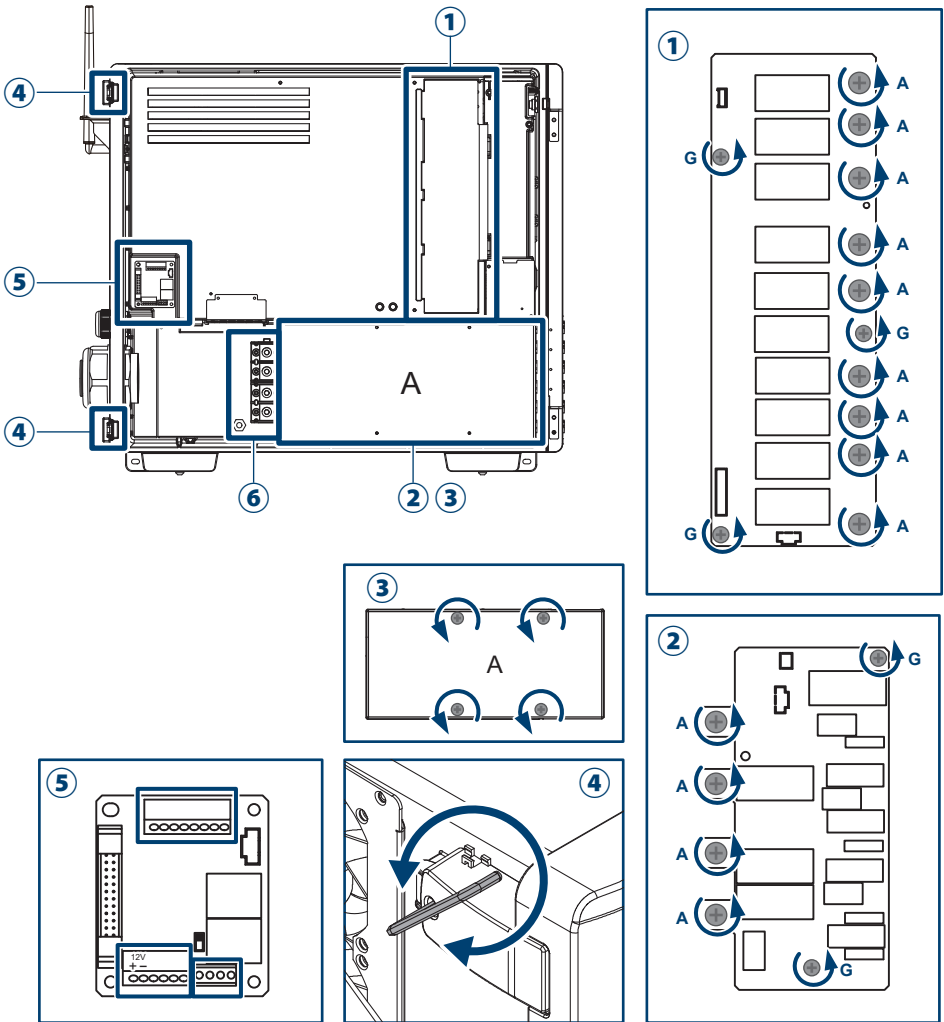
Appendix-1: Assembly Note-1

NO	Location	Screw torque
1	Filter	10 kgf-cm (0.98N · m)
2	Fan Tray	6 kgf-cm (0.6N · m)
3	Antenna	12 kgf-cm (1.2N · m)
4	Antenna Bracket (M4)	10 kgf-cm (0.98N · m)
5	Grounded Bracket	250 kgf-cm (24.5N · m)
6	Grounding (M6)	40 kgf-cm (3.9N · m)



Appendix-2: Assembly Note-2

NO	Location	Screw torque	Conductor cross-section
1	Internal Fan 2 Cover	8.0 kgf-cm (0.8N · m)	-
2	Internal Fan 2 Tray	6 kgf-cm (0.6N · m)	-
3	Internal Fan 1 Cover	8.0 kgf-cm (0.8N · m)	-
4	Internal Fan 1 Tray	6 kgf-cm (0.6N · m)	-
5	H4 wire	-	12/10 AWG (4/6mm ²)



Appendix-3: Assembly Note-3

NO	Location	Screw torque	Conductor cross-section
1	DC SPD board	A: 25 kgf-cm (2.45N · m)	-
2	AC SPD board	G: 8.0 kgf-cm (0.8N · m)	-
3	AC Cover	8.0 kgf-cm (0.8N · m)	-
4	Toggle Latch	25 kgf-cm (2.45N · m)	-
5	Communication port	-	20 AWG (0.5mm ²)
6	AC terminal	L1, L2, L3, N	M70A: 317 kgf-cm (31N · m) M50A: 126 kgf-cm (12.4N · m)
		PE	M50A_260: 35 mm ² (1 AWG)~120 mm ² (250 kcmil) M50A_260: 16 mm ² (4 AWG)~60 mm ² (2/0 AWG)



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三相并网型逆变器

M70A_260 / M50A_260

操作手册

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1 安全规范

1.1 逆变器资料

1.1.1 免责声明

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- (a) 产品没有恰当的安装或维修
- (b) 产品未依照说明书正确使用
- (c) 产品于拆装过程受损

1.1.2 适用对象

本说明书适用于针对安装、试运行、实际操作、后续维护受过良好训练的人以下基础及进阶技巧为必需的。

- 了解基础电力、配线、电子元件及电子电路符号
- 了解太阳能逆变器如何运行及操作
- 针对电子产品的安装及试运行受过训练
- 针对安装及使用电子产品的过程中会遇到的危险及风险受过训练
- 遵守本说明书及所有安全规范

开始接触此产品前，请详阅本说明书。

1.2 安全概述

重要安全指示：保存所有指示！



- 请详阅所有指示及保存供后续使用。

为了避免人员受伤或其他损失及确保逆变器长期运转，在使用此产品前请务必详阅所有安全指示。

本说明书针对Delta并网型无变压器太阳能逆变器提供重要指示。本产品进行设计、测试、验证且经国际安全规范认证，但安装及使用本产品前仍须做好防范措施。本产品适用于室内及户外。

注意：无电气隔离



- 本产品需安装外部隔离变压器确保交流侧与光伏模组进行隔离。
- 本产品无附加变压器，为非电气隔离型。
市电端与逆变器间需加入外部变压器。
请勿使用需接地(正极或负极)之太阳能板。
若使用了，则本产品会以INSULATION (E34) 告警。
- L1, L2, L3,及 N 禁止连接至地。

1.2.1 使用条件

- M70A_260 / M50A_260 为 6 MPP追踪、无变压器太阳能逆变器，能将太阳能串列的变动电流转换成与市电频率相同之三相交流能量并馈入市电。
- 所使用之太阳能模组需与逆变器匹配。
- 太阳能面板之对地电容不可超过 10 μ F。
- 本产品仅可在经Delta及市电业者许可之国家运行。

1.2.2 标志

本节说明本说明书会出现的标志定义，为了避免人员受伤或其他损失及确保逆变器长期运转，在使用此产品前请务必详阅所有安全指示并遵守。

危险！



- 此警语表示可能发生致死或严重伤亡的情形。

警告！



- 此警语表示可能发生致死或严重伤亡的情形。

注意！



- 此警语表示可能发生较轻微伤害的情形。

注意



- 此警语表示可能对资产或环境造成伤害。

资讯



- 进一步的资讯会经由双圈惊叹号指示。
这代表接续的内容将含有使用者该遵守的重要资讯以免造成任何伤害。

危险：触电！！



- 此警语表示可能会有造成严重伤亡的触电可能。

注意：表面高温，请勿触碰！



- 此警语表示当逆变器运行时机体表面高温，
待表面温度下降后在进行需接触的工作。



- 等待图示中所显示的时间后再进行工作



- 设备接地导体

2 产品介绍

M70A_260 / M50A_260 以最先进之高频切换及低EMI技术设计而成，同时具有高效率及高寿命的特点，亦适用于户外。

注意：无电气隔离



- 本产品无附加变压器，为非电气隔离型。
- 请勿使用需接地(正极或负极)之太阳能板。
- 若使用了，则本产品会以INSULATION (E34) 告警。
- L1, L2, L3,及 N禁止连接至地。

2.1 适用机种

本说明书适用以下机种:

- M70A_260
- M50A_260

安装、运行及维护过程皆必须遵守本说明书。

Delta保留在不另行告知的前提下修改内容及技术资料的权力。

2.2 产品概述

内容物如图2-1所示。

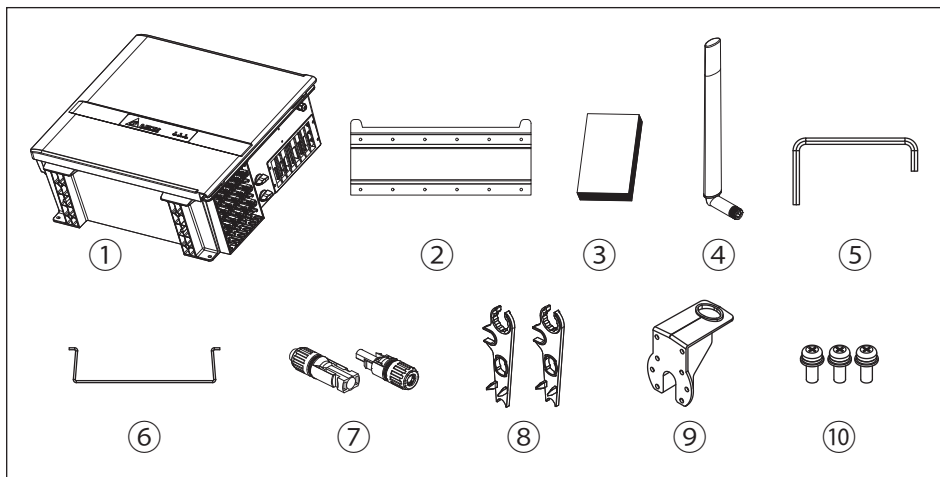


图2-1：内容物

表2-1：内容清单

M70A_260 / M50A_260			
	物件	数量	描述
1	DELTA太阳能逆变器	1	太阳能逆变器
2	壁挂架	1	将逆变器挂起之壁挂架 (材质: 铝 / 厚度: 3mm)
3	说明书	1	安装及维运过程中务必参考本说明书中的安全指示
4	SUB_1G 天线	1	SUB_1G专用天线
5	六角板手 (已安装于锁扣外盖上)	1	固定前盖用门闩与卸除锁扣外盖螺丝工具
6	保护架	6	直流组串接头保护架
7	H4端子	18/12对*	直流组串输入接头
8	H4板手	2	H4接头拆除工具
9	天线支架	1	用于固定SUB_1G天线
10	天线支架螺丝	3	用于固定天线支架

* M70A_260: 18对 / M50A_260: 12对

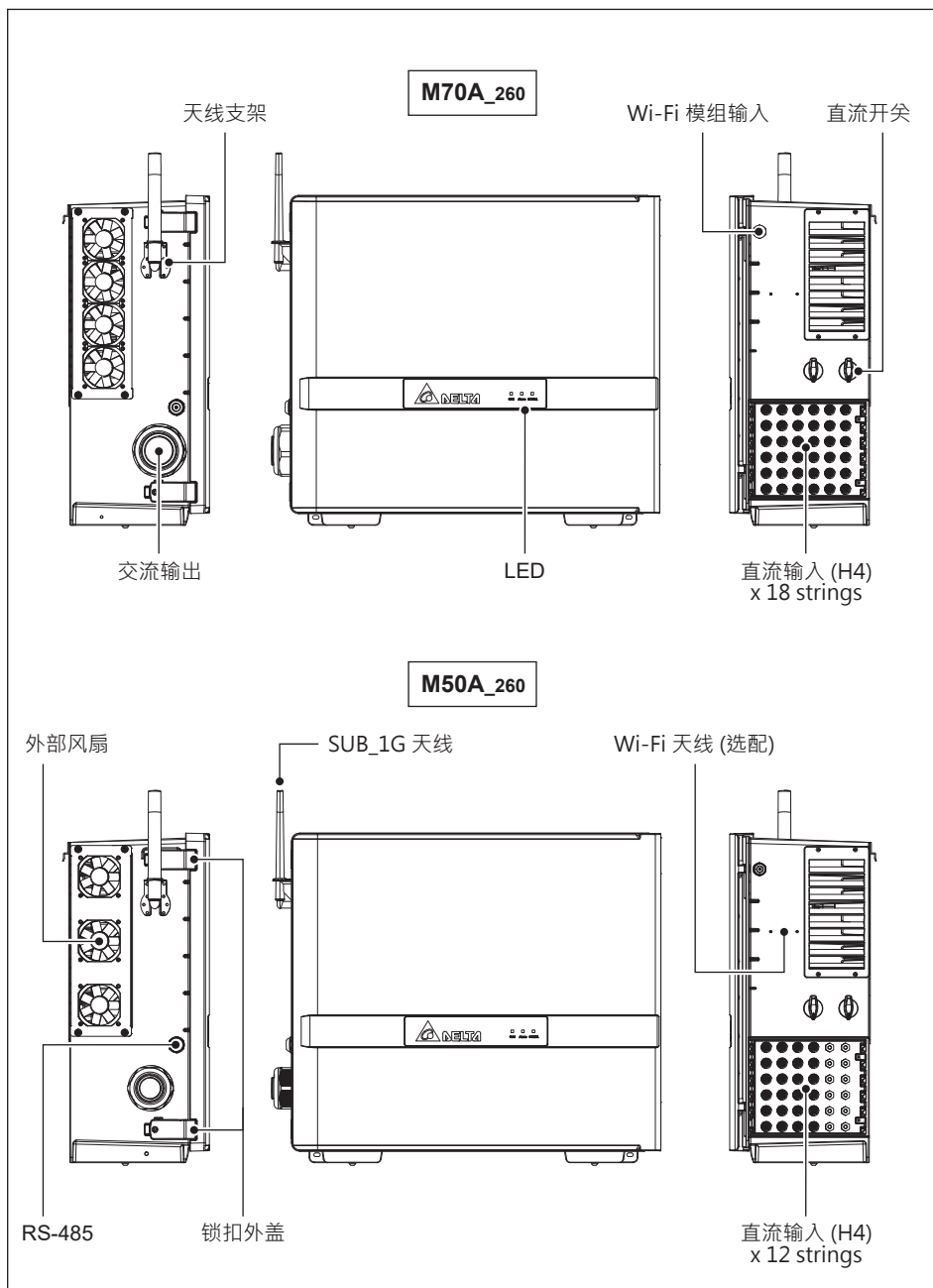


图2-2 : 外观介绍

图2-3为产品标签并配合表2-2针对特殊符号做解释。

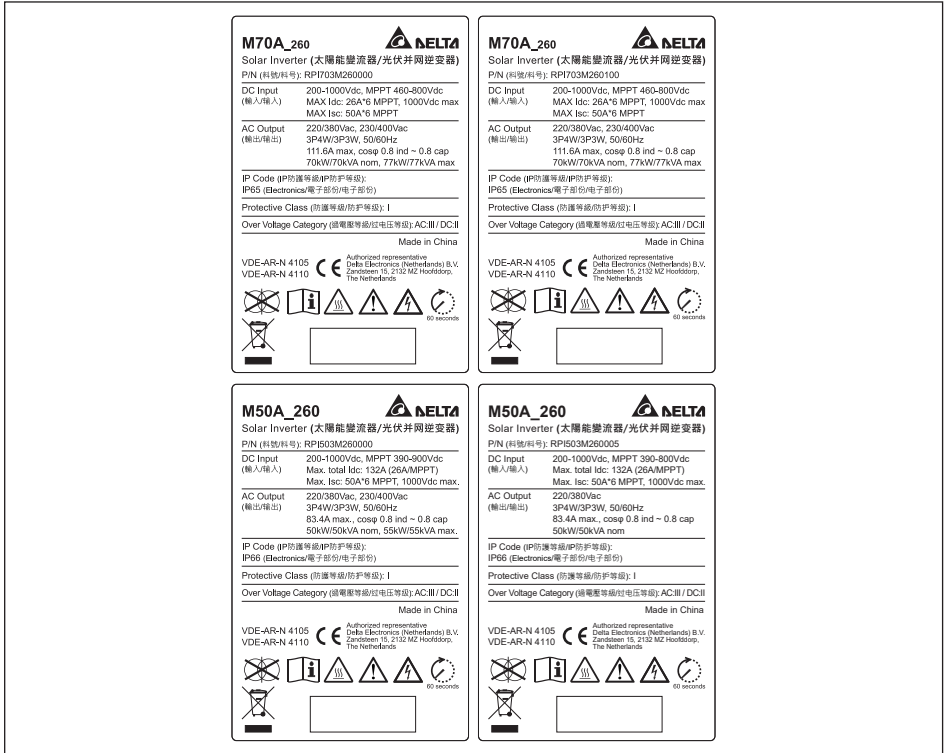


图2-3：标签

表2-2：标签内容描述

符号	定义
<p>60 seconds</p>	<p>严重触电危险 逆变器运行时会有致命高压存在，切断后危险电压存在约60秒，时间内请勿接触逆变器。 本产品不含任何需要开启机壳之元件。擅自开启机壳会使保固失效。</p>
	<p>注意表面高温 逆变器运行时，表面可能高温</p>
	<p>此逆变器本身没有经由变压器与市电端分离。</p>
	<p>若当地规范要求，机体外壳请务必下地。</p>
	<p>使用此逆变器前，请详阅说明书。</p>
	<p>WEEE marking 本逆变器须以标准家用废弃物报废，并同时遵守当地针对电器报废的相关规范。</p>

图2-4为配线箱的架构图详细描述可参照图2-5、表2-3，其中包含输出端的雷击保护装置(SPD)。

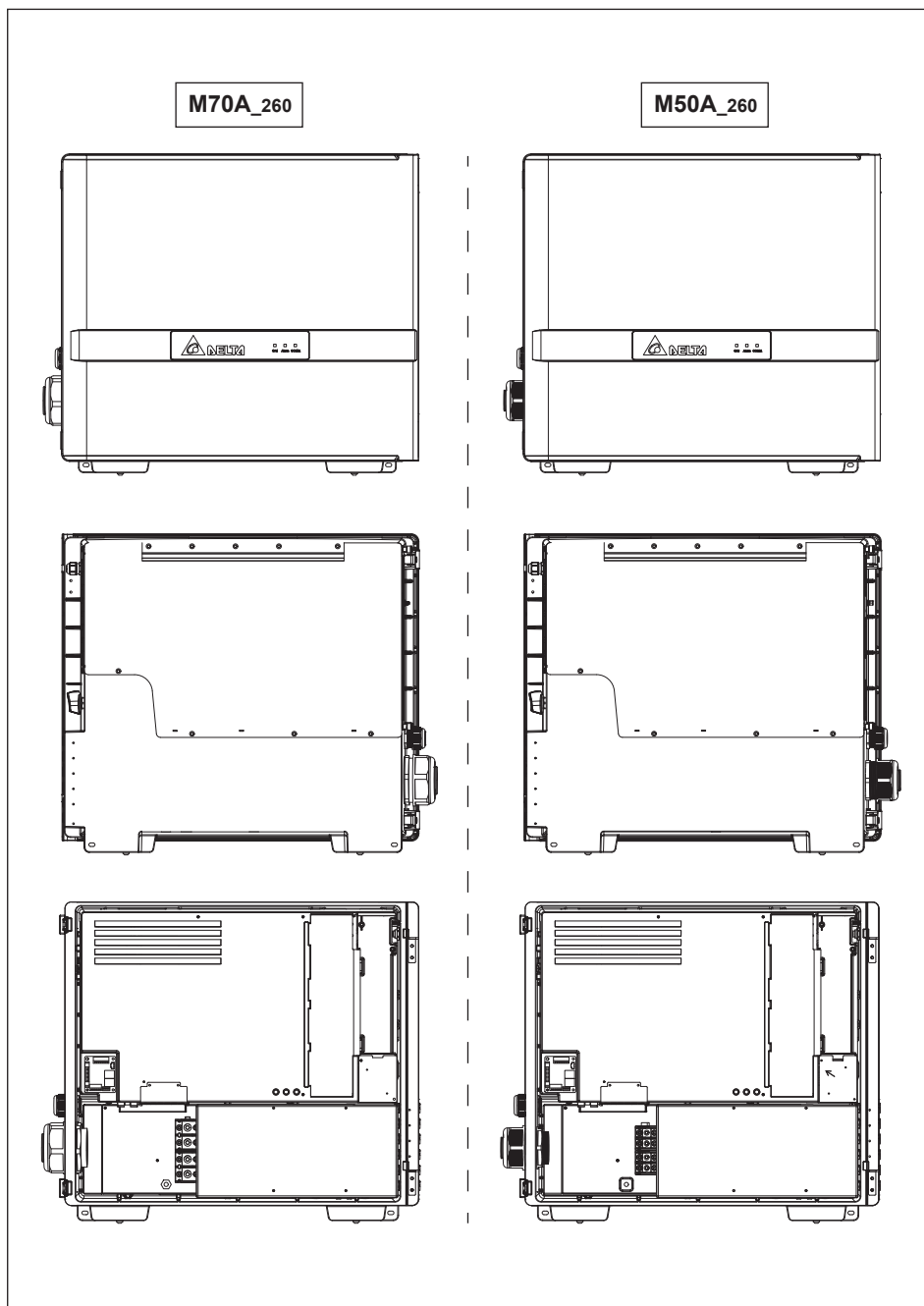


图 2-4：外部/内部结构

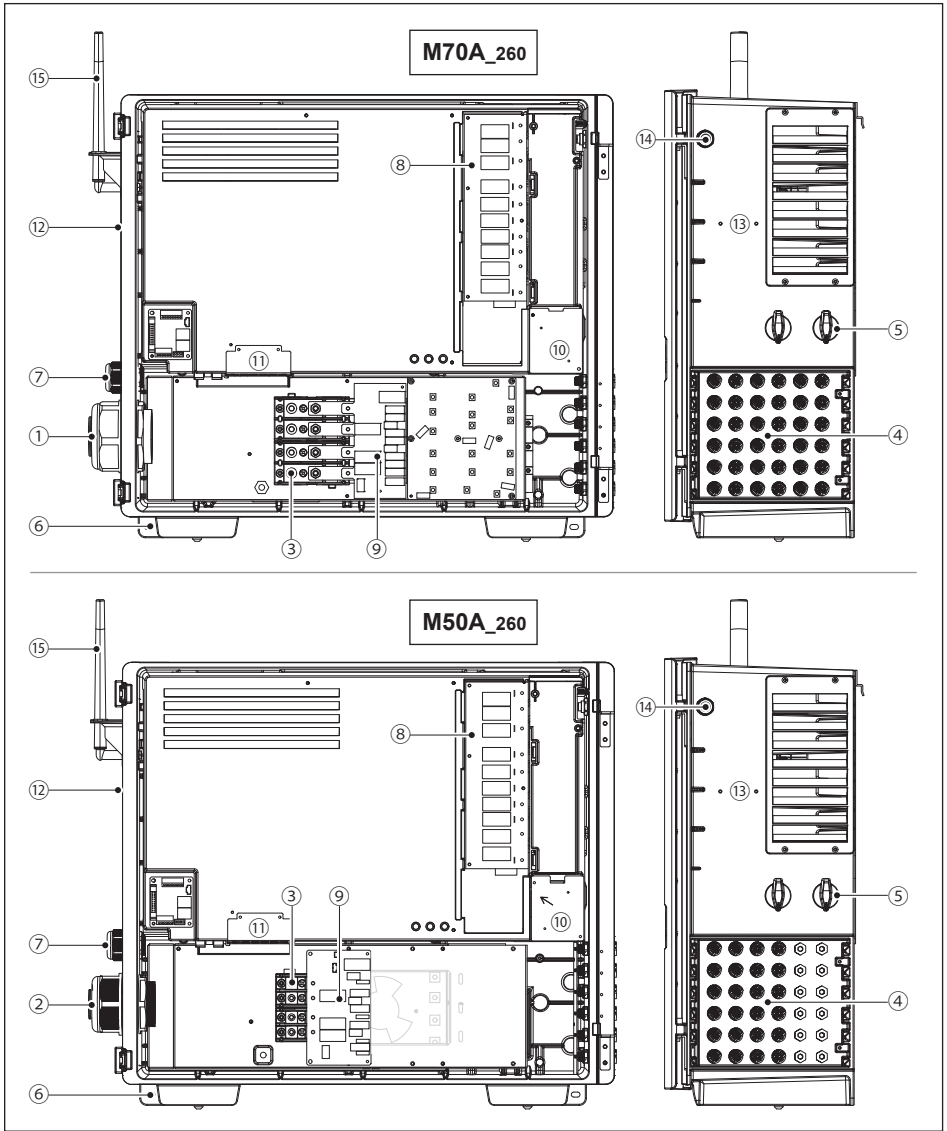


图2-5：配线箱架构图

表2-3：配线箱架构图内容描述

NO.	Component	NO.	Component	NO.	Component
1	2.8" cable opening for AC (M70A_260)	6	Grounding (M6 threaded stud)	11	Internal fan 2
2	2.5" cable opening for AC (M50A_260)	7	Communication port	12	Outer fan
3	AC terminal	8	Type 2 DC SPD	13	Wi-Fi (option)
4	H4 connectors	9	Type 2 AC SPD	14	Wi-Fi gland
5	DC switches	10	Internal fan 1	15	SUB_1G

3 安装

注意！



- 本产品不建议安装在直接日照曝晒处。

警告！



- 请勿将本产品安装在易燃表面附近。
- 请将本产品安装于坚固且平顺之表面。

本章节包含以下指示

1.机构安装 2.电气安装 3.通讯安装

3.1 拆箱与检视

请依照图 3-1所示拆封外箱包装。
建议两人以上进行作业(图 3-2)。

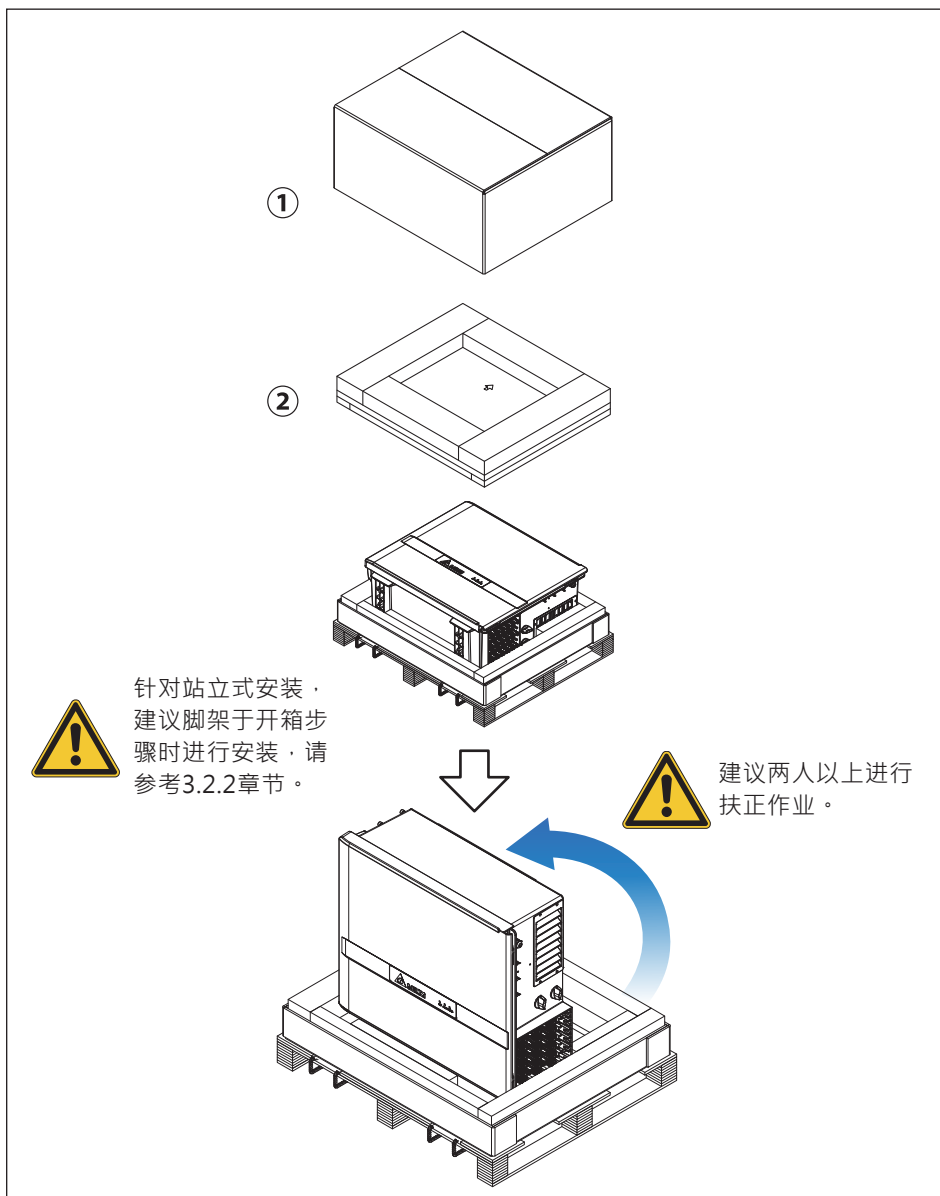


图 3-1: 开箱步骤

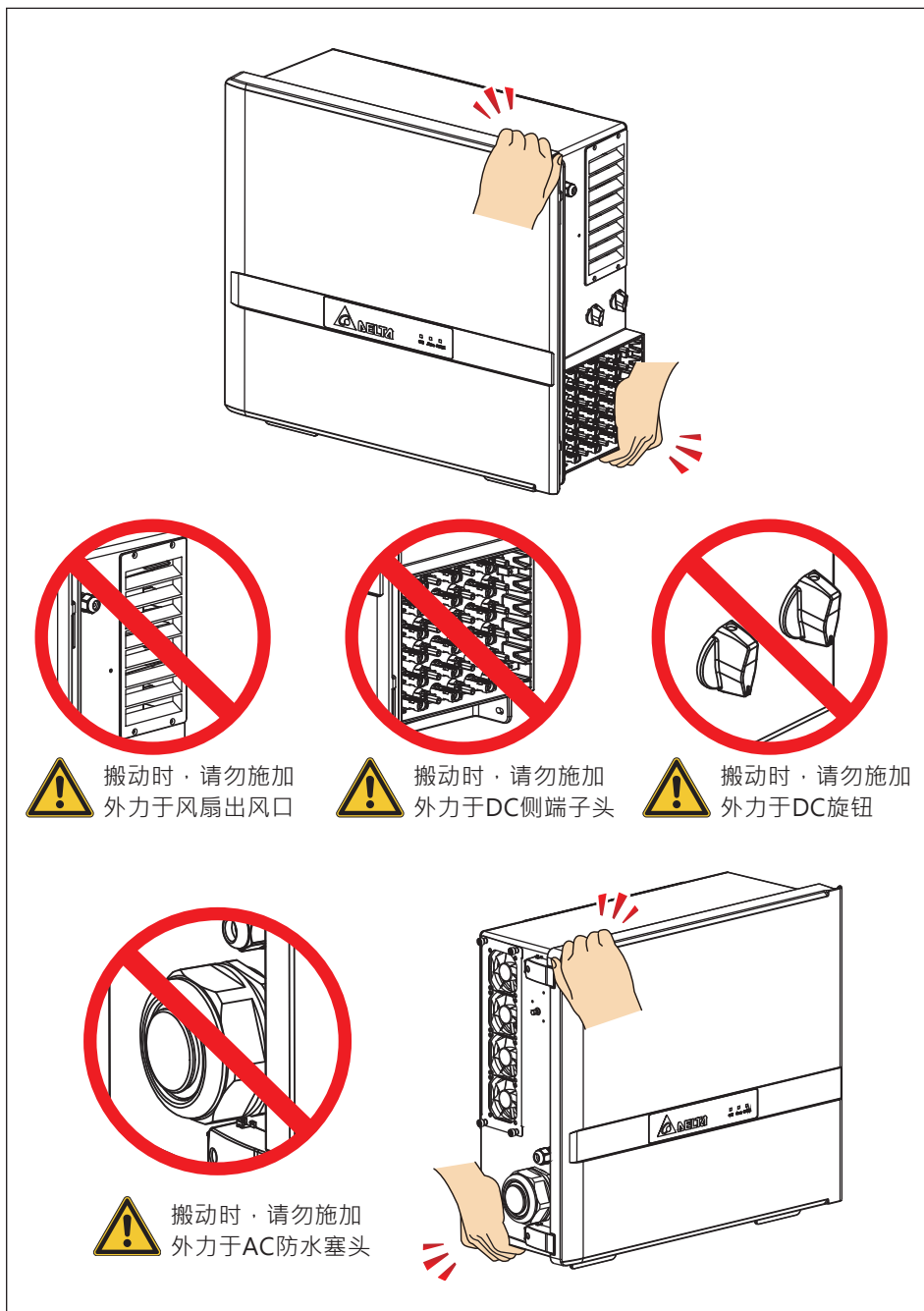


图 3-2: 搬动施力位置

3.2 机构安装

此机器设计支援壁挂式安装，请参考3.2.1 章节；同时亦支援地上站立式安装，请参考3.2.2章节。

3.2.1 直立壁挂式安装

请参考图3-4至3-9说明

1. 请先确定产品安装墙面足以承载产品重量。
2. 水平固定壁挂架(垂直于地板)，壁挂架尺寸如图3-4所示。
3. 锁附12枚M6十字螺丝于壁挂架上。(图3-5)
4. 将产品放置于壁挂架上。
5. 将产品锁附上2枚M6十字螺丝于图3-5所示之位置。
此处亦为设备外部接地点，设备接地方式请参阅3.5.2章节。

注意！



- 至少使用8枚M6螺丝将壁挂架固定墙上。
- 该壁挂架为本产品专用，请勿使用其他壁挂架来搭配本产品使用。
- 未遵守以下安装说明中的方向和间隙可能导致降额功率输出并可能使保固失效。

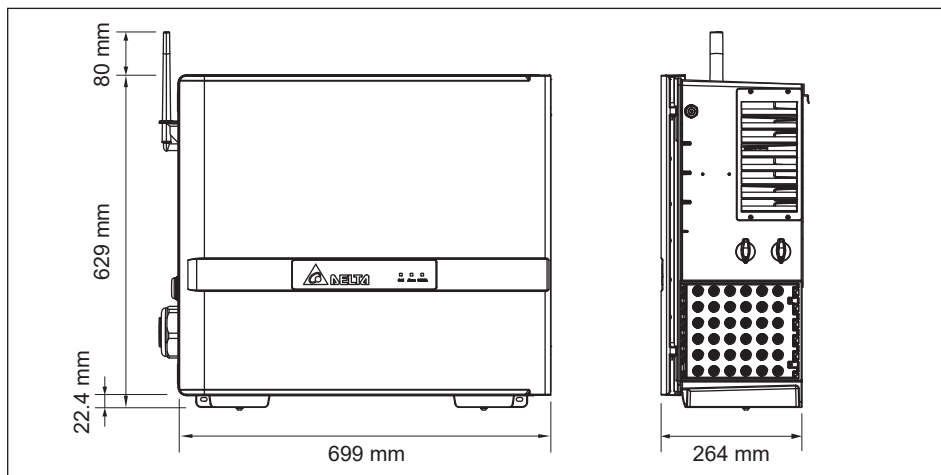


图 3-3: 逆变器尺寸

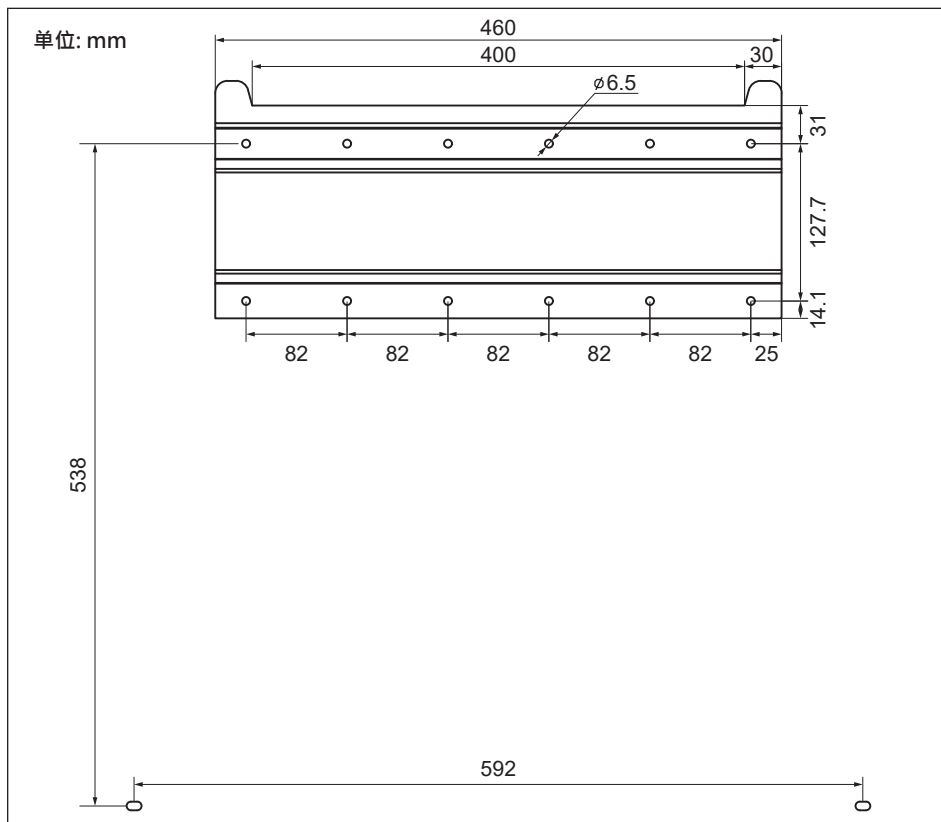


图 3-4: 壁挂架尺寸

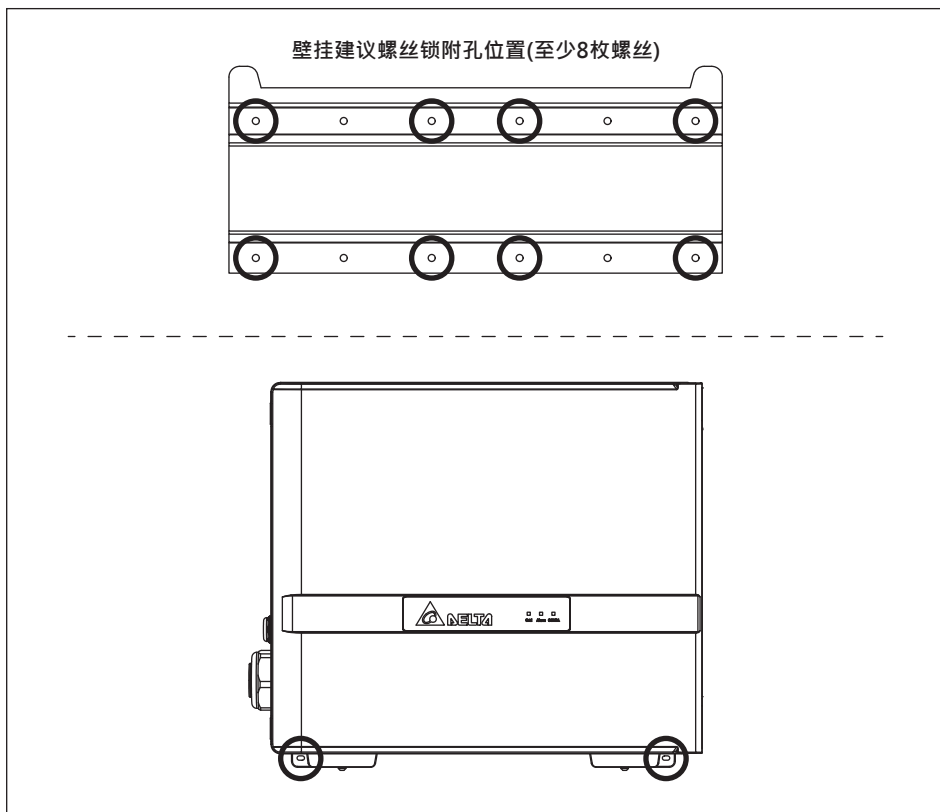


图 3-5: 壁挂螺丝锁附位置

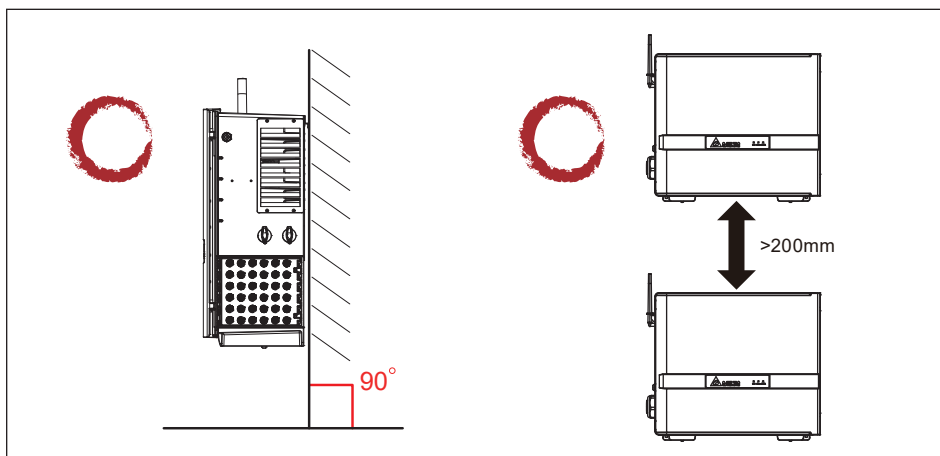


图 3-6: 正确的安装位置

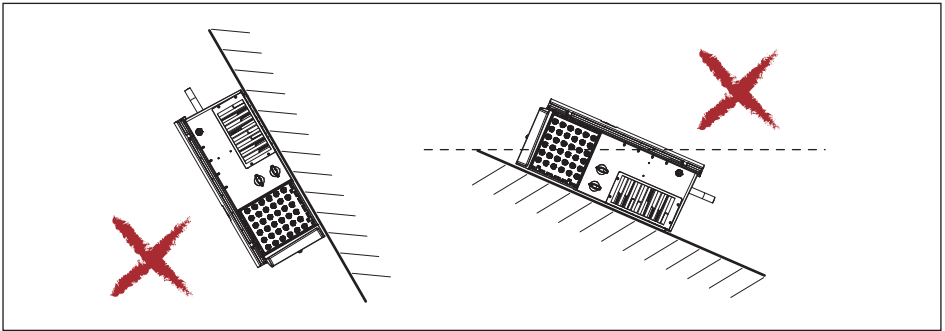


图 3-7: 禁止的安装方式

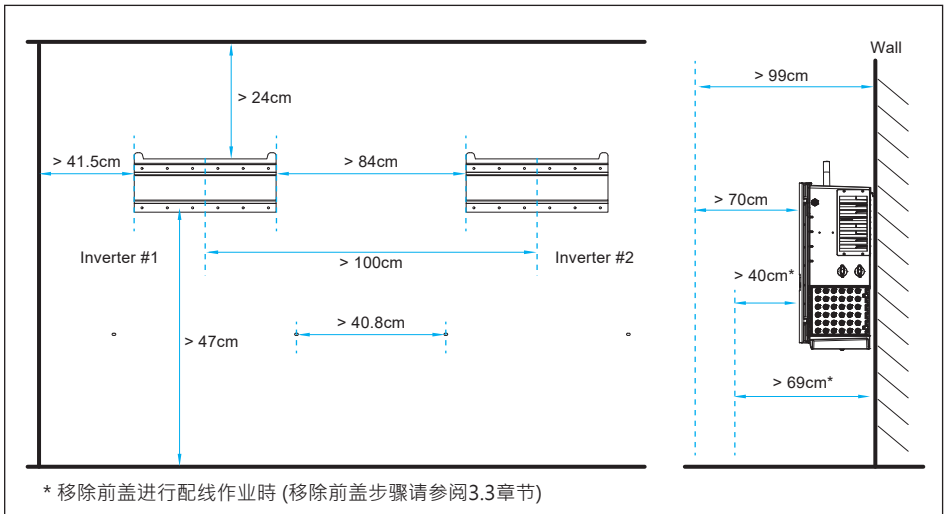


图 3-8: 壁挂所需间距

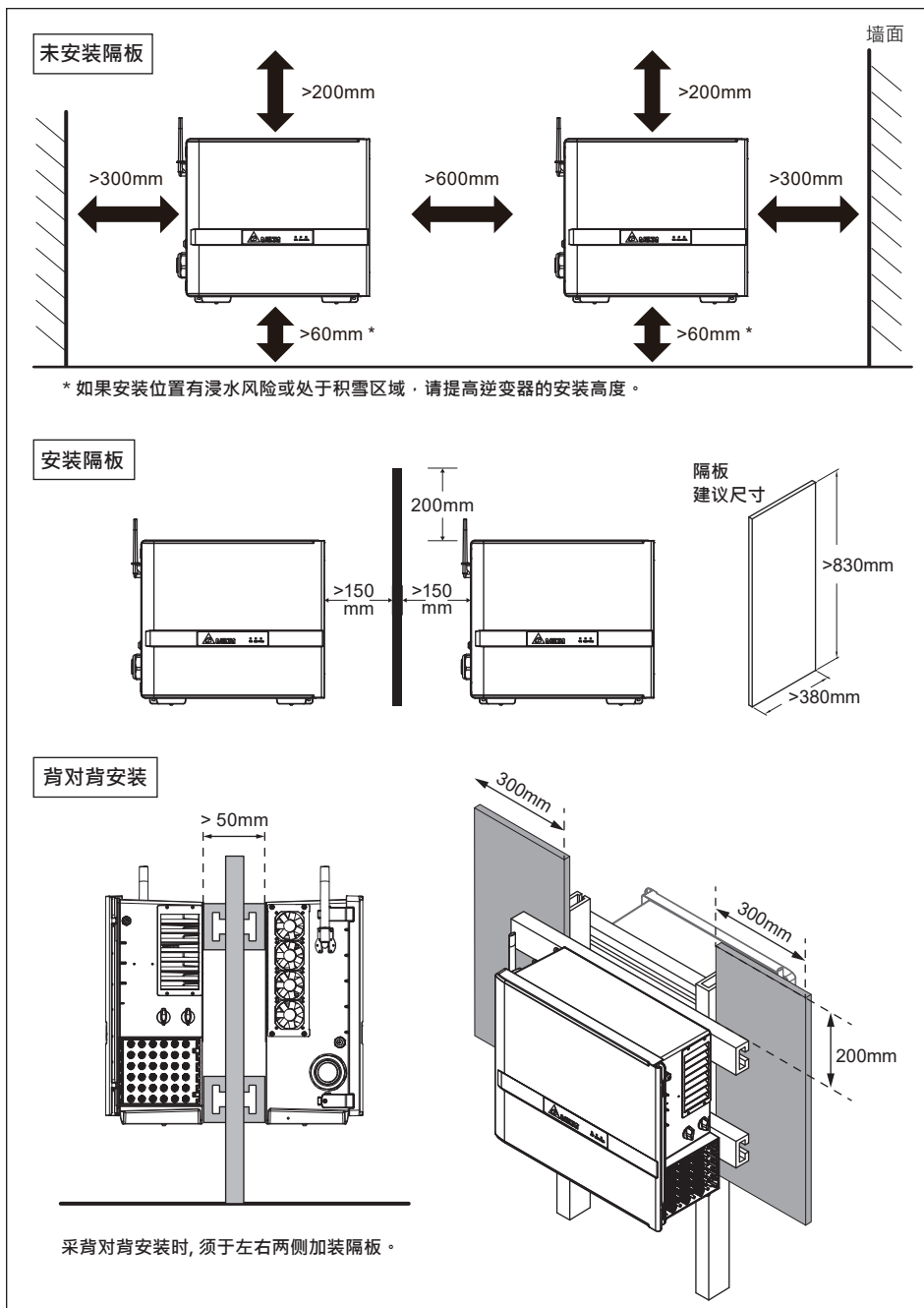


图 3-9: 机台间最低要求距离

3.2.2 落地式安装 (选配)

如果采用落地式安装，请购买落地支架配件。

1. 确保安装设备的地面基座强度足够且足以承载重量。
2. 水平安装落地支架(垂直于地板)，并标记所需安装孔位置如图3-11所示。
3. 用4个螺丝将落地支架固定到机器脚座上(图3-10)。
4. 使用4个M12螺丝将落地支架固定在机器脚座上(图3-11)。
5. 将逆变器安装在地面安装基座上。

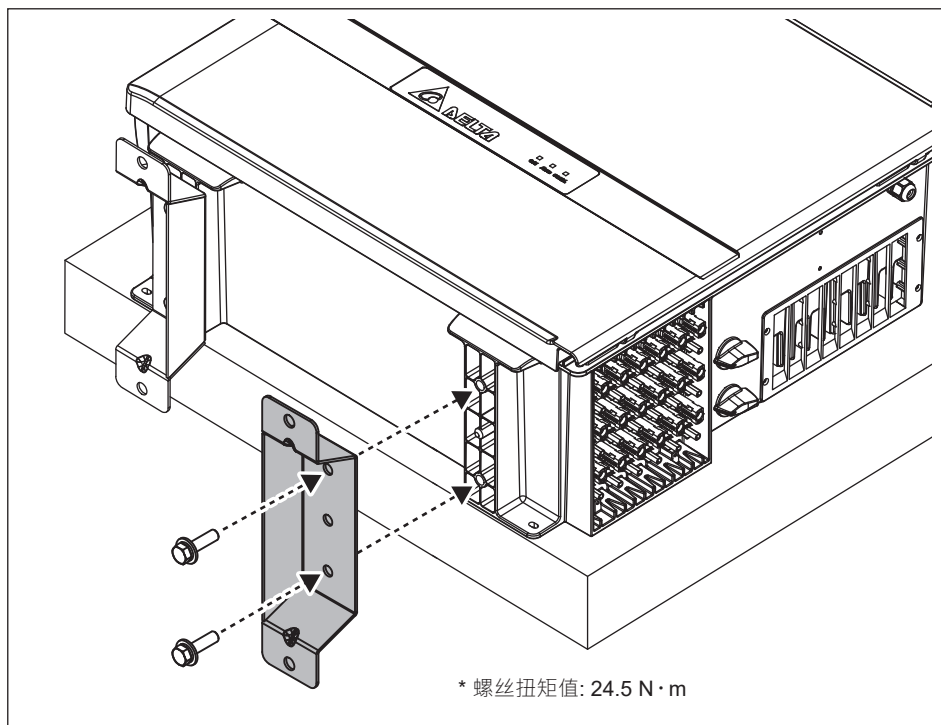
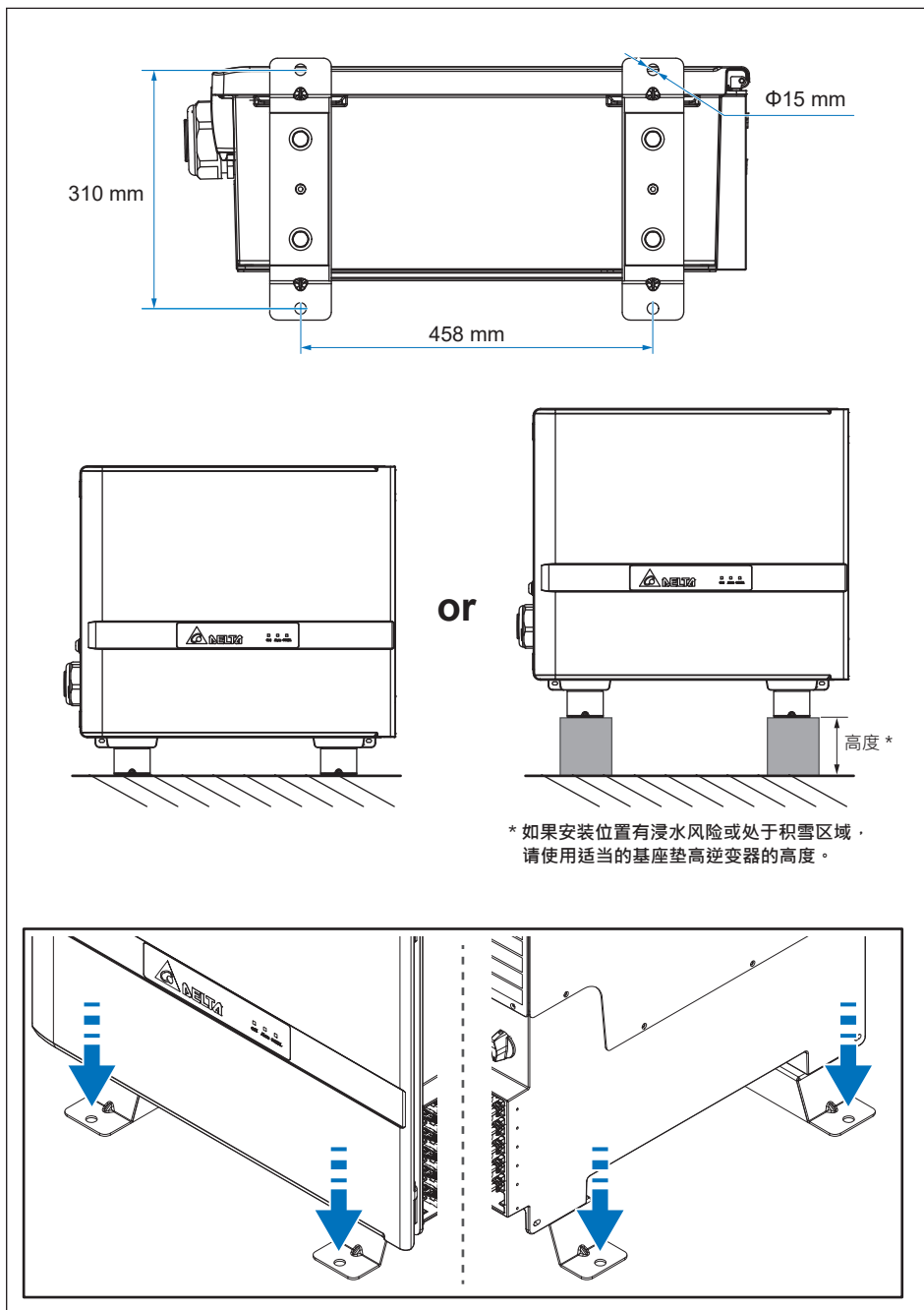


图 3-10: 落地支架安装



* 如果安装位置有浸水风险或处于积雪区域，请使用适当的基座垫高逆变器的高度。

图 3-11: 将逆变器安装在地面安装基座上

3.3 前盖

为了确保逆变器可以良好的长期运转，开关前盖时，请务必参考5.1章节步骤。当安装空间狭窄不易进行配线作业时，请依图3-12所示拆除前盖。配线完成后，请将前盖安装回逆变器，并按照5.1.2章节的步骤关闭前盖。

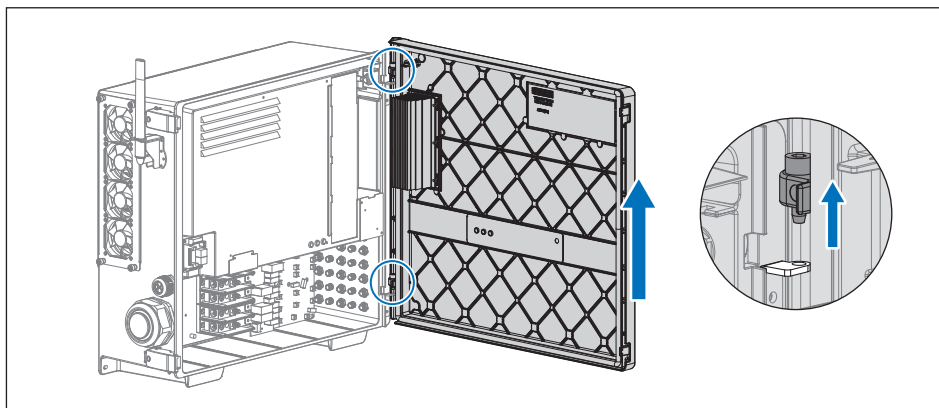


图3-12：拆除前盖

3.4 交流配线安装

危险：触电危险!!



- 配线时禁止供给逆变器任何电源。

警告！



- 遵守条文为安装者的责任。
- 直流电压超过1000V则保固失效。

注意：逆变器及设备可能损毁！



- AC端子安装须遵守当地电气法规。
- 不遵守指示可能会损坏交流线材。

注意：错误的交流线材！



- 为了不损坏逆变器中的组件，请确保将正确的线材连接到逆变器上相应的交流端子。

3.4.1 AC 形式与连接方式

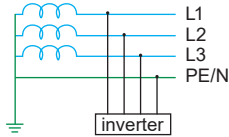
注意



机器初始设定为 3Ø-3W 接线方式，也可变更为 3Ø-4W 含中性点 N 的接线方式。逆变器可工作于下述电力系统连接方式无须额外配接外部变压器。

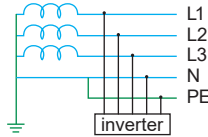
TNC system

230/400V



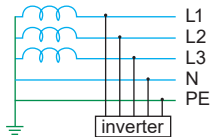
TNC-S system

230/400V



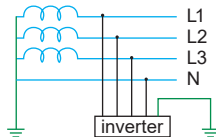
TNS system

230/400V



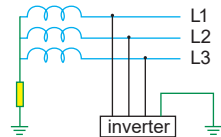
TT system

230/400V



IT system

230/400V



3.4.2 必要保护装置

建议于市电端与逆变器间加入断路器做为过电流保护。

型号	断路器规格
M70A_260	150A max.
M50A_260	125A max.

3.4.3 交流配线安装

请遵循以下步骤组装交流端子：

- 线材表面积范围如图3-13
- 适用线材资讯及注意事项请见下页说明

Conductor cross-section:

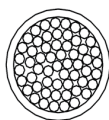
M70A_260 -
Cu: 35 mm² (1 AWG) ~ 120 mm² (250 kcmil)
Al: 60 mm² (2/0 AWG) ~ 120 mm² (250 kcmil)

M50A_260 -
Cu: 16 mm² (4 AWG) ~ 60 mm² (2/0 AWG)
Al: 25 mm² (2 AWG) ~ 60 mm² (2/0 AWG)

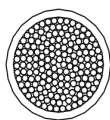
Stripping length: 20mm

图3-13：交流线材剥线

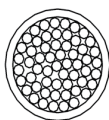
M70A_260 / M50A_260 适用铜绞线、铜软线、铝绞线、铝实心(含扇形)



铜绞线



铜软线
(需压接端子)



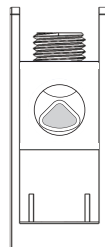
铝绞线



铝实心(扇形)*

- 铜线:
铜软线需压接端子，其他铜线型直接裸线锁附即可。
- 铝线:
铝线连接端子时必须去除末端的氧化层。(需注意刮下的铝粉墨勿沉积其他导体上)
去除氧化层后，建议立即使用中性脂或无酸、无碱凡士林涂在导体的末端，并立即连接导线。
当导线重新连接时，需再次处理氧化层。

* 扇形线接线方向如右图所示



警告！



- 如果没有遵循以上预处理，接触电阻将会显著增加，可能会导致温升过高，甚至导致着火。

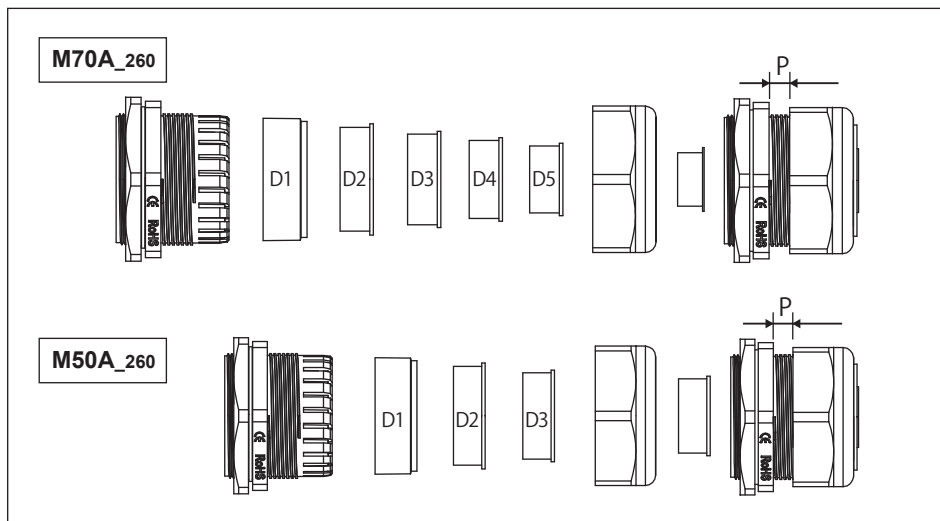


图 3-14 : 多层式防水塞盖

表 3-1: 电缆线尺寸对照表

M70A	卡线线径范围 (mm)		扭力 (N·m)	距离 P (mm)
D1	51-57	2550 mm ²	8.5	7
D2	43-50	1962 mm ²	8.5	5
D3	36-43	1450 mm ²	8	5
D4	30-36	1017 mm ²	8.5	5
D5	26-30	706 mm ²	8.5	5

M50A	卡线线径范围 (mm)		扭力 (N·m)	距离 P (mm)
D1	30.8-44.7	1570 mm ²	13	2
D2	26.8-35.4	984 mm ²	15	2
D3	21.9-27.6	598 mm ²	13	2

3.4.4 交流侧- 配线前准备

在进行导线与端子座安装连接之前，请遵循以下步骤。

对于每个交流端子 (L1 · L2 · L3 · N) ：

请用17mm六角板手进行拆装螺丝。如果使用电动工具进行施工，请确保使用适当扭力值，避免超过或不足拧紧螺丝的扭力值。当锁附螺丝顶到最低点时，请勿再进行锁附，避免造成端子座损伤。

注意:

有可能产生高温:

若压接点的阻抗过高，该点则有可能产生高温导致火灾。

为确保安全性及可靠的接触点，请确实遵守以下步骤

1. 铝线的导电性较铜线差，铝线线径请至少选用比铜线线径大一个等级。
2. 安装铝线时请尽量在低湿度且低腐蚀性的环境下进行。
3. 安装过程需快速。
4. 确实使用硬体工具(如刀子)将剥线后的裸露表面氧化层刮除，并立即将裸露线材浸泡至凡士林内(须为中性、不含酸、碱成分)，然后放入铜铝端子内。
5. 使用最大允许的压接扭力进行压接。



3.4.5 交流配线

有关用于连接交流端子的导线准备步骤，请参阅第3.4节中的图3-13。请确保所使用的交流导体尺寸符合NEC或当地电力法规的规范。

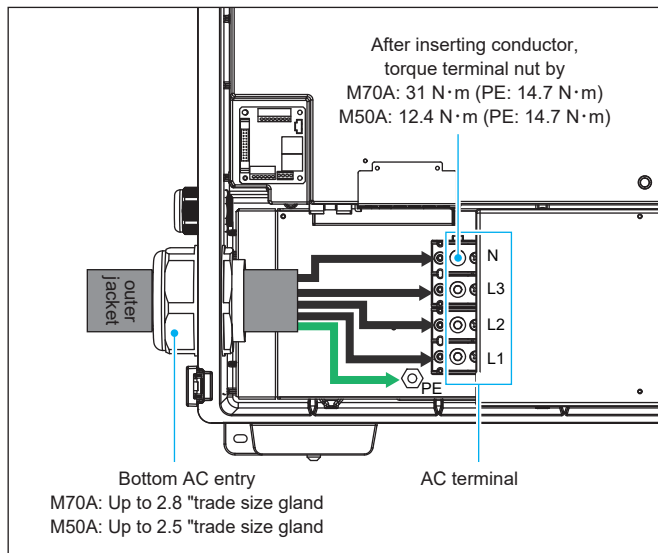


图 3-15: 交流端子位置图

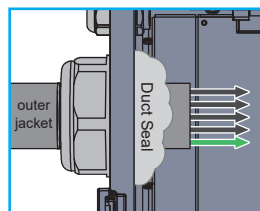
图3-15为交流导管安装处和连接机器内部交流端子的位置图：

- 如第3.4.4节所述，卸下所有交流端子上的六角螺丝。
- 确保将正确的导线连接到相应的端子位置。
- 插入导线后，使用8 mm六角扳手锁紧L1·L2·L3·N端子，安装锁附扭力值如图3-15所示。

注意



请在机壳内部使用密封胶进行交流配线端的密封，以防止异物或水气进入机壳中。



3.5 直流配线安装

危险:触电危险!!



- 太阳能串列将太阳能转换成高压直流形式，此高压有可能造成触电危险。
- 配线前请使用非透明物质将太阳能串列遮盖起来。
- 配线时请确认电压极性

警告!



- 触电及火灾危险。仅允许使用有标示低于1100V的太阳能串列。
- 配线时请确认直流开关在“关”的模式，且太阳能阵列没有连接。

注意：DC开关！



- 为了不损坏逆变器内部元件，请勿频繁且快速地切换直流开关，正确的操作方式为等待LED显示“绿灯灭及黄灯闪烁”(无直流)或等待5分钟之后。

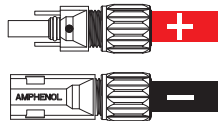
注意



- 太阳能阵列的正或负端皆禁止接到地。
- 根据UTE法规，建议配置断路器于太阳能阵列与逆变器之间做为过电流保护装置。

危险:触电危险!!

- 在安装直流端子时，请务必确认端子极性是否正确，错误的极性，将可能导致逆变器造成损坏。



注意



- 未使用的直流串列输入端子，请勿移除防水塞。

3.5.1 直流接線安裝

连接时请遵循以下步骤：

- 请使用材质为铜的导线，并确认尺寸符合NEC或当地法规。
- 剥除6.5-7.5mm的电线外皮。
- 每根直流导线的横截面积为12/10 AWG (4/6mm²)。
直流端导线可分为正负极配接，其配线方式如图3-17所示。
- 安装直流接线后，插入直流接头专用的保护支撑架，方法如图3-18所示。

M70A series / M50A_260 使用H4端子连接到逆变器。

外部配线用端子附于配件包中(见图3-16)。

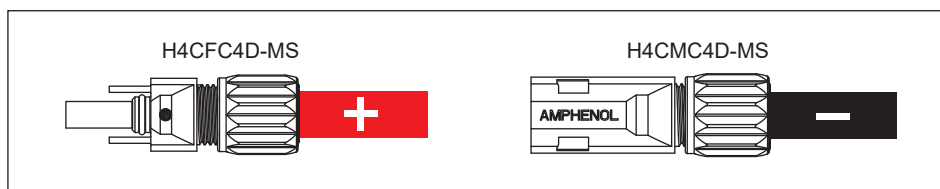


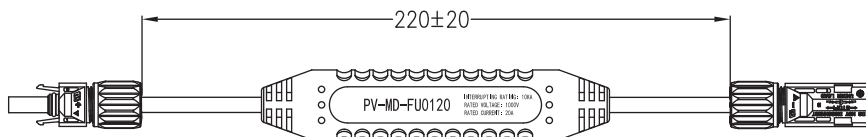
图 3-16: 直流接线安装

注意



- 根据规定，每组直流输入配置为3组串输入时，需要安装外部保险丝。
当 M70A_260 需要时请联系DELTA 经销商。

MDFU-10-66-20-H4



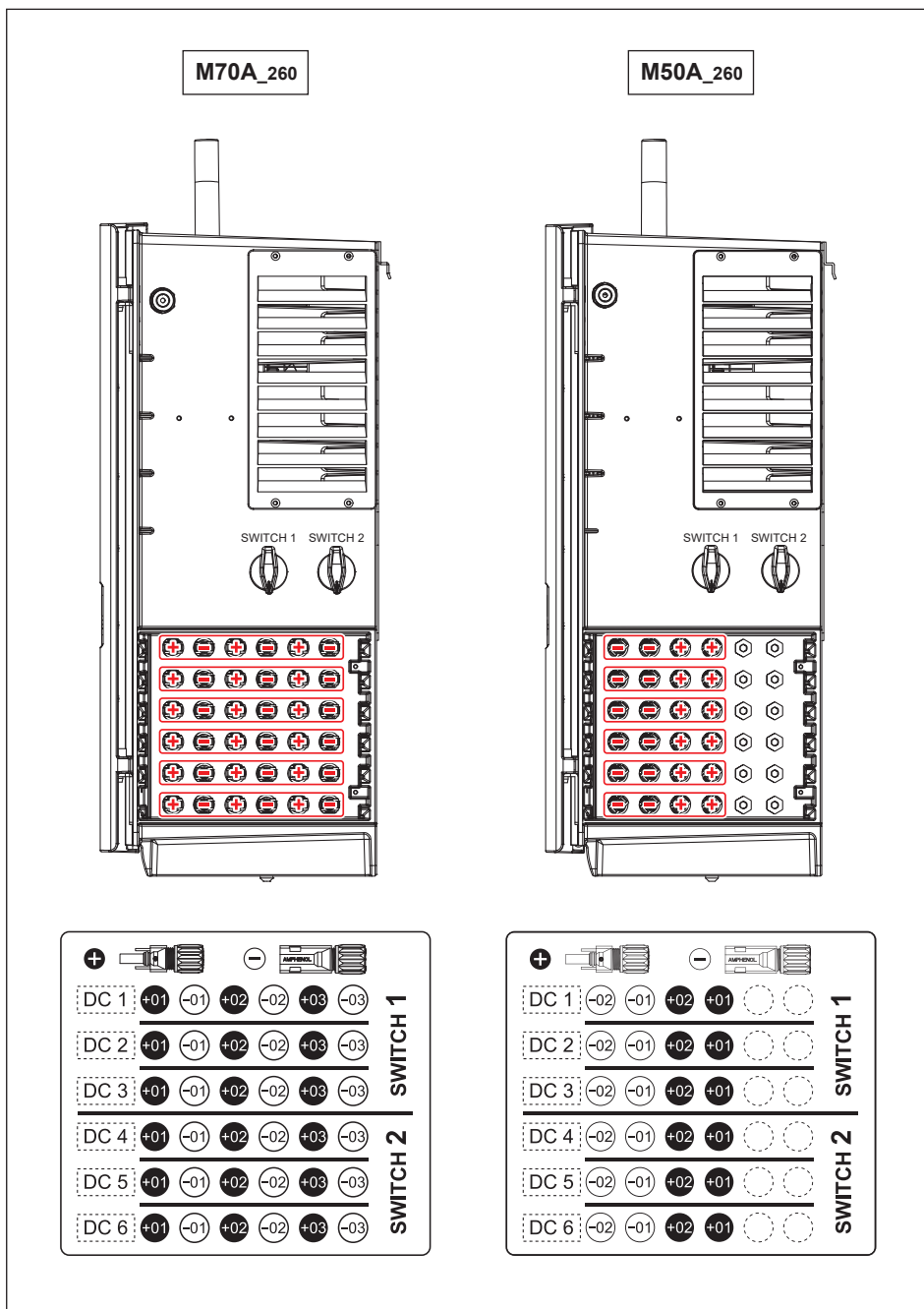


图 3-17 : H4 端子与光伏组串对照图

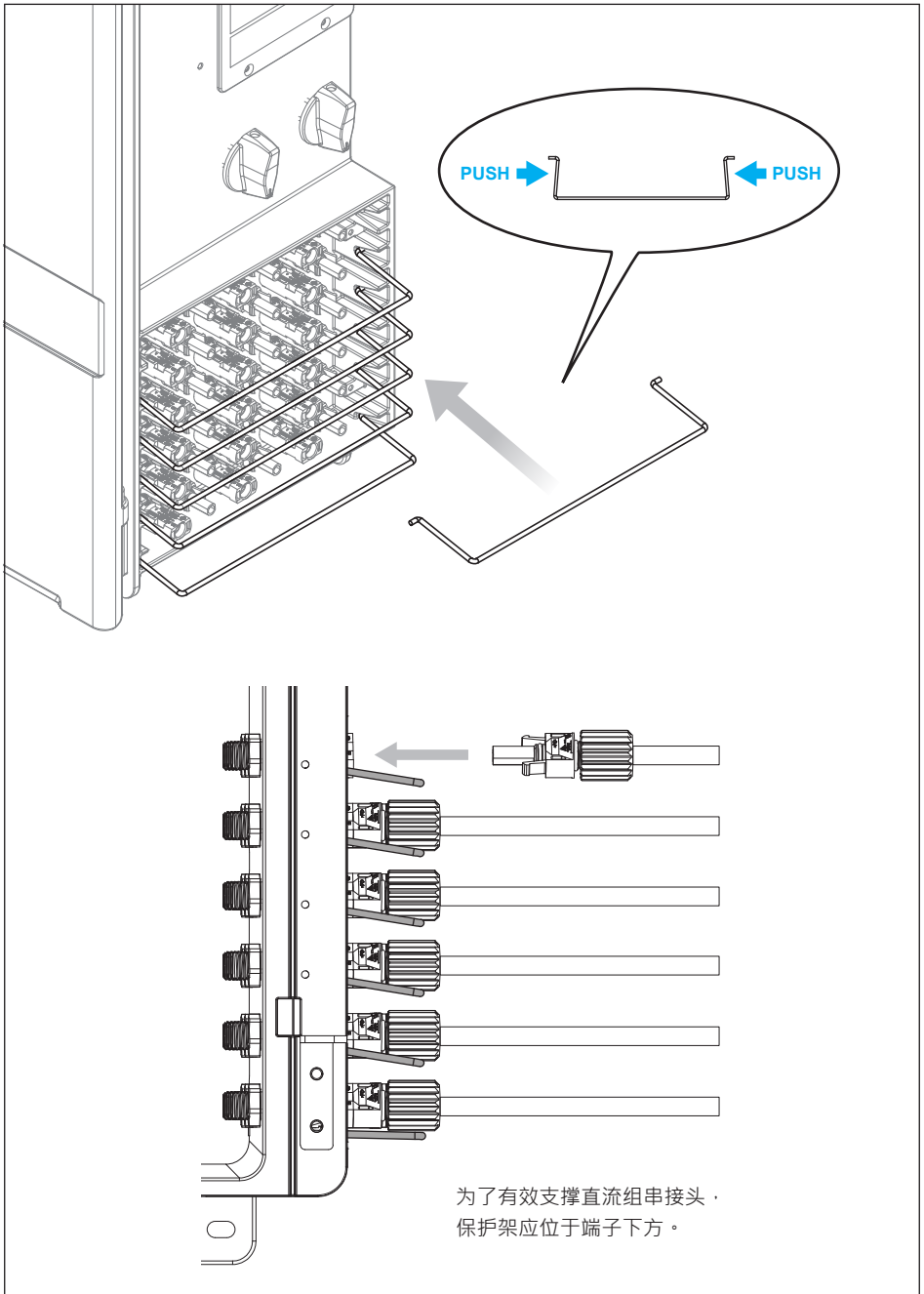


图 3-18：保护架安装说明

3.5.2 设备接地

将接地线压接O型端子后，锁附于机壳外部接地点。
机壳外部接地点位置如图3-19所示。

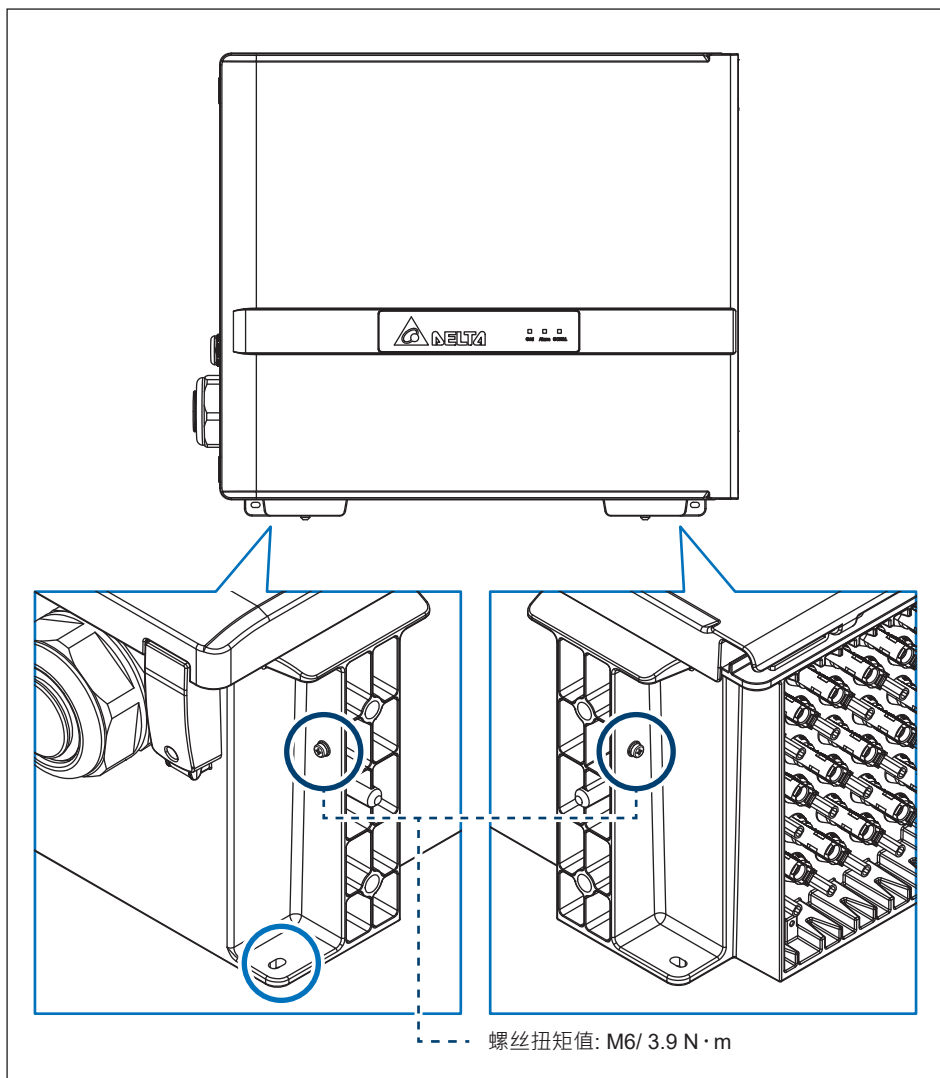


图 3-19: 设备接地点

3.6 天线

本机器支援SUB_1G无线通讯，使用前须采用1.2 N·m安装专用天线。

安装注意事项如图3-20~3-21所示。

请安装天线支架如图3-22所示。

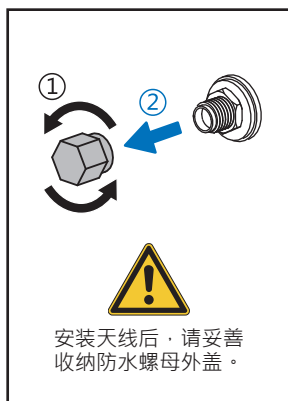
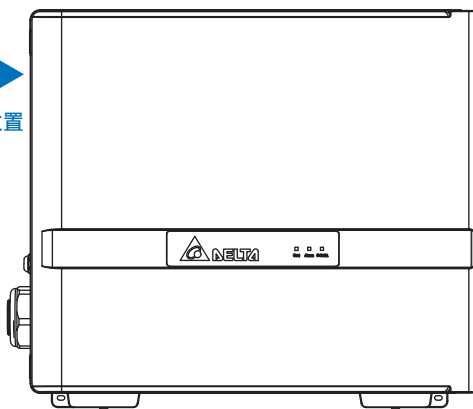
注意



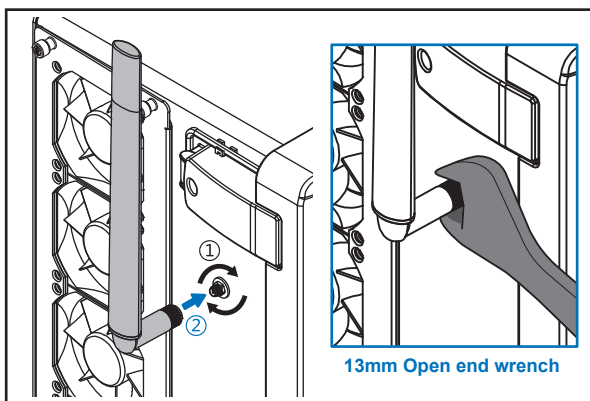
- 如果不使用SUB_1G时，请将防水螺母外盖盖上并将天线支架的三颗M4螺丝锁上。
- 安装天线后请保存防水螺母外盖。
- 拆下天线后，请用1.2N·m锁定防水螺母外盖。防水螺母外盖遗失时，请向DELTA购买，以确保机器保持IP65防水能力。



安装位置



卸下防水螺母外盖。



请使用1.2N·m的扭力安装天线。

图 3-20: 天线安装

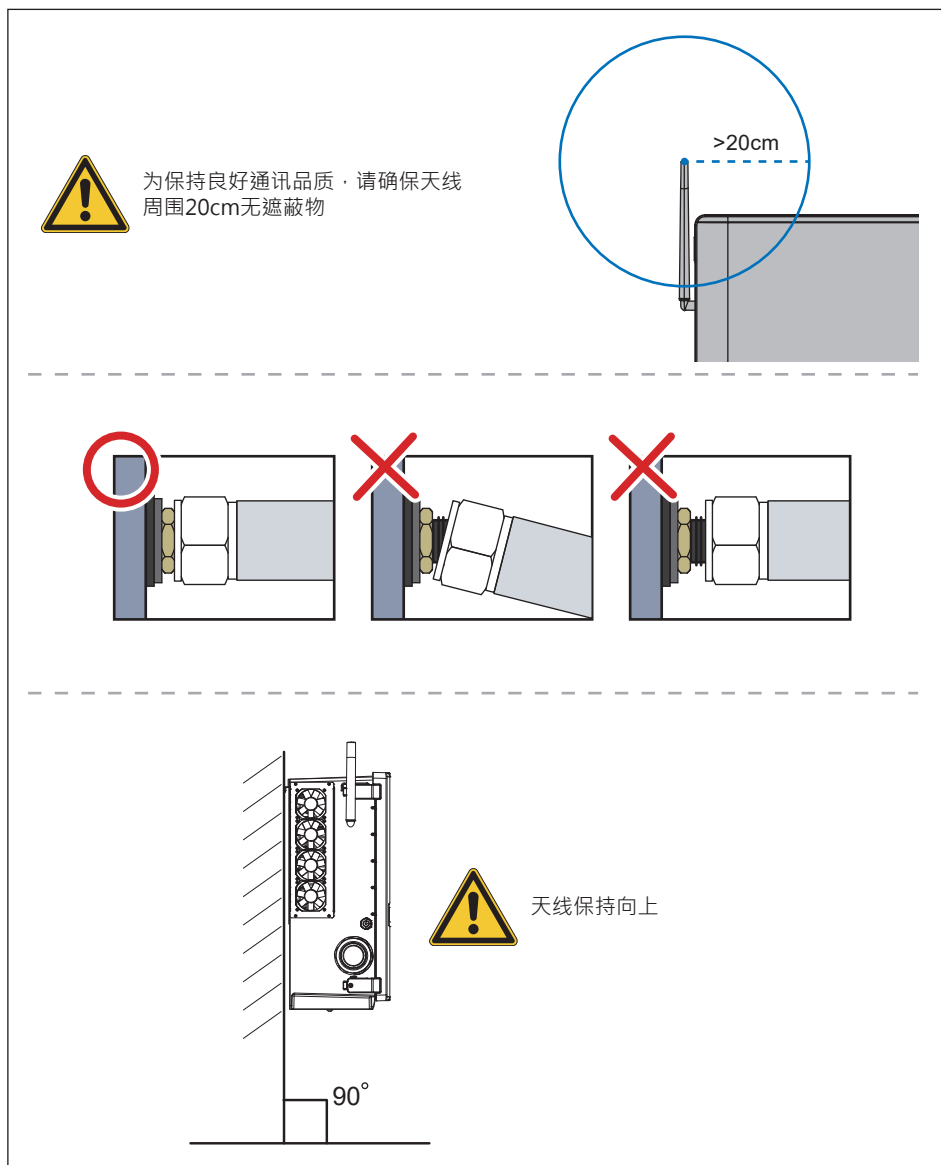


图 3-21：安装天线的注意事项

1. 逆时针旋转天线约45度。
2. 装上天线支架。
3. 将天线转回适当位置(天线保持向上)。
4. 使用图3-22扭矩值锁紧三颗螺丝。

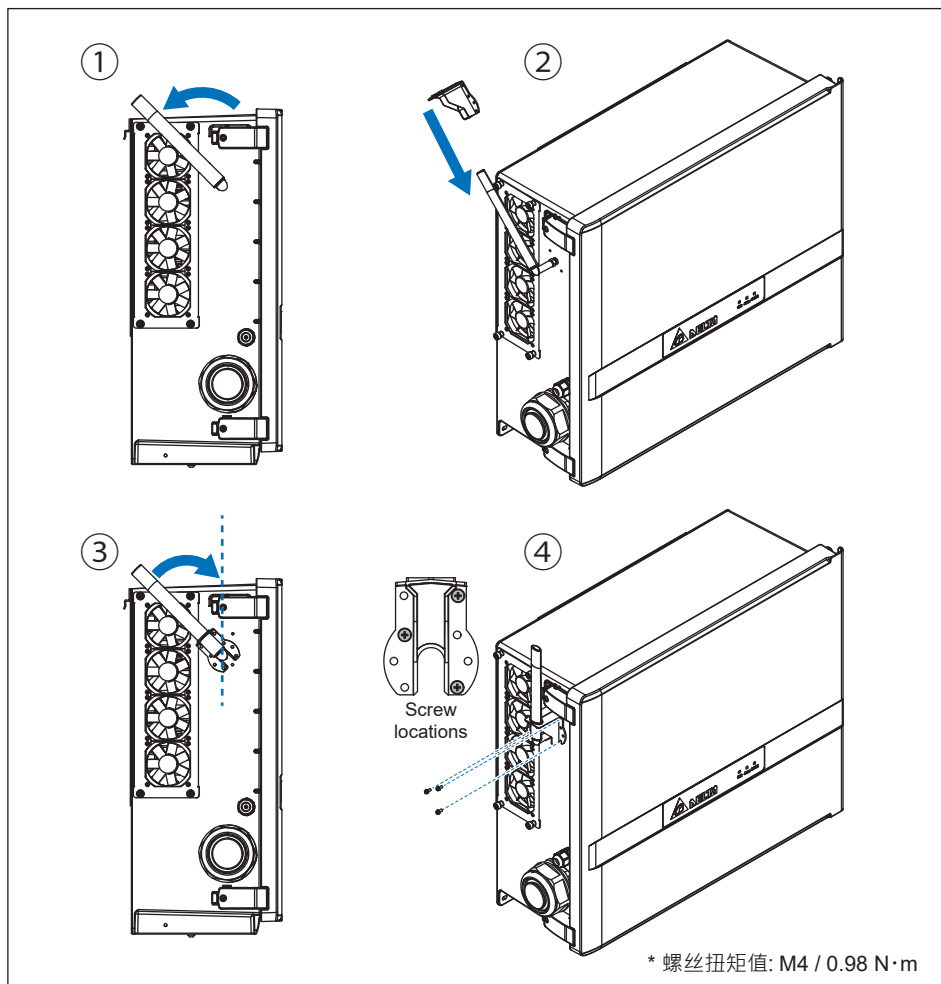


图 3-22 : 安装天线支架

注意



- 当配合DELTA PPM DC1_100使用时，请参阅PPM DC1_100使用说明书
https://mydeltasolar.deltaww.com/?p=product_manual



3.7 通信模组配接方式

通信模组如图3-23所示。

该模组提供一组12V电压源VCC、RS-485、干接点、EPO和数位输入端子供功率控制使用；详细说明如下。

使用VCC与GND输出脚位，可提供一12VDC电源，可供外部装置使用。

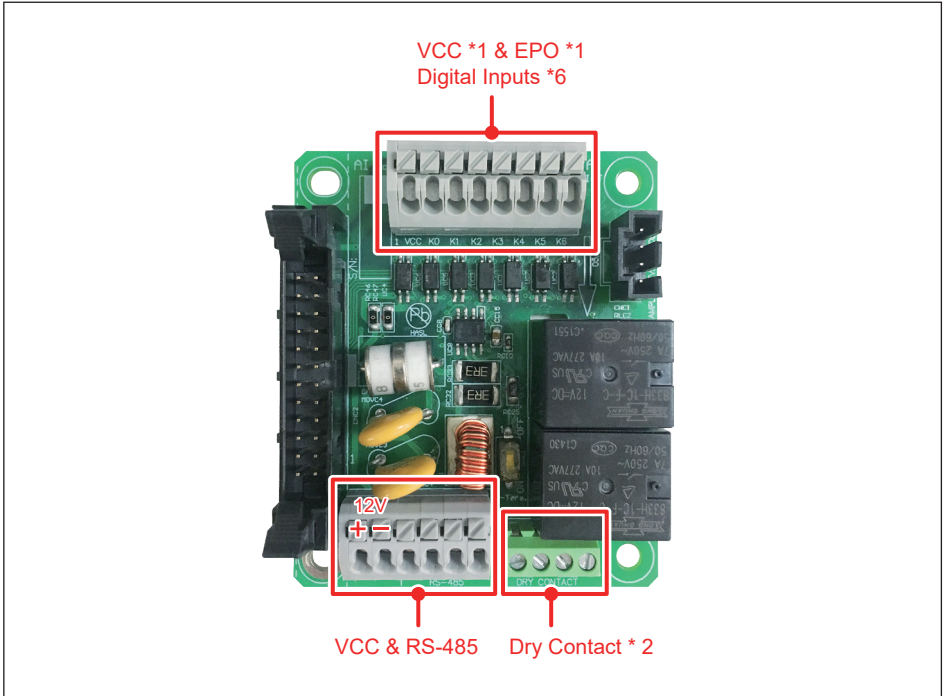


图 3-23 : 通信模组

请参考5.1章节说明开启前盖，通信模组安装于图3-24中标示处位置。

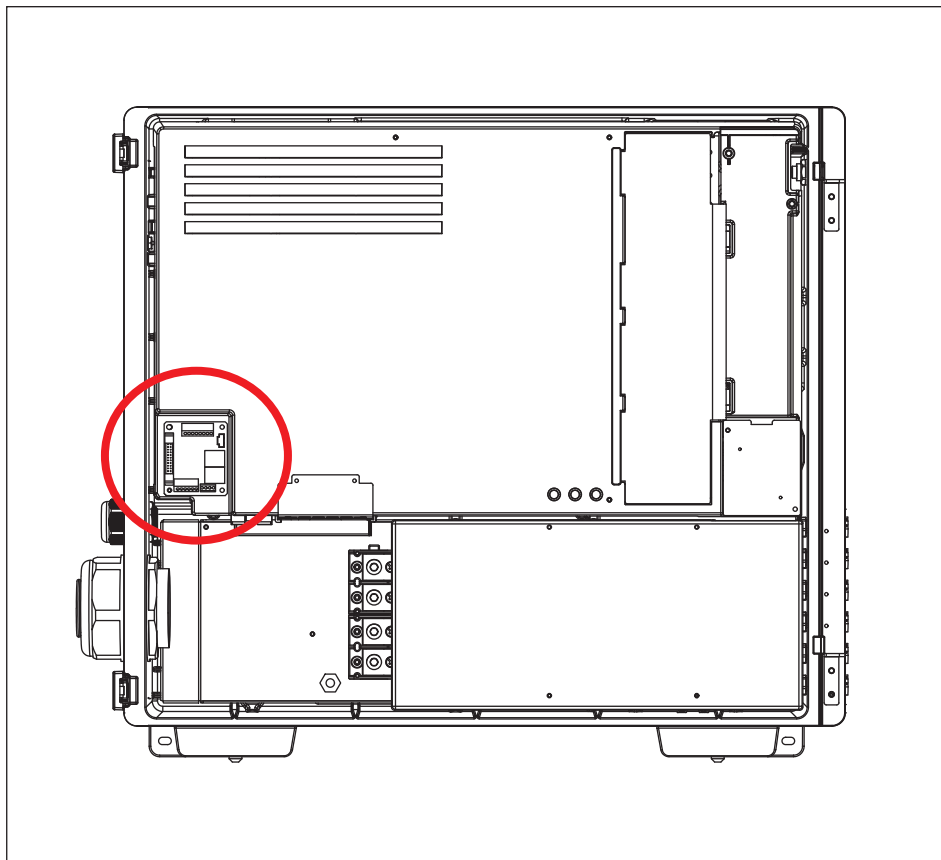


图3-24：通信模组位置图

3.7.1 RS-485 连线

RS-485端子座脚位定义如表3-2所示

- 脚位1与2提供直流电压12V/0.5A电源
- 脚位3与5为RS-485差动信号之DATA+ 信号专用脚位
- 脚位4与6为RS-485差动信号之DATA- 信号专用脚位

依据上述的脚位，可以实现多台逆变器的通信连接。

本机器设有120欧姆终端电阻，可使用通信模组上的控制开关进行切换(图3-25) 开关切换方式如表3-3所示。

不同的RS-485连接方式时，需使用不同的终端电阻设定方式。

- 当多台逆变器连接时，只有最后一台逆变器必须将终端电阻接通如图3-25。
- 如果RS-485总线长度大于610m，建议使用Belden 3105A电缆或同规品来确保通信品质。

注意



- 为确保良好的通信品质，建议使用绞线之电缆方式配置。

表 3-2: RS-485 端子座说明

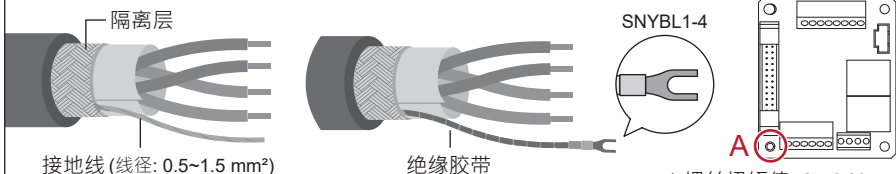
Pin	Function
1	VCC (+12V)
2	GND
3	DATA+
4	DATA-
5	DATA+
6	DATA-

资讯



当RS-485需要接地时，请遵循以下步骤

1. 从隔离层剥出一条接地线(线径: 0.5~1.5 mm²)，并做适当绝缘防护
2. 将接地线压接Y端子(建议型号: SNYBL1-4)，并锁附于下图A处



* 螺丝扭矩值: 0.59 N·m

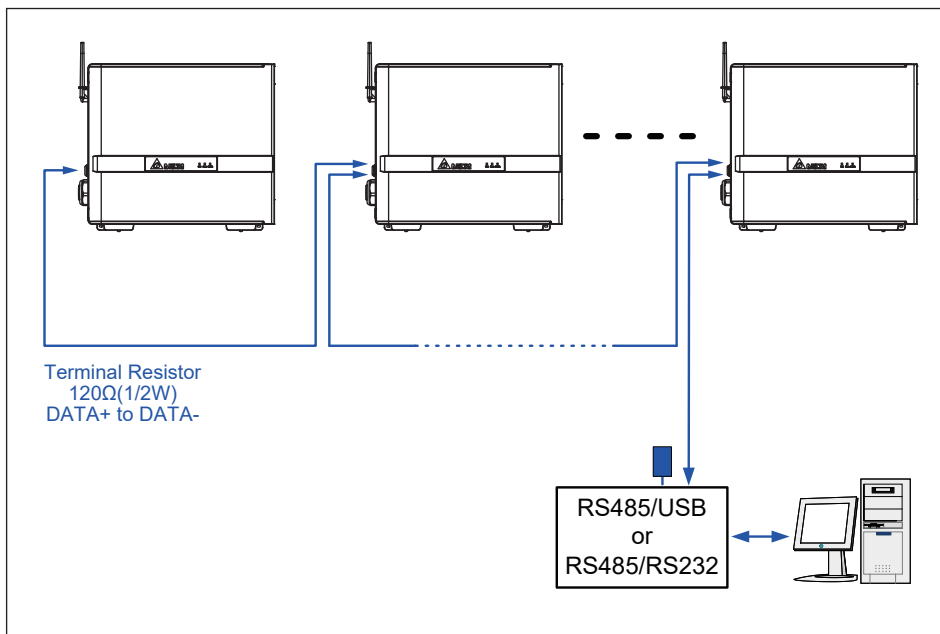


图 3-25 : 多台并接通讯示意图

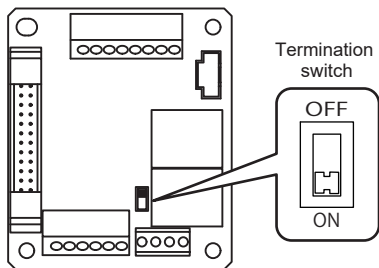


表 3-3 : 终端电阻设定说明

	Switch 1
ON	Terminal Resistor ON
OFF	Terminal Resistor OFF

3.7.2 EPO 紧急关断功能与数位输入

本通信模组提供紧急关断功能(EPO)。
使用APP 或Delta Solar System (DSS)进行设定。

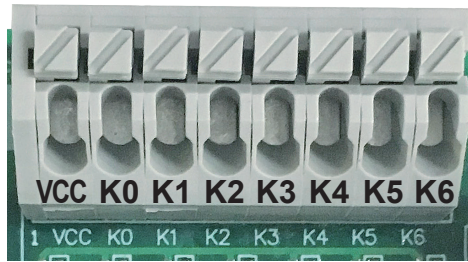


图 3-26 : 紧急关断功能端子座

利用VCC和K0连接，可启用EPO功能。此外，还可以利用数位输入功能，进行功率降低控制，限制变频器的有效输出功率。此控制设置可依据表3-4 所示的方式，将对应的两个脚位进行短路来实现。

表 3-4: 数位输入与EPO功能说明

短路脚位	逆变器动作反应
VCC & K0	紧急关断 (EPO)
VCC & K1	控制至0 % 额定功率
VCC & K2	控制至30 % 额定功率
VCC & K3	控制至60 % 额定功率
VCC & K4	控制至100 % 额定功率
VCC & K5	预留
VCC & K6	预留

3.7.3 干接点连接说明

M70A_260 / M50A_260 提供两组干接点端子，可依据逆变器运行状态控制外部装置。该功能的接线端子如图3-27所示，图中标示为两组干接点端子位置，干接点为常开状态，其动作方式定义，使用者可藉由DSS进行设定。

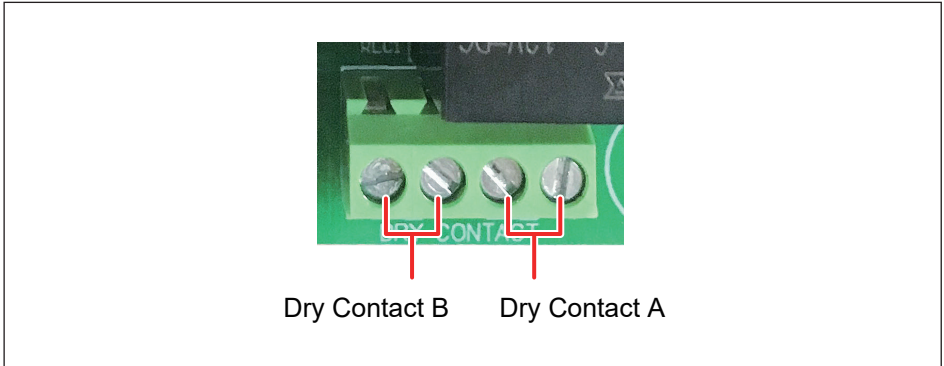


图 3-27 : 干接点连接位置图

3.8 装置场所之绝缘测试

针对客户想要于太阳能案场进行绝缘测试时，请依循下列步骤：

1. 确认直流开关关于OFF的状态
2. 请确认高阻计对逆变器以及对地的接法正确如图3-28，若是不正确的接线可能会导致逆变器的损坏

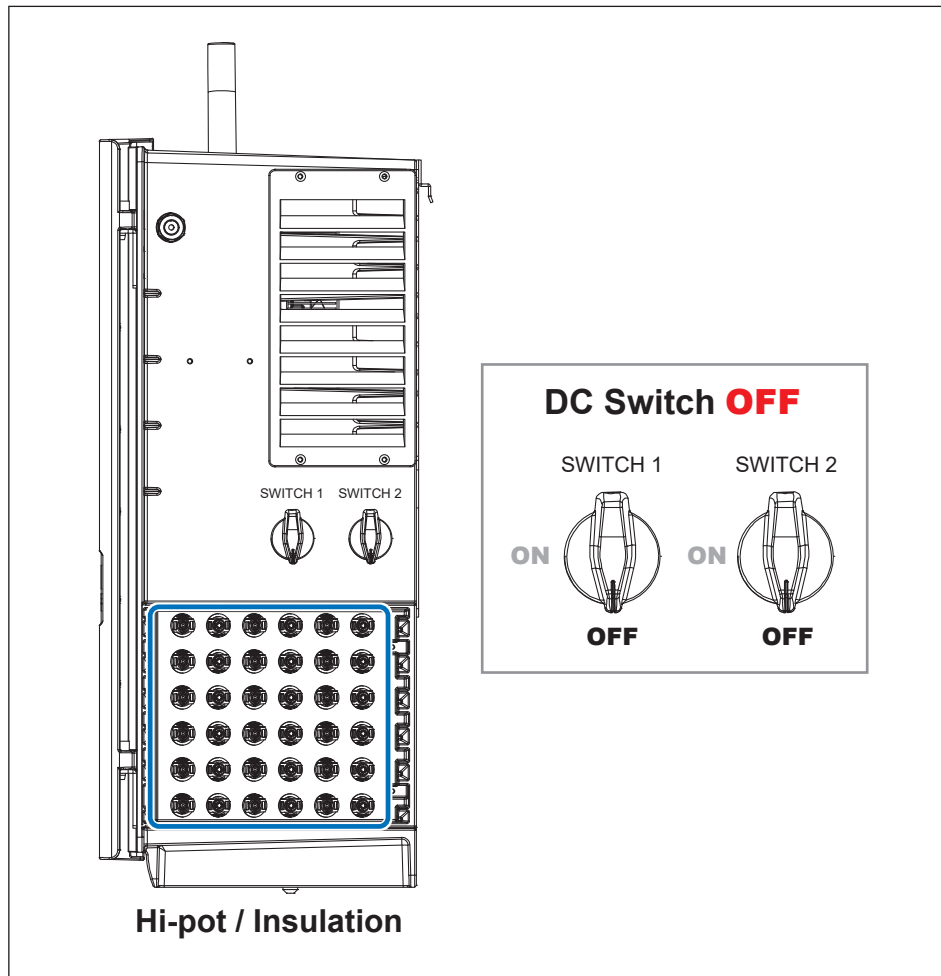


图 3-28：绝缘测试之危险预防

4 试运行

注意：表面高温，请勿触碰！



- 当开盖时请小心表面高温。
- 表面冷却前请勿接触逆变器。

4.1 控制面板介绍

M70A_260 / M50A_260 提供3颗LED 灯号提供逆变器的状态显示，如图4-1。LED灯状态对应表，请参考表 4-1 所示，可利用该表获得逆变器运行状态资讯。

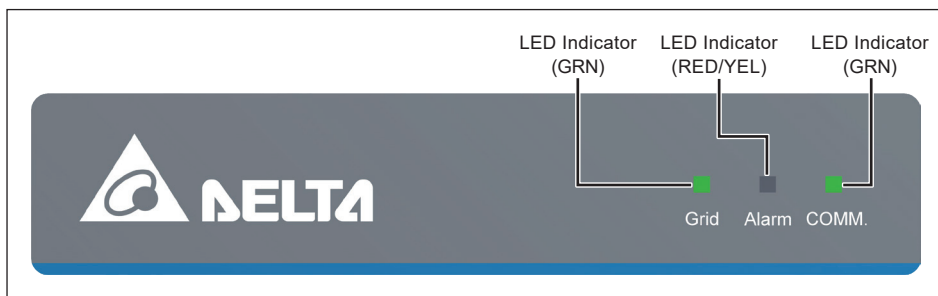


图 4-1：显示面板

表 4-1: LED 指示灯

状况	Grid (绿)	Alarm (红/黄)
Countdown	FLASH	OFF
On Grid	ON	OFF
Inverter Fault / Remote off	OFF	ON / OFF
Inverter Warning	ON (or OFF)	FLASH / OFF
Field Fault	OFF	OFF / ON
Field Warning	ON	OFF / FLASH
NO DC	OFF	OFF / FLASH SLOW
FW Upgrade	FLASH	FLASH / OFF
Standby	FLASH	OFF / FLASH
Check PV Power	OFF	OFF / FLASH FAST

*FIASH: ON 1s / OFF 1s

**FIASH FAST: ON 0.25s / OFF 0.25s

***FIASH SLOW : ON 5s / OFF 10s

表 4-2: LED 通讯指示灯

SUB_1G Condition	COMM. (绿)
Work	FLASH
Fault	OFF

* FLASH: ON 3s / OFF 2s

4.2 自动ID连线工具使用说明

当机器完成RS-485 连接后，可利用自动ID连线工具进行全部逆变器的ID设定。

注意



请至下方网址进行软件下载

https://mydeltasolar.deltaww.com/dl_installer_guide.php?f=autoid



4.2.1 自动ID设置

The figure illustrates the three-step process for using the Delta Auto ID Tool:

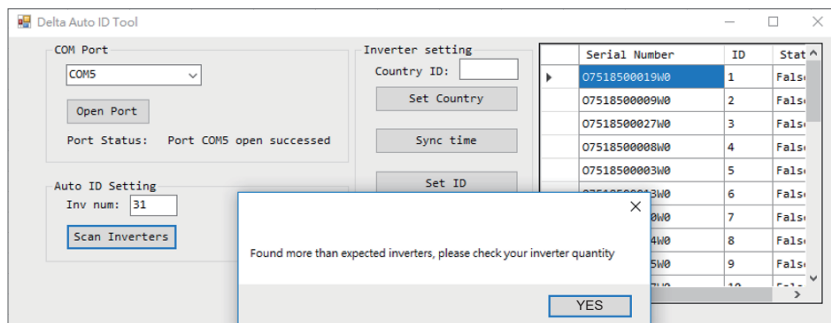
- Step 1:** Select the COM Port and click **Open Port**. The interface shows 'COM5' selected in the dropdown and a message 'Port COM5 open succeeded'.
- Step 2:** Enter the number of inverters and click **Scan Inverters**. The 'Inv num' field is set to '32'.
- Step 3:** The tool displays a list of inverter serial numbers and IDs, with 'OK' status for each. The first entry is highlighted.

Serial Number	ID	Status
0751850003W0	1	OK
07518500023W0	2	OK
07518500002W0	3	OK
07518500014W0	4	OK
07518500012W0	5	OK
07518500019W0	6	OK
07518500016W0	7	OK
07518500020W0	8	OK

图 4-2：自动ID设定步骤



当输入的ID设置数量少于逆变器数量时，状态将显示错误。



当输入的ID设置数量大于逆变器数量时，状态将显示错误。

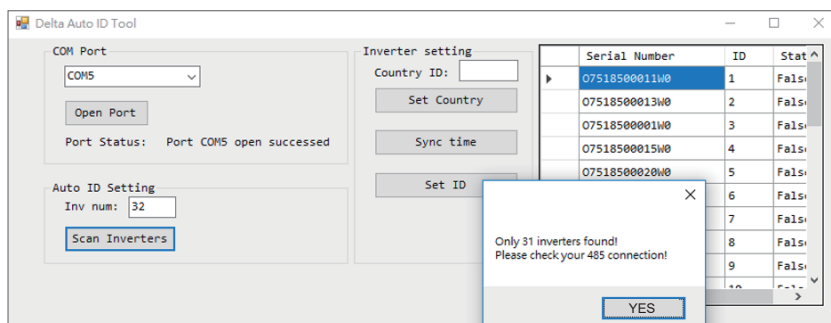


图 4-3 : 自动ID 设定无效说明

4.2.2 ID设定

当需要调整ID顺序时，请依下述说明进行设定

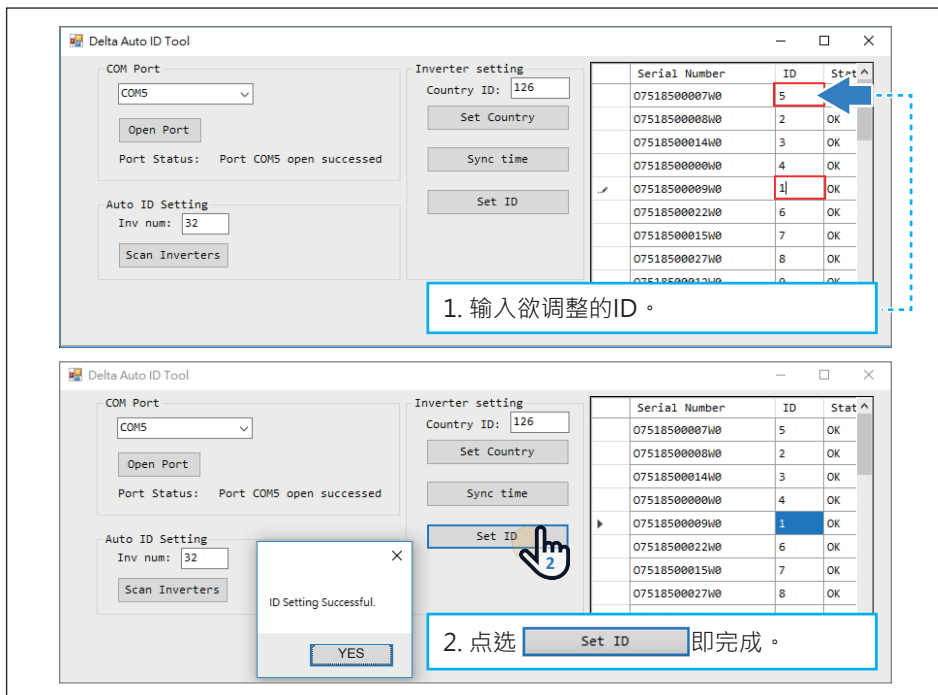


图 4-4：设定ID 步骤

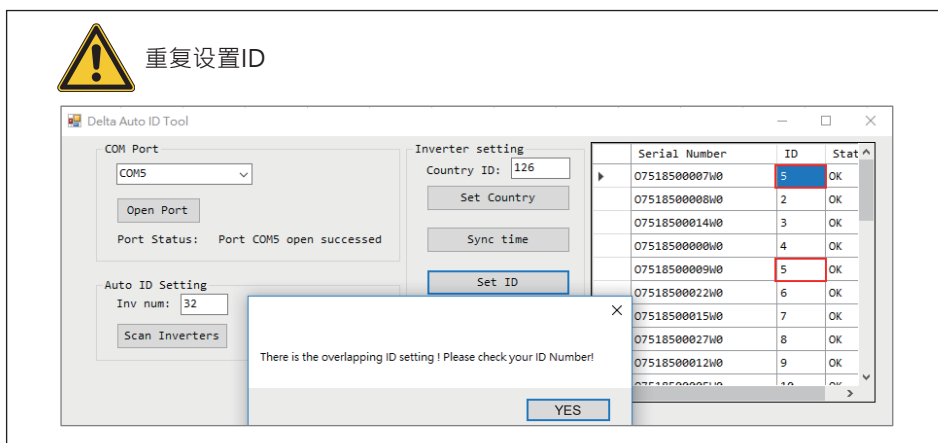


图 4-5：ID设定错误范例

4.2.3 国别设定

藉由Country ID 设定国别

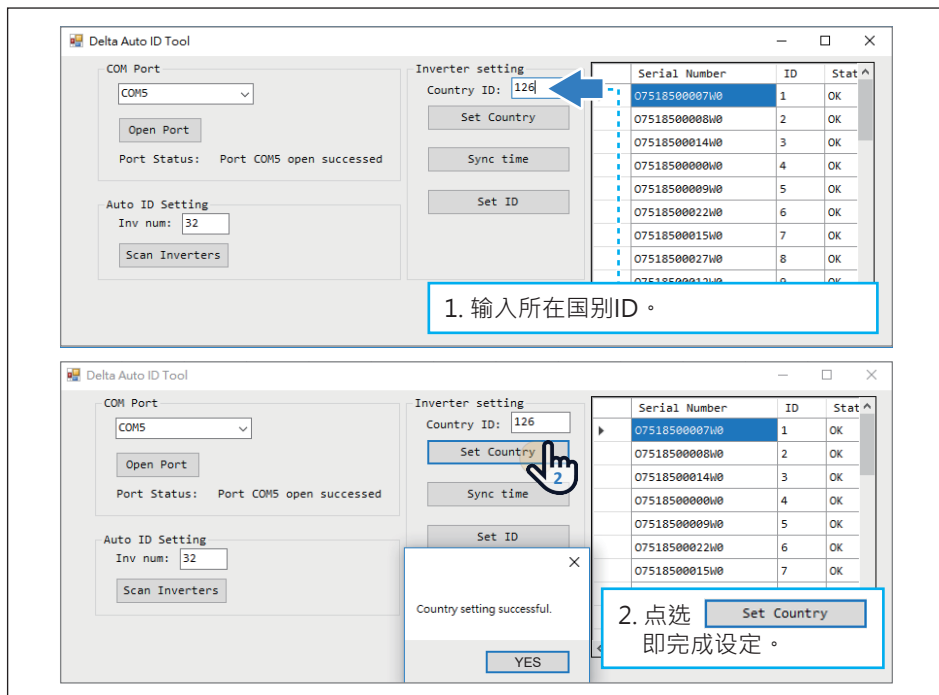


图 4-6：国别设定步骤

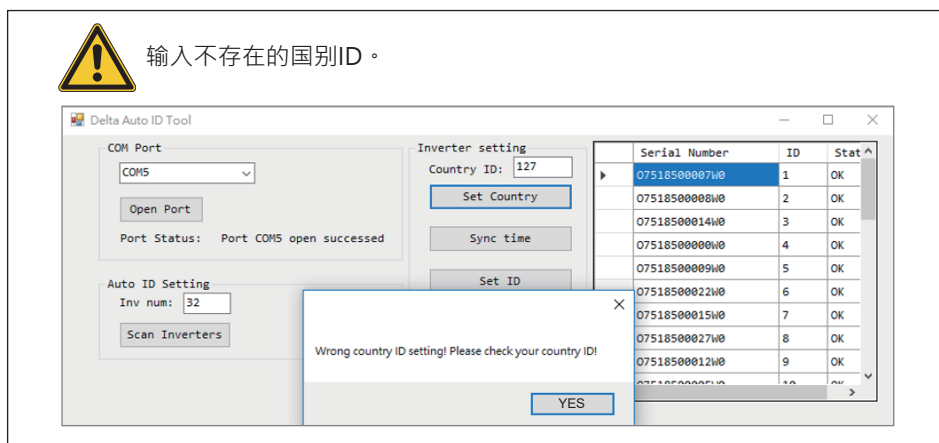


图 4-7：国别设定错误范例

4.2.4 时间同步设定

藉由自动ID工具进行时间同步。

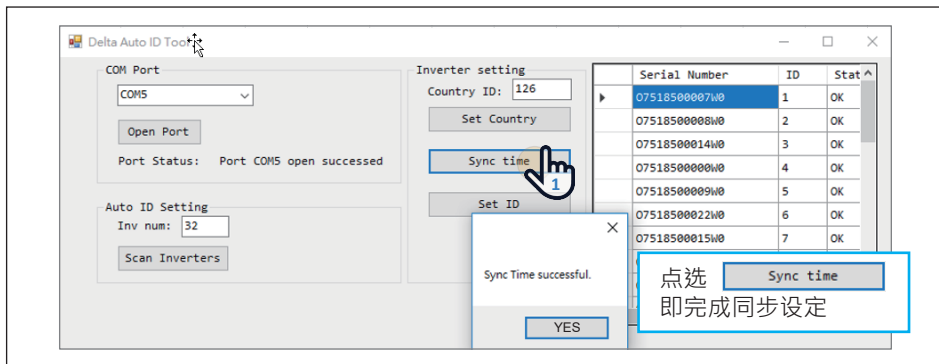


图 4-8 : 时间同步设定步骤

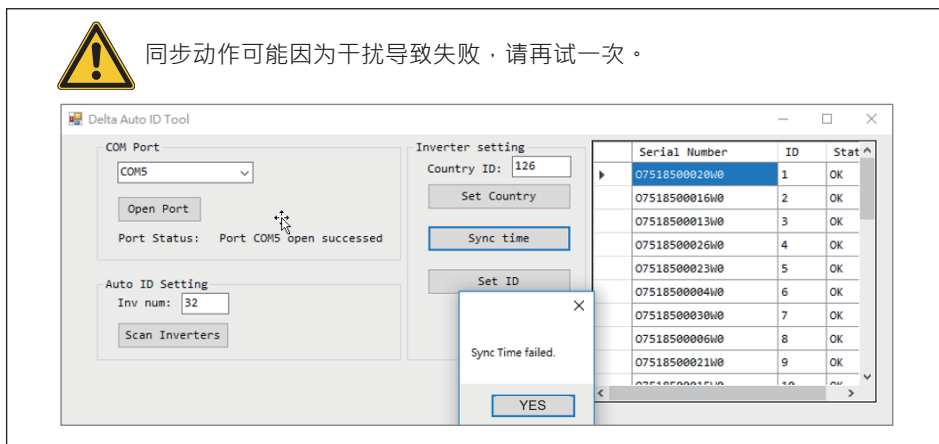


图 4-9 : 时间同步设定错误范例

4.3 Delta功能设定

Delta 提供两种机器设定方式 : DSS 与APP (MyDeltasolar)

请使用下面连结取得使用说明

DSS:

https://mydeltasolar.deltaww.com/manual/eng/SUB_1G/DSS.pdf



APP (MyDeltaSolar):

https://mydeltasolar.deltaww.com/?p=product_manual

Data Collector > PPM DC1_100 Operation and Installation Manual



5 维护

为确保逆变器正常运转，请至少每半年确认一次逆变器所有端子与螺丝是否松脱、电缆线是否毁损、散热出风口有无异物阻塞。如有上述情形，请联络合格之技术人员进行维修、清理或更换。

警告！



- 进行任何维修动作前，请确定交直流电源皆已切断以避免触电危险。

5.1 开启与关闭前盖

为确保逆变器正常运行，开启或关闭前盖时，请遵守图5-1步骤。开启前盖后，请依照图5-2方式，将前盖固定。

5.1.1 开启前盖

- 在没有任何雨遮的情况下，切勿在阴雨天气下打开前盖，以保护逆变器。
- 关闭直流与交流电源并等待LED指示灯熄灭。
- 松开天线支架上的三个螺丝。
- 逆时针旋转天线与支架约45度。
- 取出锁扣外盖上的扳手。
- 松开锁扣外盖上的一个螺丝并打开锁扣外盖。
- 注意不要污染前盖上的垫圈和接合表面。

请勿长时间开启前盖。

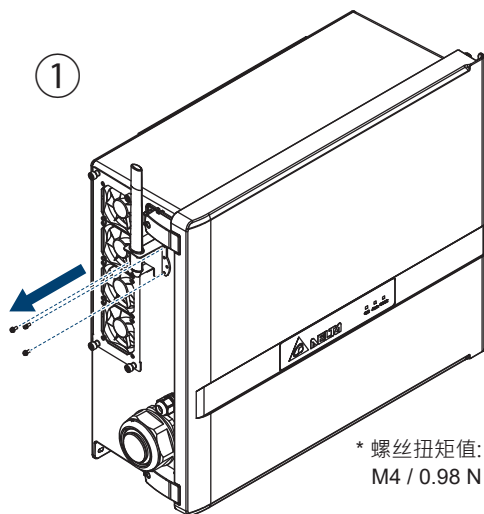
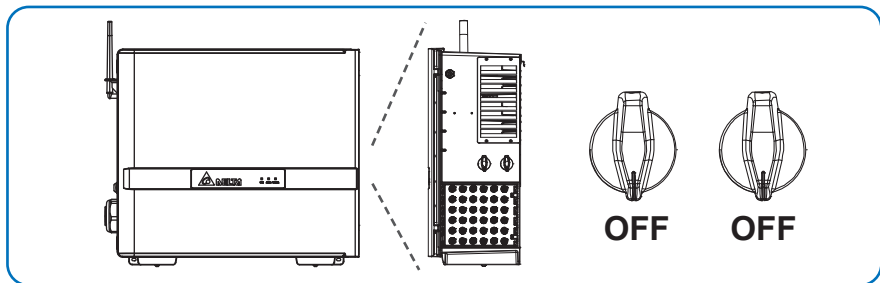
5.1.2 关闭前盖

关闭前盖之前注意事项：

1. 确认前盖门框表面与前盖防水垫圈清洁，必要时请先擦拭。
2. 确认垫圈在其安装槽中且定位正确并对齐。

当关闭前盖时：

1. 反序按照5.1.1的步骤，并锁定锁扣外盖。
2. 将锁扣外盖螺丝完全锁紧至2.45 N·m的扭矩。



* 螺丝扭矩值:
M4 / 0.98 N·m

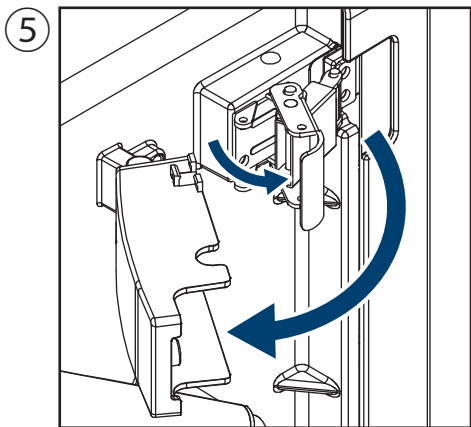
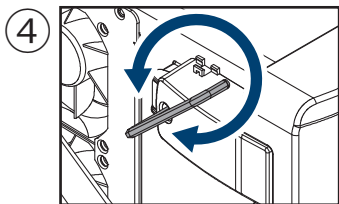
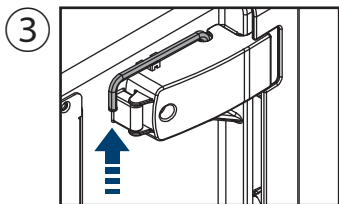
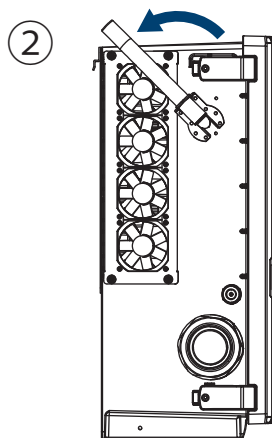


图 5-1: 开启与关闭前盖

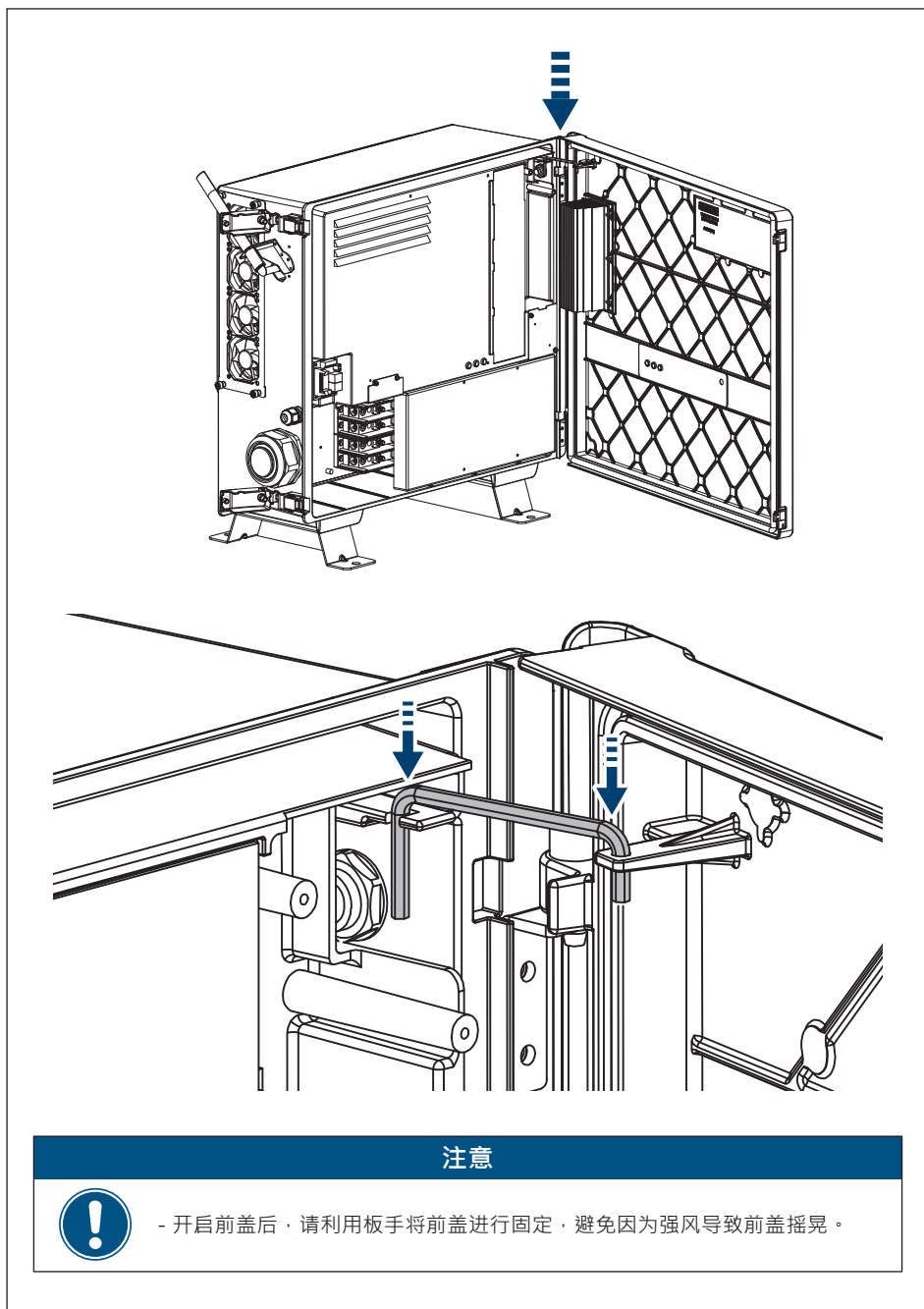


图 5-2 : 利用扳手将前盖进行固定

5.2 更换雷击保护装置 (SPD)

配置交流与直流侧的雷击保护装置(SPD)·如图5-3所示。

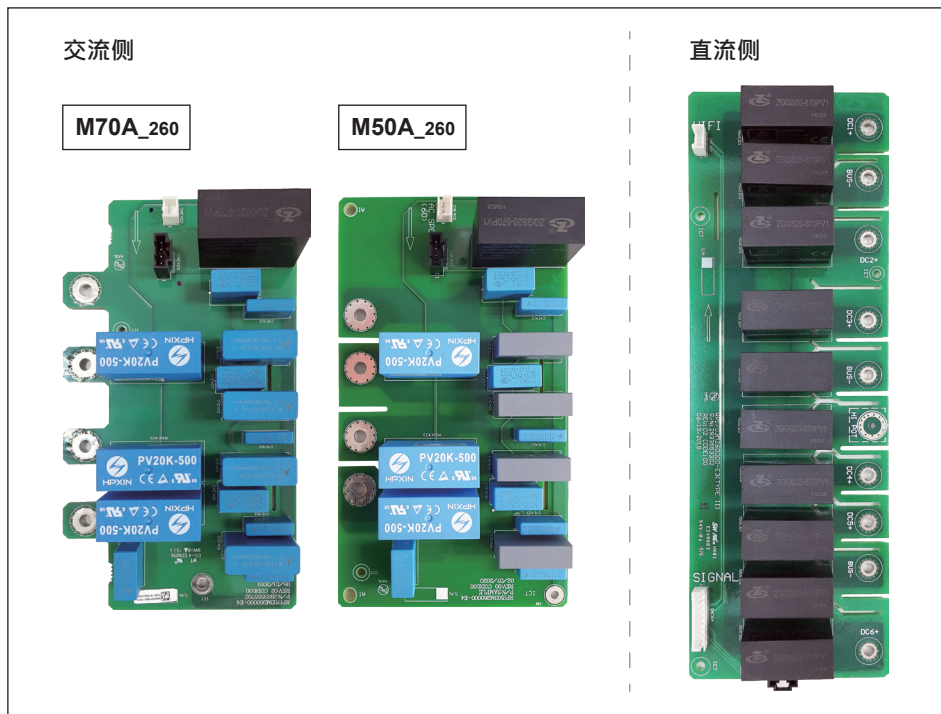


图 5-3 : 交流与直流侧的雷击保护装置

雷击保护装置是为了保护较为敏感的电路元件，避免当其受到雷击或电压骤变时损坏。

雷击保护电路位于逆变器内部，当APP或DSS 故障讯息出现 " AC Surge" 或 "DC Surge" 时，请按照下页顺序进行更换。

请参考图5-4 所示，依据LED灯号进一步判断SPD损坏与否。

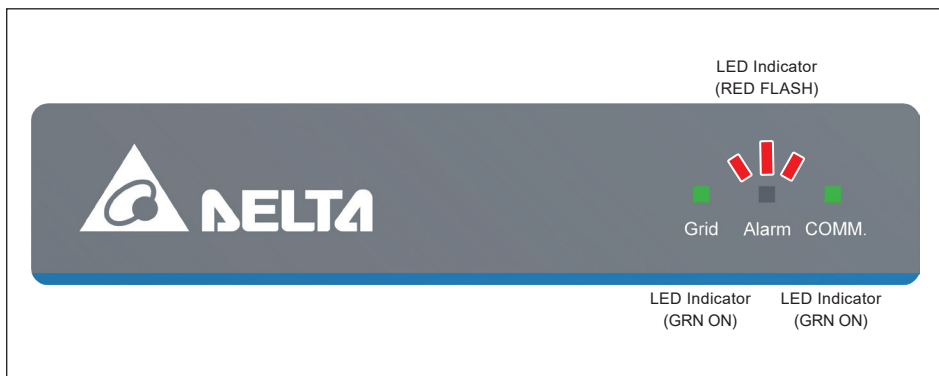


图 5-4 : SPD故障时的面板显示

- 开启前盖步骤
 1. 将直流与交流电源关闭，并等待LED灯号熄灭。
 2. 遵照5.1.1章节顺序开启前盖，施工时请勿长时间开启前盖。
- 依据以下顺序更换SPD模组：

交流与直流雷击保护器位置如图5-5所示。

• 更换异常的AC SPD模组 (图 5-6)

1. 旋松A盖板上的4颗具防脱落功能的螺丝。(螺丝扭矩值: $0.8 \text{ N} \cdot \text{m}$)
2. 从AC SPD电路板上拆下2条信号排线。(4pinx1, 2pinx1)
3. 拆下AC SPD电路板连接到AC端子的4颗防脱落螺丝。
4. 拆下电路板右侧和左侧的2颗防脱落螺丝。
5. 取下异常AC SPD电路板并更换新模组。
6. 按反顺序使用上述步骤安装新的AC SPD。

将6个螺丝锁紧至扭矩值如图5-6所示。

• 更换异常的DC SPD模组 (图 5-7)

1. 取下B盖板。
2. 取下DC SPD电路板上的Signal、FAN与Wi-Fi(选配)信号排线。
3. 拆下DC SPD电路板上的A与G的防脱落螺丝。
4. 取下异常DC SPD电路板并更换新模组。
5. 按反顺序使用上述步骤安装新的DC SPD。

将12个螺丝锁紧至扭矩值如图5-7所示。

注意



- 松开防脱落螺丝时可能造成铜柱松动，重新安装SPD前请确保铜柱已牢固拧紧。

- 关上前盖
请依据5.1.2 章节说明，关闭前盖。

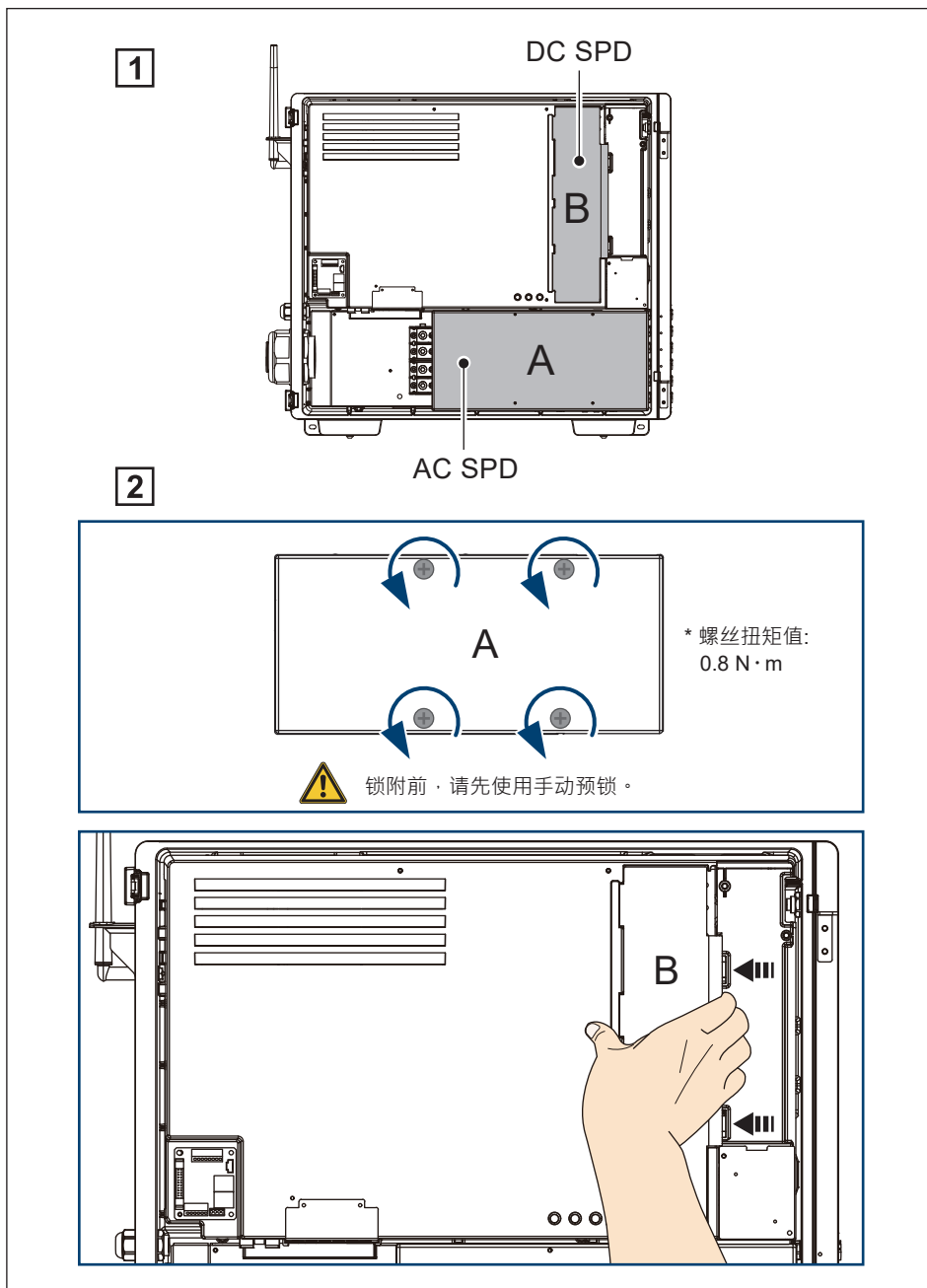


图 5-5 : SPD更换步骤

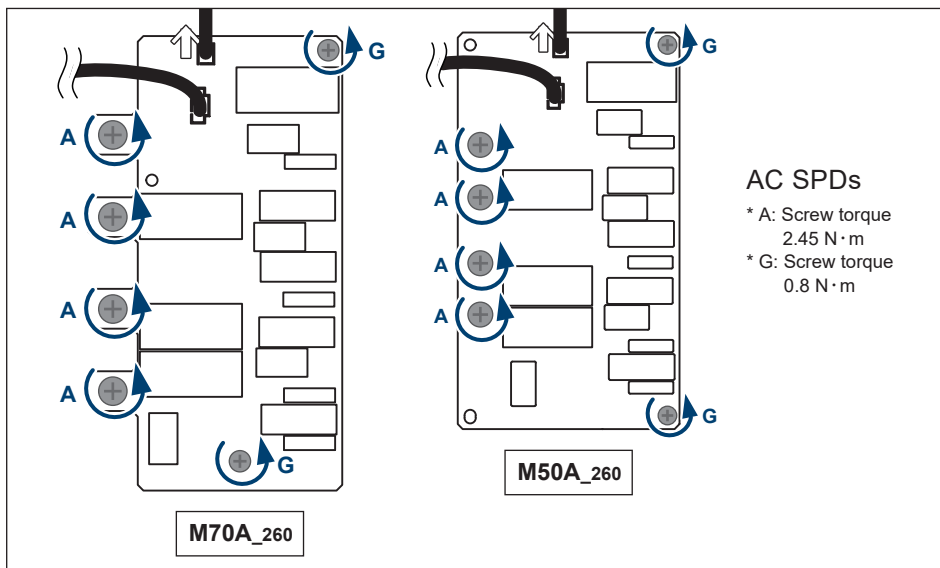


图 5-6 : 移除AC SPD 螺丝与排线

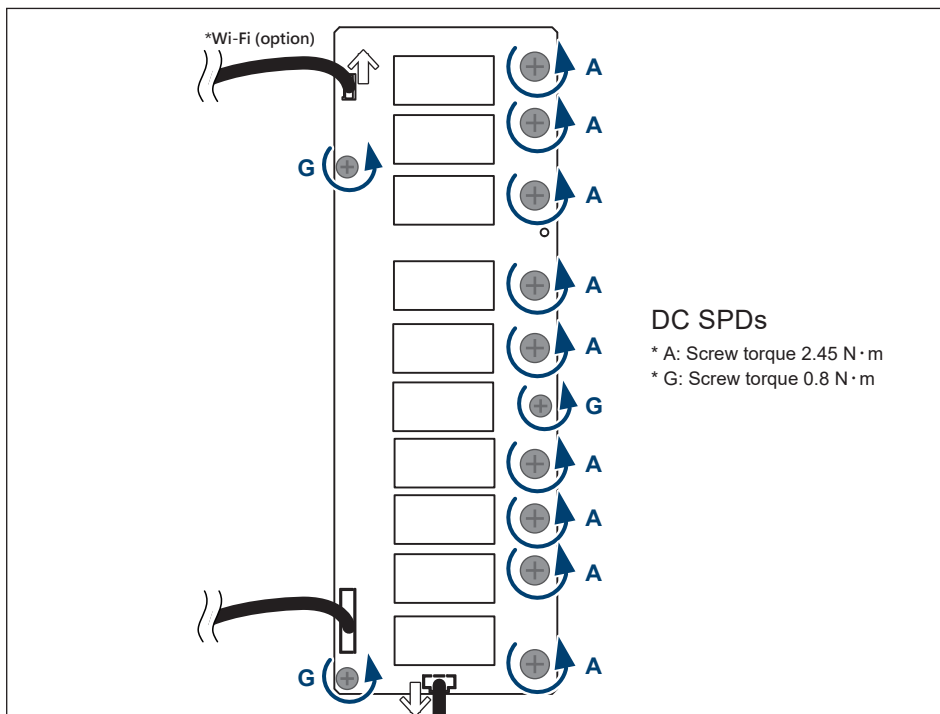


图 5-7 : 移除DC SPD 螺丝与排线

5.3 外接式保险丝 (M70A_260)

根据规定，当每组DC输入配置为3串时，必须要安装外部保险丝。
请联系DELTA经销商进行购买。

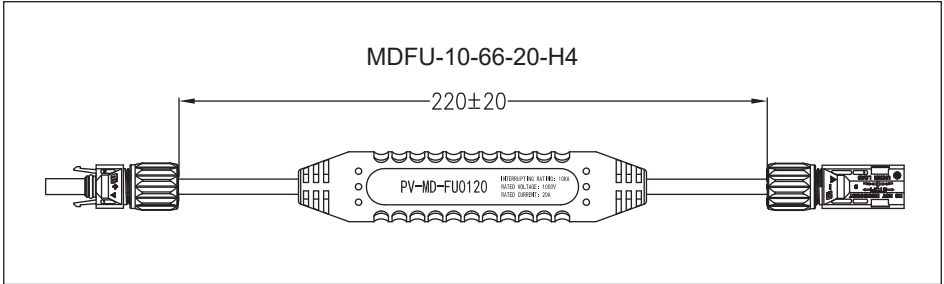


图 5-8：外接式保险丝

5.4 智慧风扇更换与滤网清洁

M70A / M50A 提供具可控型的智慧风扇冷却逆变器系统，此章节中说明滤网清洁与组装，以及在案场中更换风扇得方式说明。

此风扇模组具有高可靠度，并且结合控制器提供一个"智能化"的长效型冷却系统。当控制器侦测到风扇系统异常时，会产生"FAN-FAIL"的故障警报，此时逆变器会在安全的运作范围内进行降载运作。

依据功能性不同，逆变器所使用的风扇安装于两个位置：

- 功率模组部位
- 逆变器内部位置

图 5-9, 5-10 为功率模组风扇位置。

图 5-11, 5-12, 5-13 为内部风扇1的位置。

图 5-14, 5-15, 5-16 为内部风扇2的位置。

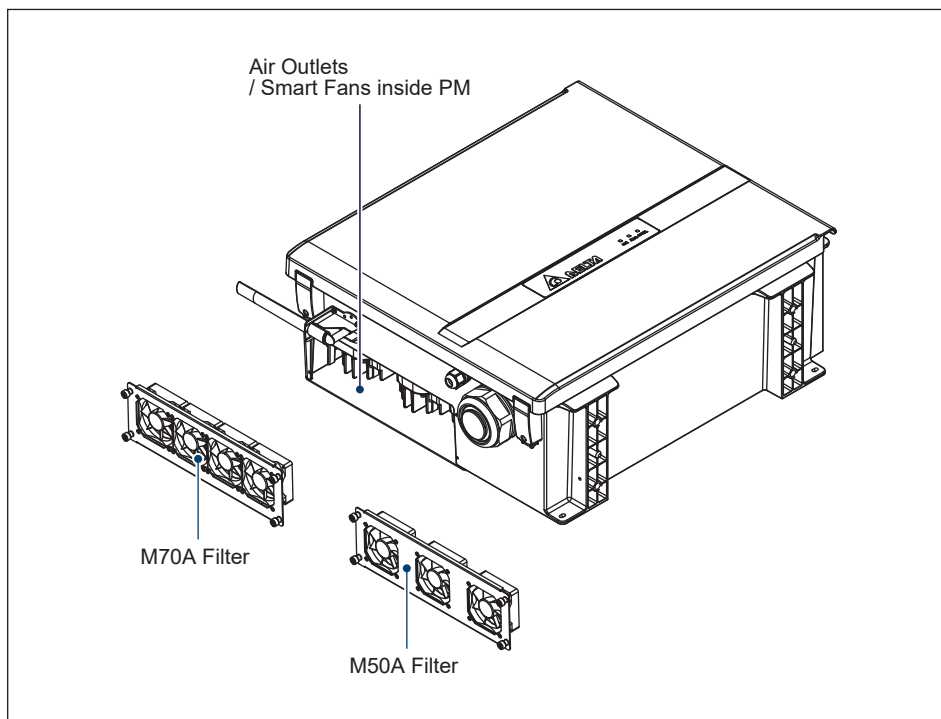


图 5-9：功率模组之智能型风扇位置

注意



需要定期的将风扇和过滤器清洁，以确保长寿命和可靠性。

- 风扇及滤网清洁频率由当地环境决定。
- 正常环境条件使用下，每四个月需清洁风扇及滤网一次。
- 若安装于严苛环境，建议每个月或每一季需清洁风扇及滤网一次。

因该冷却系统采用模组化设计，因此具有易清洁与易维护更换的特性。

警告！



- 在开始任何维护程序之前，请将交流断路器和直流开关关闭以避免电击危险！

5.4.1 功率模组专用风扇

逆变器电子设备主要是利用对流进行冷却。

而主要的功率元件则必须利用逆变器后方的风扇组进行散热，藉由隔离的配置将热量透过散热鳍片通过空气流动达到散热的功能。

功率模组使用的风扇组，采用风扇架将四颗风扇进行模组化，同时可进行全速运转亦可进行转速调节；当逆变器在额定输出且高温状态，风扇将以全速运转，当风扇故障时，逆变器发电状态则进入降载模式运行。同时在风扇组的入风与出风口处，均有滤网进行保护。

请参阅图5-10并按照下面列出的步骤操作：

1. 卸下入风口过滤网外盖的四颗螺丝。

此步骤进行后，同时确认过滤网状态，必要时进行清洁。

进行风扇维护时，请继续执行以下步骤。

2. 取下每个风扇电源排线。(要释放卡扣，请从两侧按位置A和位置B。)
3. 从机箱中取出风扇托盘。

要单独拆卸风扇时，请卸下其固定到风扇托架的四颗螺钉。

重新安装风扇架时，请按照上述步骤的顺序重新组装并锁紧螺丝。
扭矩值如图5-10所示。

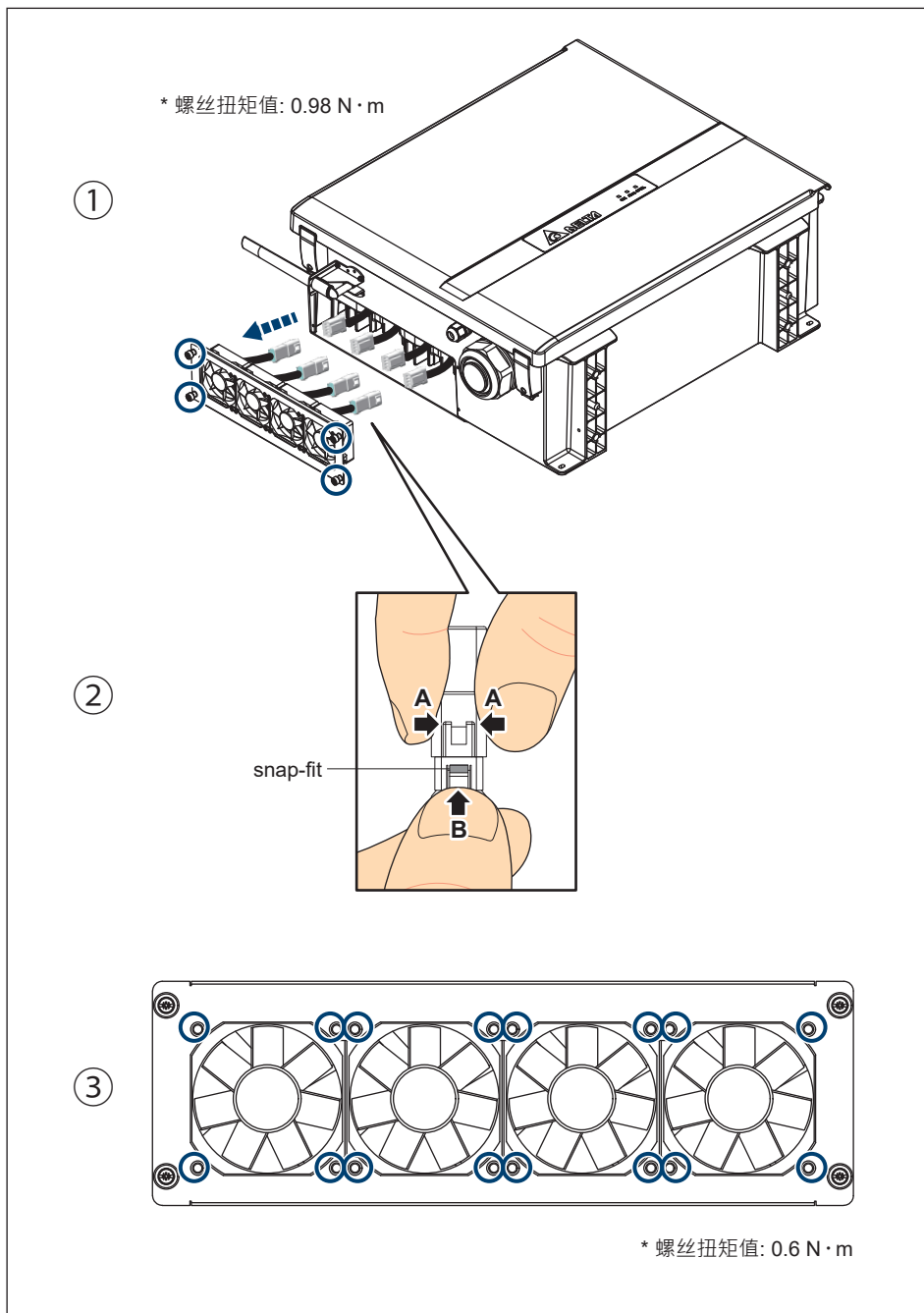


图 5-10: 风扇架拆卸示意图

5.4.2 内部风扇1

拆装内部风扇1步骤

- (1) 拆下B盖。
- (2) 松开图5-11中所示的两颗防脱落螺丝，然后拆下风扇架。
- (3) 取下DC SPD板上的电源连接排线。
- (4) 取下风扇组件。(如图5-12所示)
- (5) 清洁风扇组件或更换新风扇。(如图5-13所示)
- (6) 使用0.8N·m的扭矩重新组装。

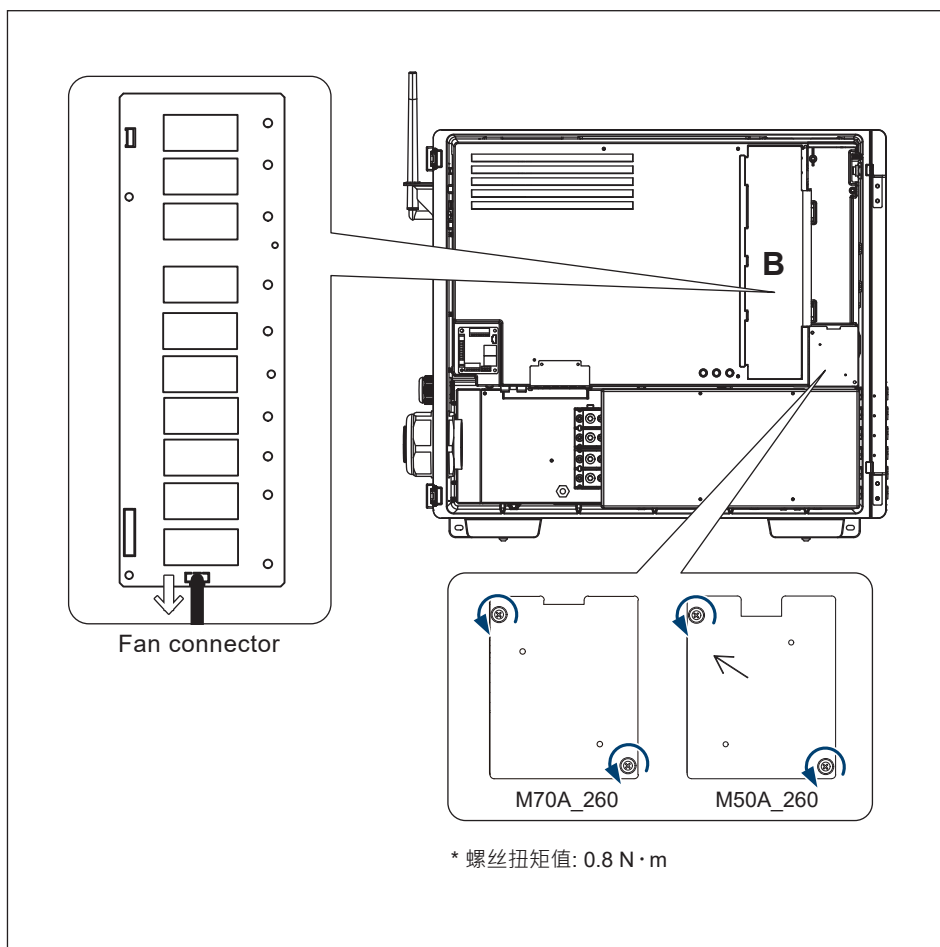


图 5-11 : 内部风扇1 位置与拆装示意图

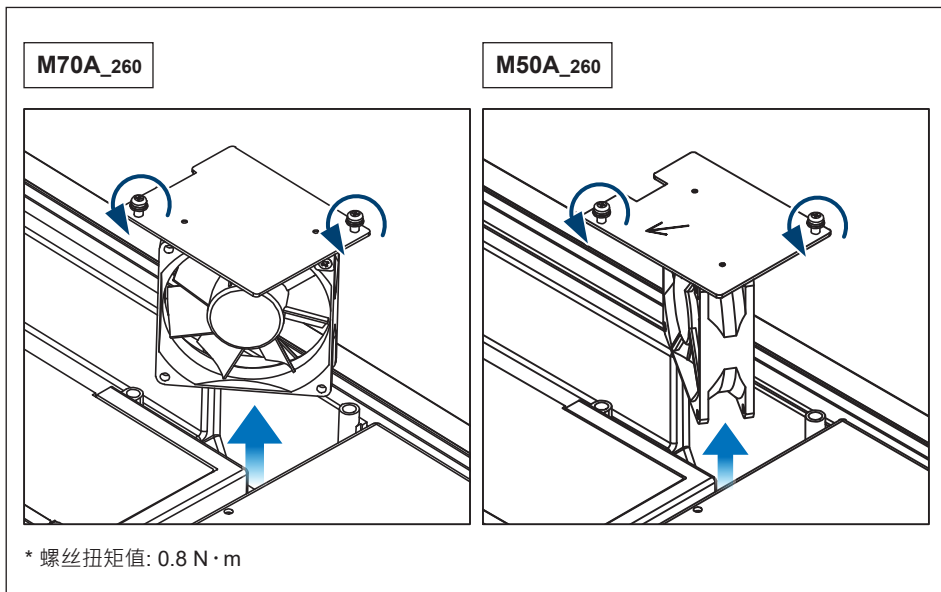


图 5-12: 取下内部风扇1示意图

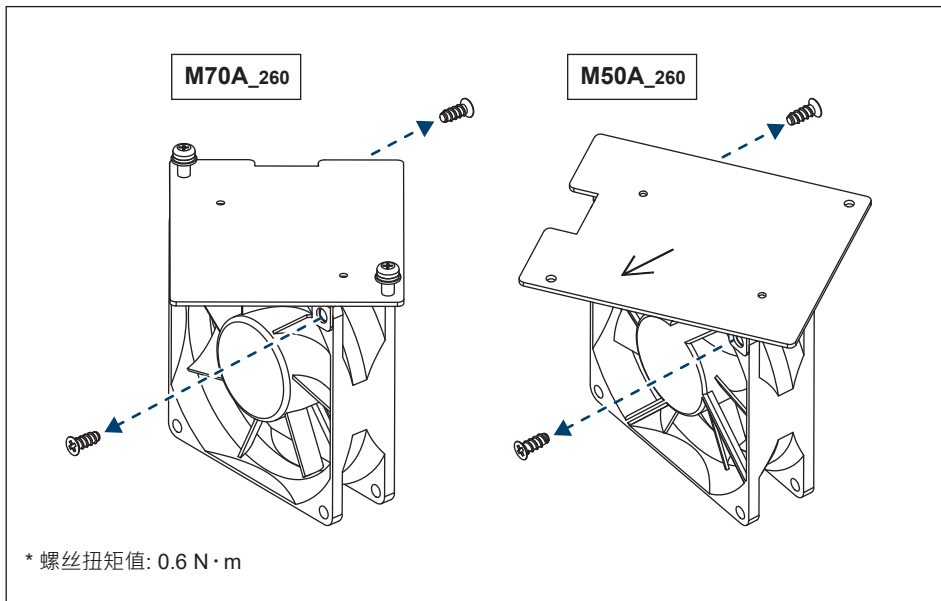


图 5-13: 更换风扇示意图

5.4.3 内部风扇2

拆装内部风扇2步骤

- (1) 松开图5-14中所示的两颗防脱落螺丝，然后拆下风扇架。
- (2) 取下通讯板上的电源连接排线。
- (3) 取下风扇组件。(如图5-15所示)
- (4) 清洁风扇组件或更换新风扇。(如图5-16所示)
- (5) 使用0.8 N·m的扭矩重新组装。

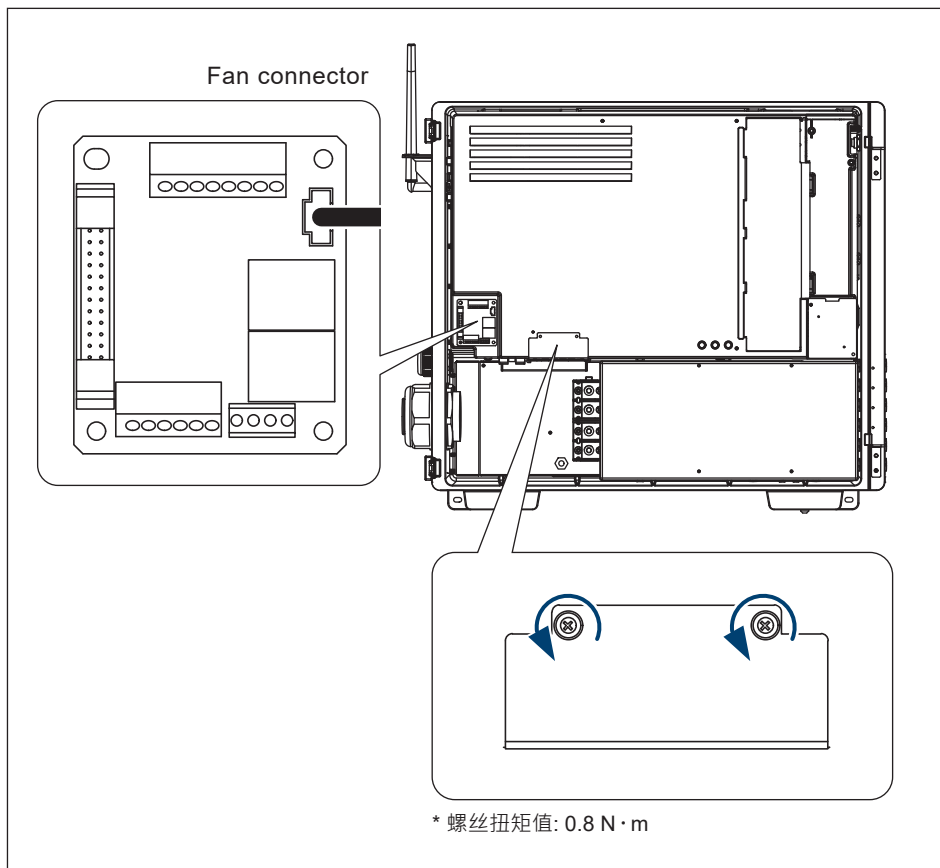


图 5-14: 内部风扇2 位置与拆装示意图

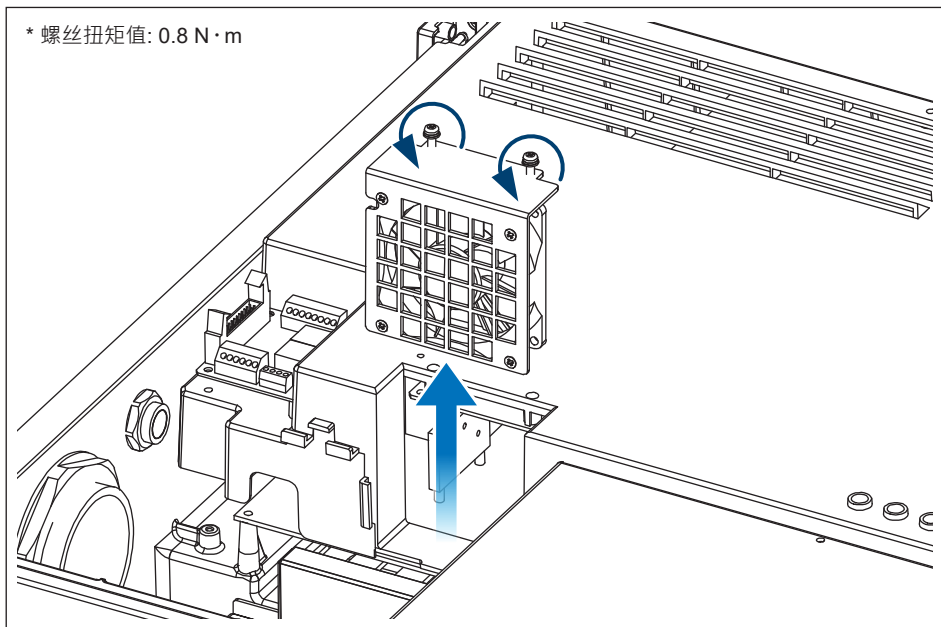


图 5-15: 取下内部风扇2示意图

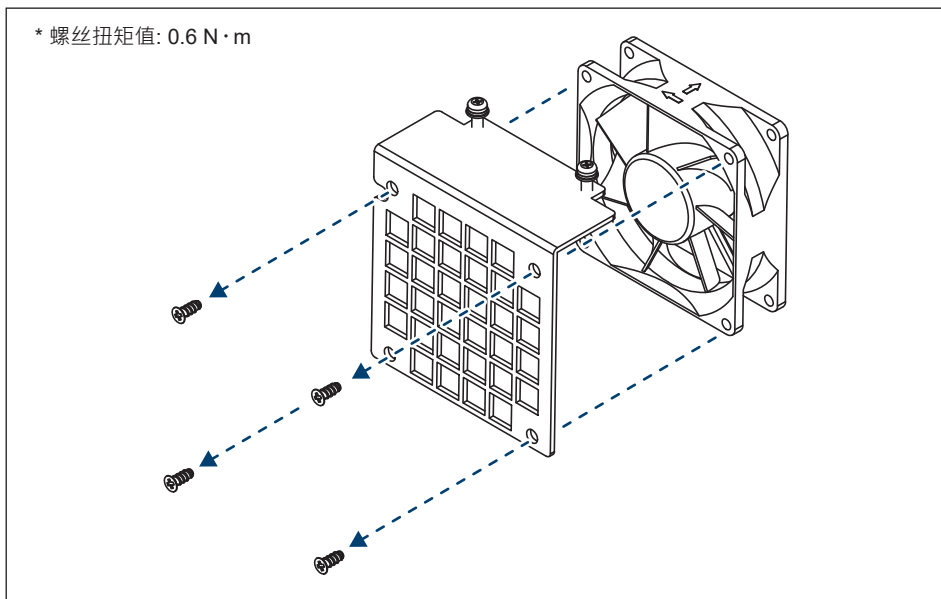


图 5-16: 更换风扇示意图

5.5 终止运转

当机器需要停止运转进行维护或保存时，请依照下面指示进行。

危险:触电危险!!



- 为避免严重伤亡，请依照下列步骤进行。

- 关闭外部AC断路器或开关确认与市电分离。
 - 关闭两组DC开关。
 - 使用H4端子专用工具移除光伏模组之直流输入H4端子，由于移除作业时，不可处于带电状态，因此务必确认直流开关必须为OFF，且无直流电流状态。
- RS-485 Communication module
1. 脱离与通讯板连接的所有通信线路。
 2. 从通信板组件上拆下接线。

注意: 表面高温 请勿触碰!

- 逆变器刚中断时，请注意表面高温。
- 直到表面降至适当温度前，请勿碰触逆变器。

注意: 可能造成伤害!

- M70A重达 69 公斤以上 / M50A重达 64 公斤以上。
- 若在搬运或从壁挂架拆卸过程中意外掉落可能造成伤害。
- 操作人员应配戴手套并稳固逆变器底座以防止受伤。

注意

- 螺丝螺帽移除后请留意，切勿将他们遗漏于机器内。

6 错误告警及排除问题

台达致力于打造高可靠标准的电子产品，若出现逆变器无法正常动作的情况时，请使用故障排除指南（表6-1、6-2和6-3）中的说明，进行故障排除；若经过排除后仍无法解决问题，请联系客服中心寻求技术协助。

6.1 错误讯息(配置端故障)

表 6-1A: 错误讯息 (配置端故障)

资讯显示	可能原因	故障排除
AC Freq High (E01)	市电频率过高	1. 请检查逆变器端的市电频率 2. 请检查国家设定
AC Freq Low (E02)	市电频率过低	1. 请检查逆变器端的市电频率 2. 请检查国家与电网设定
Grid Quality (E07)	在电网或靠近逆变器附近非线性的负载	当重复发生时，请联系客服人员，寻求技术支援
AC phase abnormal (E08)	在AC介面连接错误	请检查AC连接，必须和使用手册一致
No Grid (E09)	1. AC 断路器跳开 2. 中断AC介面	1. 请断开AC 断路器 2. 请检查连接AC介面并确认其连接至逆变器
AC Volt Low (E10)	市电电压过低	1. 请检查市电与逆变器端的连接 2. 请检查国家或电网设定 3. 请检查AC介面连接
AC Volt High (E11, E13, E16, E18, E21, E23)	市电电压过高	1. 请检查市电与逆变器端的连接 2. 请检查国家或电网设定 3. 请检查AC介面连接
DC Voltage High (E30)	输入电压超过 1000Vdc	请修正 solar array 设定并使得 Voc 小于 1000Vdc
Insulation Fault (E34)	太阳能模组与接地间发生隔离阻抗问题	1. 请检查太阳能模组接地是否确实 2. 请检查逆变器接地是否确实 3. 请检查直流断路器是否受潮

6.2 故障讯息(逆变器故障)

表 6-2A: 故障讯息(逆变器故障)

资讯显示	可能原因	故障排除
DC Injection (F01, F02, F03)	市电波形异常	请联系客服人员·寻求技术支持
Temperature High (F05)	逆变器内部环温或功率模组温度过高	请检查设备的周遭和环境
Temperature Low (F07)	逆变器内部环温或功率模组温度过低	请检查设备的周遭和环境
Amb Temp Fault (F06)	环境温度 >90°C 或 <-30°C	请联系客服人员·寻求技术支持
Inveter Temp Fault (F10)	逆变器温度 >98°C 或 <-30°C	请联系客服人员·寻求技术支持
AC Sensor Fault (F15)	交流电压或电流回纜电路异常	1. 请确认直流端子极性(当同时出现W08时) 2. 请联系客服人员·寻求技术支持
Vdc Sensor Fault (F16)	直流电压回纜电路异常	请联系客服人员·寻求技术支持
Idc Sensor Fault (F17)	直流电流回纜电路异常	1. 请确认直流端子极性(当同时出现W08时) 2. 请联系客服人员·寻求技术支持
AC Sensor Fault (F18)	交流电压或电流回纜电路异常	1. 请确认直流端子极性(当同时出现W08时) 2. 请联系客服人员·寻求技术支持
AC Sensor Fault (F19)	直流电压或电流回纜电路异常	请联系客服人员·寻求技术支持

表 6-2B: 故障讯息(逆变器故障)

资讯显示	可能原因	故障排除
Red COMM Fault (F22)	逆变器内部通讯异常	请联系客服人员，寻求技术支持
DSP COMM Fault (F23)	逆变器内部通讯断线	请确认RS-485连线介面是否正确
Ground Cur. High (F24)	太阳能模组与接地隔离阻抗异常	1. 检查输入端的绝缘 2. 检查电容值 (+ <-> GND & - <-> GND) , 必须 < 10uF. 必要时安装外部的变压器
Iac Unbalance (F26)	1. 逆变器内部的电源线未连接 2. 电流回授电路无效	请检查AC介面连接
RCMU Fault (F27)	RCMU 连接中断	请联系客服人员，寻求技术支持
AC RLY Short (F28)	AC Relay 短路	请联系客服人员，寻求技术支持
AC RLY Open (F29)	AC Relay 开路	请联系客服人员，寻求技术支持
Bus Unbalance (F30)	逆变器内部直流电压不平衡	请重新启断DC开关
Bus Voltage High (F31)	太阳能板Voc超过1000Vdc	请重新启断DC开关
AC Current High (F36)	操作期间突波发生	请联系客服人员，寻求技术支持
AC CT Fault (F42)	交流侧R相电流感测器异常	请联系客服人员，寻求技术支持
AC CT Fault (F43)	交流侧S相电流感测器异常	请联系客服人员，寻求技术支持
AC CT Fault (F44)	交流侧T相电流感测器异常	请联系客服人员，寻求技术支持
AC Current High (F45)	交流电流输出过大	请重新启断DC开关

6.3 警告讯息(配置端警告)

表 6-3A: 警告讯息 (配置端警告)

资讯显示	可能原因	故障排除
DC Voltage Low (W01)	输入电压低于下限值	请检查电压至逆变器端的连接
De-rating (W07)	<ol style="list-style-type: none"> 1. 本体及环境温度过高 2. 实功功率限制功能作动 3. P-F功能作动 4. P(V) 功能作动 5. 市电电压过低 6. 输入电压过低 7. 输入电压过高 8. 爬升功能 	<ol style="list-style-type: none"> 1. 确认安装机器本体及环境温度 2. 确认国别及最大功率限制参数设定 3. 确认市电频率是否异常 4. 确认市电电压是否异常 5-1. 确认市电电压是否异常 5-2. 确认虚功控制功能设定 6. 确认PV panel输入电压是否过低 7. 确认PV panel输入电压是否过高 8. 确认爬升功能设定
String fault (W08)	<ol style="list-style-type: none"> 1. 直流端子极性错误 2. 组串电流侦测电路异常 	<ol style="list-style-type: none"> 1. 请确认直流端子极性 2. 请联系客服人员，寻求技术支持

6.4 警告讯息(逆变器警告)

表 6-4A: 警告讯息(逆变器警告)

资讯显示	可能原因	故障排除
Fan Fail (W11)	<ol style="list-style-type: none"> 1. 一个或多个风扇锁死 2. 一个或多个风扇无效 3. 一个或多个风扇未连接 	<p>外部风扇</p> <ol style="list-style-type: none"> 1. 移除卡在风扇内的对象 2. 检查风扇的连接 3. 替换无效的风扇 <hr/> <p>内部风扇</p> <p>请联系客服人员，寻求技术支持</p>
DC SPD Fault (W17) AC SPD Fault (W18)	<ol style="list-style-type: none"> 1. 一个或多个SPD有缺陷 2. 一个或多个SPD未连接 	<ol style="list-style-type: none"> 1. 更换有缺陷之SPD 2. 检查SPD的连接

7 技术资料

表 7-1A: 规格		
Model	M70A_260	M50A_260
直流输入		
最大输入电压	1100 V *1	
工作电压范围	200 - 1000 V	
MPP 电压范围 (全功率)	460 - 900 V *2	390 - 900 V *3
启动电压	> 250 V	
额定电压	600 V	
最大输入电流	Each MPPT: 26 A, Total: 156 A	Each MPPT: 26 A, Total: 132 A
最大输入功率	Each MPPT: 15.7 kW, Total: 78.5 kW	Each MPPT: 11.7 kW, Total: 58 kW
允许最大短路电流	50 A	
MPP 追踪	6	
接头种类	2 strings/MPPT(无须保险丝) 3 strings/MPPT(需安装外部保险丝) Amphenol H4 DC Connector	2 strings/MPPT(无须保险丝) Amphenol H4 DC Connector
直流开关	Built-in	
电流监控	Built-in	
保护	Type II SPD / Type I+II SPD(option)	
交流输出		
额定输出功率	70 kW	50 kW
最大输出功率	77 kVA *4 (77kW when PF=1)	55 kVA *5 (55kW when PF=1)
最大输出电流	111.6 A	83 A
额定输出电流	3 Ph 220 / 380V, 230 / 400V Y or Δ	
工作电压范围	80% to 130% of Nominal AC Voltage	
工作频率范围	50 / 60 Hz ± 5Hz	
功率因数	0.8 ind - 0.8 cap (Adjustable)	
保护	Type II SPD / Type I+II SPD(option)	
T.H.D	< 3%	
夜间耗电 *6	< 3.5 W	

*1 The max withstand voltage is 1100Vdc. (inverter stop output when input is over 1000Vdc)
Model for Korea is 1000Vdc.

*2 Ambient < 35°C: 460 - 900V ; Ambient < 40°C: 460 - 800V ; Ambient < 50°C: 520 - 720V

*3 Ambient < 40°C: 390 - 900V ; Ambient < 50°C: 390 - 850V
Model for Korea is 390 - 800V.

*4 Ambient < 40°C

*5 Ambient < 40°C

Model for Korea is 50kVA (50kW when PF=1).

*6 Night time consumption with standby communication.

表 7-1B: 规格		
Model	M70A_260	M50A_260
效率		
最高效率	98.8 %	98.7 %
欧洲效率	98.4 %	98.3 %
资讯		
通讯介面	RS-485 / SUB_1G / Wi-Fi (optional)	
规范认证		
	IEC 62109-1/-2 EN 61000-6-2 EN 61000-6-3 VDE-AR-N 4105 VDE 0124-100	VDE-AR-N 4110 NB/T 32004: 2018 GB/T 19964: LVRT CNS 15382
一般数据		
操作温度范围	-25 to +60°C (Derating Above 50°C)	
防水防尘等级	IP65	IP66
操作海拔范围	< 4000 m	
冷却模式	Smart fan air cooling	
噪音	67.3 dBA @1m, Amb25°C	65 dBA @1m, Amb25°C
尺寸 (W x H x D)	699 x 629 x 264 mm	
重量	69 kg	64 kg

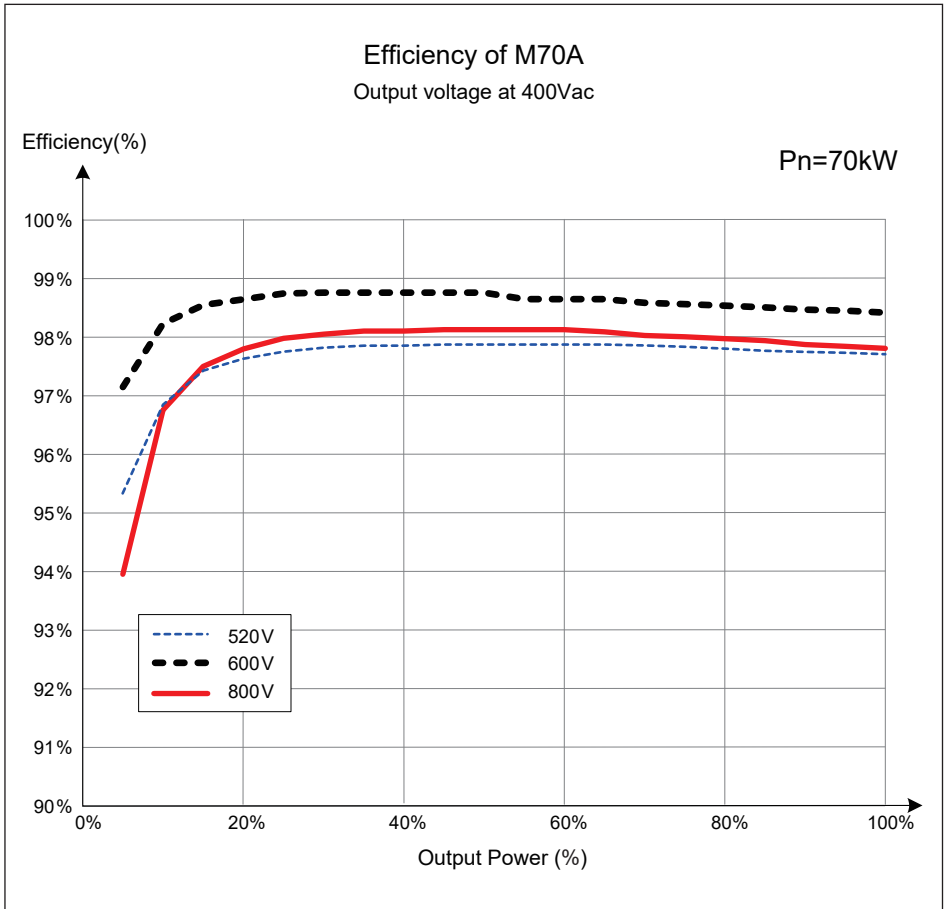


图 7-1: 效率曲线图

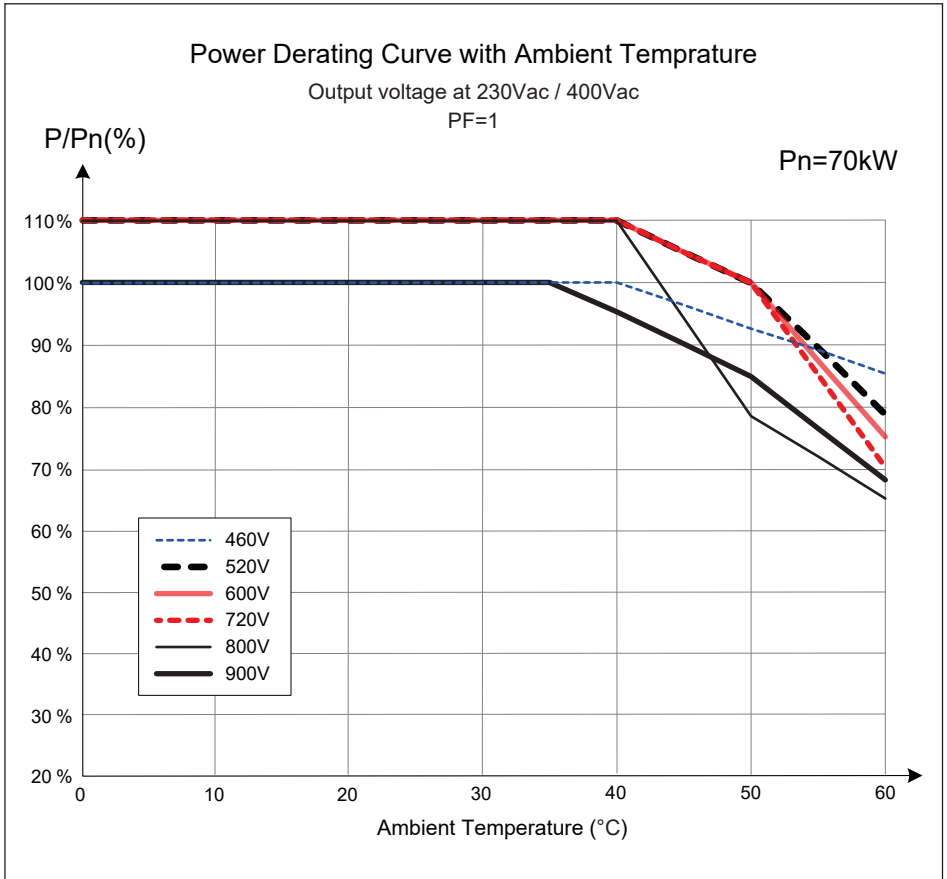


图 7-2: 环温对应降额曲线图(PF=1)

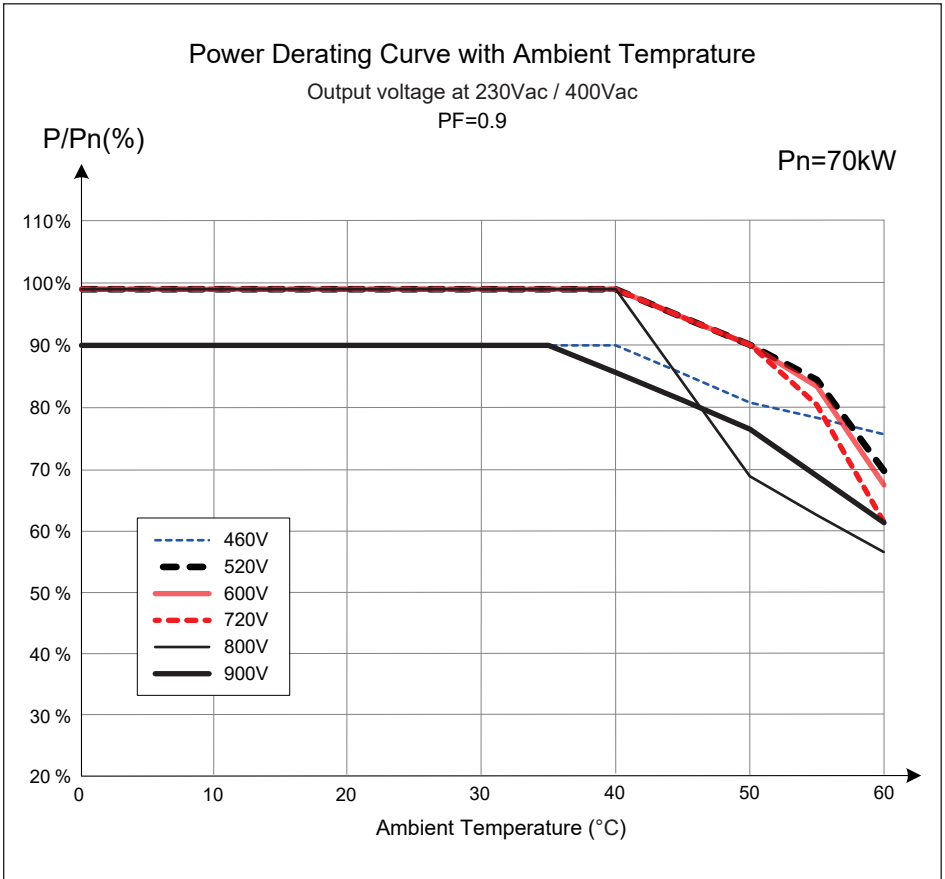


图 7-3: 环温对应降额曲线图(PF=0.9)

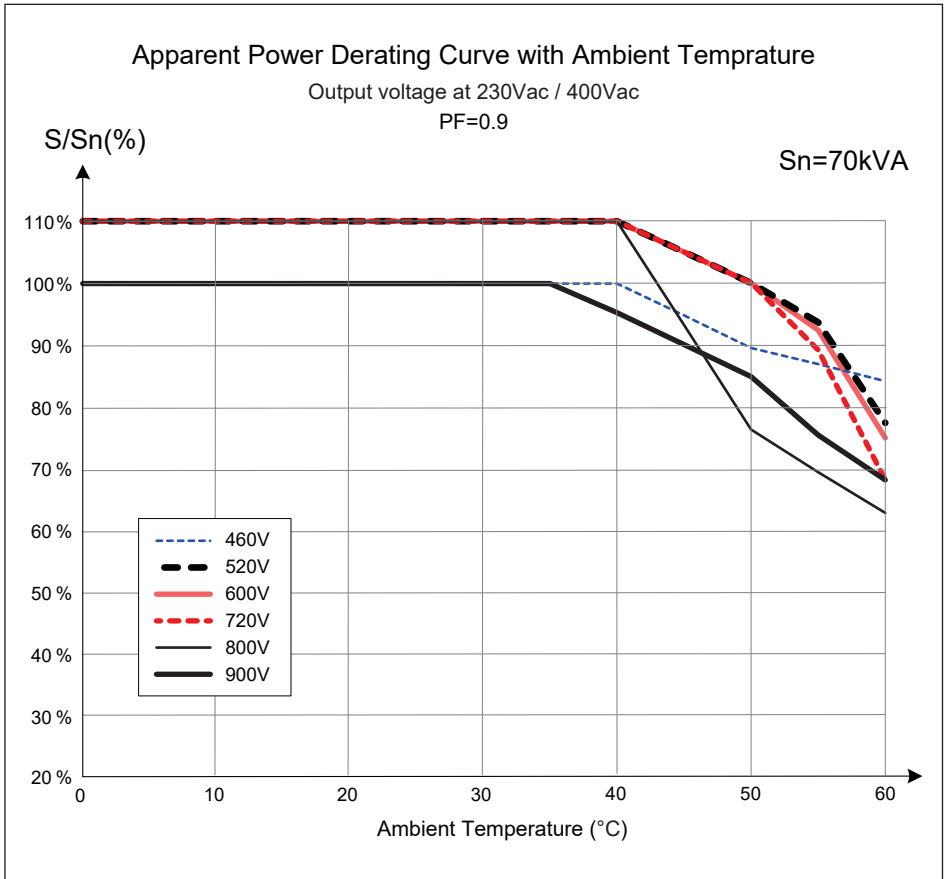


图 7-4: 环温对应视在功率降额曲线图(PF=1)

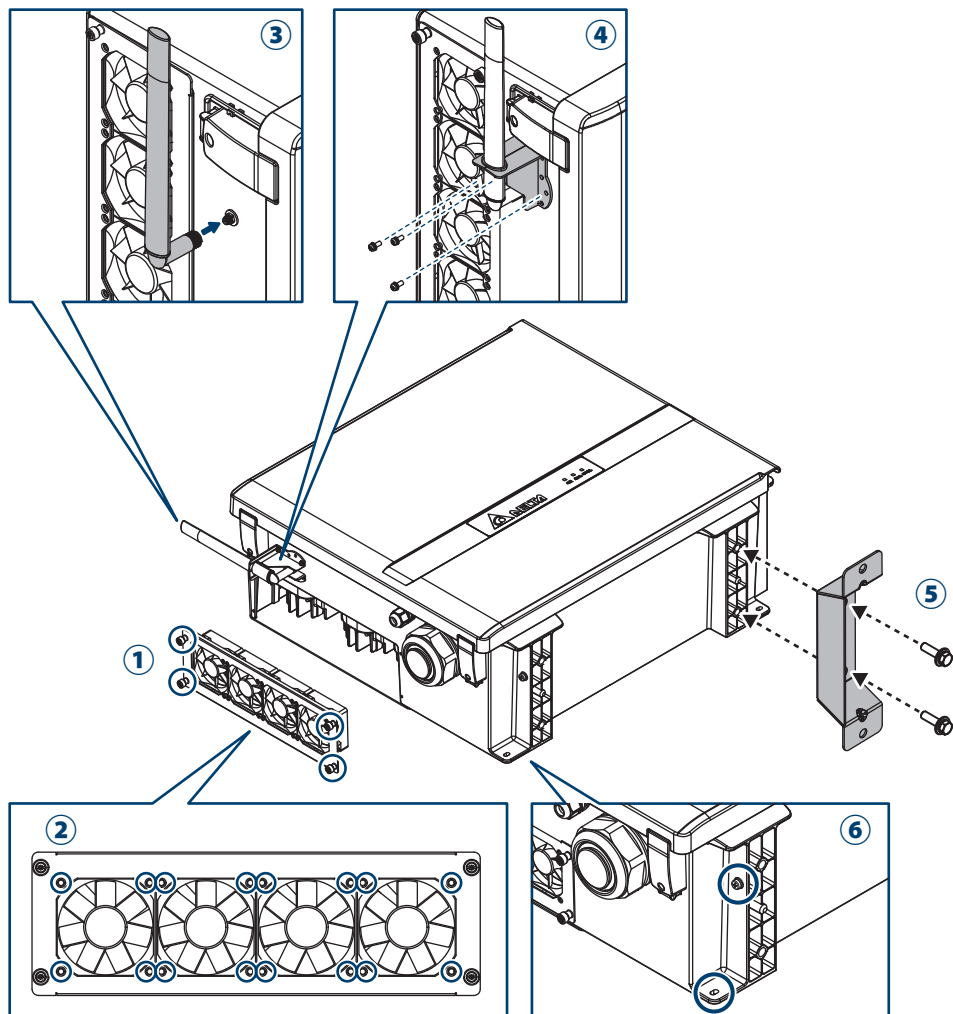
8 并网保护设定

M70A符合中国NB/T 32004-2018 B类逆变器要求，并且能实现交流相序自适应功能，此逆变器交流输出侧保护资讯如表8-1所示：

表8-1：M70A_260交流输出侧保护资讯

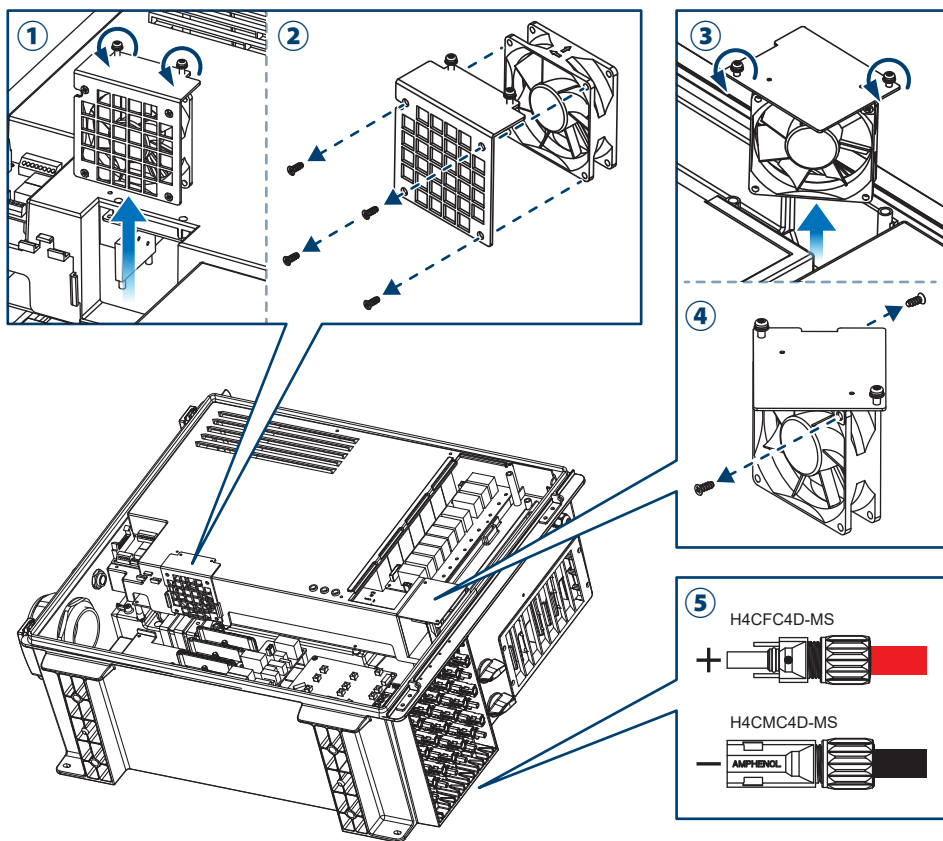
项目	设定国别	保护点预设值	逆变器响应
过电压保护	China 2018	$V \geq 135\%Un$	0.2秒内停止运行
		$V \geq 110\%Un$	2秒内停止运行
欠电压保护		$V < 50\%Un$	0.2秒内停止运行
		$V < 85\%Un$	2秒内停止运行
过频保护		$f > 50.5\text{Hz}$	0.2秒内停止运行
欠频保护		$f \leq 47.5\text{Hz}$	0.2秒内停止运行
	$f < 48.5\text{Hz}$	300秒内停止运行	

附录: 组装说明



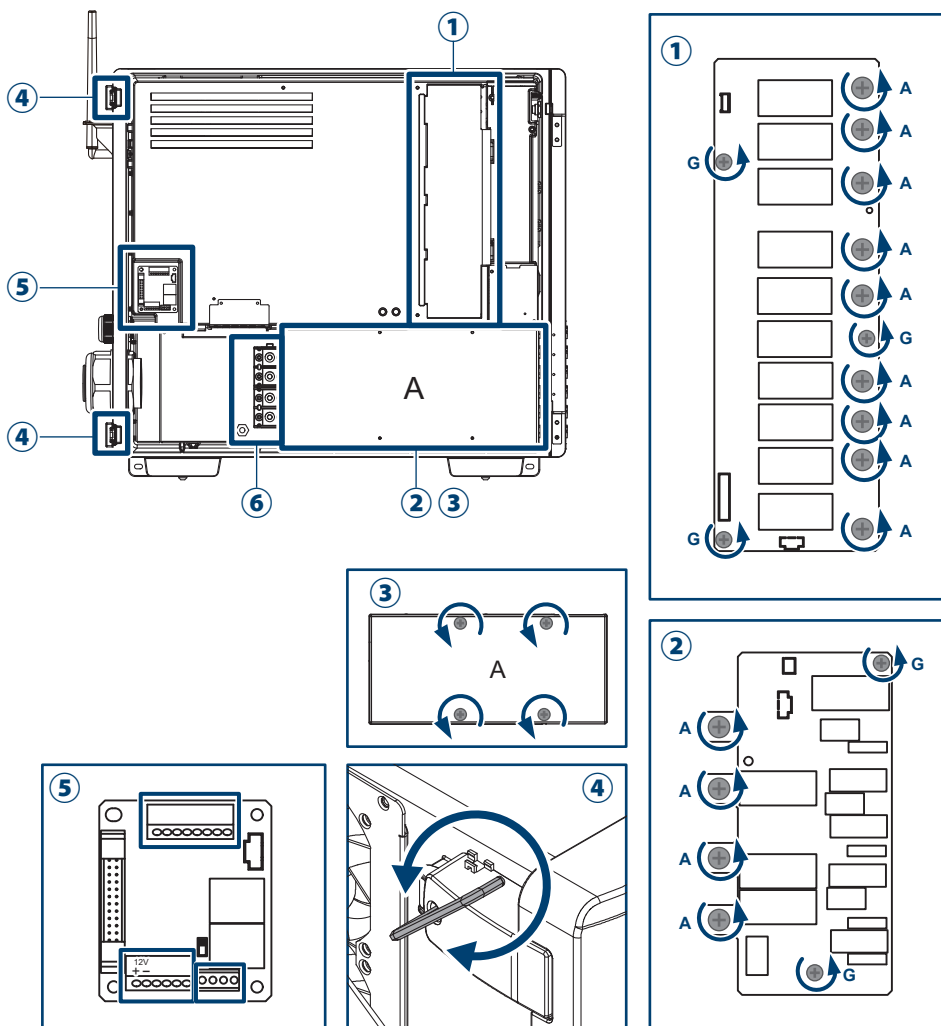
附录-1: 组装说明-1

NO	位置	螺丝扭力
1	滤网外盖	10 kgf-cm (0.98N·m)
2	风扇托盘	6 kgf-cm (0.6N·m)
3	天线	12 kgf-cm (1.2N·m)
4	天线支架 (M4)	10 kgf-cm (0.98N·m)
5	落地支架	250 kgf-cm (24.5N·m)
6	设备接地 (M6)	40 kgf-cm (3.9N·m)



附录-2: 组装说明-2

NO	位置	螺丝扭力	导体横截面
1	内部风扇架 2	8.0 kgf-cm (0.8N · m)	-
2	内部风扇组件 2	6.0 kgf-cm (0.6N · m)	-
3	内部风扇架 1	8.0 kgf-cm (0.8N · m)	-
4	内部风扇组件 1	6.0 kgf-cm (0.6N · m)	-
5	H4 导线	-	12/10 AWG (4/6mm ²)



附录-3: 组装说明-3

NO	位置	螺丝扭力	导体横截面
1	直流侧雷击保护装置	A: 25 kgf-cm (2.45N·m)	
2	交流侧雷击保护装置	G: 8.0 kgf-cm (0.8N·m)	-
3	交流绝缘盖	8.0 kgf-cm (0.8N·m)	-
4	锁扣外盖	25 kgf-cm (2.45N·m)	-
5	通信模组	-	20 AWG (0.5mm ²)
6	交流端子	L1, L2,	M70A: 317 kgf-cm (31N·m)
		L3, N	M50A: 126 kgf-cm (12.4N·m)
		PE	150 kgf-cm (14.7N·m)
			M70A_260: 35 mm ² (1 AWG)~120 mm ² (250 kcmil)
			M50A_260: 16 mm ² (4 AWG)~60 mm ² (2/0 AWG)



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