



Grid-tie Transformerless Solar Inverter

M70A_263

Operation and Installation Manual

English 1

繁體中文 85

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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_263 is a transformerless solar inverter with 6 MPP tracking inputs, 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.
- Do not touch the product surface when operating.
- 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_263 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.



- 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_263

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

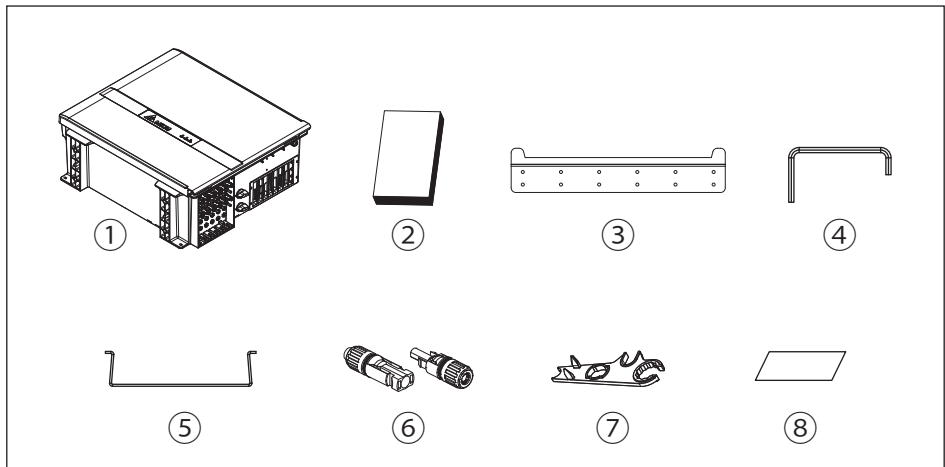


Figure 2-1: Components

Table 2-1: Packing list

M70A_263			
	Object	Qty	Description
1	Delta Solar Inverter	1 pc	Solar inverter
2	User Manual	1 pc	Important instructions for solar inverter. Safety instructions should be followed during installation and maintenance.
3	Mounting Bracket	1 pc	Wall mounting bracket (Material: Aluminum/Thickness: 3mm)
4	Hexagon Driver (Installed on latch lock cover)	1 pc	Keep the door being open. Can unscrew the latch lock cover screw.
5	Protective Frame	6 pcs	Protect DC connectors
6	H4 Connector	12 pairs	DC String inputs
7	H4 Wrench	2 pcs	To disconnect H4 connector
8	Security Seal	3 pcs	Tamper stickers for Taiwan use only

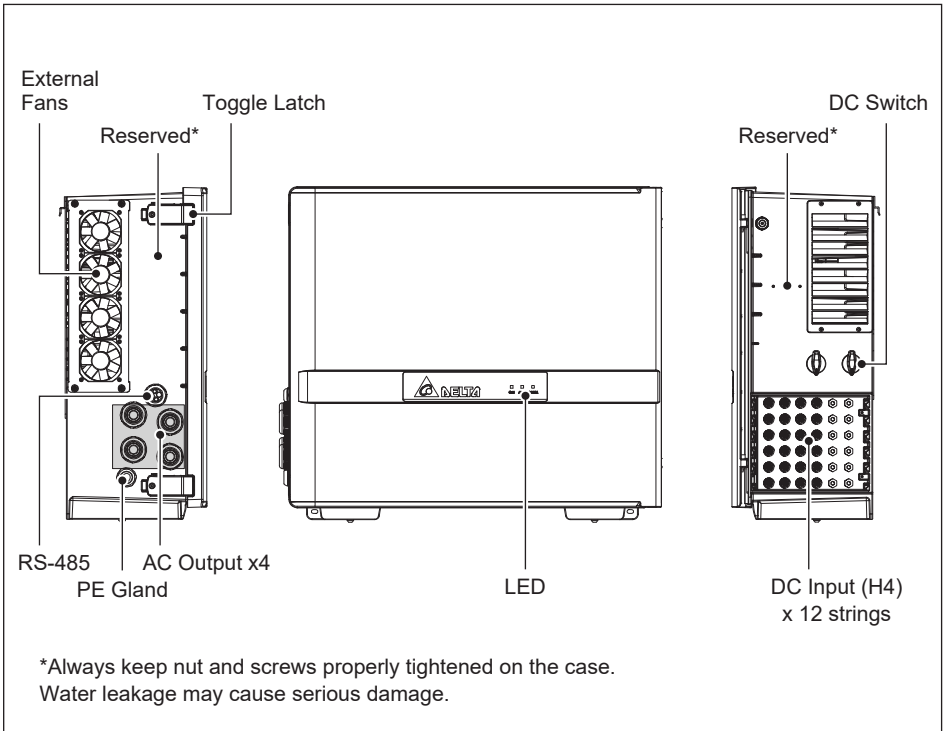


Figure 2-2: Overview

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

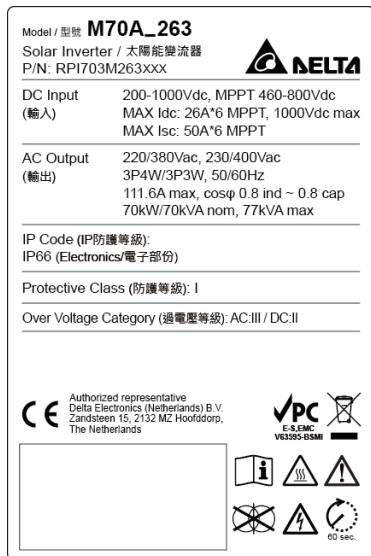


Figure 2-3: Rating label

Table 2-2: Rating label explanation

Symbol	Definition		
 60 seconds	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 or installer. Opening the housing will void the warranty.		
	Beware of hot surface. This inverter can get hot during operation.		Before working with the inverter, you must read the supplied manual and follow the instructions contained therein.
	This inverter is not separated from the grid with a transformer.		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.
	The housing of the inverter must be grounded if this is required by local regulations.		

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.

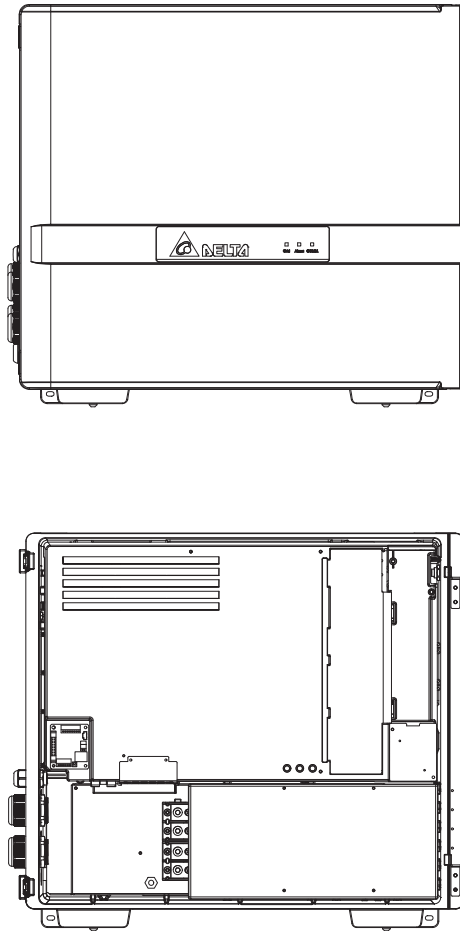


Figure 2-4: External/ internal view

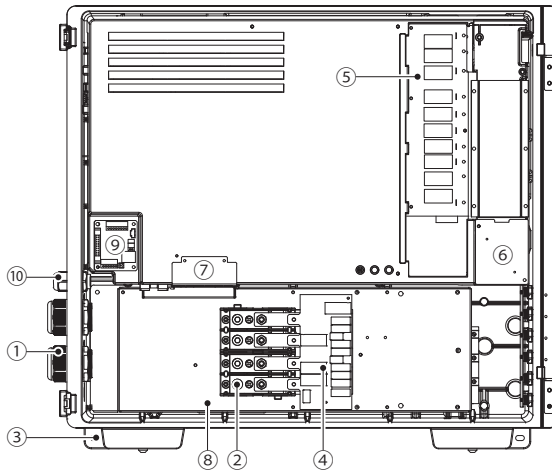


Figure 2-5: Layout

Table 2-3: layout description

NO.	Component	NO.	Component	NO.	Component
1	4x M40 glands for AC Output	5	Type II DC SPD	9	Communication module
2	AC terminal	6	Internal fan 1	10	Cable gland for COMM. wiring
3	Grounding (M6 threaded stud)	7	Internal fan 2		
4	Type II AC SPD	8	Internal grounding		

3 Installation

WARNING !



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

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.

CAUTION !



The product supports wireless communication.

- Install the product as far away as possible from devices that emit strong radio waves, such as civil band radio equipment.
- Do not install the product in metal box and make sure there is no metal barrier between the product and connecting devices to prevent the communication signal attenuation.
- When using Bluetooth to connect the inverter, make sure the device is operated in front of the inverter within 1.5 m for the best communication quality.

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**) .

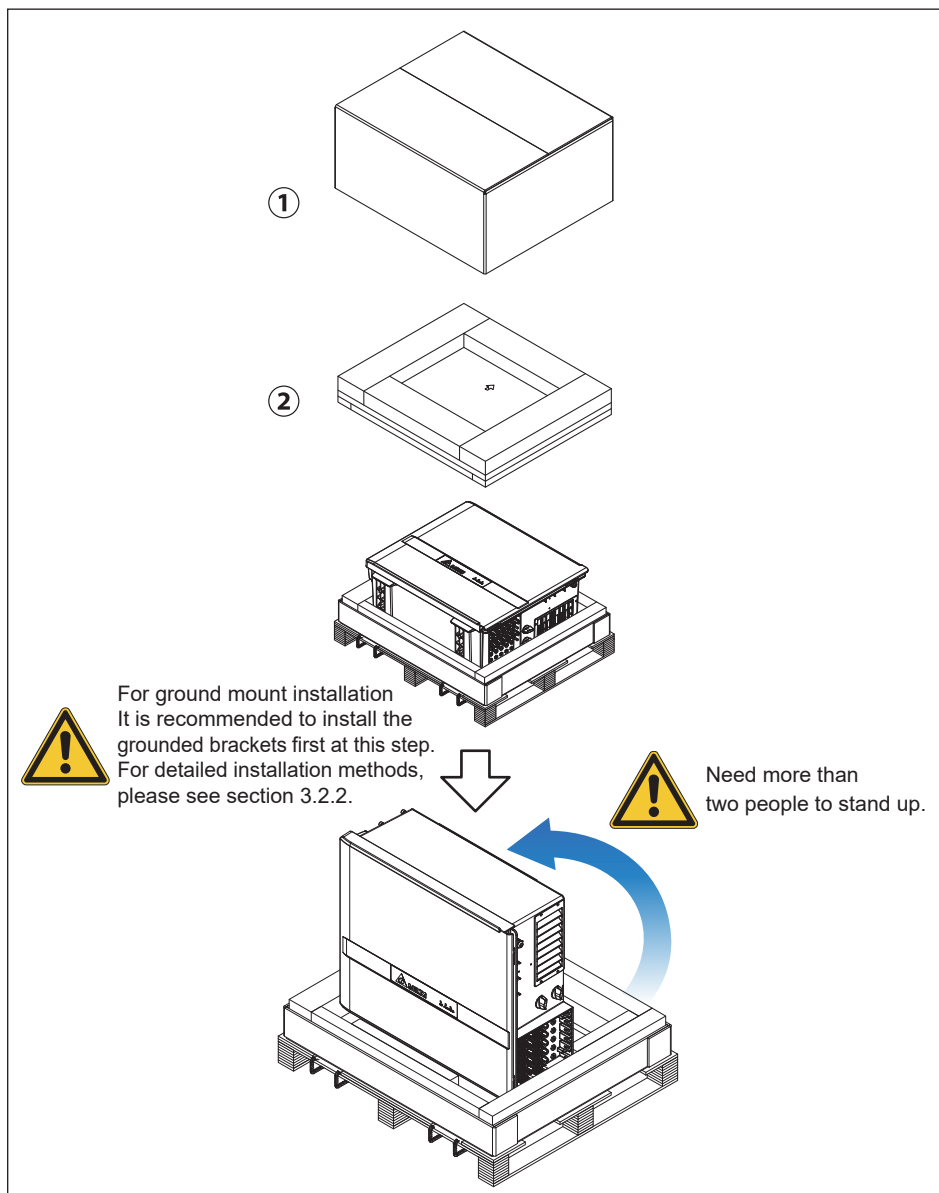
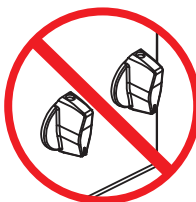
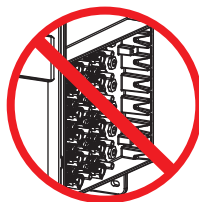
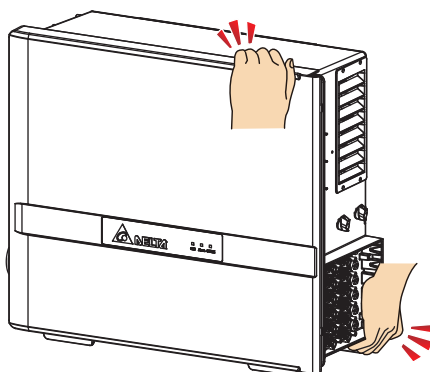


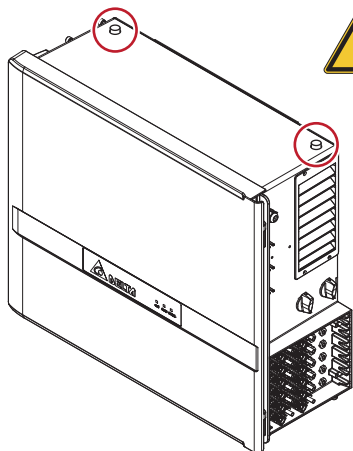
Figure 3-1: The step to unpacking the inverter

Manual handling

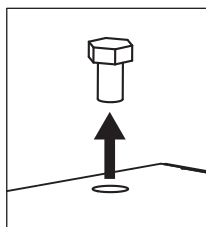


Do not hold fan, fan shutter, DC connectors, DC switches nor AC glands, it may cause damage to certain components.

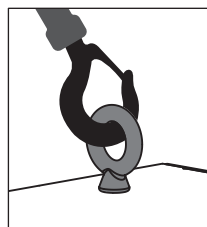
Hoisting



After hoisting, please keep the screw plugs on the casing to prevent water from entering.



Screw plug
(4 N·m)



Hoisting ring
(M12 x P1.75, L ≤ 20 mm)
(42 N·m)

Figure 3-2: Lift the inverter

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 **Figure 3-4** to **Figure 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 !



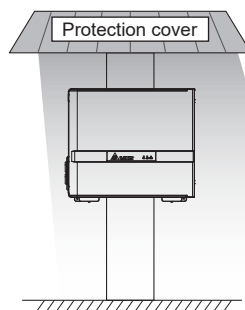
- The mounting bracket shipped with the unit is specially designed and is the only certified mounting device for mounting the inverter.
- Secure the mounting bracket on the wall with at least 6 pieces of M6 screws.
- Failure to comply with following mounting instructions including permitted orientations and designated clearances may result in derated power output and may void the warranty.

CAUTION !



To avoid malfunction of inverter caused by extreme weather (ex: snow, hail...etc) or non-proper installation/maintenance, an additional protection cover is strongly recommended to be installed by DELTA.

For more details, please contact local service team.



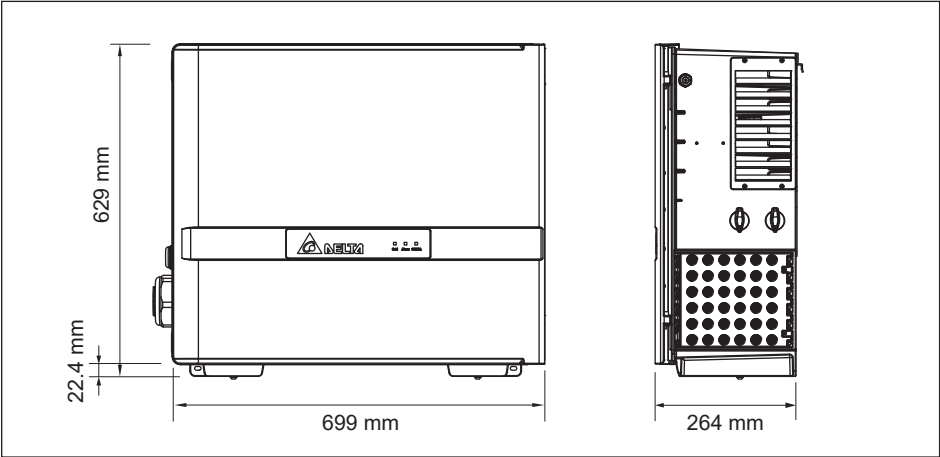


Figure 3-3: Inverter dimensions

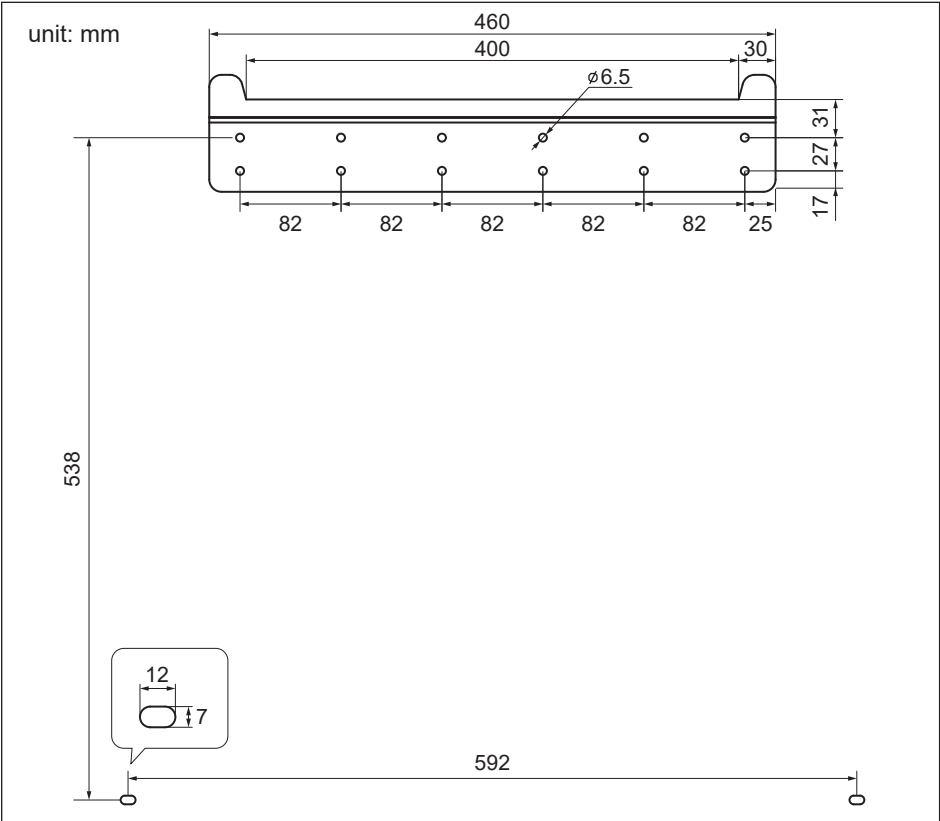
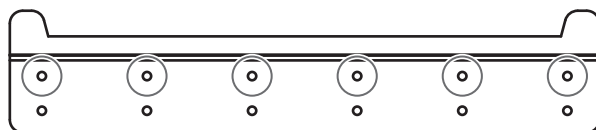


Figure 3-4: Mounting bracket dimensions

Positions for least amount of mounting bracket screws



or

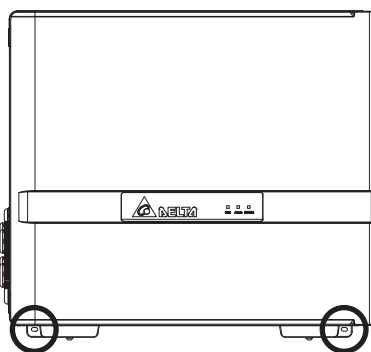
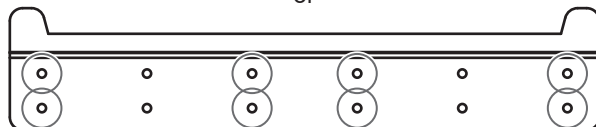


Figure 3-5 : Positions of mounting screws

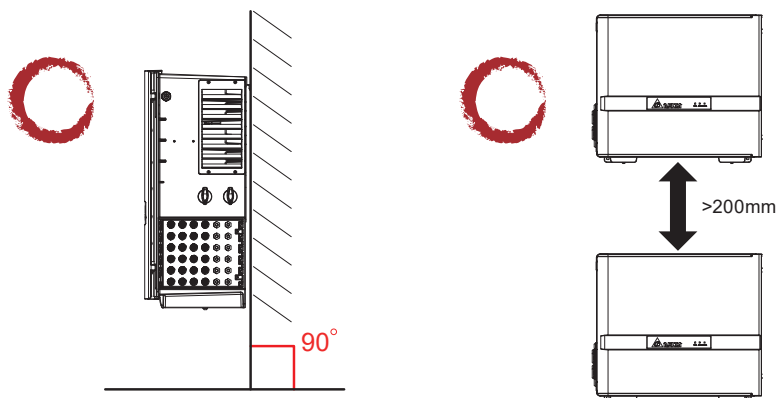


Figure 3-6: Permitted mounting positions

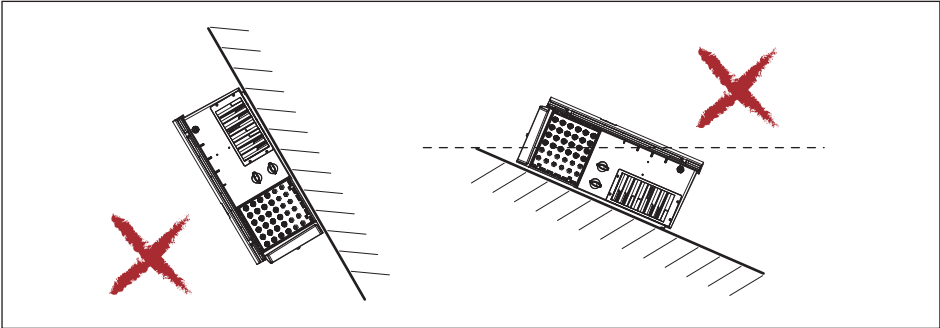


Figure 3-7: Prohibited mounting positions

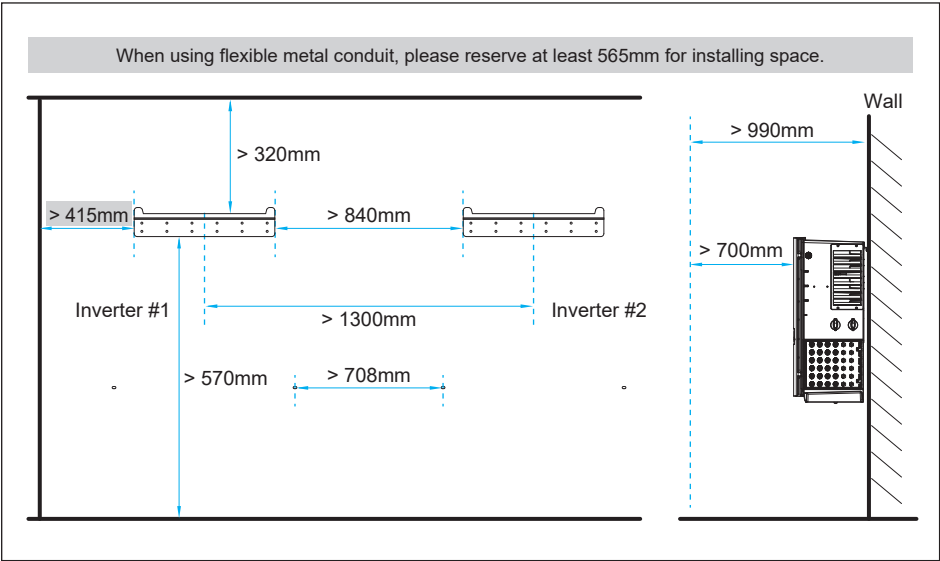
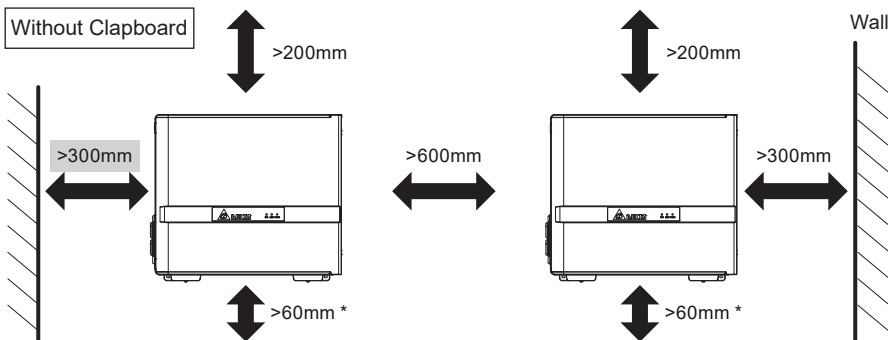
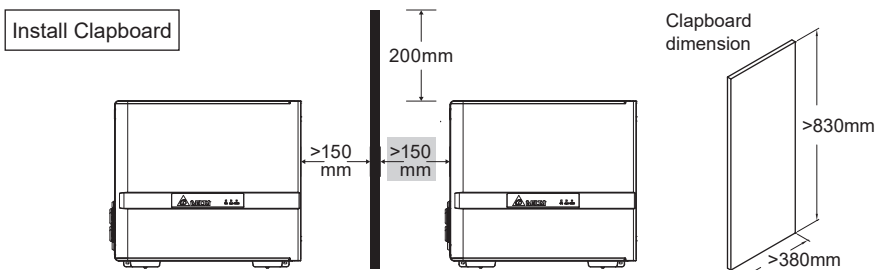


Figure 3-8: Required mounting clearances

When using flexible metal conduit, please reserve at least 450mm for conduit bending space.



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



* In order to avoid interference, please do not install metal clapboard when using SUB_1G antenna.

* Clapboard is not necessary when using flexible metal conduit, because the required distance between inverter will be 600mm.

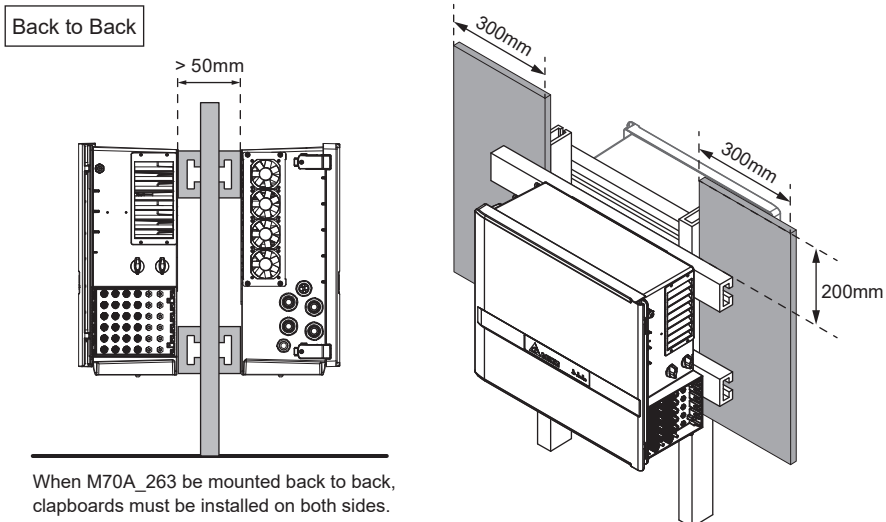


Figure 3-9: Separation distance of plural inverters

3.2.2 Ground Mount (optional)

ATTENTION



- Ensure the grounded base is strong enough to hold the weight of the inverter.

Grounded Bracket kit is an optional part, please contact the customer service center for the detail.

1. Fix the grounded brackets to the bottom of the inverter as **Figure 3-10**.
2. Mount the inverter with grounded brackets to the ground-mounting base by 4 expansion bolts as **Figure 3-11**.

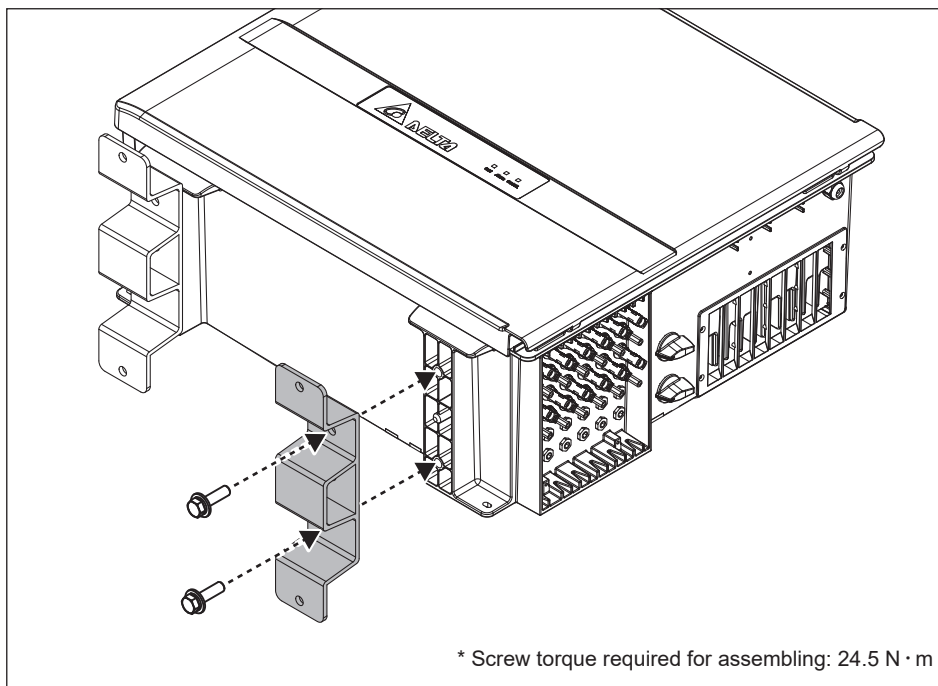


Figure 3-10 : Lock the grounded brackets to feet

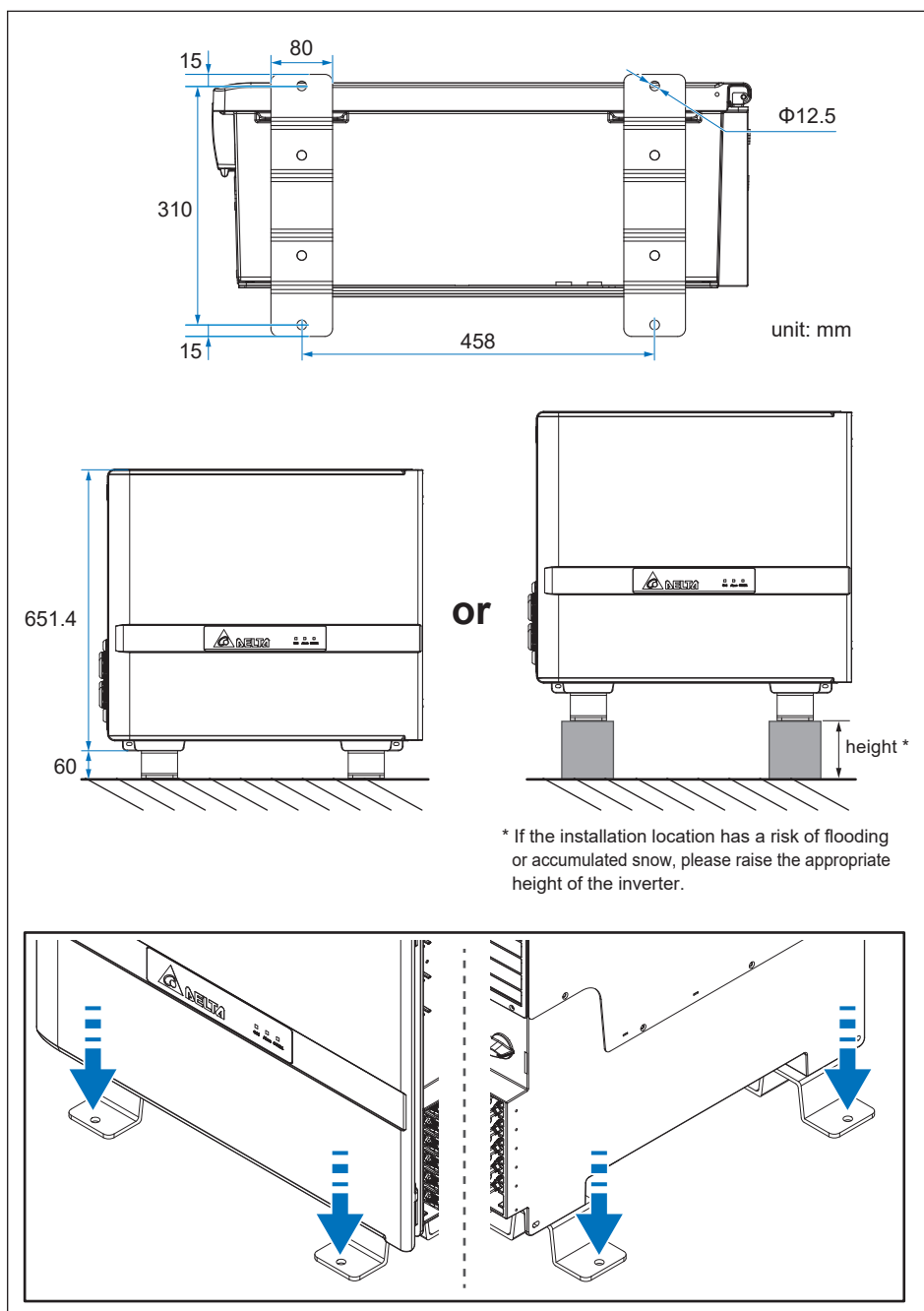


Figure 3-11: To secure inverter grounded brackets to ground-mounting base

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.

After opening the door, please make sure the door is fixed by hexagon driver as shown below.

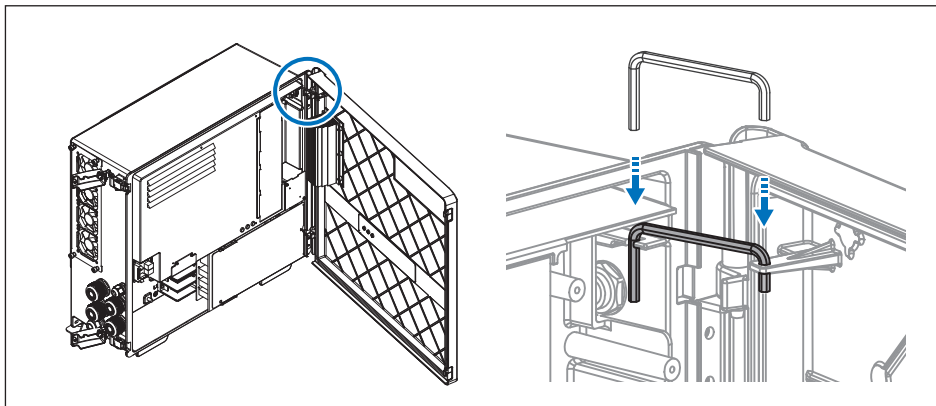


Figure 3-12: To secure the door by hexagon driver

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.
- Without rain cover or protection, never perform any wiring operations under rainy conditions.

WARNING !



- Code compliance is the installer's responsibility.
- After the wiring operations, please close the door immediately and fully tighten both toggle latches.

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

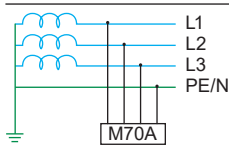
ATTENTION



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

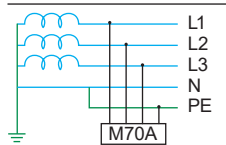
TNC system

230/400V



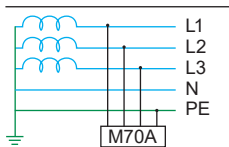
TNC-S system

230/400V



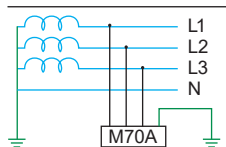
TNS system

230/400V



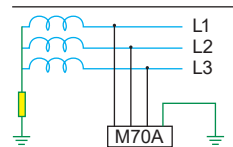
TT system

230/400V



IT system

230/400V



3.4.2 Required Protective Devices

It is recommended to install an upstream AC line disconnection and over current protection device. Please refer to your local rules for the required product.

3.4.3 Multiple Inverters in Parallel Connection

When multiple inverters are connected to the grid in parallel, the maximum number of inverters can be connected to a single winding of the transformer is 25.

3.4.4 AC Wiring Preparation

WARNING !

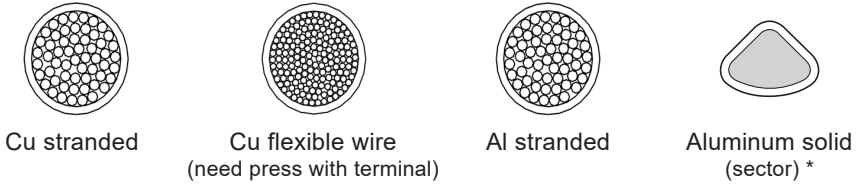


- If not following the above pretreatment, the contact resistance will increase significantly which will lead to the excessive temperature rise, even catch fire.

- Please use cooper or aluminum cables which are met the installation requirement of local power system.
- Stranded and Solid wire is available. Bootlace ferrules must be when using the flexible wire.
- If using the ferrule on the conductor, please ensure that the ferrule and the conductor are the same material base to prevent the destruction by corrosion.

Cable Type	Cable Cross-section range	Cable allowable diameter range
Single-Core	35 mm ² - 240 mm ²	12 mm - 27 mm

M70A_263 support Cu stranded wire, Cu flexible conductor, Al stranded wire and aluminum solid (include sector wire).



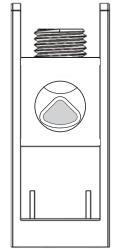
• Cu:

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.

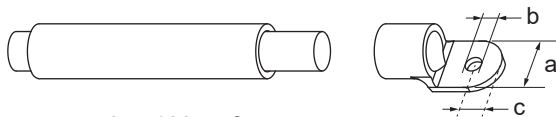
* The sector wiring direction is shown as right figure.



PE

The inverter must be grounded via the internal or external PE point which should follow below requirements.

- Cross section of the conductor must be at least $\frac{1}{2}$ of AC cable cross section
- Must follow the below table to use the proper lug for the connection

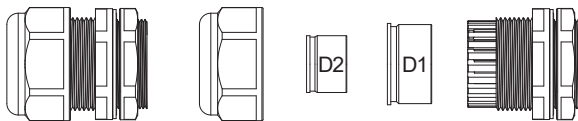


Max. conductor cross section: 120mm²

Cable diameter range: 9.5 - 18.8mm

Cable lug dimension: Size of bolt = M8 (a<24mm, b=10.5mm, c<12.5mm)

Figure 3-13: Size of PE conductors



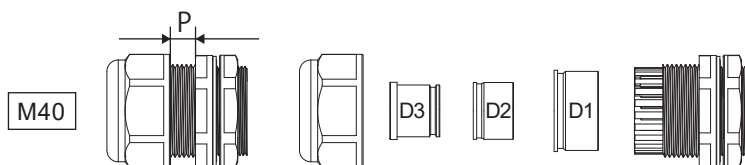
PE	Cable diameter range	Torque	Dimension of P
D1	14.1-18.8 mm	3.5-5.2 N·m	1.5-5.0 mm
D2	9.5-14.1 mm	3.5 N·m	1.5-5.0 mm

3.4.5 AC Side –Prewire Set-Up

Prior to install conductors on the terminal, please complete the following procedure to make terminals ready for connections.

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

Tighten / Lose nuts with 8 mm hex wrench. If an electric tool is used, insure the torque setting is low enough to NOT OVER-TORQUE the nuts.



AC	Cable diameter range	Torque	Dimension of P
D1	21.7-28.9 mm	5.5-10 N·m	1.0-8.0 mm
D2	16.2-21.7 mm	6.0 N·m	1.0-6.5 mm
D3	12.0-16.2 mm	4.0-6.5 N·m	1.0-7.5 mm

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.

Proper cable routing can avoid water dripping to cable glands and make the sealing of the cable glands well. Please follow the requirements to lay cables for the inverter.

1. Keep 10-20 cm length of straight cables from the edge of cable glands.
2. Anchor or support the straight cables to strain relief.
3. Must be routed to create a "hump" to prevent flowing water on the cable gland.

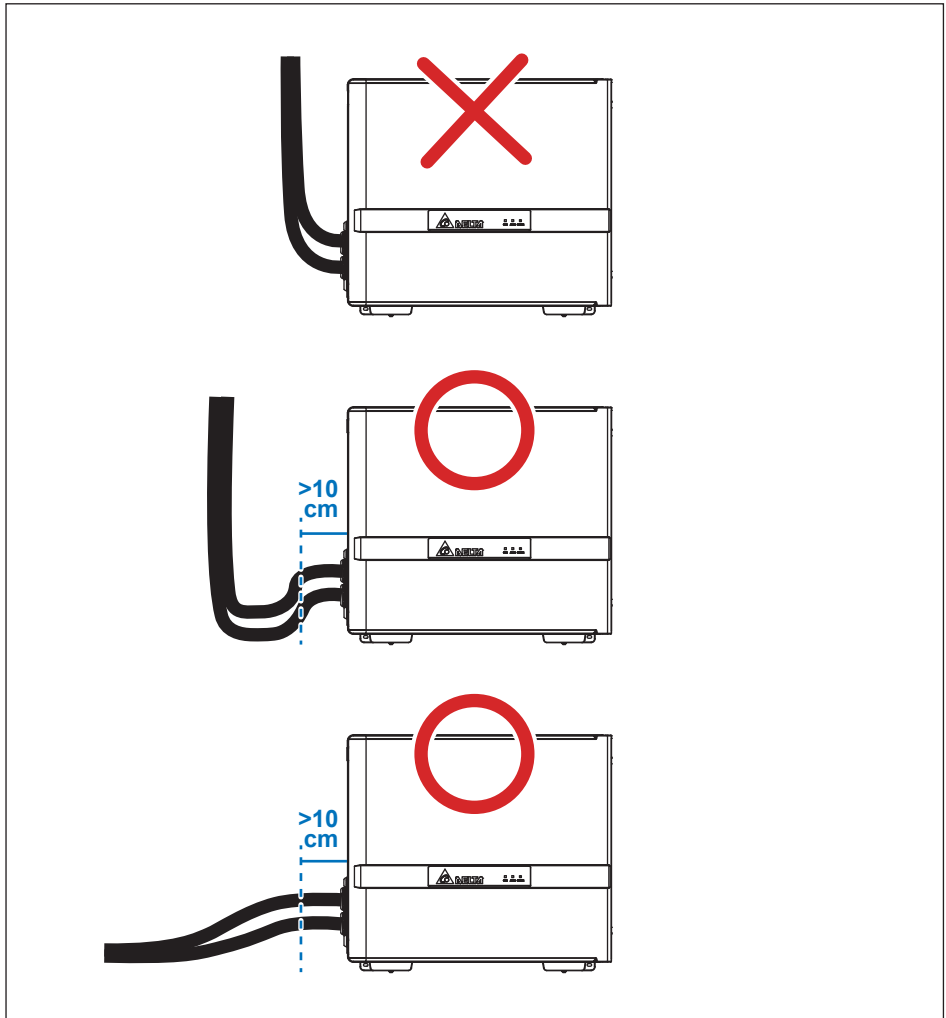


Figure 3-14: Cable routing

Please do not separate the three phase AC cable into individual metal conduit to avoid eddy current affect, please refer **Figure 3-15** for AC cable installation suggestion.

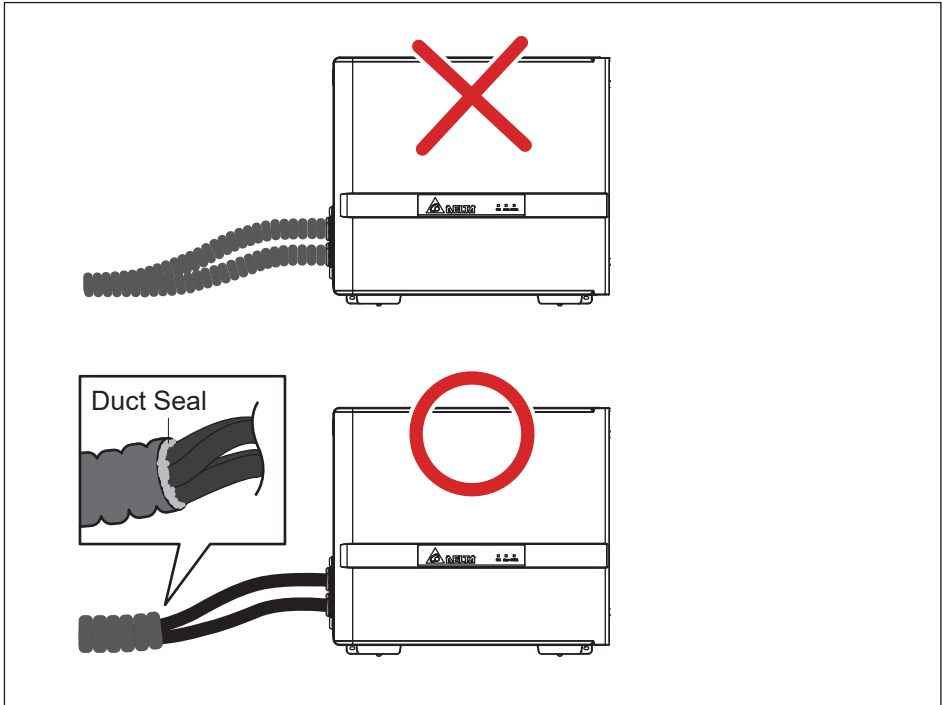
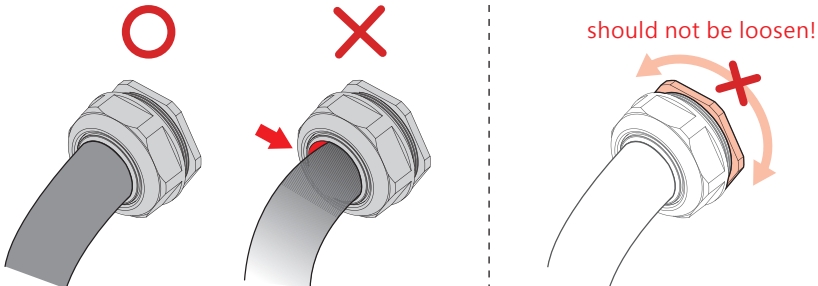


Figure 3-15: AC side metal conduit installation suggestion

CAUTION !



- Please make sure there is no gap between gland and cable.
- Please make sure the gland is tight after setup as shown below.



3.4.6 AC Wiring

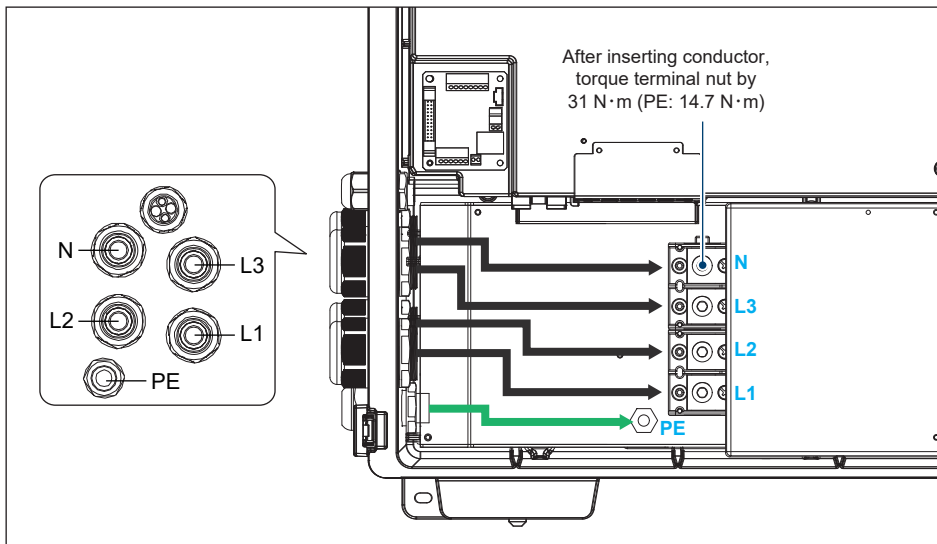


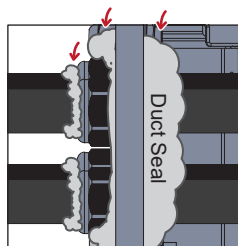
Figure 3-16: Location for AC entry and AC terminal

- (1) Ensure the AC disconnect device is in “OFF”
- (2) Strip off the insulation of each cable by 30mm.
- (3) For the aluminum conductor, remove the oxide film of the conductor surface and apply the protective grease.
- (4) Pass the cable of L1, L2, L3 or neutral (if required) through each M40 cable gland with the proper inner rubber.
- (5) Follow the label to Connect L1, L2, L3 and neutral (if required).
- (6) Tighten all screws of the terminal with 31 N·m torque (PE:14.7 N·m).
- (7) Fasten all AC cable glands for sealing.

CAUTION !



- Please seal all the glands from both inside and outside the wiring box and the gap between outer jacket and gland by using duct seal to prevent living creature or moisture from entering the wiring box.
- When using plastic or HDPE conduit cabling, please use silicon or fire mod to fill the gap and conduit.
- **It will avoid warranty if the installation is not properly sealed.**



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.
- The amount of PV module of each string within one MPPT should be the same to avoid the circulating current between the strings.
- Without rain cover or protection, never perform any wiring or maintenance operations under rainy conditions.

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 SWITCH 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

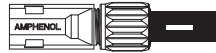


- The PV Array current carrying conductors (positive or negative) must not be referenced to ground.

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

M70A_263 use bulkhead mounted H4 type connectors for interconnecting string wiring to the inverter. Mating connectors (See **Figure 3-17**) are provided within the accessory kit.

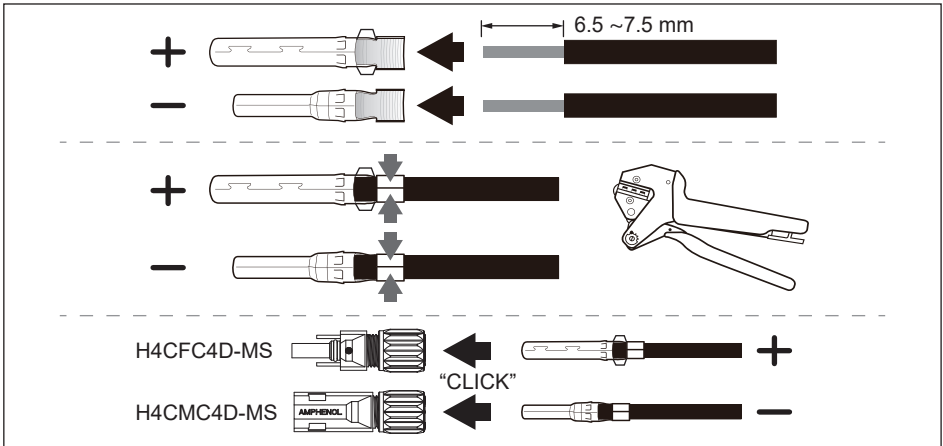


Figure 3-17: DC Wiring

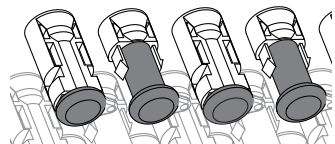
DC wiring polarities are divided into positive and negative, and the layout of the connectors is shown in **Figure 3-18**.

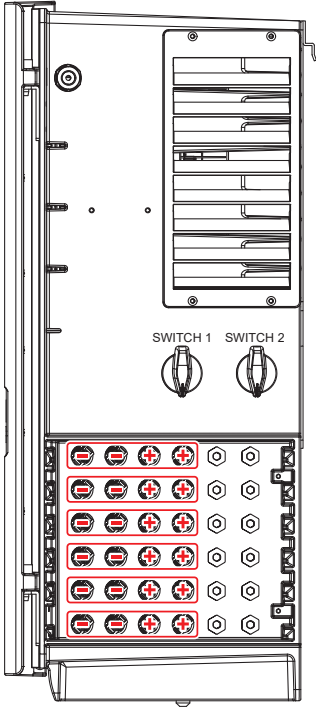
- After DC Wiring installing, insert the protective frame for DC connector and the method is shown in **Figure 3-19**.

ATTENTION



- For unused DC connectors, please keep the cap on to prevent water or dirt intrusion.





Santon DC switch: XBCH+3610/2
1000 V / 50 A

直流開關組串對應表 / String mapping

DC Switch		Inverter input			
SWITCH 1	Pole 1	DC1	-02	-01	+02 +01
	Pole 2	DC2	-02	-01	+02 +01
	Pole 3	DC3	-02	-01	+02 +01
SWITCH 2	Pole 1	DC4	-02	-01	+02 +01
	Pole 2	DC5	-02	-01	+02 +01
	Pole 3	DC6	-02	-01	+02 +01



Figure 3-18: location of H4 connectors to connect array wiring (DC)

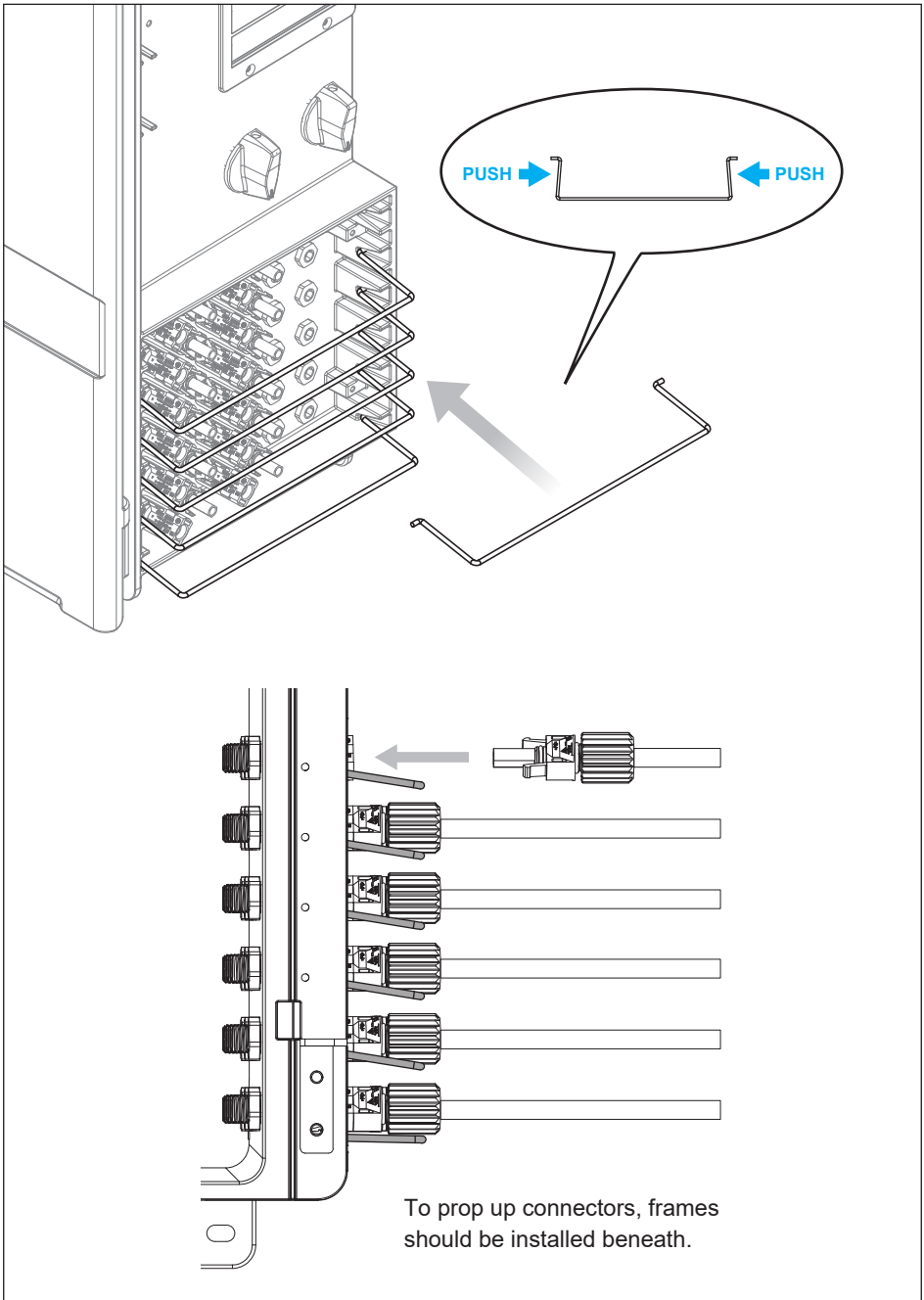


Figure 3-19: Installation methods for protective frame

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 3-20**.

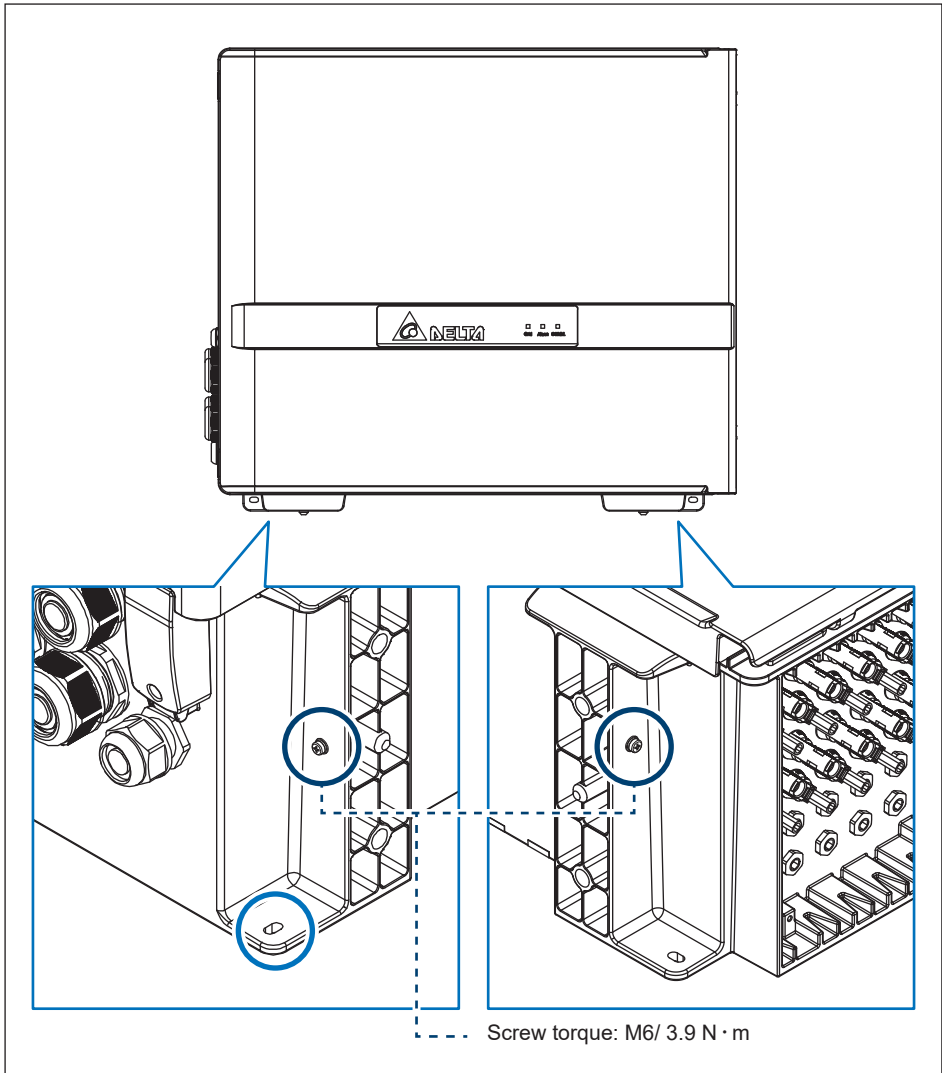


Figure 3-20: Mount the equipment grounding

3.6 Communication Module Connections

The communication module of M70A is shown in **Figure 3-21**. 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.

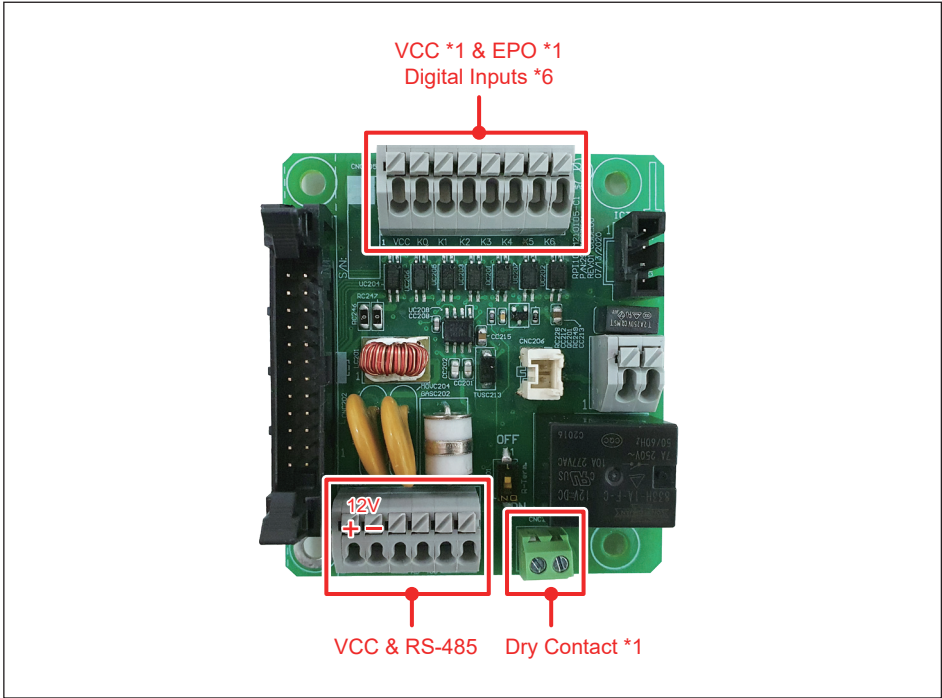


Figure 3-21: Communication Module Layout

ATTENTION



- This inverter is compliant with the “Technical Specification for Security Inspection of Solar Inverter and Monitoring Units” required by BSMI. Please refer to section 5.1.2 for the guidance to lock the door after completing all the wiring, then apply a brand new one-time-use security seal (item 8, Table2-1) on the toggle latch. We will not be liable or responsible for any security incident caused by an improper application of the sticker.

Please refer to the chapter 5.1 and open the door, the communication module is at the red circle that is shown in **Figure 3-22**.

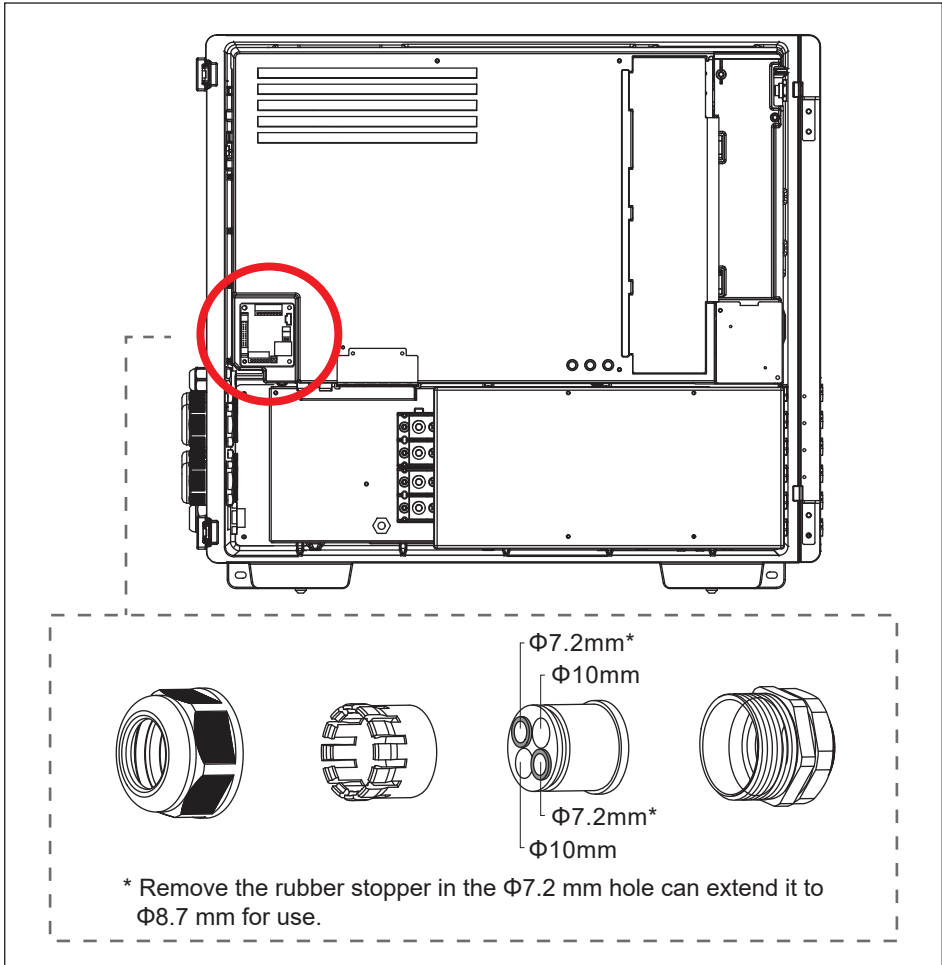
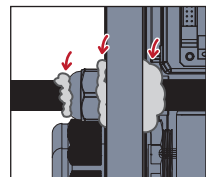


Figure 3-22: Location and access to Communication Module

CAUTION !



- Please seal the COMM. gland from both inside and outside the wiring box and the gap between outer jacket and gland by using duct seal to prevent living creature or moisture from entering the wiring box.
- It will avoid warranty if the installation is not properly sealed.



3.6.1 RS-485 Connection

The pin definition for the RS-485 terminal block is shown in **Table 3-1**.

- 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 3-23**). **Table 3-2** 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 3-23**).
- 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 3-1: RS-485 Terminal block wiring

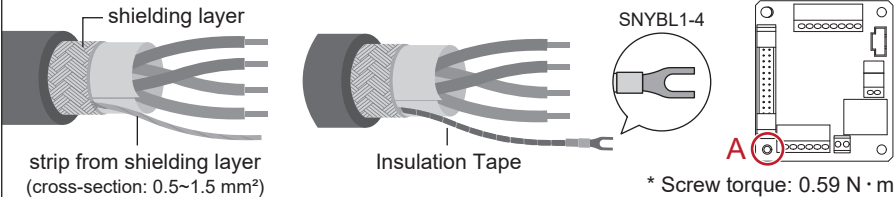
Pin	Function	
1	VCC (+12V)	
2	GND (It is NOT the PE)	
3	DATA+	
4	DATA-	
5	DATA+	
6	DATA-	

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



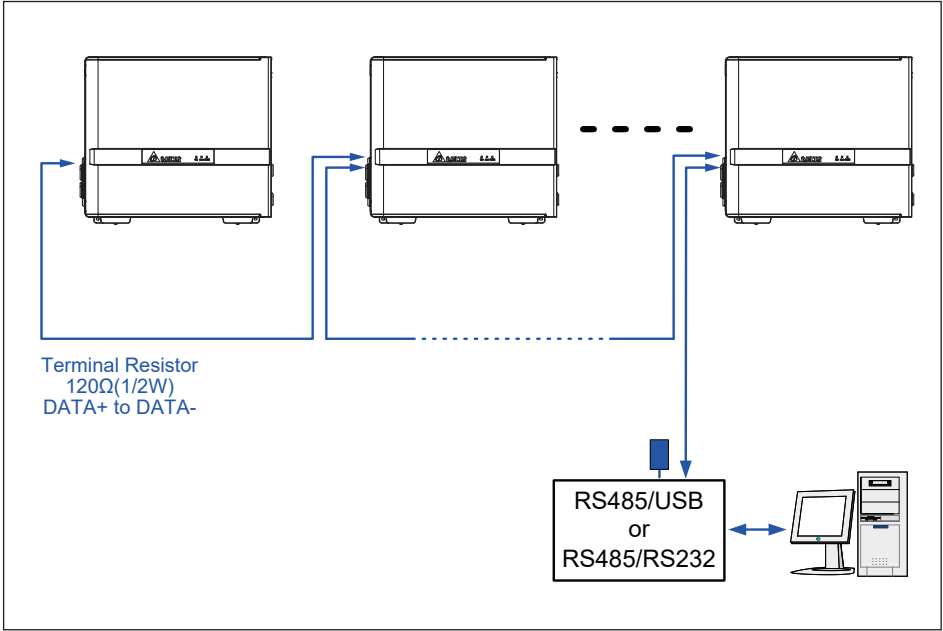


Figure 3-23: Multiinverter connection illustration

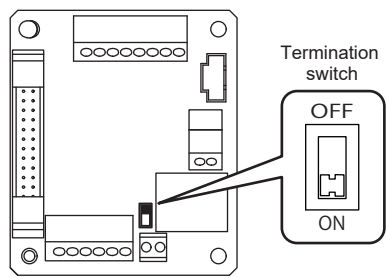


Table 3-2: Bus Termination switch settings

	Switch 1
ON	Terminal Resistor ON
OFF	Terminal Resistor OFF

3.6.2 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).

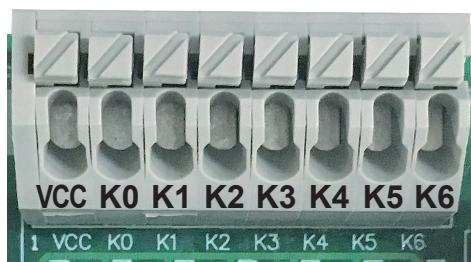


Figure 3-24: EPO function terminal block

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 3-3**, below.

Table 3-3: 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

3.6.3 Dry Contact Connection

M70A_263 provide dry control contact pairs 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 3-25**. 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.

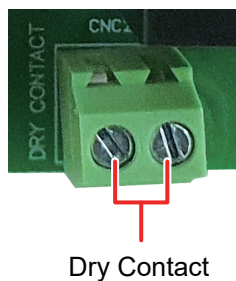


Figure 3-25: Dry Contact connection

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

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.

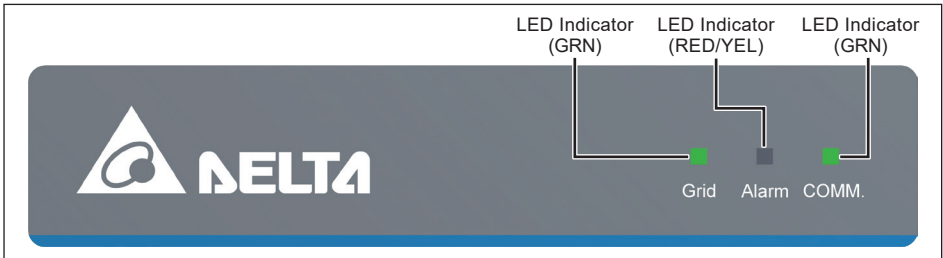


Figure 4-1: Front Panel Display

Table 4-1: Inverter status

Condition	Grid (Green)	Alarm (Red/Yellow)
Countdown	FLASH	OFF / OFF
On Grid	ON	OFF / 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
System Lock	OFF	FLASH / FLASH

*FLASH: ON 1s / OFF 1s

FLASH FAST: ON 0.25s / OFF 0.25s

FLASH SLOW: ON 5s / OFF 10s

4.2 Commission an Inverter Individually – Bluetooth

The inverter with built-in Bluetooth function can be commissioned individually via the “DeltaSolar” App.

DeltaSolar App can be downloaded and installed by scanning the QR code or searching in App Store (iOS user) / Google Play (Android user).



DeltaSolar
DELTA ELECTRONICS, INC.



QR Code



iOS



Android



About OS version
iOS: 8.0 and above
Android OS: Android 8.0 and above

Start Commissioning the Inverter

- ① Enable the Bluetooth function of your mobile device.
- ② Click the Bluetooth icon on the bottom right corner.
- ③ Select the S/N of the corresponding inverter.

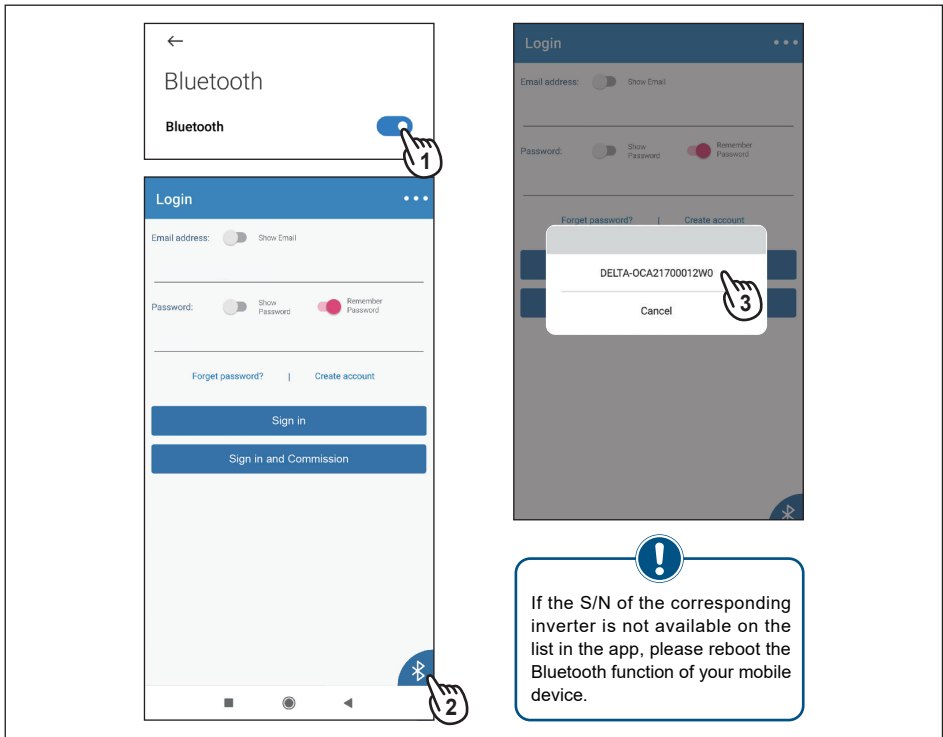


Figure 4-2: Steps to commission via bluetooth (1-3)

- ④ Select “Local Setting” sheet and click “Grid Setting”.
- ⑤ Click “Inverter ID” to select the required ID and then click “Inverter ID Set”.
- ⑥ Click “Country” to select the required grid code and then click “Set”.
- ⑦ Done.

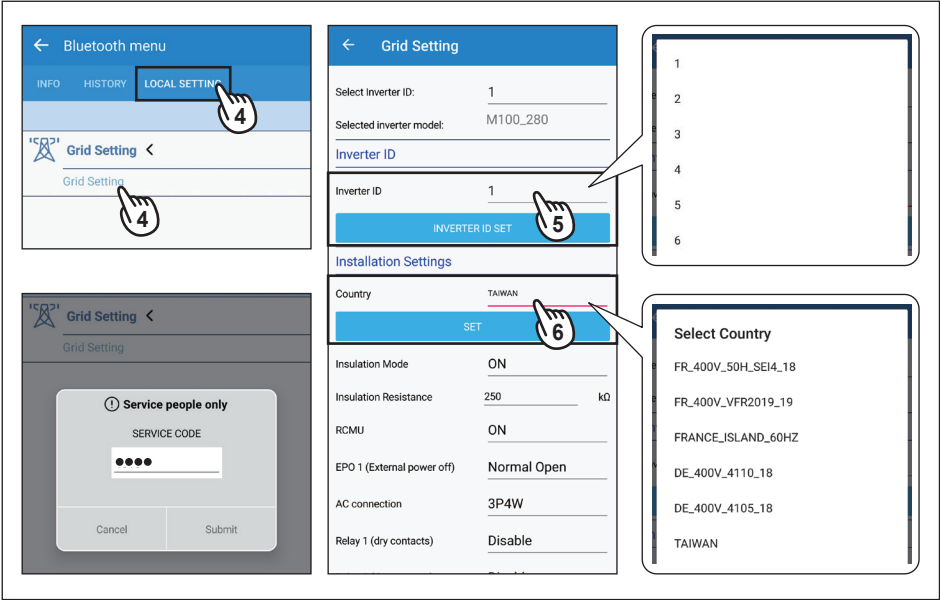


Figure 4-3: Steps to commission via bluetooth (4-7)

4.3 Commission multiple inverters – Auto ID Function

The Auto ID function can set all inverter IDs at once by DSS (Delta Solar System) or DeltaSolar APP.

- DSS

Connect the inverter through RS-485 with computer.

- APP

Connect the inverter through DC1 with mobile device.

(please refer to **chapter 4.4** for operation manual.)

4.3.1 Commission Setting (DSS)

- ① Select the corresponding model
- ② Click "RS485"
- ③ Select communication port (automatic detection by the system).
- ④ Click 

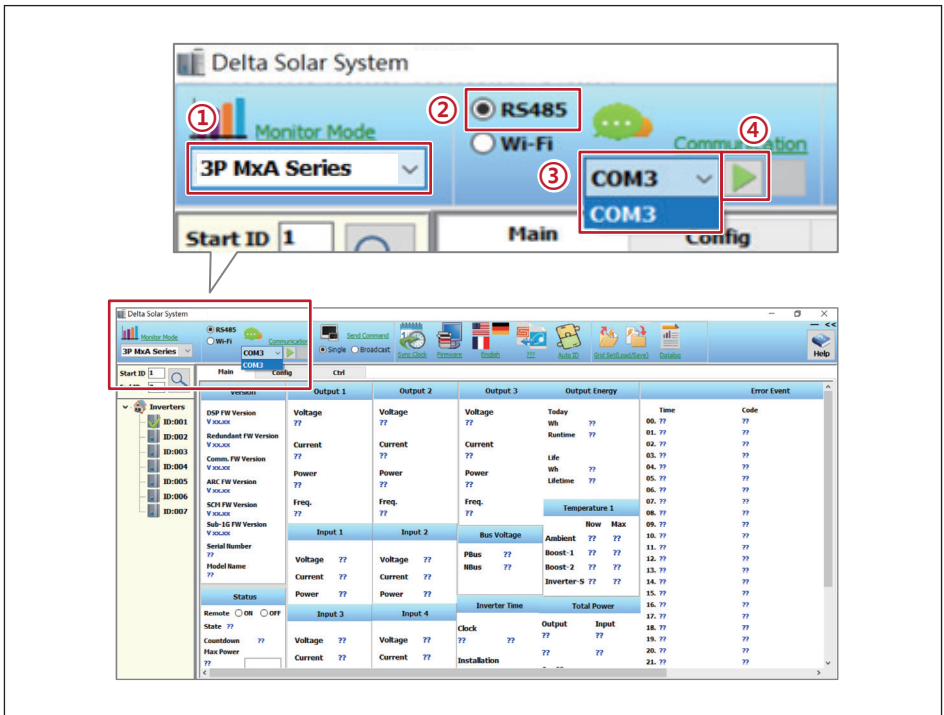


Figure 4-4: DSS Commission setting

4.3.2 Scan inverter

- ① Click “Auto ID” 
- ② Enter numbers of inverters.
- ③ Click “Scan”.

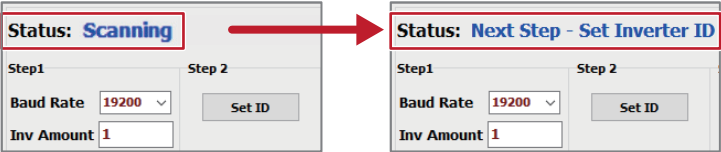
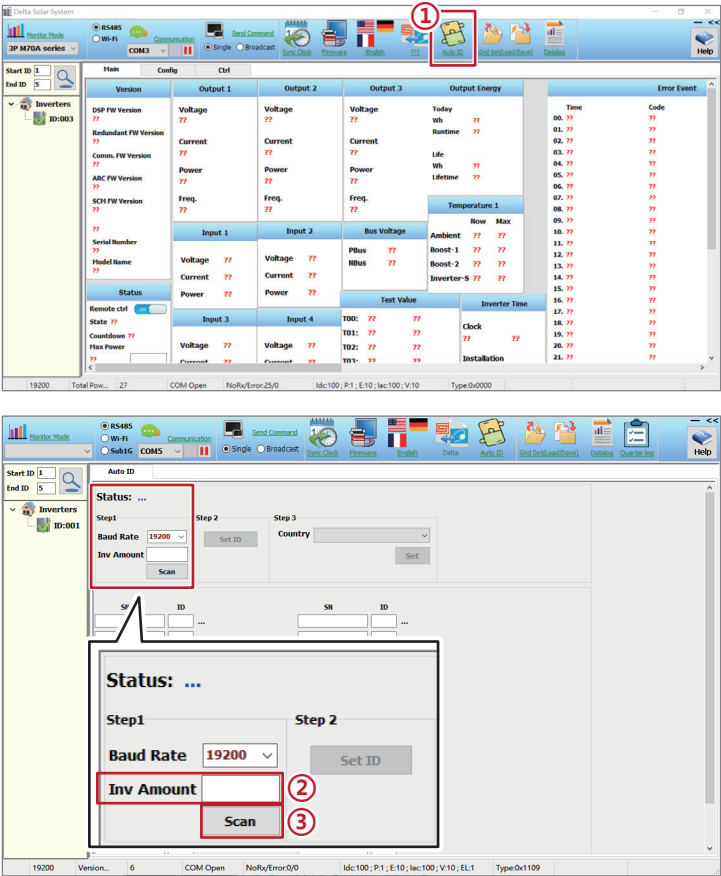


Figure 4-5: Steps of scanning inverters

4.3.3 Set ID

- ① The serial number of the successfully scanned device will be displayed below, the default ID can be changed.
- ② After ID setting is completed, click "Set ID".

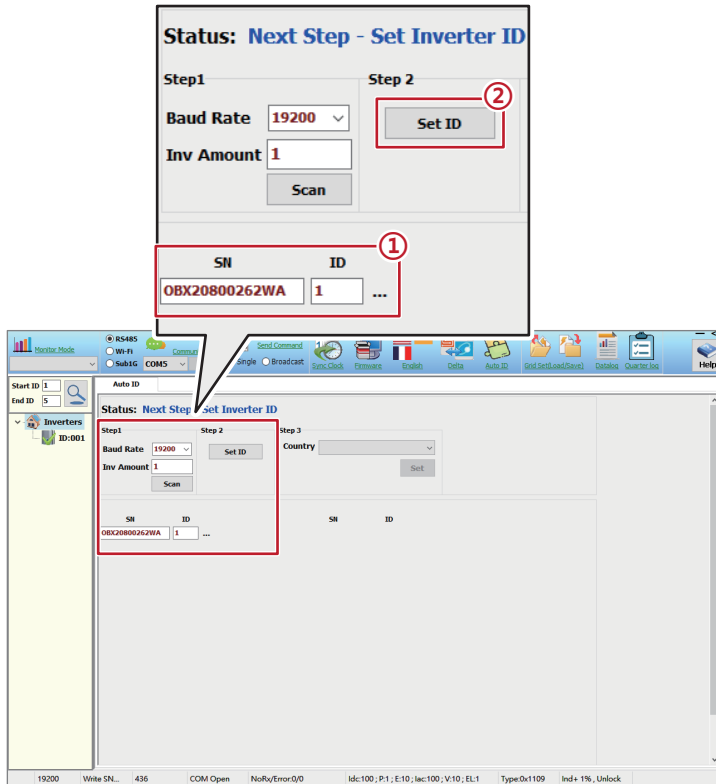


Figure 4-6: Steps of ID setting

4.3.4 Set Country

- ① Click to select the country of inverter.
- ② Click “Set”.

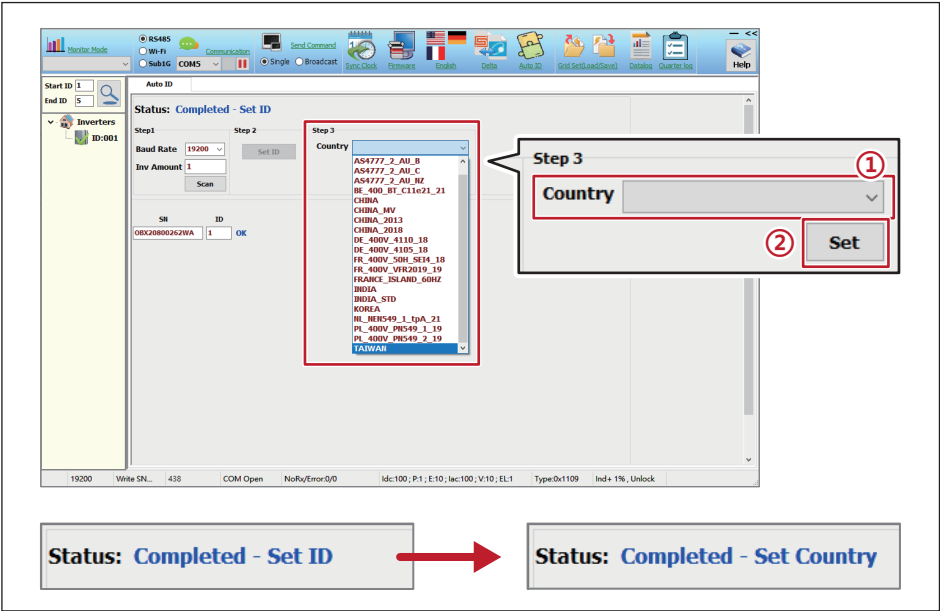


Figure 4-7: Steps of country setting

4.3.5 Synchronize time

Click “Sync Clock”  to Synchronize time.

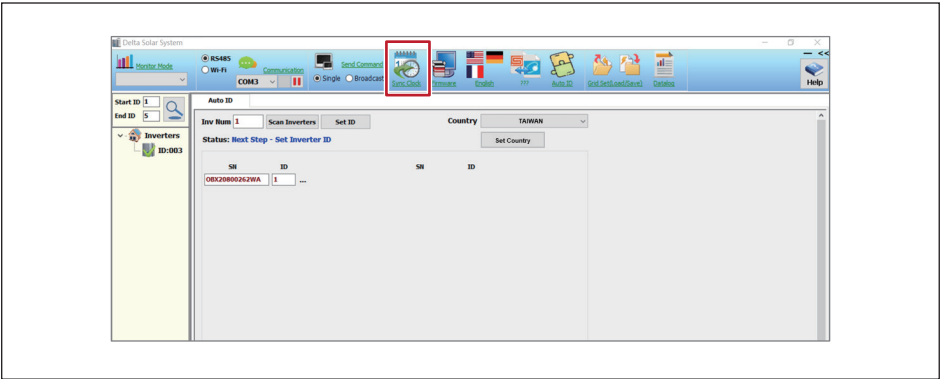


Figure 4-8: Steps of time synchronization

4.4 Delta Function Setting

Delta offers two setting tools:

DSS (Delta Solar System Software) and APP (MyDeltaSolar)

Function	
Active power control	Q(U) control (volt-var control)
P-F control (watt-frequency control)	Q by night(Q setting 24/7)
P(U) control (volt-watt control)	Anti-PID
Fixed cosφ	Dry contact
Fixed Q(%)	ARC fault detection
Auto ID	Bluetooth

Please refer to the following link for operation manual.

DSS Operation Manual:



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

DeltaSolar (APP) Operation and Installation Manual:



<https://mydeltasolar.deltaww.com/index.php?p=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.

DANGER !



- Prior to beginning any maintenance procedures outside AC breaker and DC switch off to avoid risk of electrical shock!
- Without rain cover or protection, never perform any wiring or maintenance operations under rainy conditions.

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

- Before opening the front door, please wipe the inverter case if it is wet to avoid water seepage.
- Switch DC and AC power off and wait until LED display turns off.
- Take out the hexagonal wrench on the latch lock cover.
- Loosen 1 screw on the latch lock cover and open its.
- Fix the door by hexagon driver as **figure 5-2** to avoid strong wind breaking it.

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.

After closing the door:

1. Lock both toggle latches properly to make sure the IP66 protection of inverter.
2. Apply a brand new one-time-use security seal (item 8, Table 2-1) on each of the toggle latches as **figure 5-3**.

ATTENTION



- This inverter is compliant with the "Technical Specification for Security Inspection of Solar Inverter and Monitoring Units" required by BSMI. After closing the door, please apply a security seal on the toggle latch. We will not be liable or responsible for any security incident caused by an improper application of the sticker.

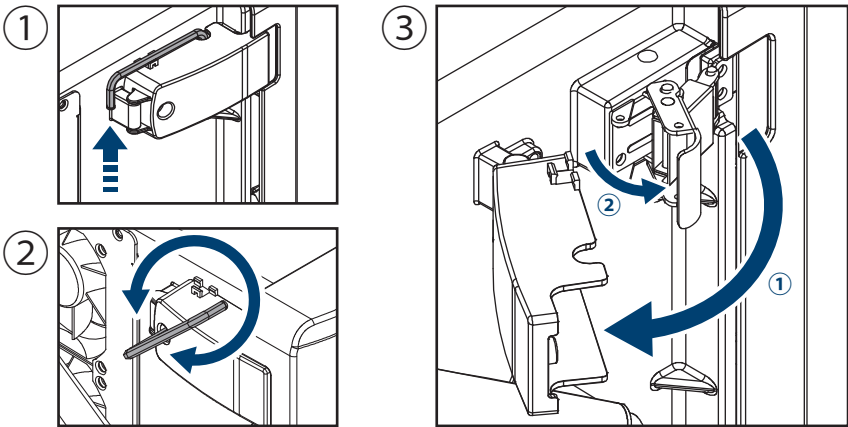
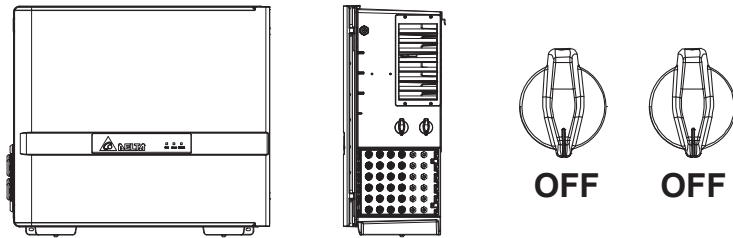
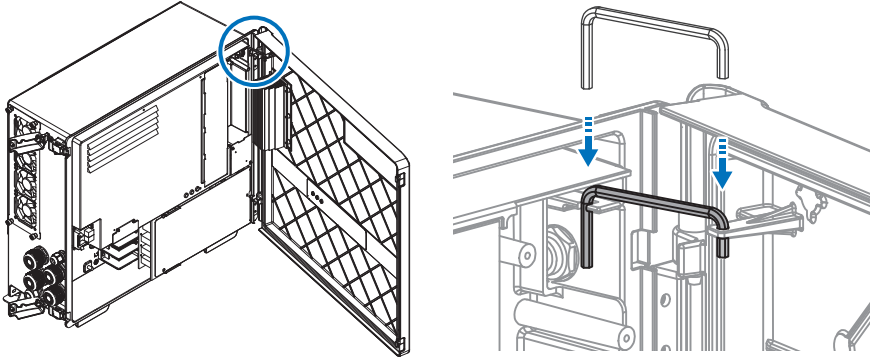


Figure 5-1: Opening and closing the door



ATTENTION



- After opening the door, please make sure the door is fixed by hexagon driver to avoid strong wind breaking it.

Figure 5-2: To secure door by hexagon driver

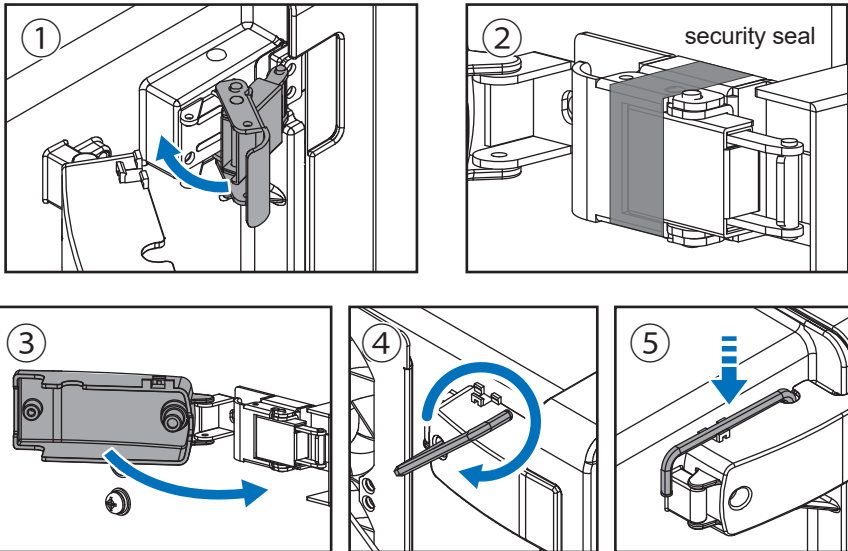


Figure 5-3: Apply a security seal on the toggle latch

5.2 Replacement of Surge Protection Devices (SPD)

M70A_263 have the surge protection device (SPD) at both AC and DC side as shown in **Figure 5-4**.

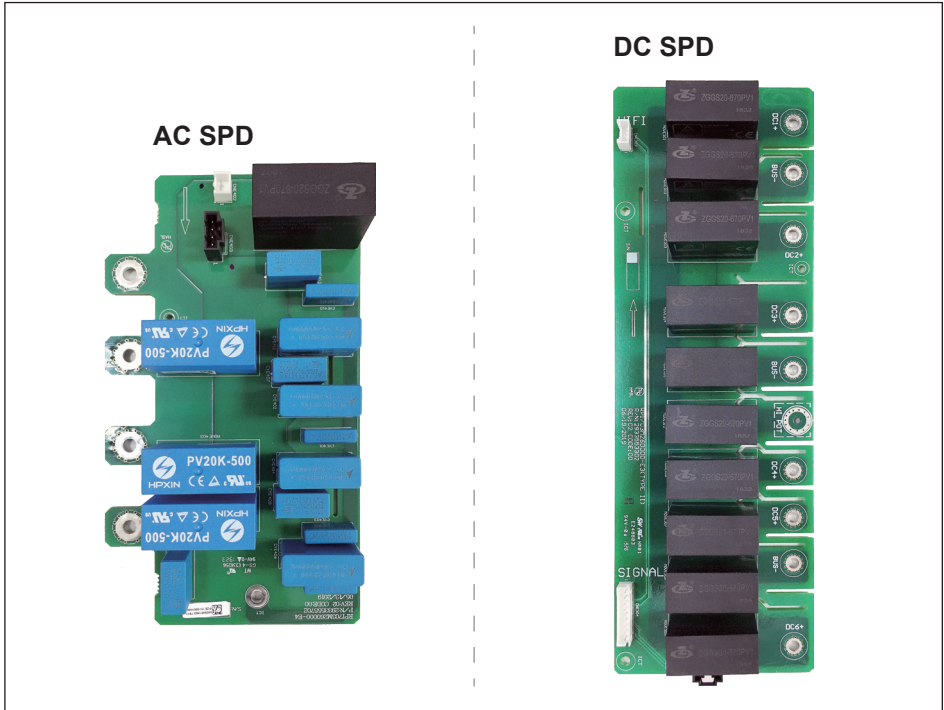


Figure 5-4: AC and DC SPD modules

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 5-5**.

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



Figure 5-5: 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 5-6**.

- **To remove the defective AC SPD**

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 5-7**.

- **To remove the defective DC SPD**

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 5-8**.

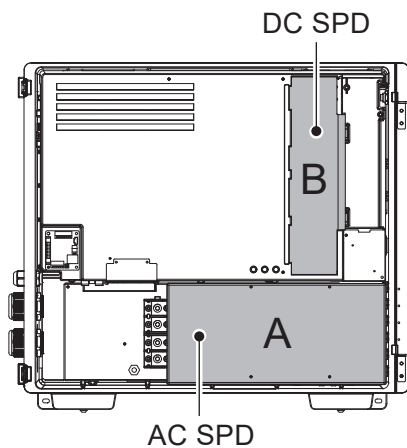
ATTENTION



- 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

1



2

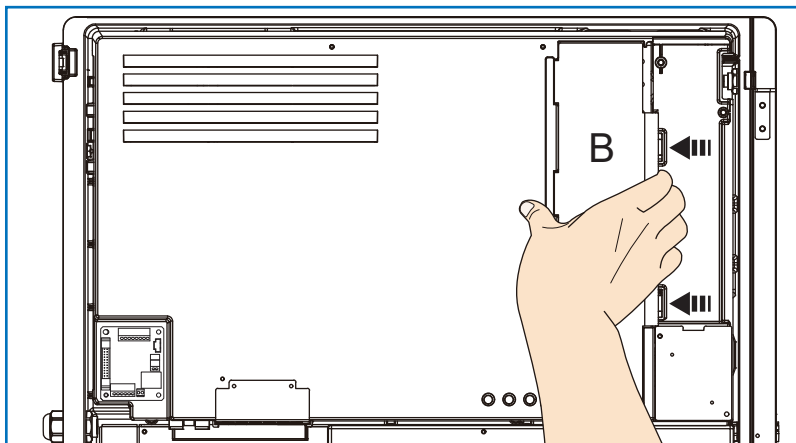
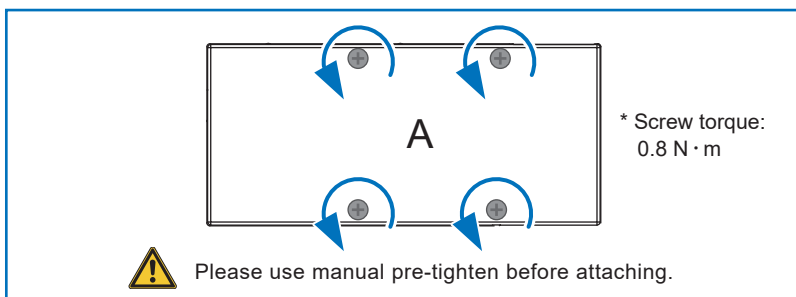


Figure 5-6: Steps of changing SPDs

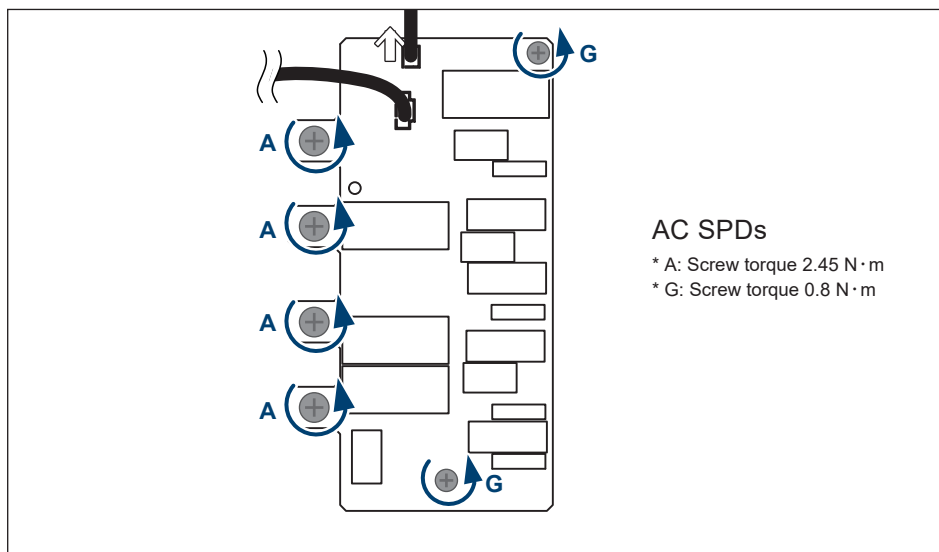


Figure 5-7: Remove wirings as connectors of AC SPD

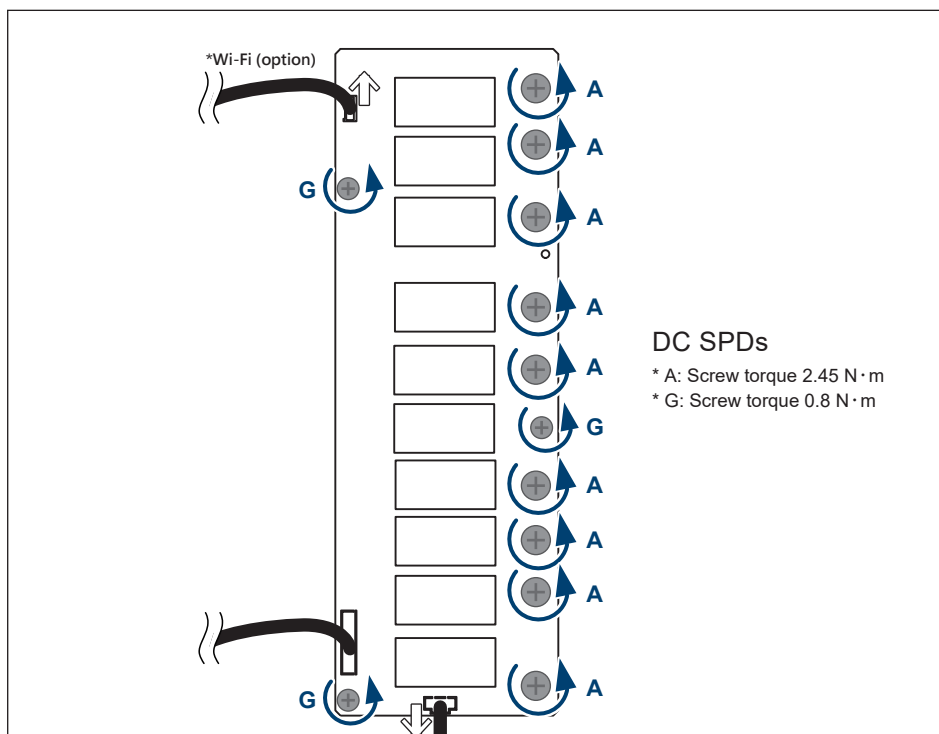


Figure 5-8: Remove wirings as connectors of DC SPD

5.3 External String Fuse

According to different local regulations, if the external string fuse is required, please contact Delta dealers.

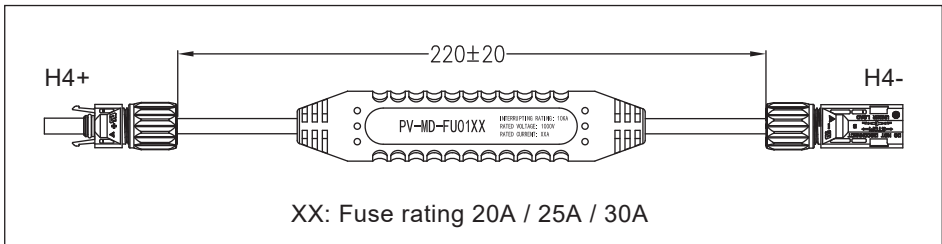


Figure 5-9: External String Fuse

5.4 Smart Fans Replacement and Filter Cleaning

M70A_263 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

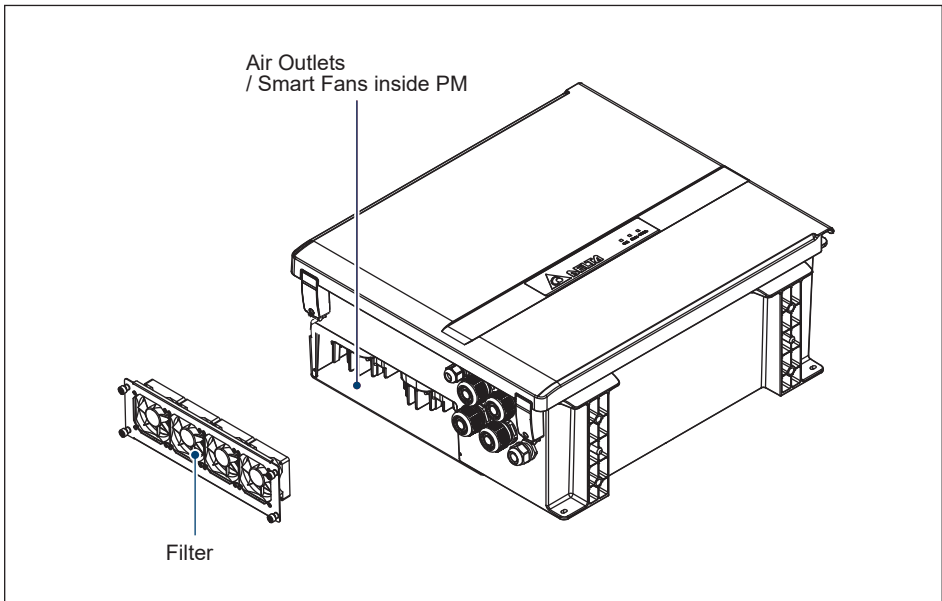


Figure 5-10: Smart Fans location on Power Module chassis

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 5-11** 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 .)

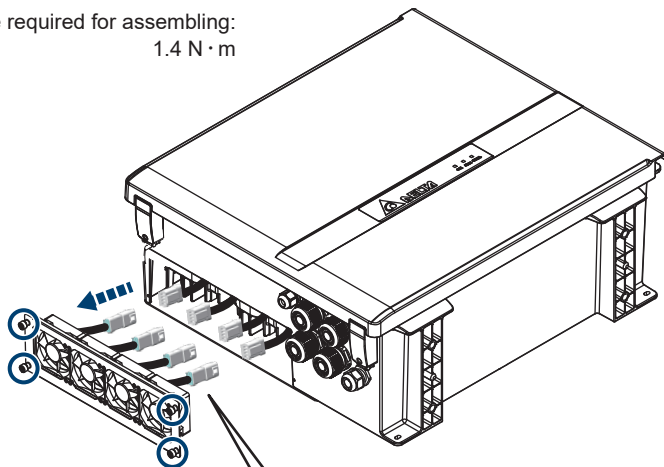
- 3.Pull fan tray out from PM chassis.

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

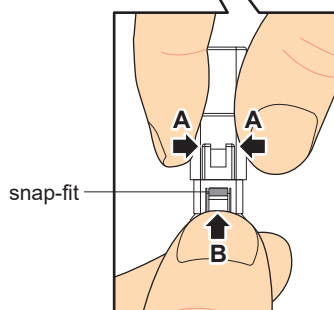
To reassemble reverse the order of the above procedure and tighten screws to torque values indicated in **Figure 5-11**.

* Screw torque required for assembling:
 $1.4 \text{ N} \cdot \text{m}$

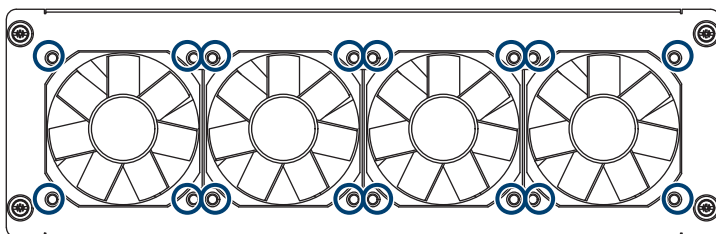
①



②



③



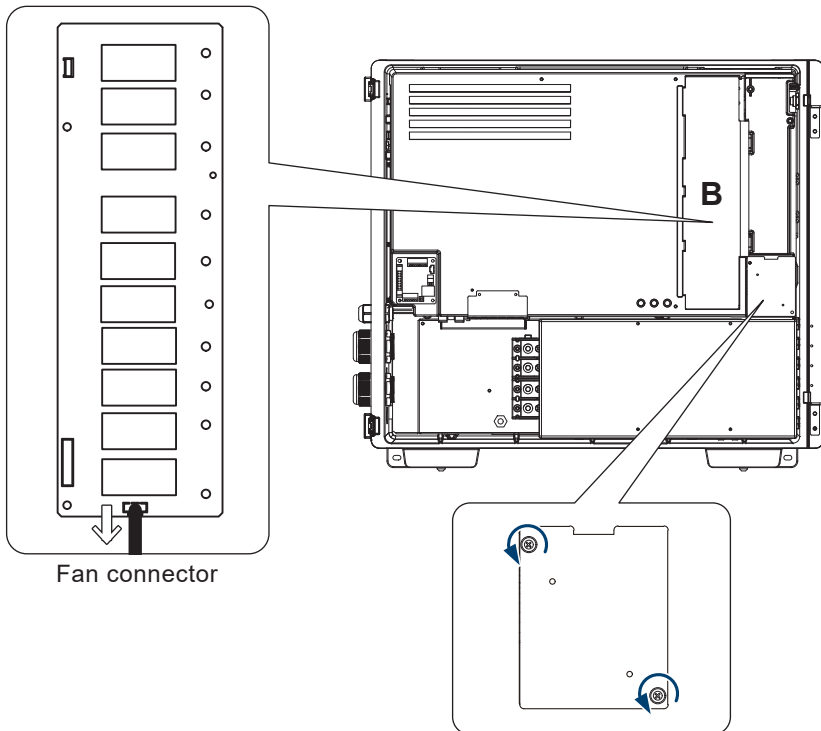
* Screw torque required for assembling: $0.6 \text{ N} \cdot \text{m}$

Figure 5-11: Disassembling fan tray from PM chassis

5.4.2 Internal Fan 1

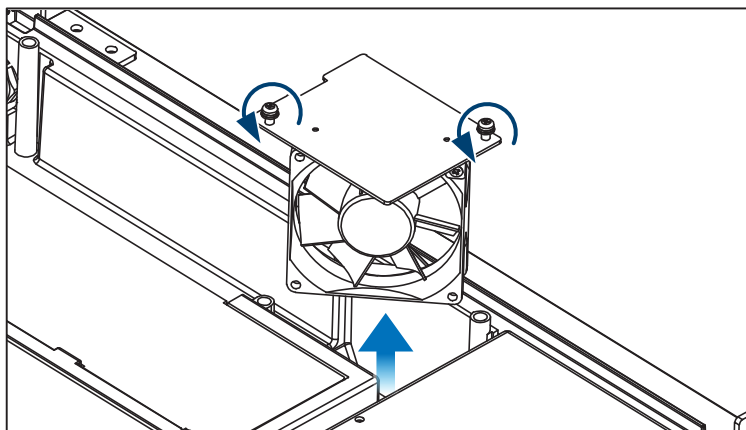
Procedure to remove Internal Fan 1

- (1) Remove the B cover.
- (2) Loosen two self-retaining screws shown in **Figure 5-12** and remove the fan cabinet.
- (3) Disconnect the power connector on the DC SPD board.
- (4) Lift the entire fan assembly. (shown in **Figure 5-13**)
- (5) Clean assembly or replace with a new fan. (shown in **Figure 5-14**)
- (6) Reassemble using a tightening torque of $0.8 \text{ N} \cdot \text{m}$.



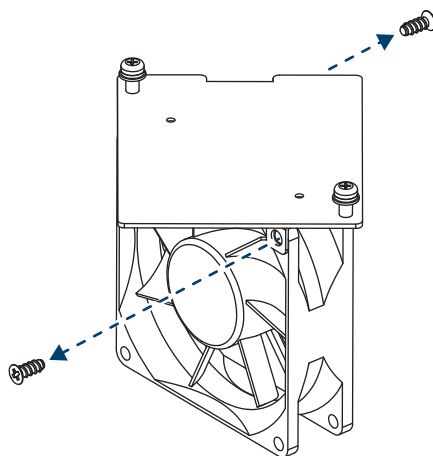
* Screw torque required for assembling: $0.8 \text{ N} \cdot \text{m}$

Figure 5-12: Internal fan 1 location & remove the shield cover



* Screw torque required for assembling: $0.8 \text{ N} \cdot \text{m}$

Figure 5-13: Take off the internal fan 1



* Screw torque required for assembling: $0.6 \text{ N} \cdot \text{m}$

Figure 5-14: 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 5-15** and remove the fan cabinet.
- (2) Disconnect the power connector on the comm. board.
- (3) Lift the entire fan assembly. (shown in **Figure 5-16**)
- (4) Clean assembly or replace with a new fan. (shown in **Figure 5-17**)
- (5) Reassemble using a tightening torque of $0.8 \text{ N} \cdot \text{m}$.

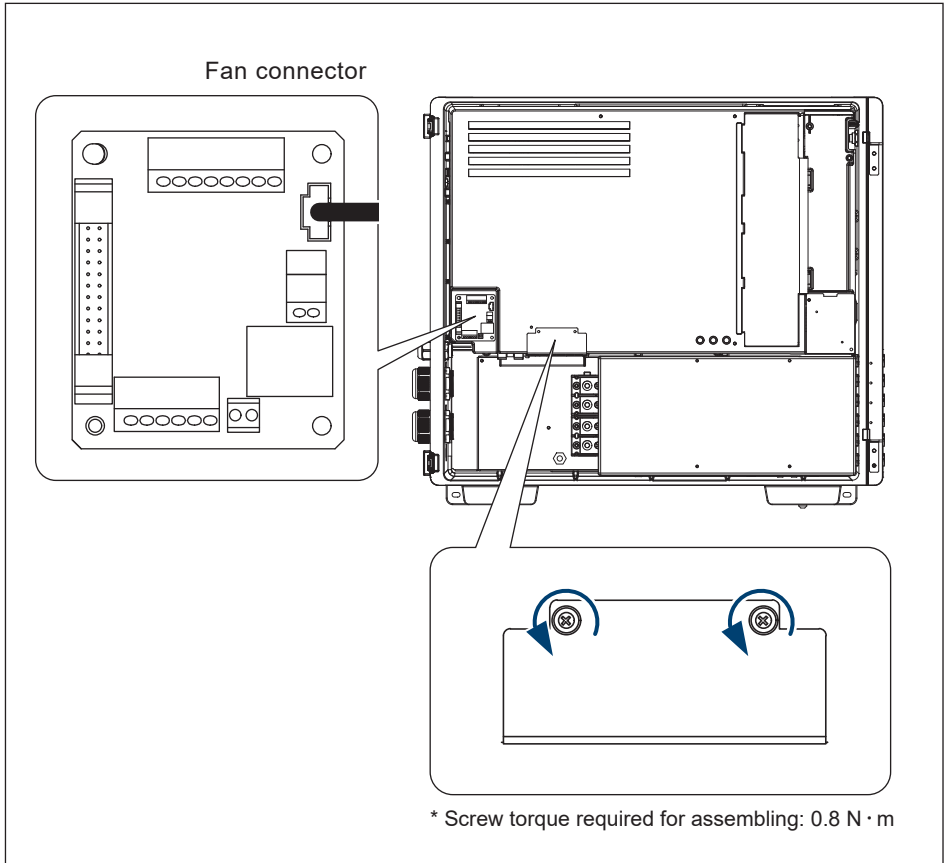


Figure 5-15: Internal fan 2 location & remove the shield cover

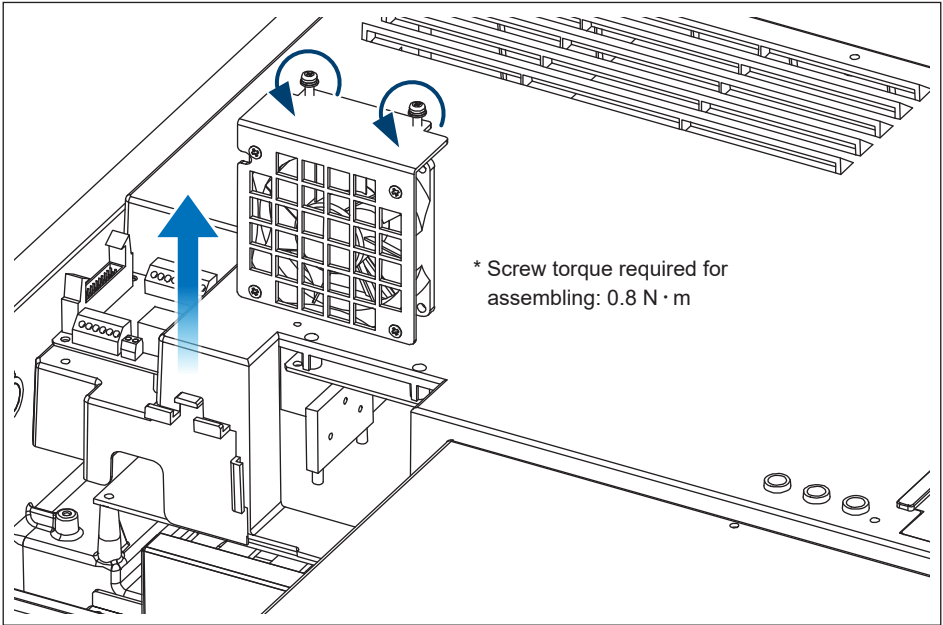


Figure 5-16: Take off the internal fan 2

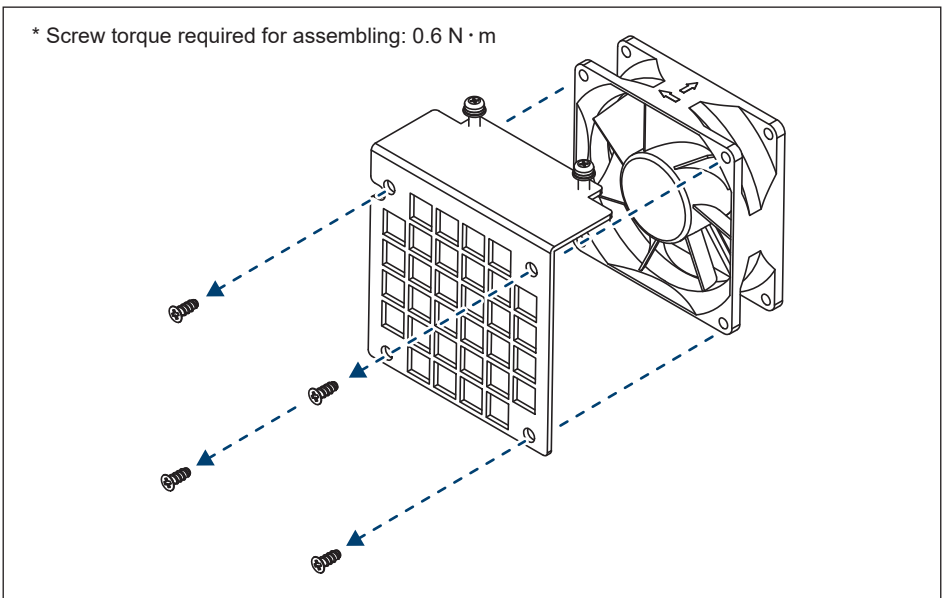


Figure 5-17: Replace with a new fan

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_263 weighs 69 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 with high reliability standards, there may still be situations where the inverter may not operate properly. In this case, please follow the instructions in the following table to attempt to clear the fault. If the problem can't be solved, please contact customer service for technical support.

6.1 Error Codes (Field Fault)

Table 6-1A: Error Codes (Field Fault) & Messages		
Message	Description	Action
AC Freq High (E01)	Grid frequency high	1. Check the utility frequency 2. Check Grid code & Grid setting
AC Freq Low (E02)	Grid frequency low	
Island (E03,E04,E05)	Islanding is detected	Check Grid breaker
AC phase jump (E06)	Phase jump of Grid voltage	If repeated occurrence, contact customer service for technical support
Grid Quality (E07)	Non-linear load in Grid and near to inverter	If repeated occurrence, contact customer service for technical support
AC phase abnormal (E08)	Wrong connection in AC plug	Check the AC connection in accordance with the user manual
No Grid (E09)	1. AC breaker is OFF 2. Disconnect in AC plug	1. Switch on AC breaker 2. Check the connection in AC plug and make sure it connects to inverter
AC Volt Low (E10)	1. Actual utility voltage is under the UVR setting 2. Incorrect Grid Code or Grid setting 3. Wrong connections in AC plug	1. Check the utility voltage within the suitable range 2. Check Grid code & Grid setting 3. Check the connection in AC plug
AC Volt High (E11)	1. Actual utility voltage is over the OVR setting 2. Incorrect Grid Code or Grid setting	
EPO (E25)	EPO is operated by user	Release the EPO button
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	1. Check if panel enclosure ground completely 2. Check if inverter ground completely 3. Check if the DC breakers get wet
Remote OFF (E36)	Remote OFF by external communication	Check if remote OFF function is active

6.2 Fault Codes (Inverter Fault)

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

Message	Description	Action
DC Injection (F01,F02,F03,F04)	Utility waveform is abnormal	Contact customer service for technical support
Temperature High (F05)	The internal ambient temperature is over limit	Check the installation ambient and environment
Amb Temp Fault (F06)	Ambient temperature detection failure	Contact customer service for technical support
Temperature Low (F07)	The internal ambient temperature is under limit	Check the installation ambient and environment
Boost Temp Fault (F08)	Boost module temperature detection failure	Contact customer service for technical support
Bidir. Temp Fault (F09)	The boost/bidir. NTC temperature	Contact customer service for technical support
Inverter Temp Fault (F10)	Inverter module temperature detection failure	Contact customer service for technical support
AC RLY Fault (F13)	1. Defective relay driver circuit 2. Relay(s) failure	Contact customer service for technical support
FW Unmatch (F14)	Firmware Incompatibility	Contact customer service for technical support
AC Sensor Fault (F15)	Auxiliary power circuit failure	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)	Auxiliary power circuit failure	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)	Auxiliary power circuit failure	Contact customer service for technical support
Idc Sensor Fault (F19)	Auxiliary power circuit failure	Contact customer service for technical support
Red COMM Fault (F22)	The internal communication connection is disconnected	Contact customer service for technical support

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

Message	Description	Action
DSP COMM Fault (F23)	The internal communication connection is disconnected	Check the connection interface RS-485
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 2. Current feedback circuit is defective	Check the connection in AC plug
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 switch
Bus Voltage High (F31, F32, F33 F34, F35)	High bus capacitor voltage	1.Restart inverter by DC switch 2.Check the solar array setting, and make sure the Voc less than Max. Vdc of Inverter (if the error code comes along with E30)
AC Current High (F36,F37,F38 F39,F40,F41)	Surge occurs during operation	Contact customer service for technical support
AC CT Fault (F42,43,44)	Phase R / S / T CT is defective	Contact customer service for technical support
AC Current High (F45)	AC current over range	Restart the inverter by DC switches
ZC Circuit Fault (F50)	The zero crossing circuit is defective	Contact customer service for technical support
Inv Circuit Fault (F51)	The inverter circuit is defective	Contact customer service for technical support
Boost Circuit Fault (F52)	The boost circuit is defective	Contact customer service for technical support
Arc circuit fail (F58)	1. AFCI is not installed 2. AFCI self-test is fail	Check the AFCI detection circuit board for making sure it is connected correctly
Arc fault (F59)	The inverter detects arcing occurs	1. Check if there are any cable damaged at DC side. 2. Replace DC cable and unlock the Arc fault from DSS 3. Contact customer service for technical support

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

Message	Description	Action
DC Current High (F60,F61,F70,F71)	DC current over range	Restart inverter by DC switches
Ext COMM. Fault (F74)	The external communication connection is disconnected	1. Check the connection between external unit and COMM 2. Contact customer service for technical support

6.3 Warning Codes (Field Warning)

Table 6-3A: Warning Codes (Field warning) & Messages

Message	Description	Action
De-rating (W07)	1. Over temperature 2. Power Limit function 3. Power vs. Frequency function 4. P(V) function 5. Grid Voltage low 6. Solar Voltage low 7. Solar Voltage High 8. Ramp up function	1. Check the installation ambient and environment 2. Check Grid Code & Grid setting 3. Check the utility frequency on the inverter terminal 4. Check the utility voltage on the inverter terminal 5-1. Check the utility voltage on the inverter terminal 5-2. Check reactive power setting 6. Check the Solar voltage on the inverter terminal 7. Check the Solar voltage on the inverter terminal 8. Check Ramp up setting
String fault (W08)	1. Polarity of DC connectors is incorrect 2. String current monitoring function is fail	1. Check the polarity of PV connection 2. Restart DC switch and AC breaker 3. Contact customer service for technical support
String Current Low (W23)	Disconnection in DC connectors	1. Check String Connector and Fuse 2. 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)	1. One or more fans are locked 2. One or more fans are defective 3. One or more fans are disconnected	Contact customer service for technical support
DC SPD Fault AC SPD Fault (W17) (W18)	1. One or more SPD are defective 2. One or more SPD are disconnected	1. Replace the defective SPD 2. Check the connections of SPDs
Aux Power Fault (W19)	The AC Aux power is fail	Contact customer service for technical support
Boost Circuit Fault (W30)	The boost circuit defective	Contact customer service for technical support

7 Technical Information

Table 7-1A: Specifications	
Model	M70A_263
DC Input	
Occasionally Max. voltage	1000 V *1
Operating Voltage Range	200 - 1000 V
MPP Voltage Range (Full Power)	460 - 800 V *2
Start Voltage	> 250 V
Rated Voltage	600 V
Max. Input Current	Each MPPT: 26 A *3, Total: 156 A
Max. Input Power	Each MPPT: 15.7 kW
Max. allowable array Isc	50 A / MPPT
MPP Tracker	6
Connection Type	2 strings / MPPT (fuse not required) Amphenol H4 Connector
DC Switch	Built-in
String Monitoring	Built-in
Arc Fault Detection	Built-in
Surge Protection	Type II SPD(built-in) / Type I+II SPD(optional)
AC Output	
Rated Output Power	70kW
Max. Output Power	77kVA *4 (77kW when PF=1)
Max. Output Current	111.6A
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(built-in) / Type I+II SPD(optional)
T.H.D	< 3%
Night Time Consumption *5	< 3.5 W

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

*2 AC 400V - Ambient < 35°C: 460 - 900V ; Ambient < 40°C: 460 - 800V ; Ambient < 50°C: 520 - 720V
AC 380V - Ambient < 35°C: 490 - 820V ; Ambient < 40°C: 490 - 800V ; Ambient < 50°C: 520 - 720V

*3 Model for korea: Idc max. /string =16A

*4 Ambient < 40°C

*5 Night time consumption with standby communication.

Table 7-1B: Specifications	
Model	M70A_263
Efficiency	
Peak efficiency	98.8 %
Euro efficiency	98.4 %
Information	
Communication Port	RS-485 / Bluetooth
Regulation	
	VDE-AR-N 4110 VDE-AR-N 4105 VDE 0124-100 NB/T 32004: 2018 GB/T 19964: LVRT IEC 62109-1/-2 EN 61000-6-2 EN 61000-6-3 CNS 15382
General Data	
Operating Temp. Range	-25 to +60°C (Derating Above 50°C)
Protection Level	IP66
Operating Elevation	< 4000 m
Cooling	Smart fan air cooling
Noise	67.3 dBA @1m, Amb25°C
Dimension (W x H x D)	699 x 629 x 264 mm
Weight	69 kg

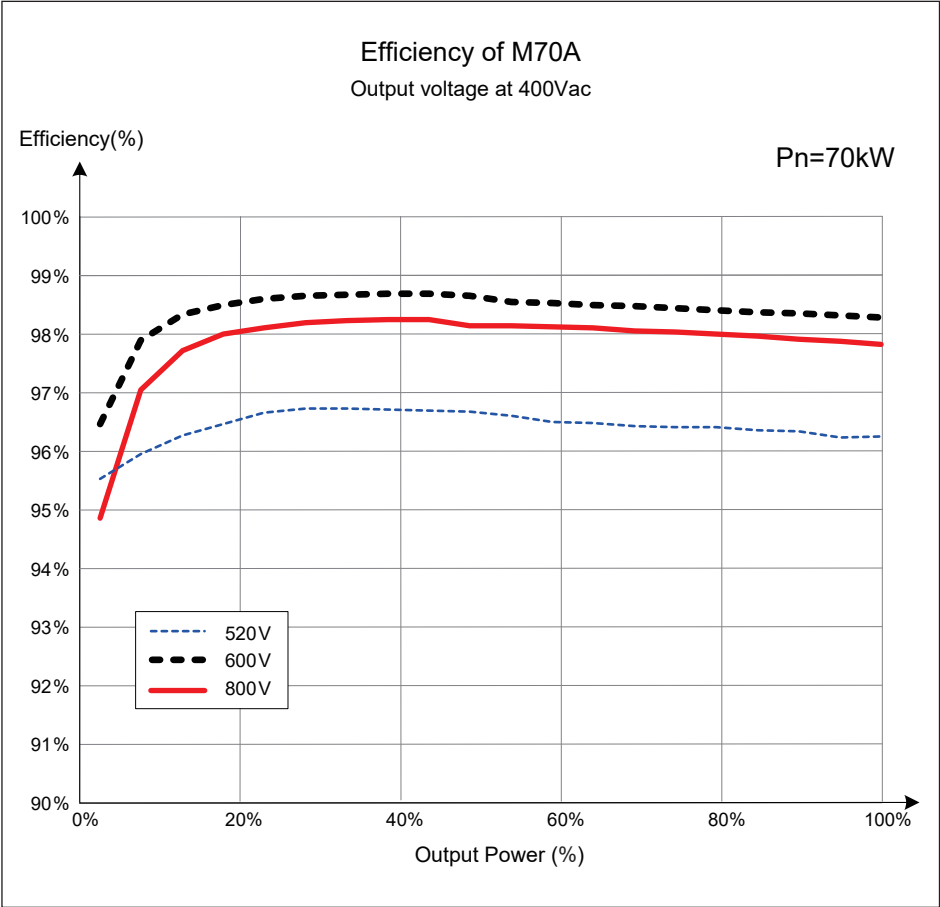


Figure 7-1: Efficiency Curve

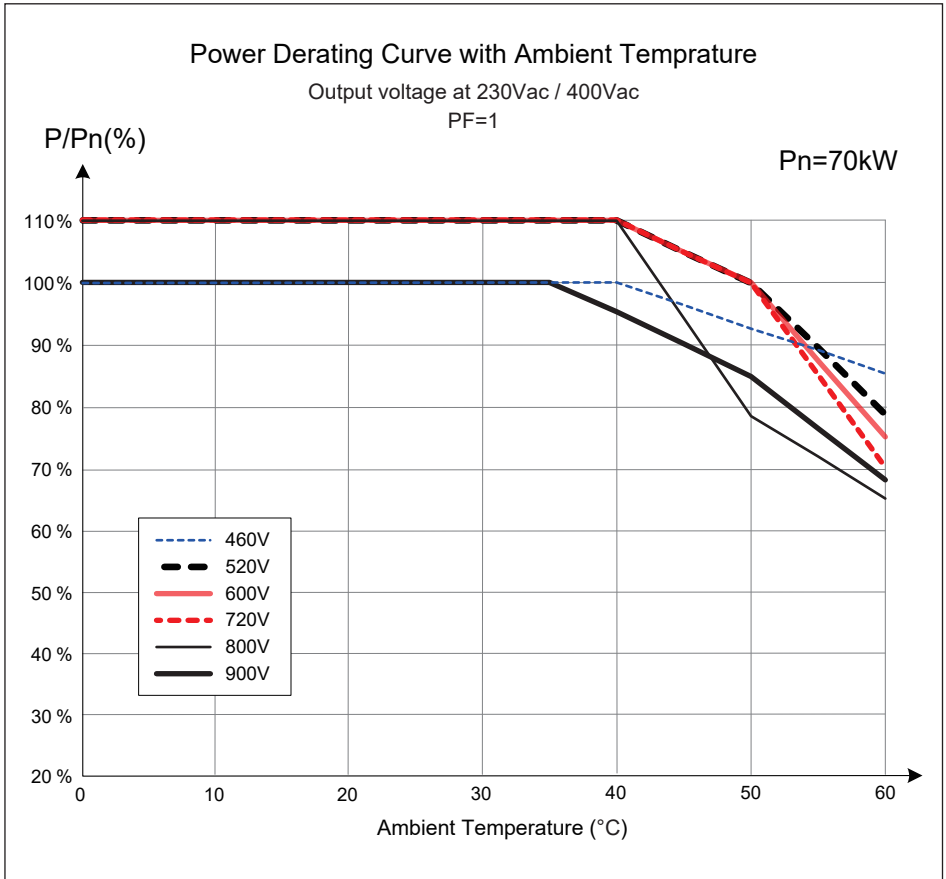


Figure 7-2: Power Derating Curve with Ambient Temperature (PF=1)

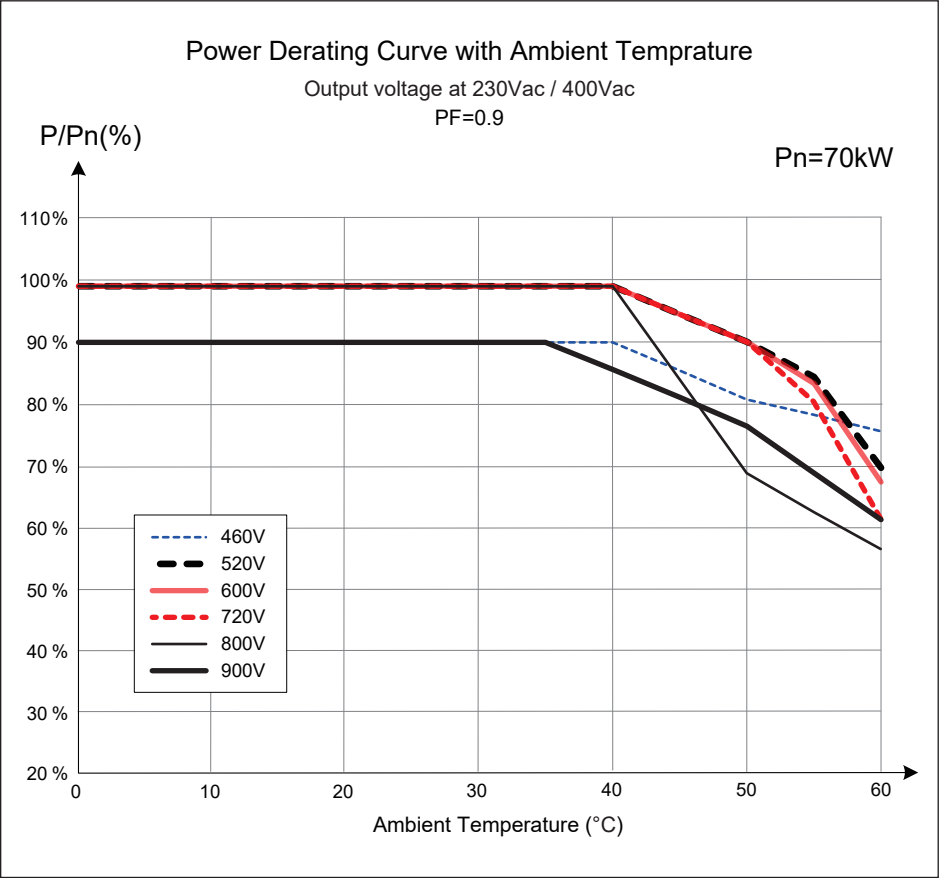


Figure 7-3: Power Derating Curve with Ambient Temperature (PF=0.9)

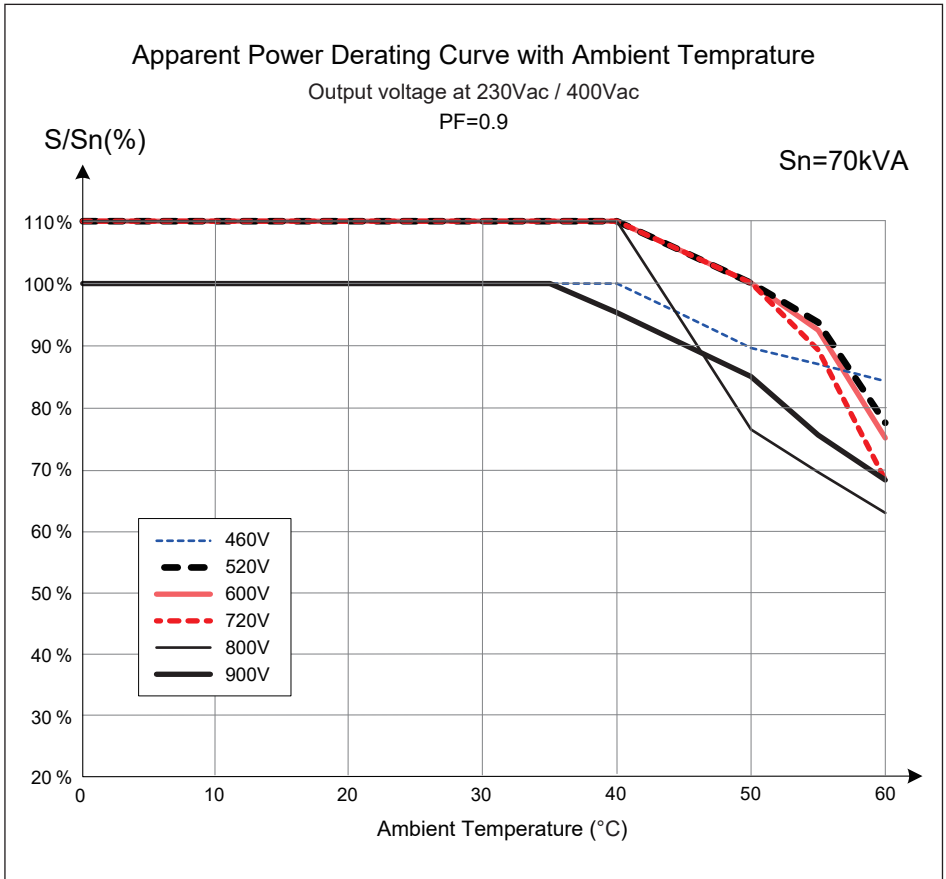
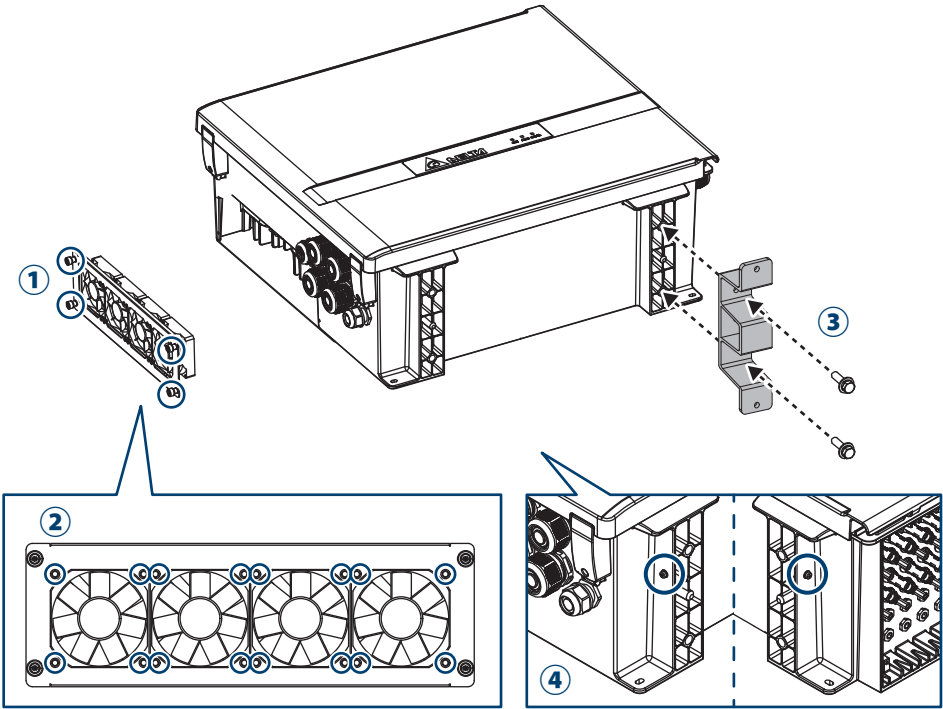


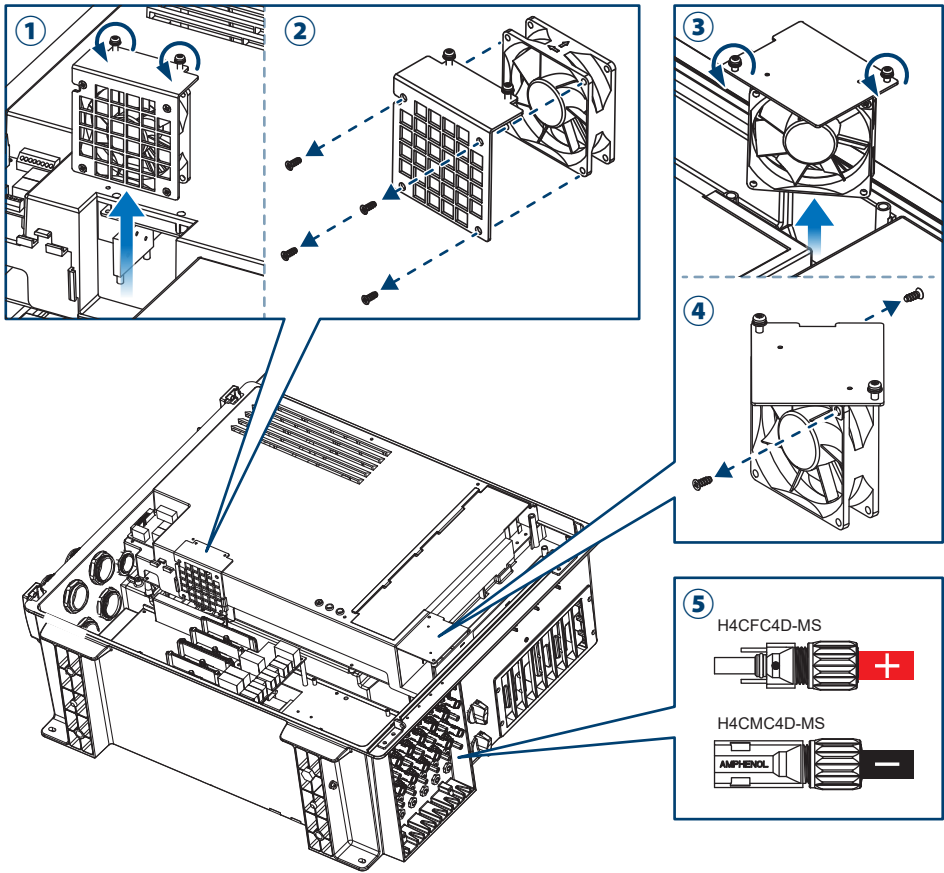
Figure 7-4: Apparent Power Derating Curve with Ambient Temperature (PF=0.9)

Appendix: Assembly Note



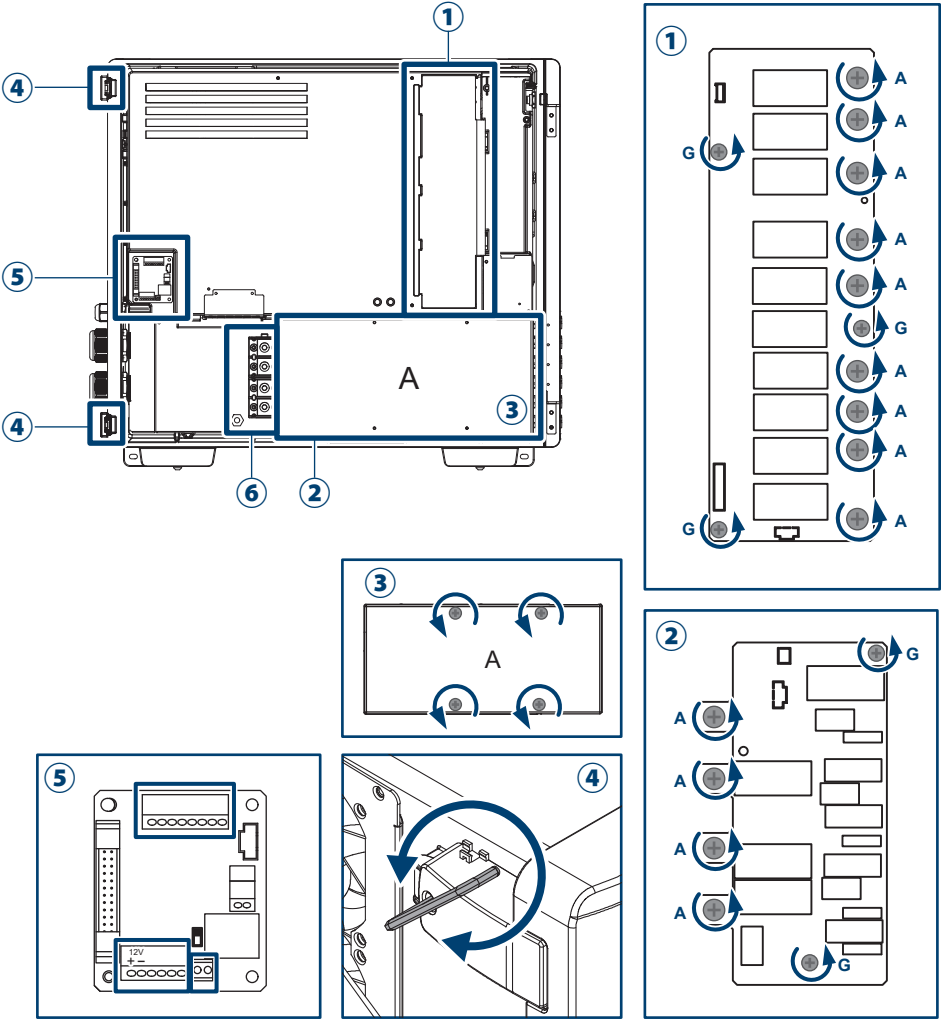
Appendix-1: Assembly Note-1

NO	Location	Screw torque
1	Filter	14 kgf-cm (1.4N · m)
2	Fan Tray	6 kgf-cm (0.6N · m)
3	Grounded Bracket	250 kgf-cm (24.5N · m)
4	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	317 kgf-cm (31N · m)	Cu: 35 mm ² (1 AWG)~120 mm ² (250 kcmil) Al: 60 mm ² (2/0 AWG) ~ 120 mm ² (250 kcmil)
		PE	150 kgf-cm (14.7N · m)	



The power behind competitiveness

三相併網型變流器

M70A_263

操作手冊

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繁體中文 85

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1 安全規範

1.1 變流器資料

1.1.1 免責聲明

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DELTA ELECTRONICS, INC. 針對以下情形造成的損害將不負任何責任及義務：

- (a) 產品沒有恰當的安裝或維修
- (b) 產品未依照說明書正確使用
- (c) 產品於拆裝過程受損

1.1.2 適用對象

本說明書適用於針對安裝、試運行、實際操作、後續維護受過良好訓練的人以下基礎及進階技巧為必需的。

- 了解基礎電力、配線、電子元件及電子電路符號
- 了解太陽能變流器如何運行及操作
- 針對電子產品的安裝及試運行受過訓練
- 針對安裝及使用電子產品的過程中會遇到的危險及風險受過訓練
- 遵守本說明書及所有安全規範

開始接觸此產品前，請詳閱本說明書。

1.2 安全概述

重要安全指示：保存所有指示！



- 請詳閱所有指示及保存供後續使用。

為了避免人員受傷或其他損失及確保變流器長期運轉，在使用此產品前請務必詳閱所有安全指示。

本說明書針對DELTA併網型無變壓器太陽能變流器提供重要指示。本產品進行設計、測試、驗證且經國際安全規範認證，但安裝及使用本產品前仍須做好防範措施。本產品適用於室內及戶外。

注意：無電氣隔離



- 本產品需安裝外部隔離變壓器確保交流側與光伏模組進行隔離。
- 本產品無附加變壓器，為非電氣隔離型。
市電端與變流器間需加入外部變壓器。
請勿使用需接地(正極或負極)之太陽能板。
若使用了，則本產品會以INSULATION (E34) 告警。
- L1, L2, L3,及 N 禁止連接至地。

1.2.1 使用條件

- M70A_263為 6 MPP追蹤、無變壓器太陽能變流器，能將太陽能串列的變動電流轉換成與市電頻率相同之三相交流能量並饋入市電。
- 所使用之太陽能模組需與變流器匹配。
- 太陽能面板之對地電容不可超過 $10\mu\text{F}$ 。
- 本產品僅可在經DELTA及市電業者許可之國家運行。
- 市電系統相容性:

PV系統提供至AC負載及市電系統之電力品質，係由實際與規範要求之電壓、閃爍、頻率、諧波和功率因數所支配。實際與規範要求的偏差超過條件範圍及可能需藉由PV系統感測偏差，並適當地從市電系統切斷。除非另有說明，否則所有的電力品質參數（電壓、閃爍、頻率、諧波和功率因數）都必須在公用介面/公共點等處測量。

諧波及波形失真：低度的電流和電壓諧波是理想的，對市電其他AC負載端連接之設備/儀器本身若有較高的諧波及波形失真，PV系統可能會有發電不穩定的現象發生或停止供電至市電配電系統。

1.2.2 標誌

本節說明本說明書會出現的標誌定義，為了避免人員受傷或其他損失及確保變流器長期運轉，在使用此產品前請務必詳閱所有安全指示並遵守。

危險！



- 此警語表示可能發生致死或嚴重傷亡的情形。

警告！



- 此警語表示可能發生致死或嚴重傷亡的情形。

注意！



- 此警語表示可能發生較輕微傷害的情形。

注意



- 此警語表示可能對資產或環境造成傷害。

資訊



- 進一步的資訊會經由雙圈驚嘆號指示。
這代表接續的內容將含有使用者該遵守的重要資訊以免造成任何傷害。

危險：觸電!!



- 此警語表示可能有造成嚴重傷亡的觸電可能。

注意：表面高溫，請勿觸碰！



- 此警語表示當變流器運行時機體表面高溫，
待表面溫度下降後在進行需接觸的工作。



- 等待圖示中所顯示的時間後再進行工作



- 設備接地導體

2 產品介紹

M70A_263 以最先進之高頻切換及低EMI技術設計而成，同時具有高效率及高壽命的特點，亦適用於戶外。

注意：無電氣隔離



- 本產品無附加變壓器，為非電氣隔離型。
請勿使用需接地(正極或負極)之太陽能板。
若使用了，則本產品會以INSULATION (E34) 告警。
- L1, L2, L3,及 N禁止連接至地。

2.1 適用機種

本說明書適用以下機種:

- M70A_263

安裝、運行及維護過程皆必須遵守本說明書。

DELTA保留在不另行告知的前提下修改內容及技術資料的權力。

2.2 產品概述

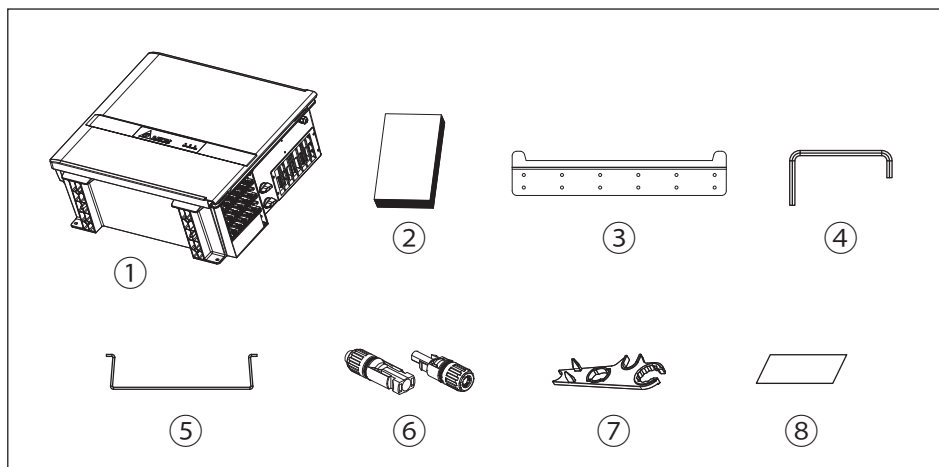


圖2-1：內容物

表2-1：內容清單

M70A_263			
	物件	數量	描述
1	DELTA太陽能變流器	1	太陽能變流器
2	說明書	1	安裝及維運過程中務必參考本說明書中的安全指示
3	壁掛架	1	將變流器掛起之壁掛架 (材質: 鋁/厚度: 3mm)
4	六角板手 (已安裝於鎖扣外蓋上)	1	固定前蓋用門門與卸除鎖扣外蓋螺絲工具
5	保護架	6	直流組串接頭保護架
6	H4端子	12對	直流組串輸入接頭
7	H4板手	2	H4接頭拆除工具
8	資安封條	3	用於資安檢測的一次性貼紙

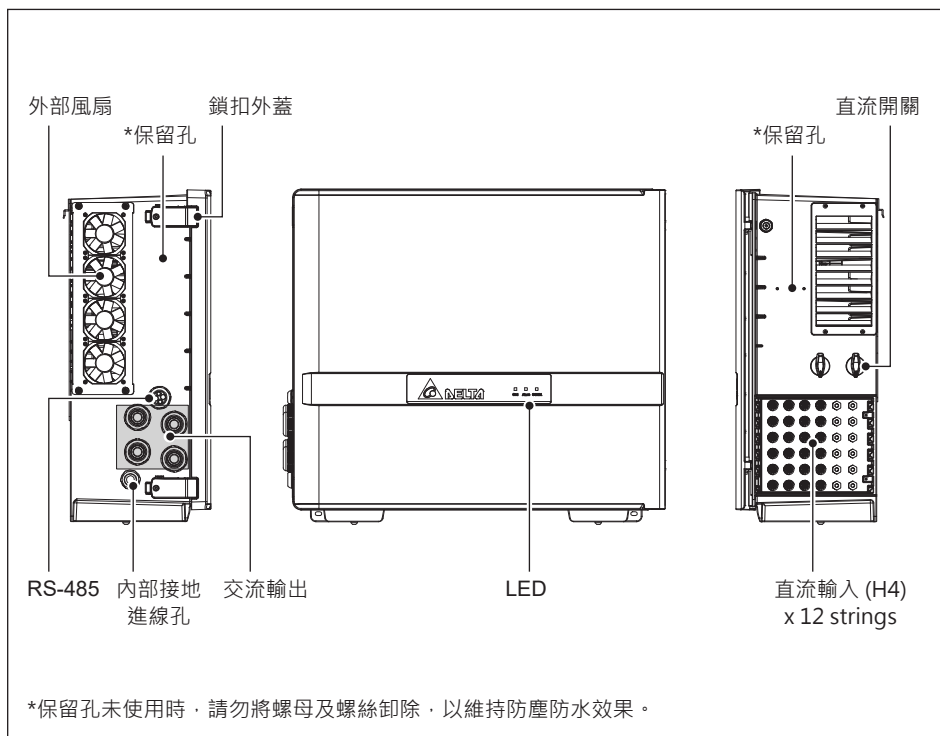


圖 2-2：外觀介紹

圖2-3為產品標籤並配合表2-2針對特殊符號做解釋。



圖2-3：標籤

表2-2：標籤內容描述

符號	定義		
  60 seconds	嚴重觸電危險 變流器運行時會有致命高電壓存在，切斷後危險電壓存在約60秒，時間內請勿接觸變流器。 本產品不含任何需要開啟機殼之元件。擅自開啟機殼會使保固失效。		
	注意表面高溫 變流器運行時，表面可能高溫。		使用此變流器前，請詳閱說明書。
	此變流器本身沒有經由變壓器與市電端分離。		WEEE marking 本變流器須以標準家用廢棄物報廢，並同時遵守當地針對電器報廢的相關規範。
	若當地規範要求，機體外殼請務必下地。		

圖2-4為配線箱的架構圖詳細描述可參照圖2-5、表2-3，其中包含輸出端的雷擊保護裝置(SPD)。

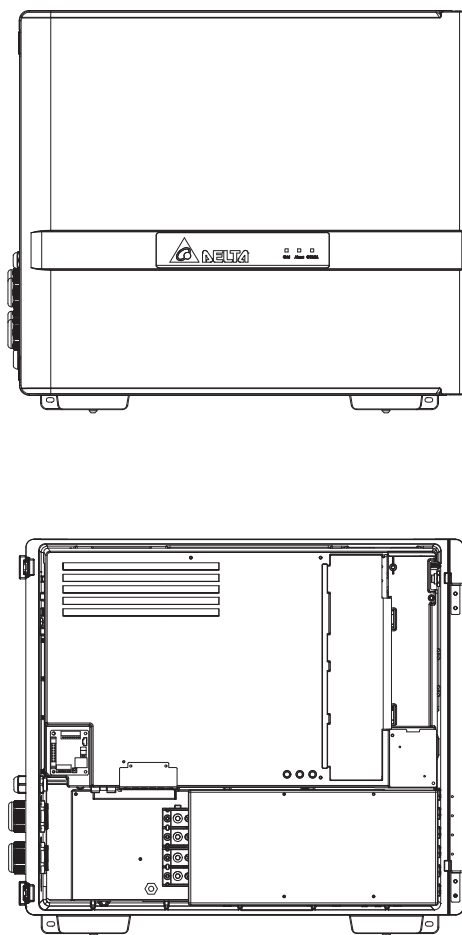


圖 2-4：外部/ 內部 結構

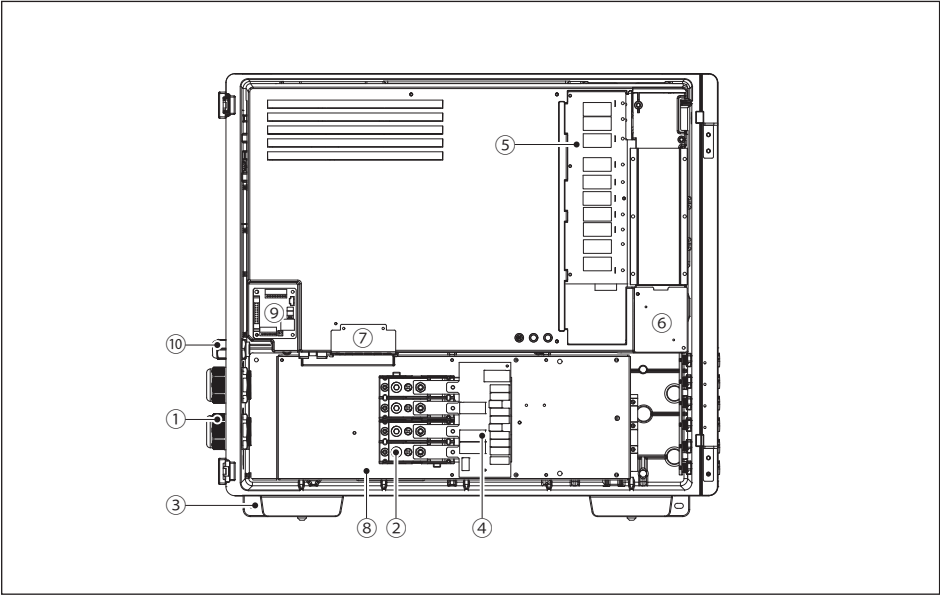


圖2-5：配線箱架構圖

表2-3：配線箱架構圖內容描述

NO.	部件	NO.	部件	NO.	部件
1	2.5" 交流接線口	5	直流雷擊保護裝置	9	通訊模組
2	交流端子	6	內部風扇 1	10	通訊進線孔
3	外部接地 (M6)	7	內部風扇 2		
4	交流雷擊保護裝置	8	內部接地		

3 安裝

警告！



- 請勿將本產品安裝在易燃表面附近。
- 請將本產品安裝於堅固且平順之表面。

注意！



- 本產品不建議安裝在直接日照曝曬處。

注意！



- 本產品支援無線通訊方式。
- 確保產品安裝位置遠離發射強無線電波的設備（例如民用頻段無線電設備）。
- 避免將產品安裝在金屬箱內，並確保產品與連接設備之間沒有金屬阻擋物，以防止通訊訊號衰減。
- 使用藍牙功能連接設備時，請確保設備前方 1.5 m 範圍內進行操作，以獲得最佳通訊品質。

本章節包含以下指示

1.機構安裝 2.電氣安裝 3.通訊安裝

3.1 拆箱與檢視

請依照圖 3-1 所示拆封外箱包裝。
建議兩人以上進行作業(圖 3-2)。

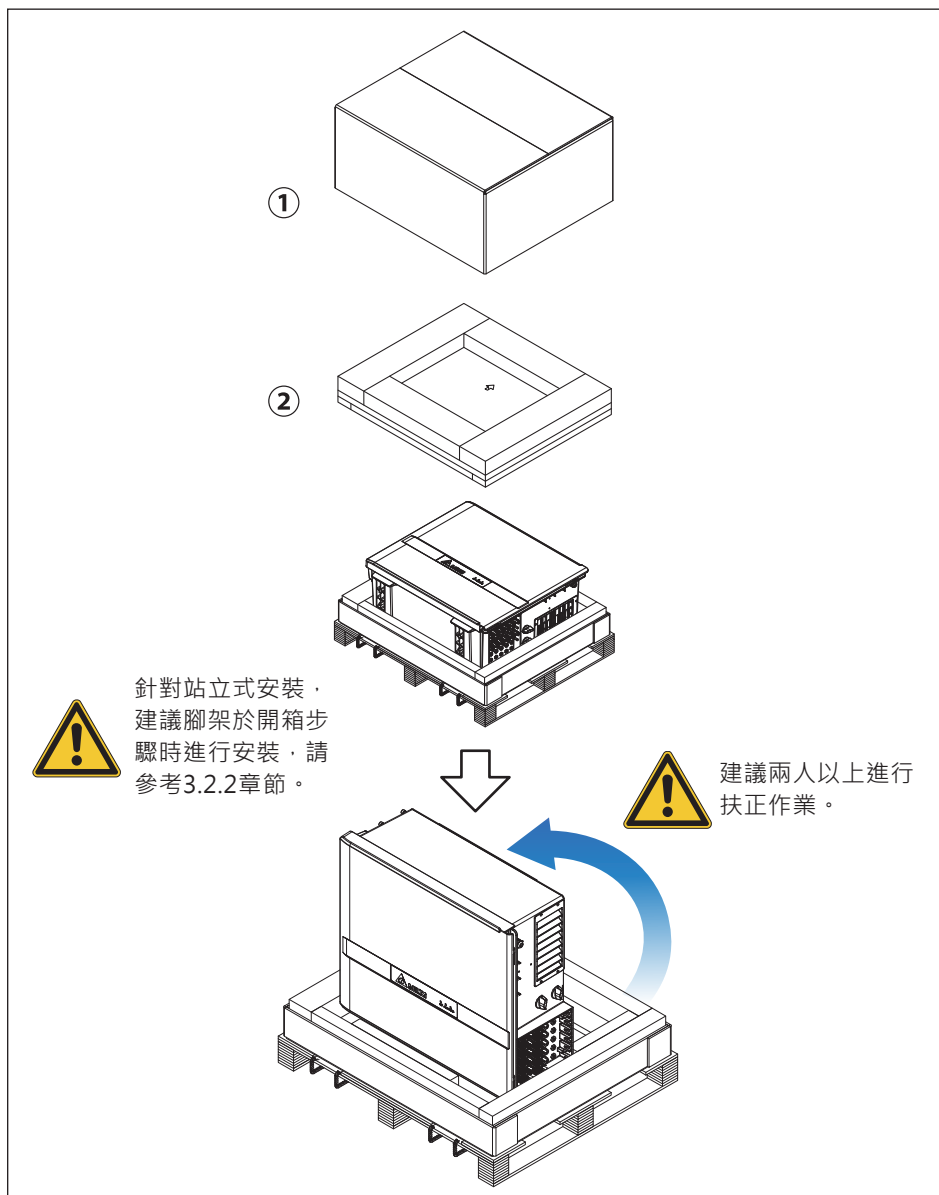
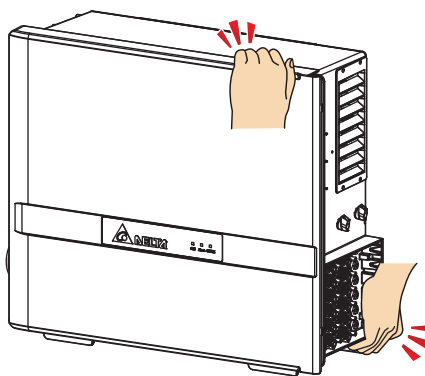


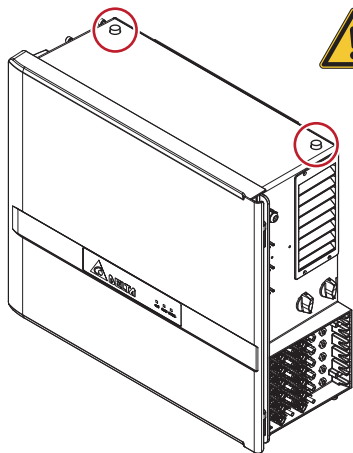
圖 3-1: 開箱步驟

人力搬運

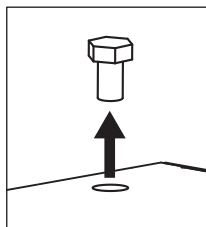


搬動時，請勿施加外力於風扇、直流開關及交流電纜接頭。

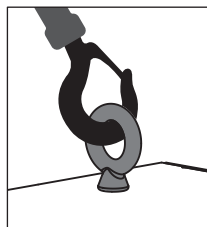
吊掛搬運



吊掛作業完成後，請將螺絲鎖回機殼上，以防止水或髒汙等侵入。



螺絲 (4 N-m)



吊環 (42 N-m)
(M12 x P1.75, L ≤ 20 mm)

圖 3-2: 變流器搬運

3.2 機構安裝

此機器設計支援壁掛式安裝，請參考3.2.1 章節；同時亦支援落地式安裝(選配)，請參考3.2.2章節。

3.2.1 直立壁掛式安裝

請參考圖3-4至3-9說明

1. 請先確定產品安裝牆面為足以承載產品重量。
2. 水平固定壁掛架(垂直於地板)，壁掛架尺寸如圖3-4所示。
3. 鎖附12枚M6十字螺絲於壁掛架上。(圖3-5)
4. 將產品放置於壁掛架上。
5. 將產品鎖附上2枚M6十字螺絲於圖3-5所示之位置。
此處亦為設備外部接地點，設備接地方式請參閱3.5.2章。

注意！

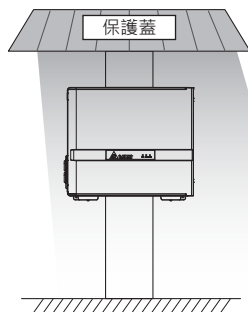


- 至少使用6枚M6螺絲將壁掛架固定牆上。
- 該壁掛架為本產品專用，請勿使用其他壁掛架來搭配本產品使用。
- 未遵守以下安裝說明中的方向和間隙可能導致降額功率輸出並可能使保固失效。

注意！



為避免由於極端氣候(大雪, 冰雹...等)或不恰當的安裝/維運所導致的變流器故障, 台達強烈建議安裝額外的保護蓋，詳細細節請洽當地服務團隊。



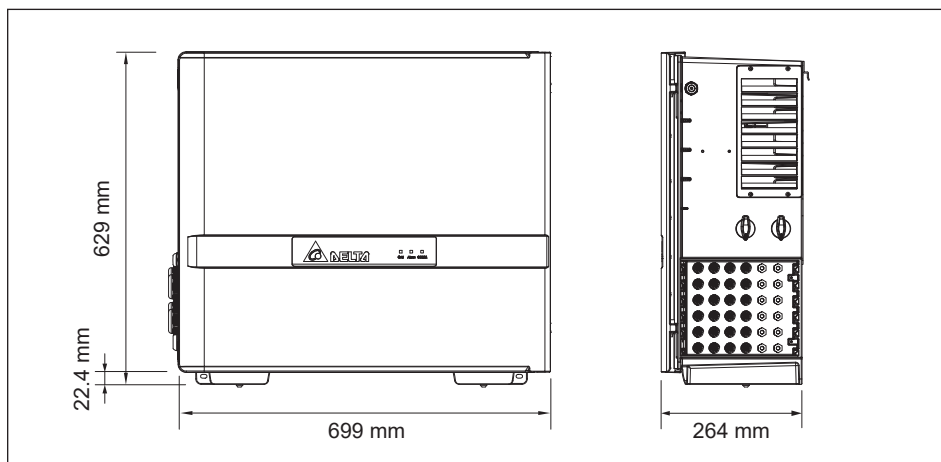


圖 3-3: 變流器尺寸

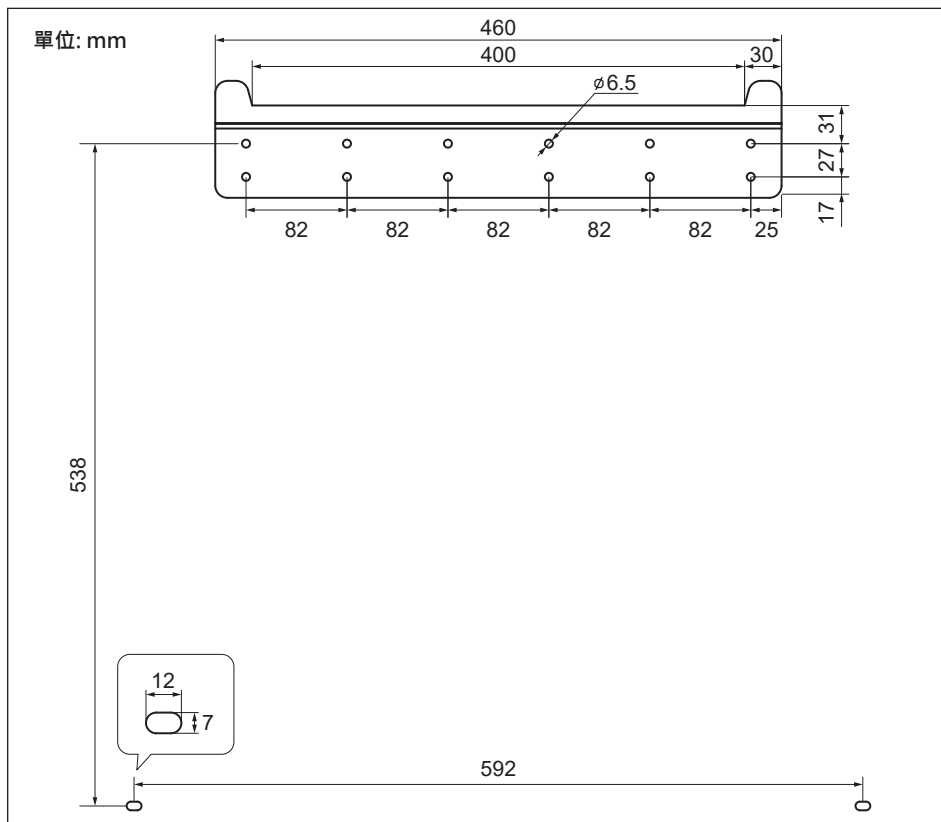


圖 3-4: 壁掛架尺寸

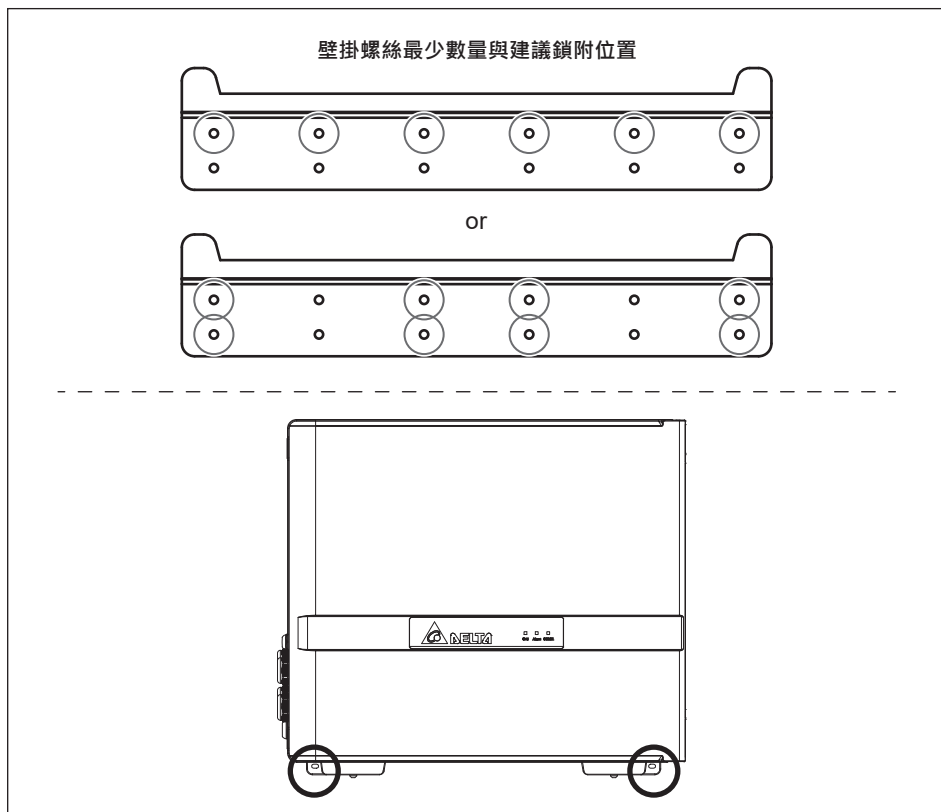


圖 3-5：壁掛螺絲鎖附位置

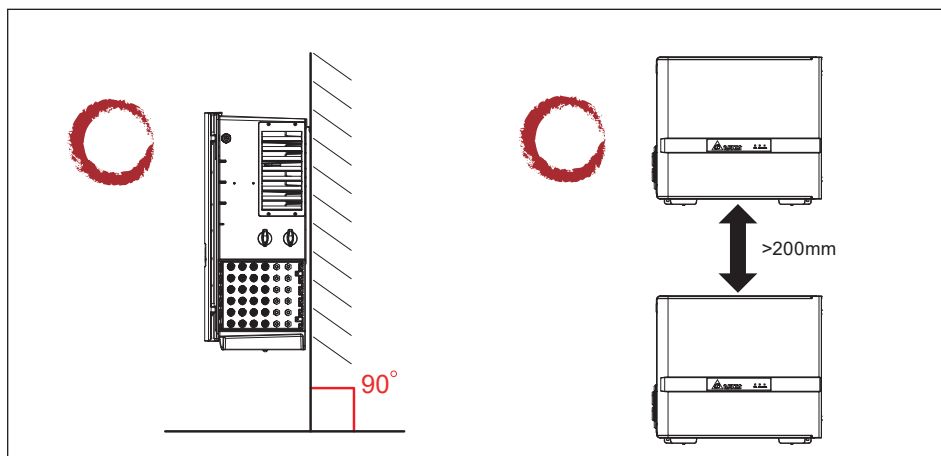


圖 3-6：正確的安裝位置

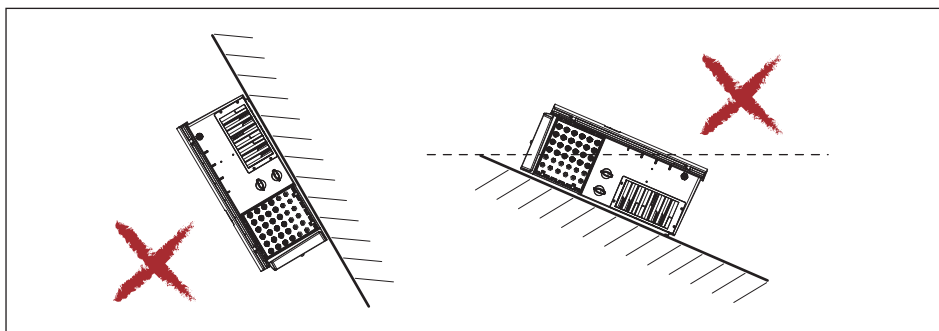


圖 3-7: 禁止的安裝方式

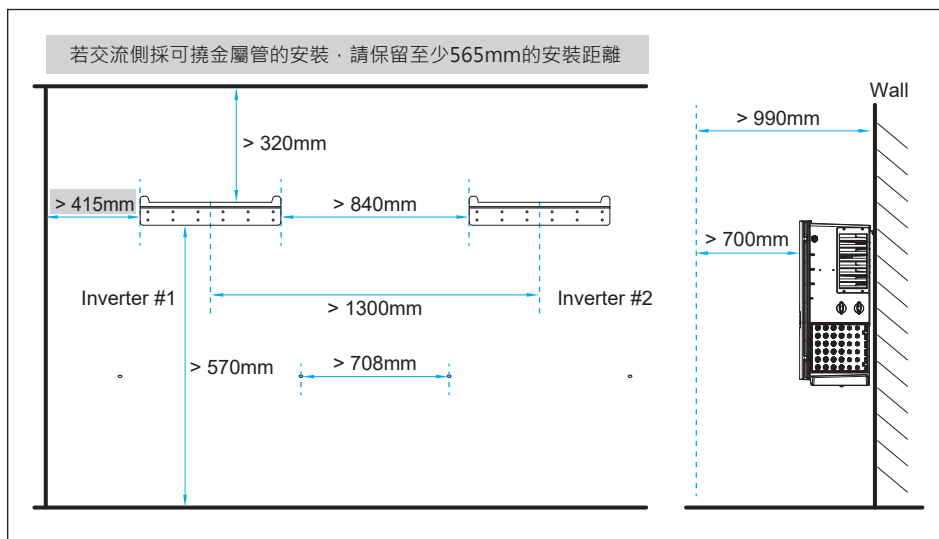
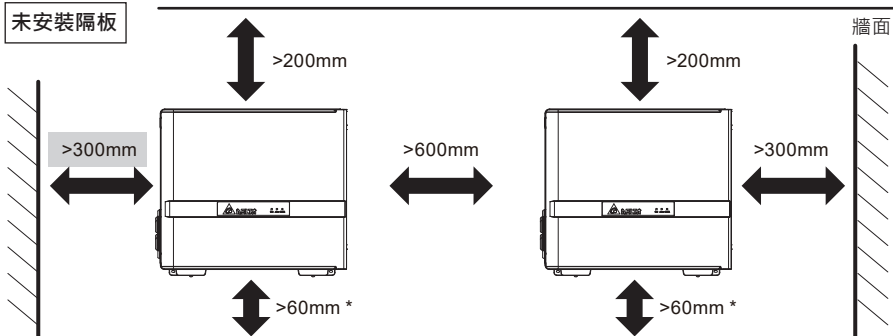


圖 3-8: 壁掛所需間距

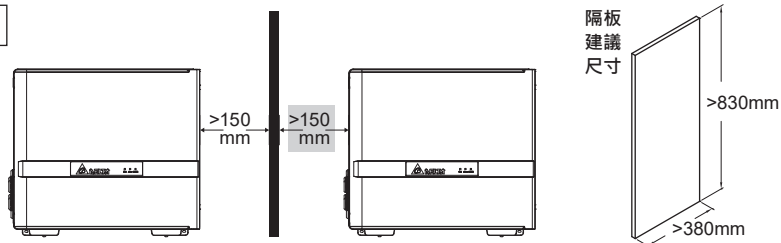
若交流側採可撓金屬管的安裝，請保留至少450mm的彎管距離

未安裝隔板



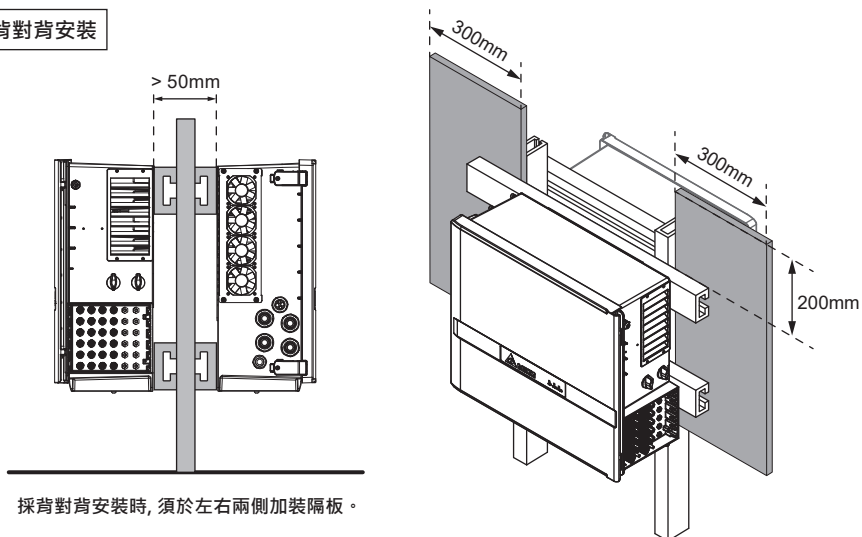
* 如果安裝位置有浸水風險或處於積雪區域，請提高變流器的安裝高度。

安裝隔板



* 當交流側安裝可撓金屬管時，變流器間需要間隔至少600mm，隔板則不需安裝。

背對背安裝



採背對背安裝時，須於左右兩側加裝隔板。

圖 3-9: 機台間最低要求距離

3.2.2 落地式安裝 (選配)

注意



- 請確保安裝基座足以承載變流器重量。

落地支架為選配套件，請聯繫客服中心取得詳細資訊。

1. 將落地支架安裝於變流器腳座上，如圖3-10所示
2. 以4顆膨脹螺絲安裝落地支架於地面基座上，如圖3-11所示

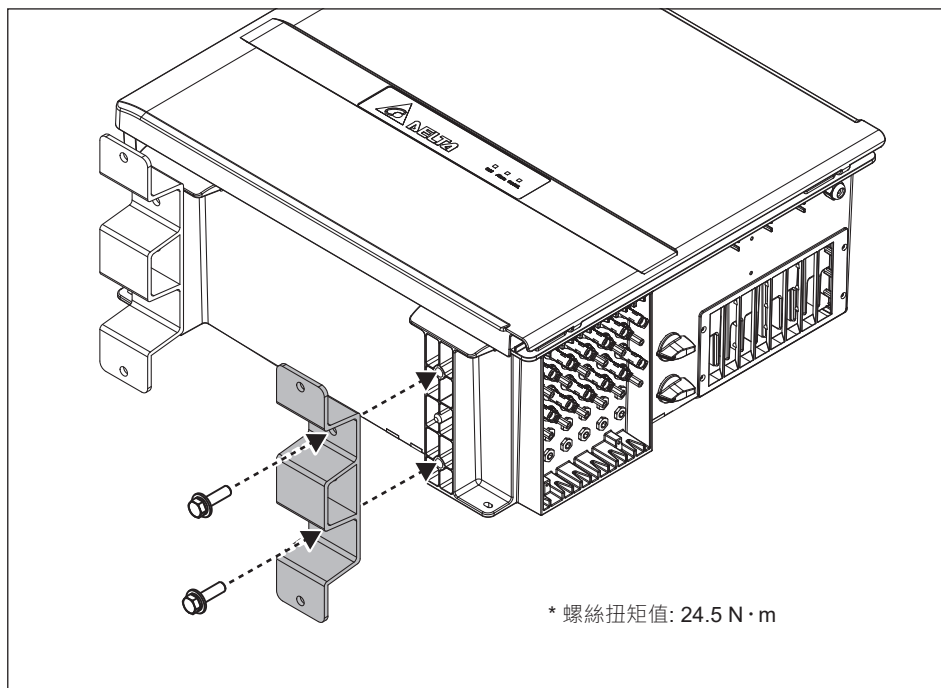


圖 3-10: 落地支架安裝

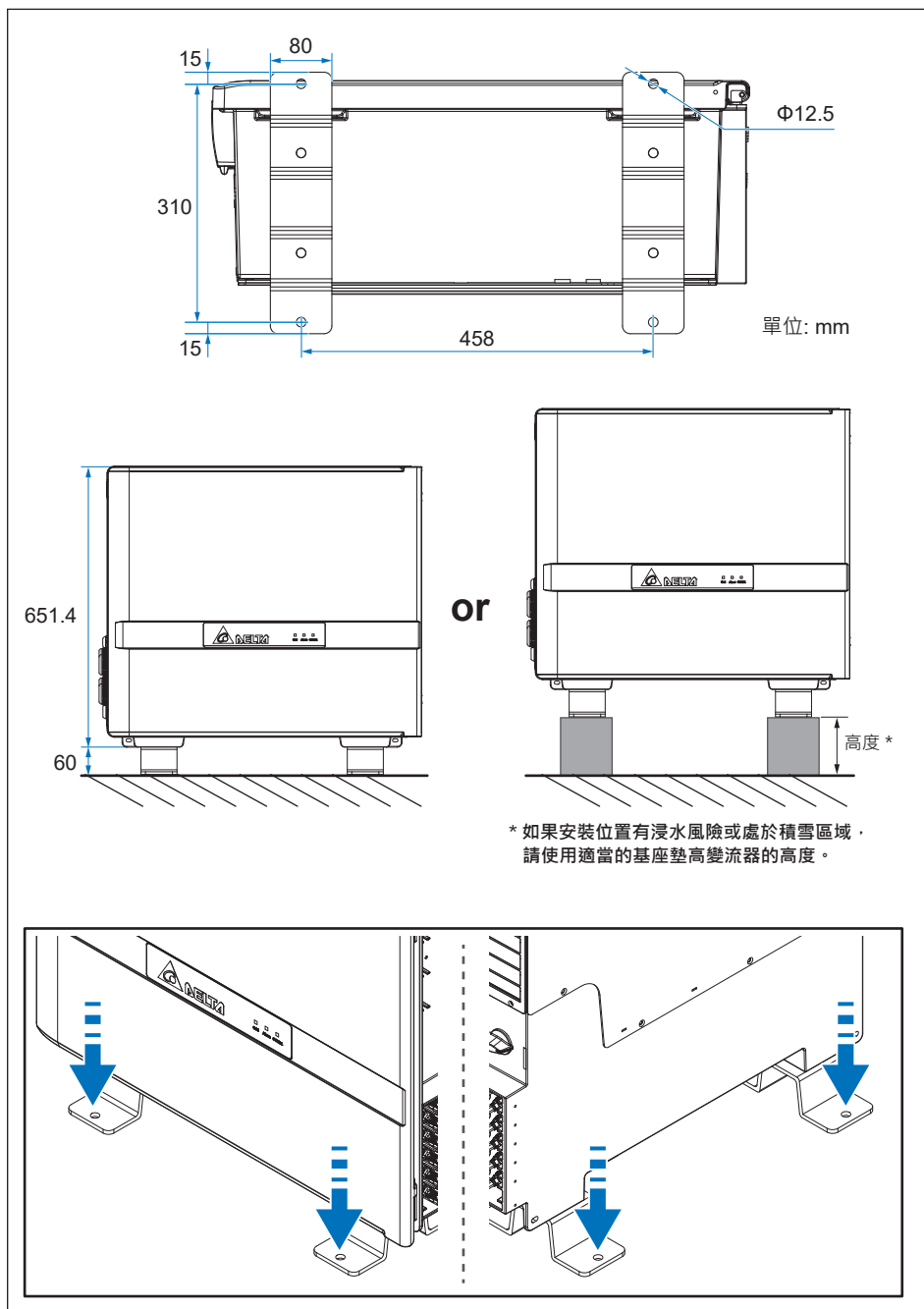


圖 3-11: 將變流器安裝在地面安裝基座上

3.3 前蓋

為了確保變流器可以良好的長期運轉，開關前蓋時，請務必參考5.1章節步驟。開啟前蓋後，請利用板手將前蓋進行固定如下圖，避免因為強風導致前蓋搖晃。

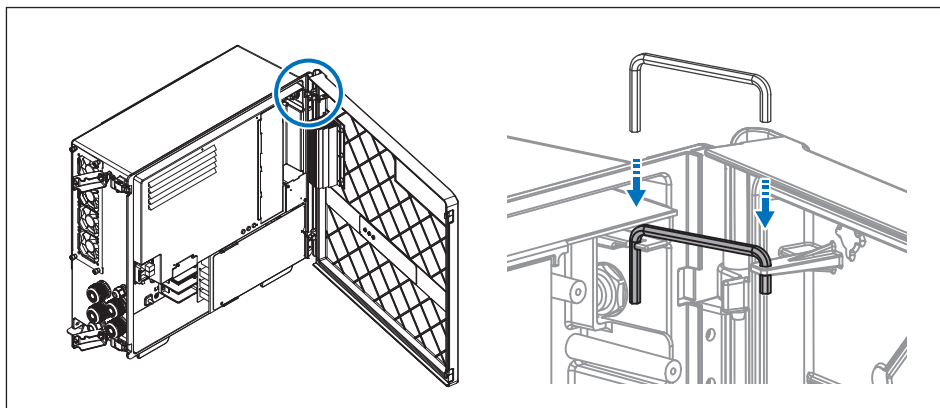


圖3-12：利用板手將前蓋進行固定

3.4 交流配線安裝

危險：觸電危險!!



- 配線時禁止供給變流器任何電源。
- 在沒有任何雨遮的情況下，請勿在陰雨天氣時打開前蓋。

警告！



- 遵守條文為安裝者的責任。
- 配線作業完成後，請立即關上前蓋並確實扣緊鎖扣。

注意：變流器及設備可能損毀！



- AC端子安裝須遵守當地電氣法規。
- 不遵守指示可能會損壞交流線材。

注意：錯誤的交流線材！



- 為了不損壞變流器中的組件，請確保將正確的線材連接到變流器上相應的交流端子。

3.4.1 AC 形式與連接方式

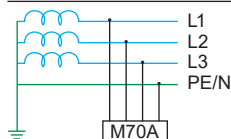
注意



機器初始設定為 3Ø-4W 接線方式，也可變更為 3Ø-3W 不含中性點N的接線方式。變流器可工作於下述電力系統連接方式無須額外配接外部變壓器。

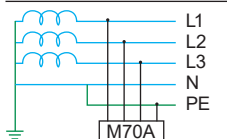
TNC system

230/400V



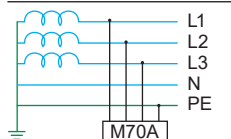
TNC-S system

230/400V



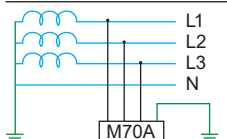
TNS system

230/400V



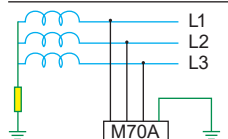
TT system

230/400V



IT system

230/400V



3.4.2 必要保護裝置

建議於市電端與變流器間加入隔離及過電流保護裝置，請依據當地電工法規設計裝置規格。

3.4.3 多台變流器並聯安裝要求

多台變流器並聯連接到電網時，最多可連接 25 台變流器至變壓器的單個繞組上。

3.4.4 交流配線安裝

警告！

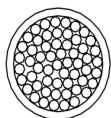


- 如果沒有遵循以上預處理，接觸電阻將會顯著增加，可能會導致溫升過高，甚至導致著火。

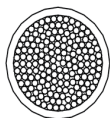
- 請使用符合當地電力系統裝配要求之銅或鋁導體之線材
- 可使用絞線和實心線。當使用平波花線時，則需壓接端子
- 如使用壓接端子，需確保壓接端子與導體為相同材料基底，以避免不同材料間電位腐蝕之風險。

導線截面積範圍	電纜容許總直徑
35 mm ² - 240 mm ²	12 mm - 27 mm

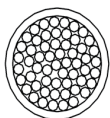
M70A_263 適用銅絞線·銅軟線·鋁絞線·鋁實心(含扇形)



銅絞線



銅軟線 (需壓接端子)



鋁絞線



鋁實心 (扇形) *

• 銅線:

銅軟線需壓接端子，其他銅線型直接裸線鎖附即可。

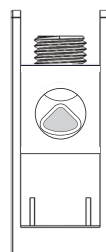
• 鋁線:

鋁線連接端子時必須去除末端的氧化層。(需注意刮下的鋁粉末勿沉積其他導體上)

去除氧化層後，建議立即使用中性脂或無酸、無鹼凡士林塗在導體的末端，並立即連接導線。

當導線重新連接時，需再次處理氧化層。

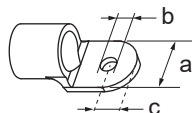
* 扇形線接線方向如右圖所示



接地線

變流器必須通過內部或外部接地點接地，接地線材應符合以下要求。

- 導體的橫截面必須為交流線材橫截面的 $\frac{1}{2}$ 以上
- 請遵循下表使用正確之端子進行連接

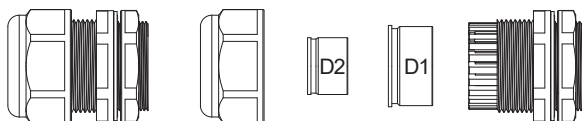


最大導體截面積: 120mm²

線材外徑範圍: 9.5 - 18.8mm

線材端子尺寸: 螺絲尺寸 = M8 (a < 24.0 mm, b = 10.5 mm, c < 12.5 mm)

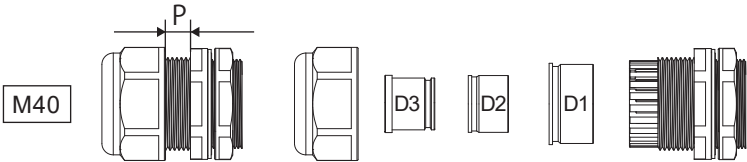
圖 3-13: 接地線尺寸



PE	Cable diameter range	Torque	Dimension of P
D1	14.1-18.8 mm	3.5-5.2 N·m	1.5-5.0 mm
D2	9.5-14.1 mm	3.5 N·m	1.5-5.0 mm

3.4.5 交流側- 配線前準備

在進行導線與端子座安裝連接之前，請遵循以下步驟。
對於每個交流端子 (L1 · L2 · L3 · N) ：
請用8 mm六角板手進行拆裝螺絲。如果使用電動工具進行施工，請確保使用適當扭力值，避免超過或不足擰緊螺絲的扭力值。當鎖附螺絲頂到最低點時，請勿再進行鎖附，避免造成端子座損傷。



AC	Cable diameter range	Torque	Dimension of P
D1	21.7-28.9 mm	5.5-10 N·m	1.0-8.0 mm
D2	16.2-21.7 mm	6.0 N·m	1.0-6.5 mm
D3	12.0-16.2 mm	4.0-6.5 N·m	1.0-7.5 mm

注意:

- 有可能產生高溫：
若壓接點的阻抗過高，該點則有可能產生高溫導致火災。
為確保安全性及可靠的接觸點，請確實遵守以下步驟
1. 鋁線的導電性較銅線差，鋁線線徑請至少選用比銅線線徑大一個等級。
 2. 安裝鋁線時請盡量在低濕度且低腐蝕性的環境下進行。
 3. 安裝過程需快速。
 4. 確實使用硬體工具(如刀子)將剝線後的裸露表面氧化層刮除，並立即將裸露線材浸泡至凡士林內(須為中性、不含酸、鹼成分)，然後放入銅鋁端子內。
 5. 使用最大允許的壓接扭力進行壓接。



請依循以下原則進行佈線，以避免雨水流入電纜密封套，可確保變流器長時間運行之防水能力。

1. 距電纜密封套 10-20 cm 之電纜應維持水平佈線
2. 以固定座或導線槽固定與支撐導線使其與變流器之間水平無歪斜
3. 固定前之導線以下凹形式產生雨水截流

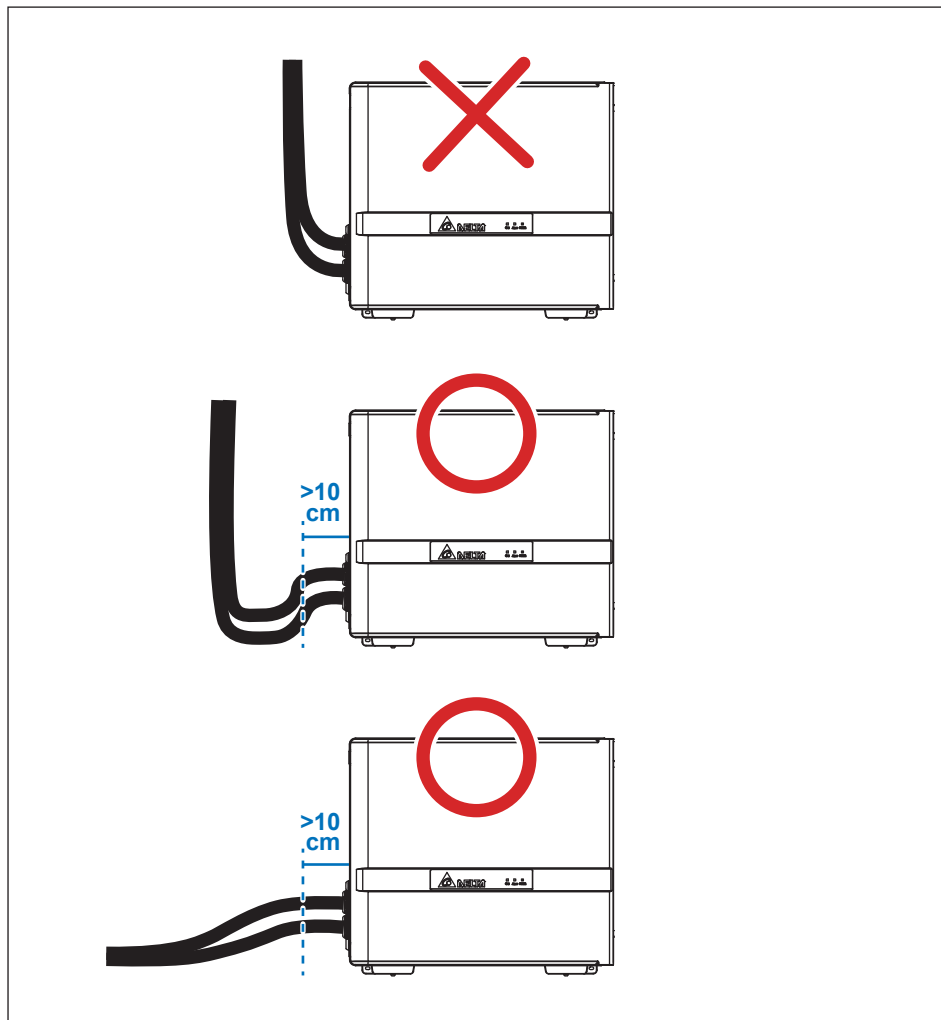


圖 3-14: 佈線

為了預防渦流效應的產生，請勿將三相交流電纜分置於獨立的金屬管，請參考以下建議安裝方式配置。

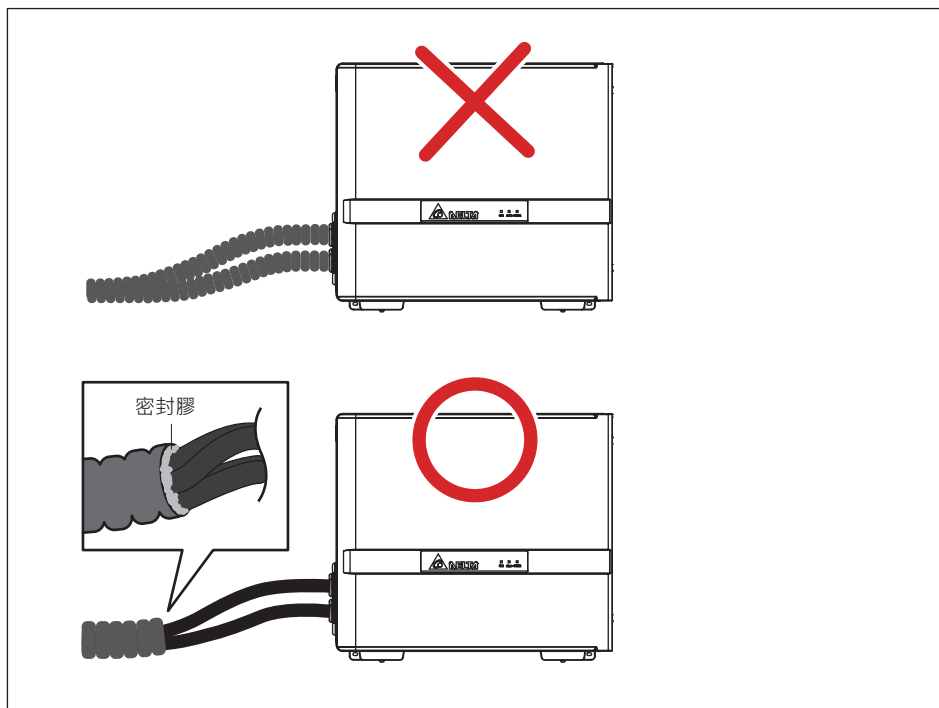
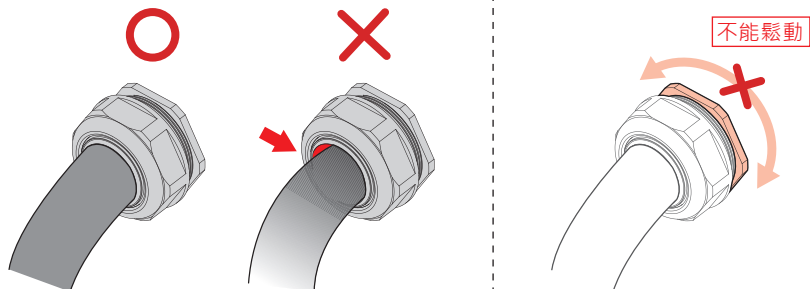


圖 3-15: 交流側金屬管安裝配置

注意！



- 防水塞蓋裝配線後不能產生縫隙避免水、灰塵或生物入侵。
- 防水塞蓋應確實鎖緊，不能產生鬆動。



3.4.6 交流配線

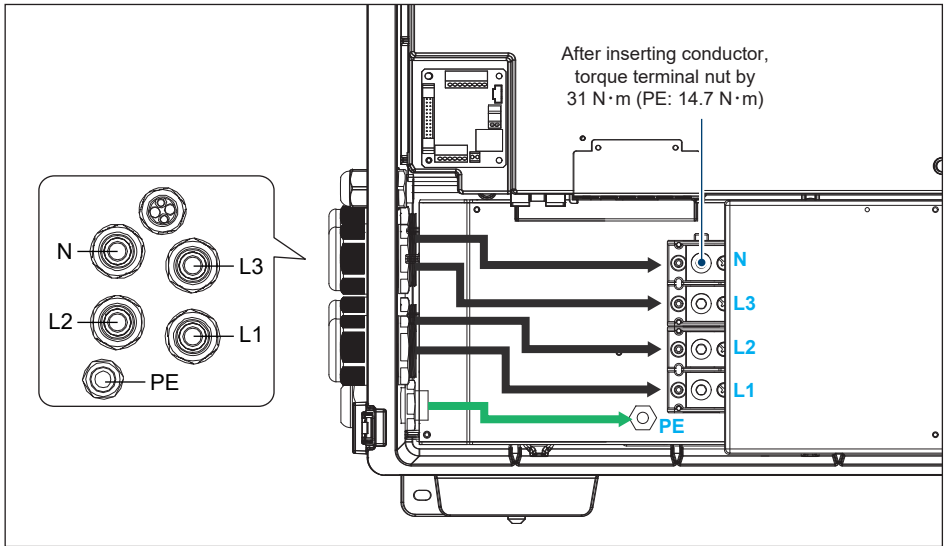


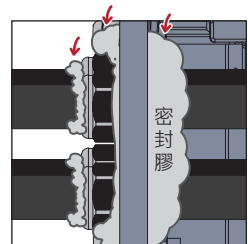
圖 3-16: AC側配線孔與交流端子位置圖

- (1) 確保交流斷路器處於“關閉”狀態。
- (2) 剝去電纜絕緣皮30mm。
- (3) 對於鋁質導線，請去除導體表面的氧化膜並塗上防護油脂。
- (4) 使用適當的內部橡膠將L1、L2、L3或中性線(若需配置)穿過對應的M40電纜密封套。
- (5) 按照標示連接L1、L2、L3和中性線(若需配置)。
- (6) 以31 N·m的扭矩鎖緊所有交流端子螺絲(接地: 14.7 N·m)。
- (7) 擰緊所有交流電纜密封套以確保密封。

注意！



- 配線完成後請使用矽利康或防火泥填塞電纜密封套和電纜間的所有間隙
- 若採用塑膠或HDPE材質等管路進線，管內請確實使用矽利康或防火泥進行填塞進行填塞



3.5 直流配線安裝

危險:觸電危險!!



- 太陽能串列將太陽能轉換成高壓直流形式，此高壓有可能造成觸電危險。
- 配線前請使用非透明物質將太陽能串列遮蓋起來。
- 配線時請確認電壓極性。
- 同一組MPPT下各組串的模組數量需相同，以降低模組間環流問題。
- 在沒有任何雨遮的情況下，請勿在陰雨天氣時進行配線作業。

警告!



- 觸電及火災危險。僅允許使用有標示低於1100V的太陽能串列。
- 配線時請確認直流開關在"關"的模式，且太陽能陣列沒有連接。

注意：DC開關！



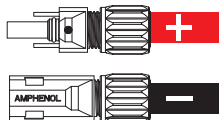
- 為了不損壞變流器內部元件，請勿頻繁且快速地切換直流開關，正確的操作方式為等待LED顯示"綠燈滅及黃燈閃爍"(無直流)或等待5分鐘之後。

注意



- 太陽能陣列的正或負端皆禁止接到地。
- 根據UTE法規，建議配置斷路器於太陽能陣列與變流器之間做為過電流保護裝置。

危險:觸電危險!!



- 在安裝直流端子時，請務必確認端子極性是否正確，錯誤的極性，將可能導致變流器造成損壞。

注意



- 未使用的DC串列輸入端子，請勿移除防水塞。

3.5.1 直流接線安裝

連接時請遵循以下步驟：

- 請使用材質為銅的導線，並確認尺寸符合NEC或當地法規。
- 剝除6.5-7.5mm的電線外皮。
- 每根直流導線的橫截面積為12/10 AWG (4/6mm²)。

直流端導線分為正負極配接，其配線方式如圖3-18所示。

- 安裝直流接線後，插入直流接頭專用的保護支撐架，方法如圖3-19所示。
- M70A_263 使用H4端子連接到變流器，外部配線用端子附於配件包中(圖3-17)。

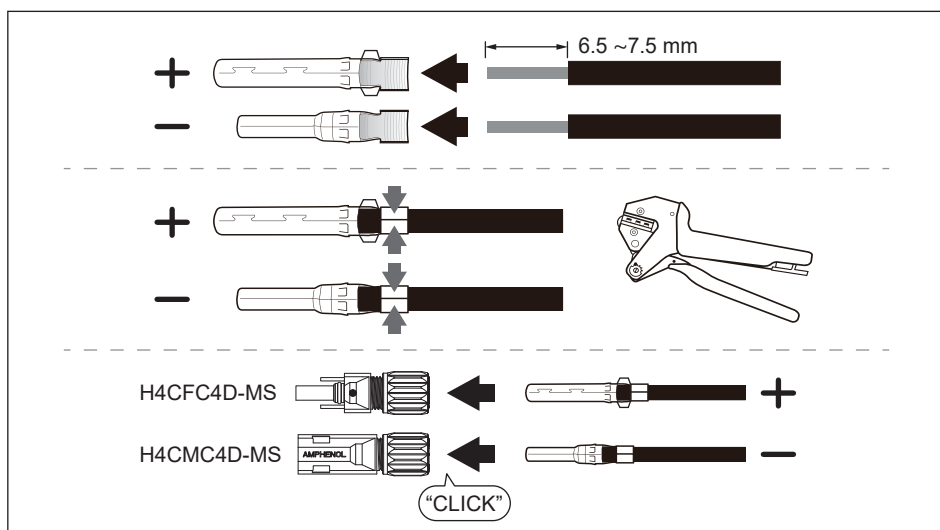
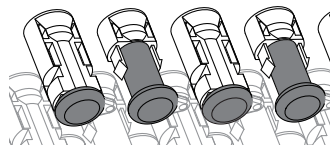


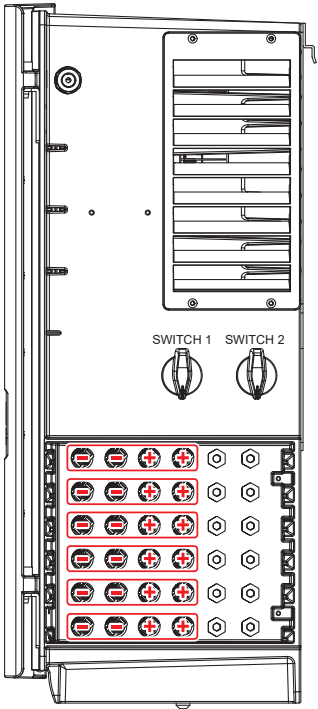
圖 3-17: 直流接線安裝

注意



- 請勿拆除未使用的直流端防水塞，以避免水或異物侵入。





Santon DC switch: XBCH+3610/2
1000 V / 50 A

直流開關組串對應表 / String mapping

DC Switch		Inverter input			
SWITCH 1	Pole 1	DC1	-02	-01	+02 +01
	Pole 2	DC2	-02	-01	+02 +01
	Pole 3	DC3	-02	-01	+02 +01
SWITCH 2	Pole 1	DC4	-02	-01	+02 +01
	Pole 2	DC5	-02	-01	+02 +01
	Pole 3	DC6	-02	-01	+02 +01



圖 3-18 : H4 端子與光伏組串對照圖

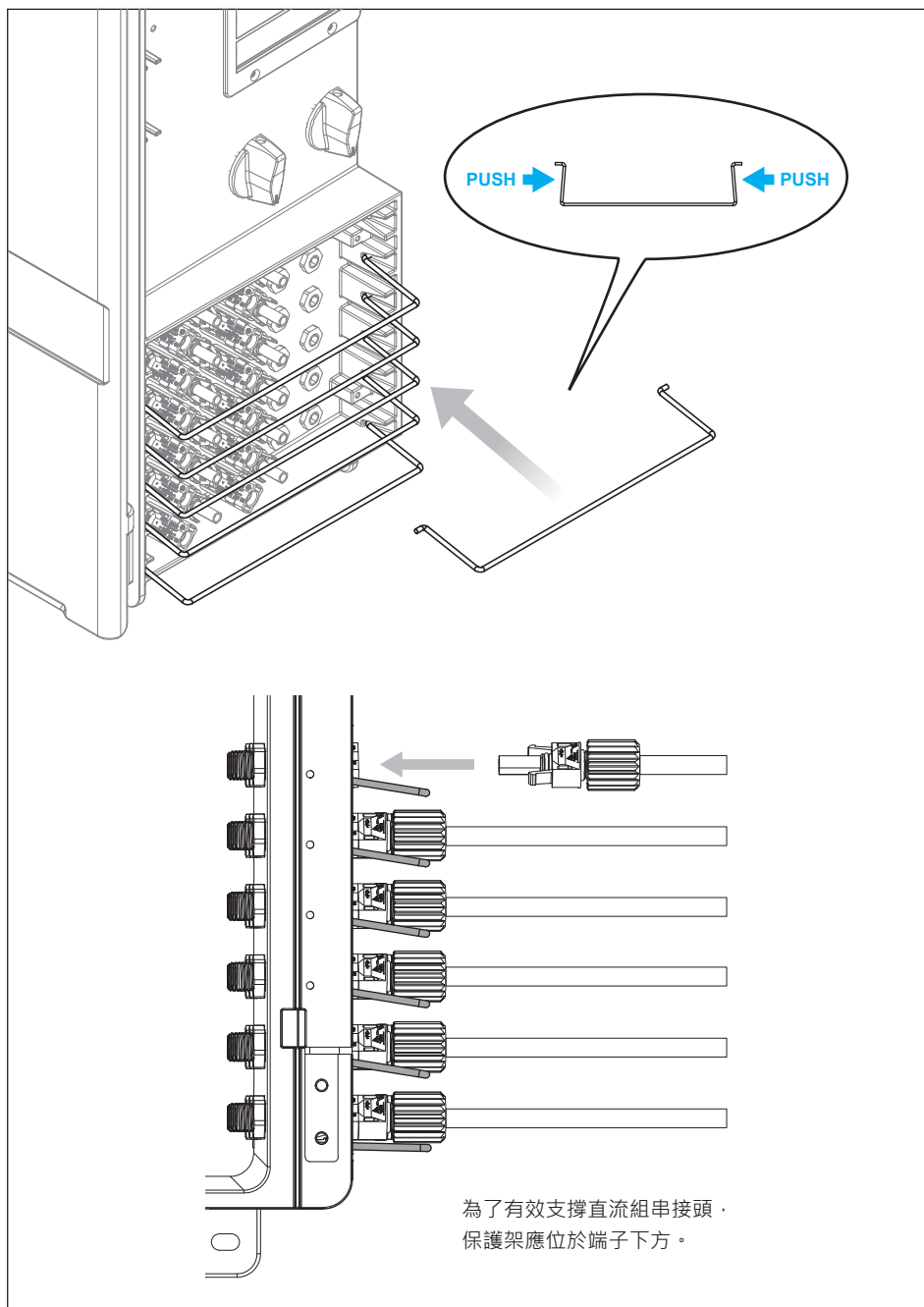


圖 3-19：保護架安裝說明

3.5.2 設備接地

將接地線壓接O型端子後，鎖附於機殼外部接地點。
機殼外部接地點位置如圖3-20所示。

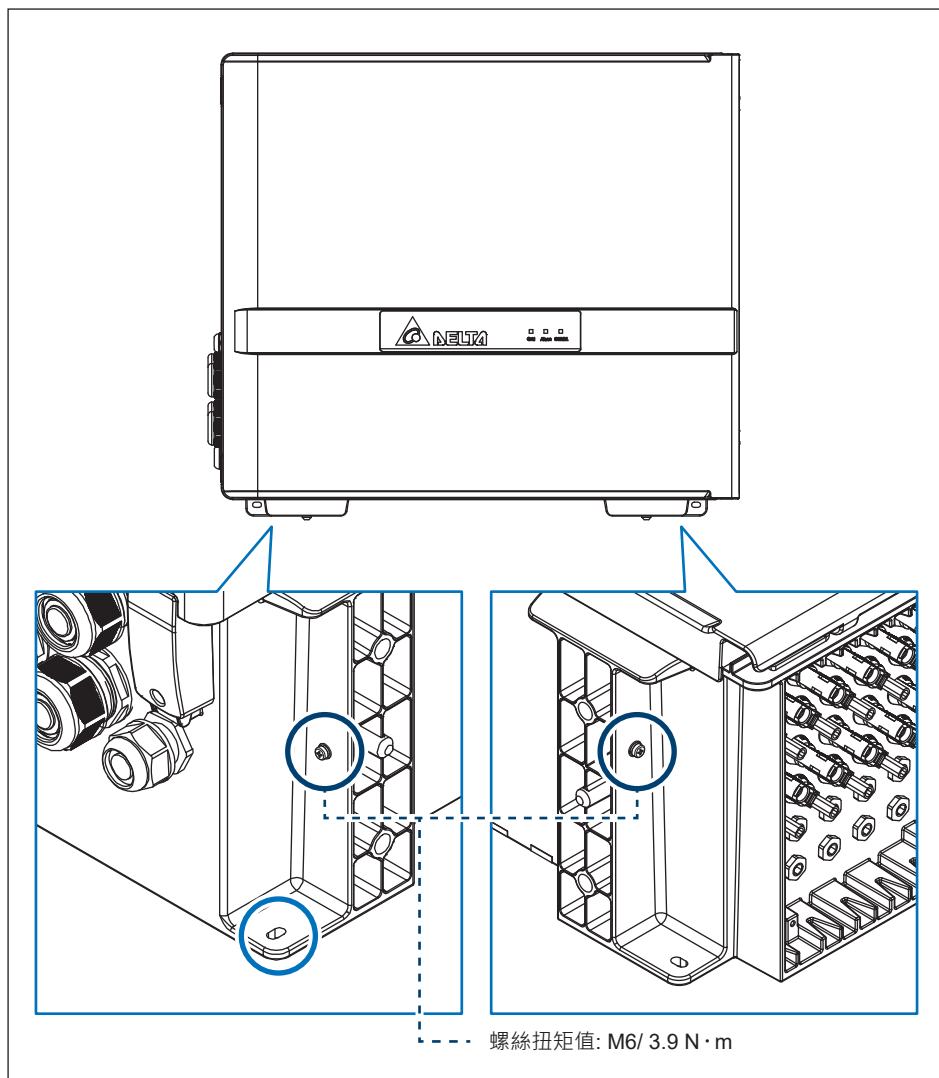


圖 3-20：設備接地點

3.6 通訊模組配接方式

通訊模組如圖3-21所示。

該模組提供一組12V電壓源VCC、RS-485、乾接點，EPO和數位輸入端子供功率控制使用；詳細說明如下。

使用VCC 與GND輸出腳位，可提供一12VDC電源，可供外部裝置使用。

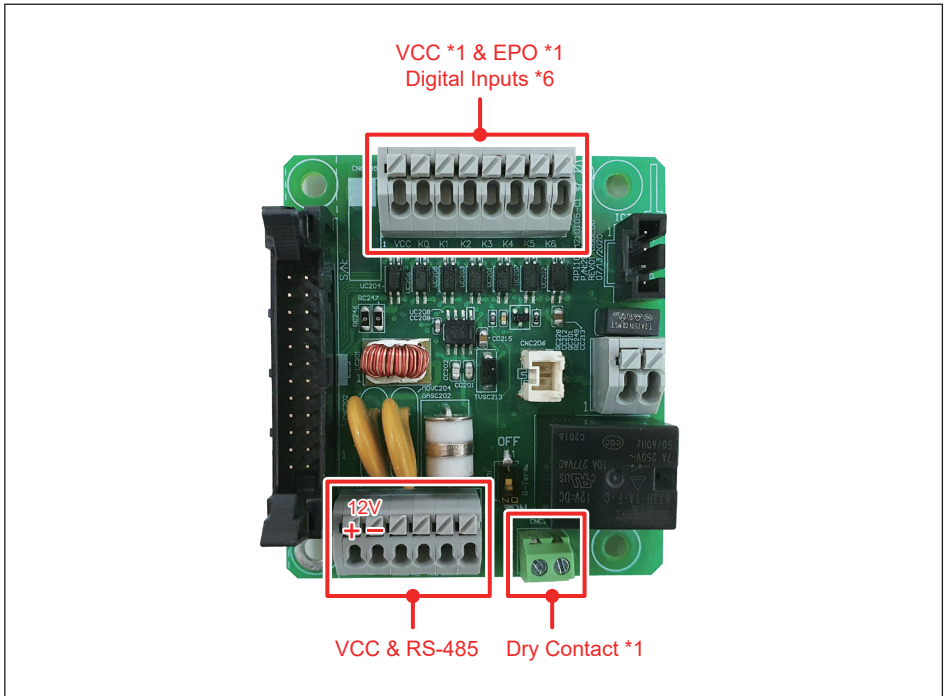


圖 3-21：通訊模組

注意



本機已通過標準檢驗局公告之「太陽光電變流器及監視單元資安檢測技術規範」，於變流器通訊模組安裝完畢後，請參照5.1.2章節，確實扣緊鎖扣後，張貼全新專用資安封條(表2-1 項目8)，如未確實張貼而因此導致資安事件，則本公司概不負責。

請參考5.1章節說明開啟前蓋，通訊模組安裝於下圖中紅圈處位置。

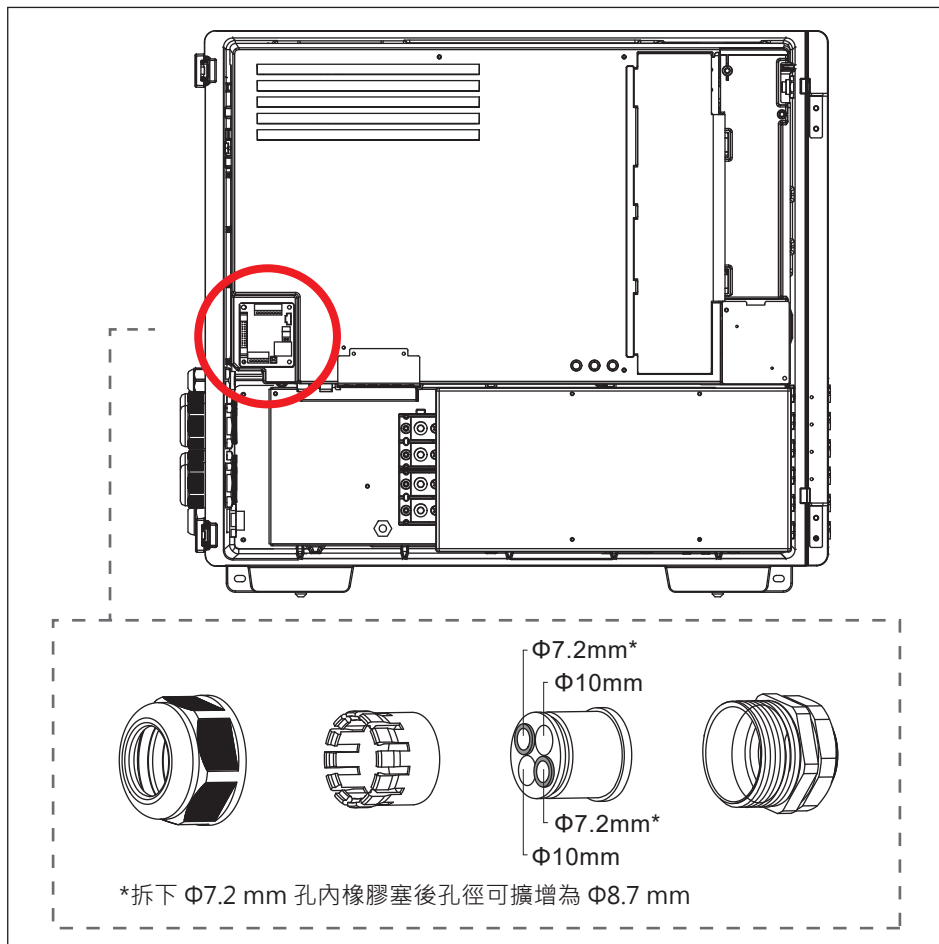
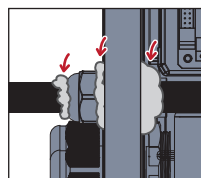


圖3-22：通訊模組位置圖

注意！



- 配線完成後請使用矽利康或防火泥填塞電纜密封套和電纜間的所有間隙



3.6.1 RS-485 連線

RS-485端子座腳位定義如表3-1所示

- 腳位1與2提供直流電壓12V/0.5A電源
- 腳位3與5 為RS-485差動信號之DATA+ 信號專用腳位
- 腳位4與6 為RS-485差動信號之DATA- 信號專用腳位

依據上述的腳位，可以實現多台變流器的通信連接。

本機器設有120歐姆終端電阻，可使用通信模組上的控制開關進行切換(見表3-2)。

不同的RS-485連接方式時，需使用不同的終端電阻設定方式。

- 當多台變流器連接時，只有最後一台變流器必須將終端電阻接通如圖3-23。
- 如果RS-485總線長度大於610m，建議使用Belden 3105A電纜或同規品來確保通信品質。
- 一般情況下，RS-485線長建議小於30m。

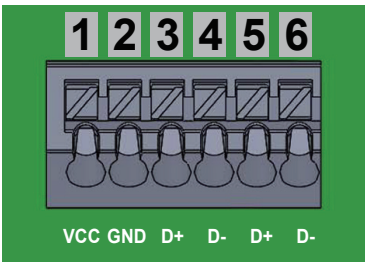
注意



- 為確保良好的通信品質，建議使用絞線之電纜方式配置。

表 3-1: RS-485 端子座說明

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

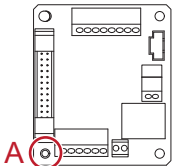
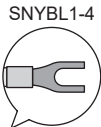
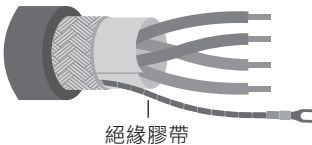
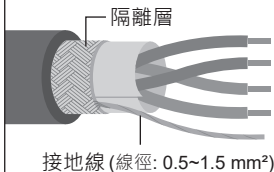


資訊



當RS-485需要接地時，請遵循以下步驟

1. 從隔離層剝出一條接地線(線徑: 0.5~1.5 mm²)，並做適當絕緣防護
2. 將接地線壓接Y端子(建議型號: SNYBL1-4)，並鎖附於下圖 A 處



* 螺絲扭矩值: 0.59 N·m

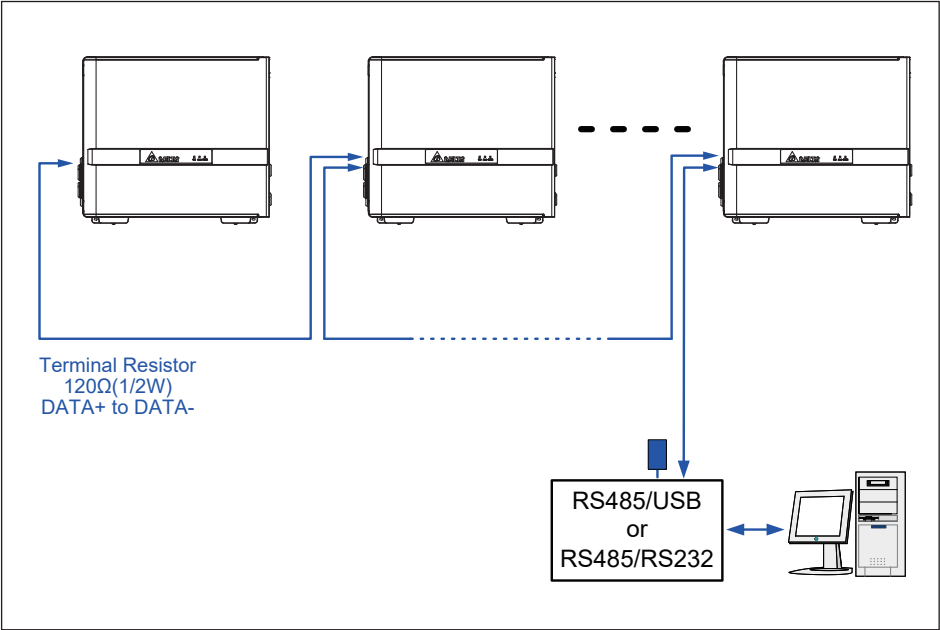


圖 3-23 : 多台併接通訊示意圖

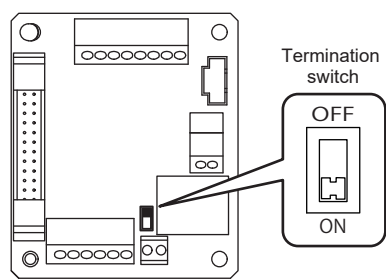


表 3-2 : 終端電阻設定說明

	Switch 1
ON	Terminal Resistor ON
OFF	Terminal Resistor OFF

3.6.2 EPO 緊急關斷功能與數位輸入

本通信模組提供緊急關斷功能(EPO)。
可使用APP或Delta Solar System (DSS)進行設定。

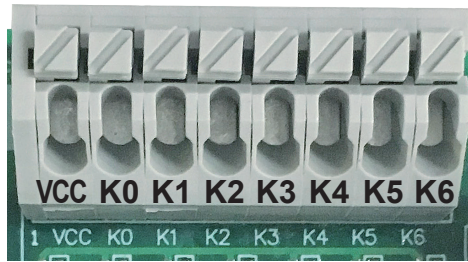


圖 3-24：緊急關斷功能端子座

利用VCC和K0連接，可啟用EPO功能。此外，還可以利用數位輸入功能，進行功率降低控制，限制變頻器的有效輸出功率。此控制設置可依據表3-3 所示的方式，將對應的兩個腳位進行短路來實現。

表 3-3: 數位輸入與EPO功能說明

短路腳位	變流器動作反應
VCC & K0	緊急關斷 (EPO)
VCC & K1	控制至0 % 額定功率
VCC & K2	控制至30 % 額定功率
VCC & K3	控制至60 % 額定功率
VCC & K4	控制至100 % 額定功率
VCC & K5	預留
VCC & K6	預留

3.6.3 乾接點連接說明

M70A_263 提供兩組乾接點端子，可依變流器運行狀態控制外部裝置。該功能的接線端子如下圖所示，圖中標示為兩組乾接點端子位置，乾接點為常開狀態，其動作方式定義，使用者可藉由APP或DSS進行設定。



圖 3-25 : 乾接點連接位置圖

4 試運行

注意：表面高溫，請勿觸碰！



- 當開蓋時請小心表面高溫。
- 表面冷卻前請勿接觸變流器。

4.1 控制面板介紹

M70A_263 提供3顆LED燈號顯示變流器狀態，如圖4-1所示。

LED燈狀態對應表，請參考表 4-1 所示，可利用該表獲得變流器運行狀態資訊。

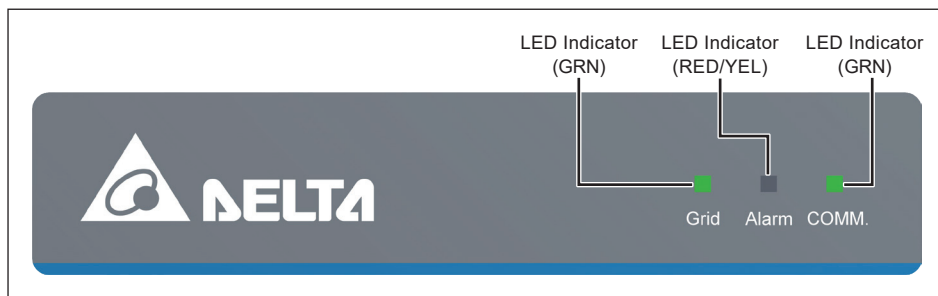


圖 4-1：顯示面板

表 4-1: LED 指示燈

狀況	Grid (綠)	Alarm (紅/黃)
Countdown	FLASH	OFF / OFF
On Grid	ON	OFF / 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
System Lock	OFF	FLASH / FLASH

*FLASH: ON 1s / OFF 1s

FLASH FAST: ON 0.25s / OFF 0.25s

FLASH SLOW: ON 5s / OFF 10s

4.2 單一裝置初始設定-藍牙

內建藍牙功能的變流器可以透過“DeltaSolar”應用程式，以藍牙功能進行單一裝置的初始設定。

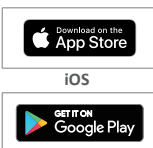
掃描下方二維條碼或是前往App Store (iOS用戶) / Google Play (安卓用戶)搜尋並下載及安裝應用程式。



DeltaSolar
DELTA ELECTRONICS, INC.



二維條碼



安卓系統



適用操作系統版本

iOS: 8.0或以上
安卓系統: 8.0或以上

初始設定步驟 - 藍牙

- ① 開啟行動裝置上的藍牙功能
- ② 點擊應用程式登入頁面右下角的藍牙圖示
- ③ 選擇對應的變流器序號

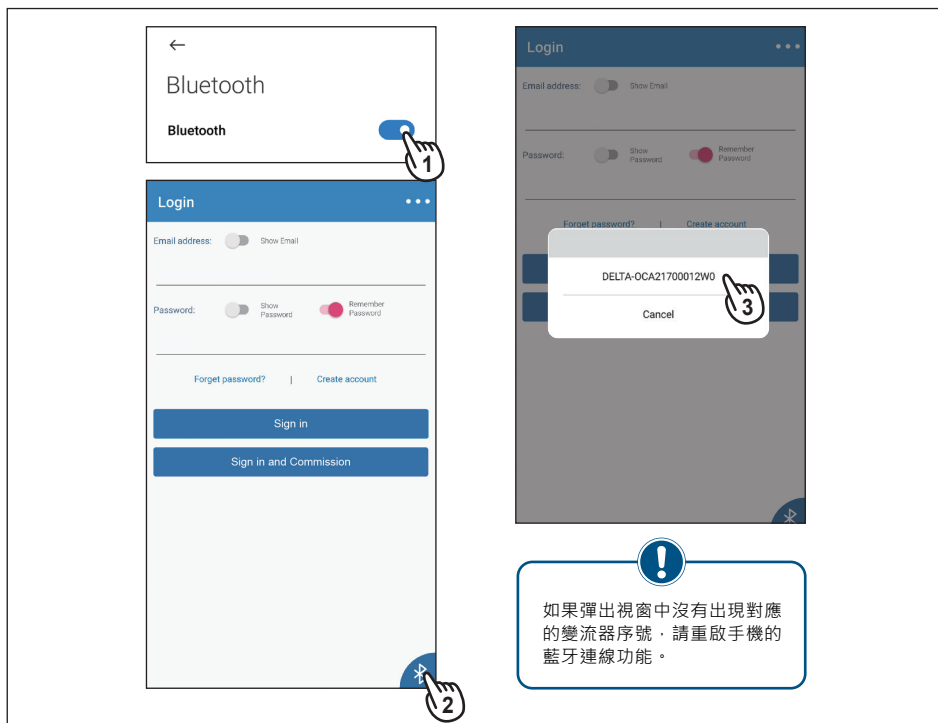


圖 4-2 :初始設定(藍牙) 步驟1-3

- ④ 選取分頁 “Local Setting” 並點擊 “Grid Setting”
- ⑤ 點擊 “Inverter ID” 選擇對應的 ID 後點擊 “Inverter ID Set”
- ⑥ 點擊 “Country” 選擇使用的電網
- ⑦ 完成

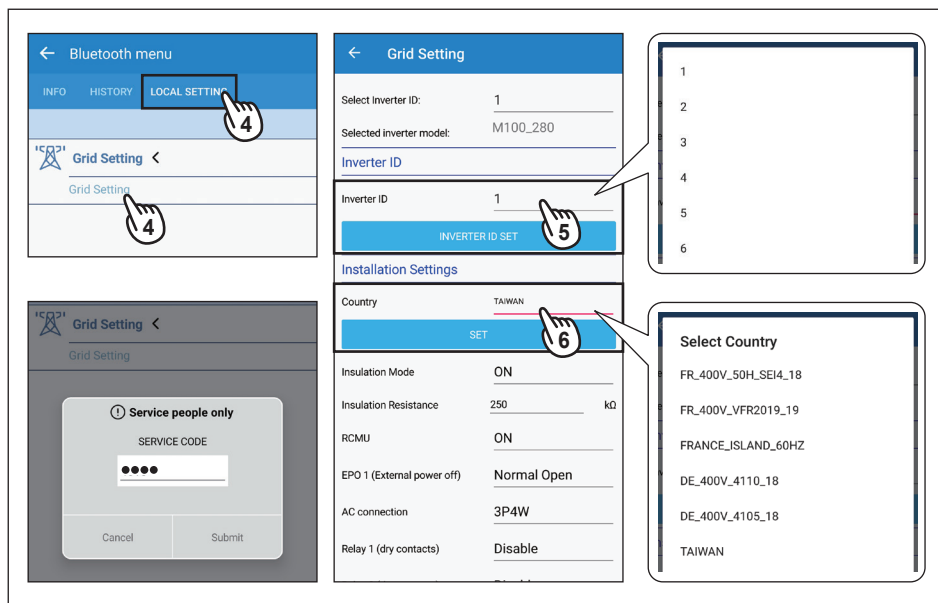


圖 4-3 :初始設定(藍牙) 步驟4-7

NCC

取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

4.3 多台裝置初始設定-Auto ID

透過以下兩種軟體可以使用自動ID設定功能，一次設定所有變流器ID

- DSS (Delta Solar System)

變流器可透過RS485接線連接至電腦，使用DSS進行設定。

- DeltaSolar APP

變流器透過藍牙或DC1連接行動裝置(智慧型手機、平板等)，使用APP進行設定。

4.3.1 DSS連接

- ① 選取欲設定的機種
- ② 點擊 “RS485 ”
- ③ 選取通訊端 (程式自動偵測)
- ④ 點擊 ▶

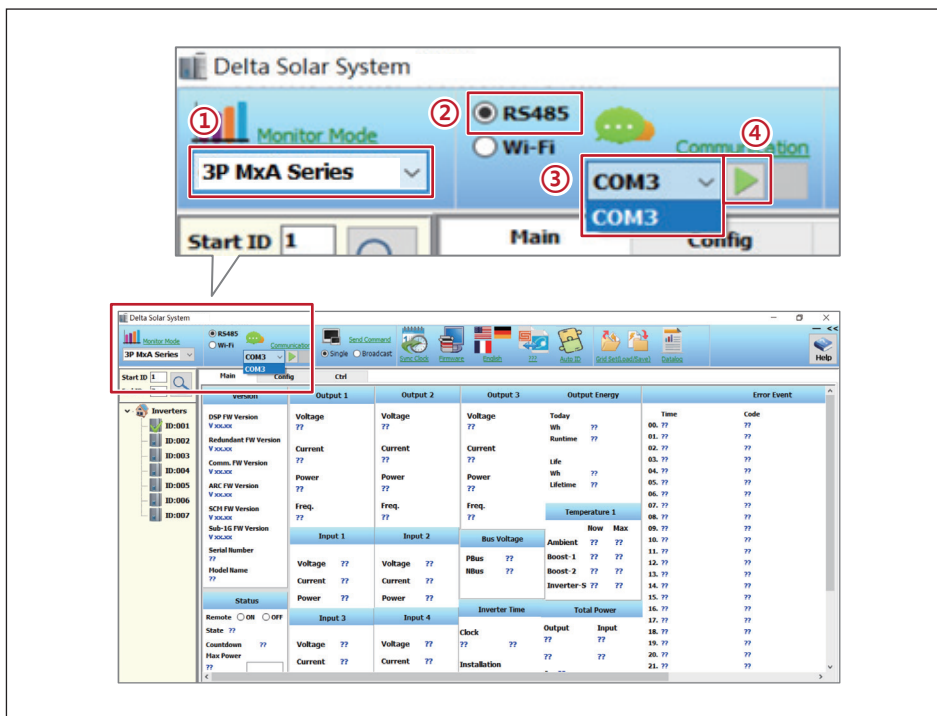


圖 4-4 : DSS連接

4.3.2 掃描變流器

- ① 點擊 “Auto ID” 
- ② 輸入變流器數量
- ③ 點擊 “Scan”

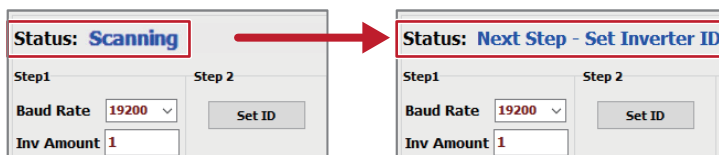
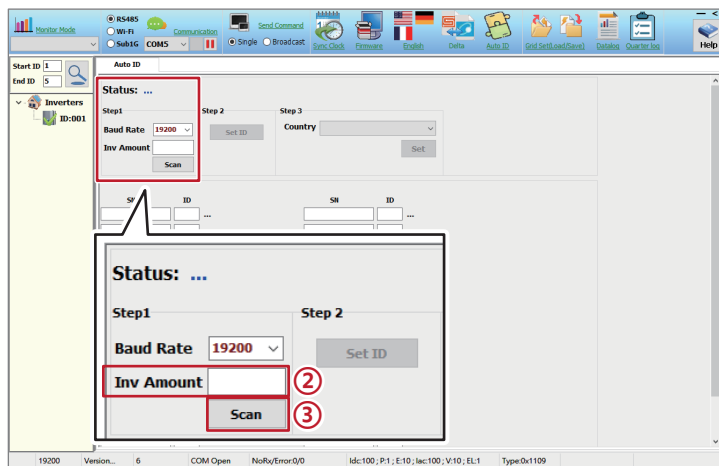


圖 4-5：變流器掃描

4.3.3 ID設定

- ① 被掃描到的裝置將顯示序號及系統預設ID，可以手動變更ID
- ② ID設定完成後點擊“Set ID”

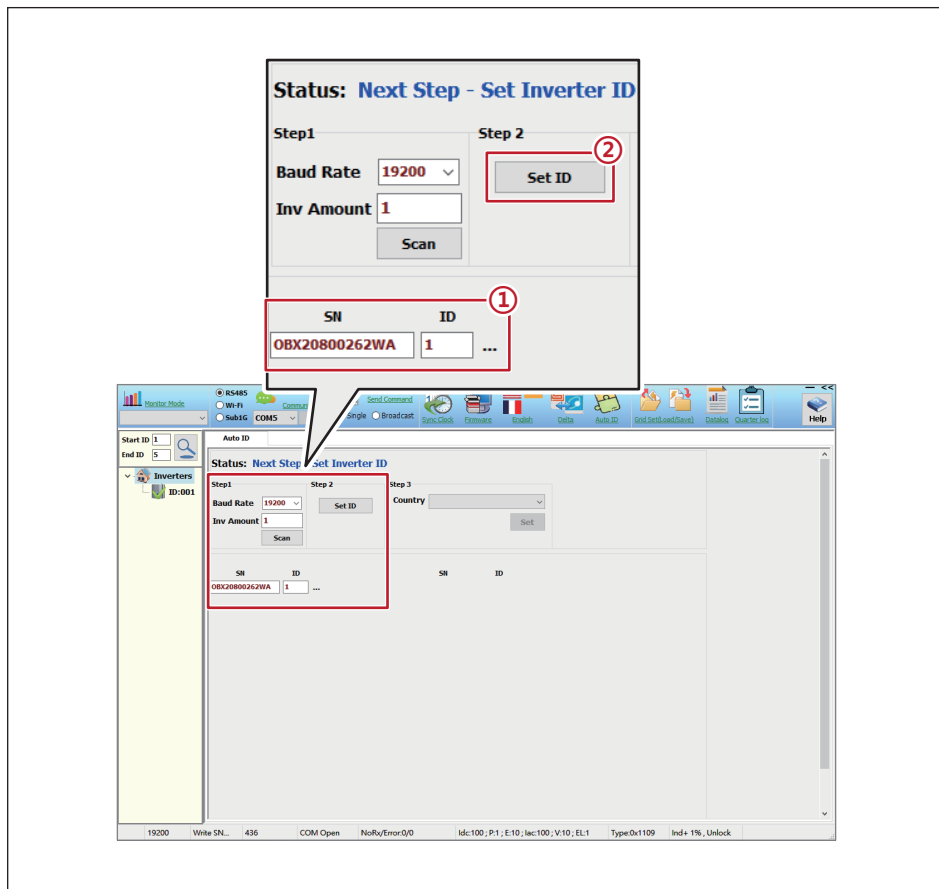


圖 4-6 : ID設定

4.3.4 國別設定

- ① 選取變流器國別
- ② 點擊 “Set”

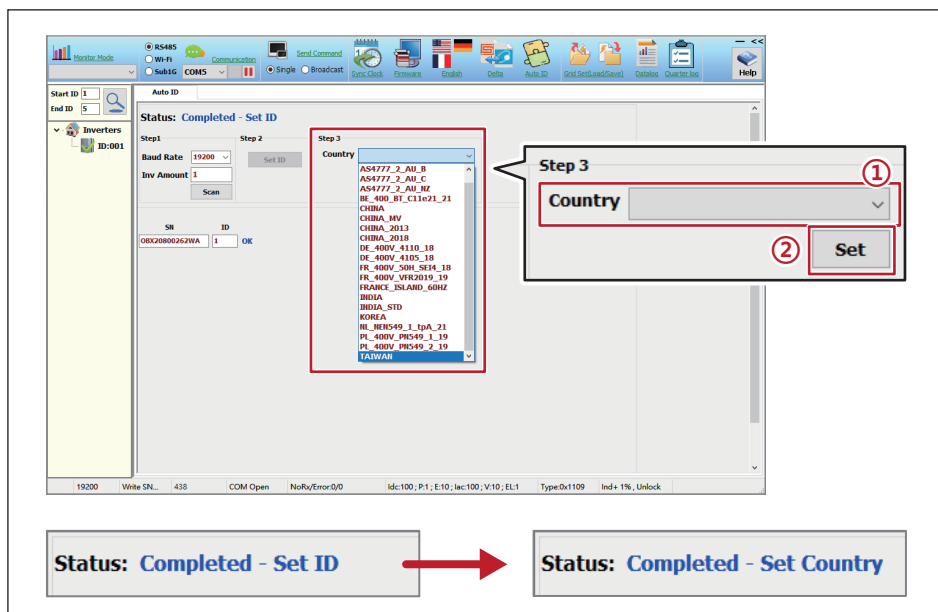


圖 4-7 : 國別設定

4.3.5 時間同步設定

點擊 “Sync Clock” 以同步時間設定

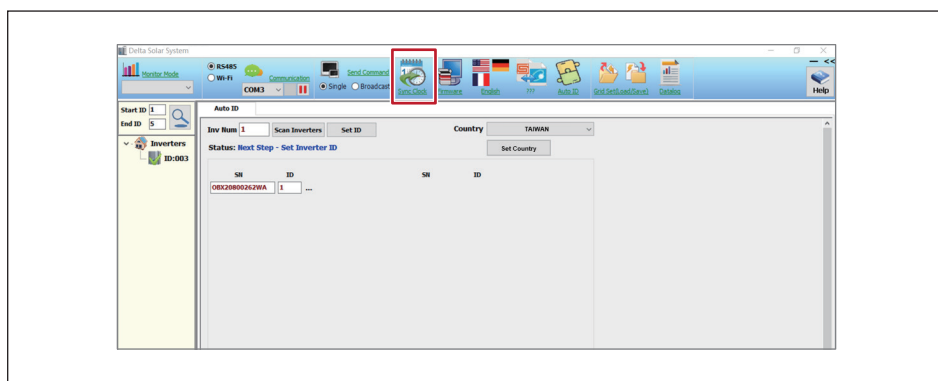


圖 4-8 : 時間同步設定

4.4 Delta功能設定

Delta 提供兩種機器設定方式：

DSS (Delta Solar System Software) 與 APP(MyDeltasolar)

功能列表	
Active power control	Q(U) control (volt-var control)
P-F control (watt-frequecy control)	Q by night(Q setting 24/7)
P(U) control (volt-watt control)	Anti-PID
Fixed cos ϕ	Dry contact
Fixed Q(%)	ARC fault detection
Auto ID	Bluetooth

請掃描下方連結取得使用說明



DSS 操作手冊:

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



APP (DeltaSolar) 操作手冊:

<https://mydeltasolar.deltaww.com/index.php?p=manual>

5 維護

為確保變流器正常運轉，請至少每半年確認一次變流器所有端子與螺絲是否鬆脫、電纜線是否毀損、散熱出風口有無異物阻塞。如有上述情形，請聯絡合格之技術人員進行維修、清理或更換。

危險！



- 進行任何維修動作前，請確定交直流電源皆已切斷以避免觸電危險。
- 在沒有任何雨遮的情況下，請勿在陰雨天氣時打開前蓋。

5.1 開啟與關閉前蓋

為確保變流器正常運行，開啟或關閉前蓋時，請遵守圖5-1步驟。開啟前蓋後，依照圖5-2方式，將前蓋固定。

5.1.1 開啟前蓋

- 若變流器外殼處於潮濕狀態，請擦拭過後再開啟前蓋，以防水氣進入箱體。
- 關閉直流與交流電源並等待LED指示燈熄滅。
- 取出鎖扣外蓋上的板手。
- 鬆開鎖扣外蓋上的螺絲並打開鎖扣外蓋。
- 注意不要污染前蓋上的墊圈和接合表面。

請勿長時間開啟前蓋。

5.1.2 關閉前蓋

關閉前蓋之前注意事項：

1. 確認前蓋門框表面與前蓋防水墊圈清潔，必要時請先擦拭。
2. 確認墊圈在其安裝槽中且定位正確並對齊。

當關閉前蓋時：

1. 反序按照5.1.1的步驟，並鎖定鎖扣外蓋。
2. 將鎖扣外蓋螺絲完全鎖緊至2.45 N·m的扭矩。

配線或開蓋檢查結束後，請將兩個鎖扣都確實扣上，避免機器失去IP66的防護。確實扣緊鎖扣後，請參考圖5-3張貼全新專用資安封條(表2-1 項目8)。

注意



本機已通過標準檢驗局公告之「太陽光電變流器及監視單元資安檢測技術規範」，請於變流器通訊模組安裝完畢並確實扣緊鎖扣後，張貼資安封條，如未確實張貼而因此導致資安事件，則本公司概不負責。

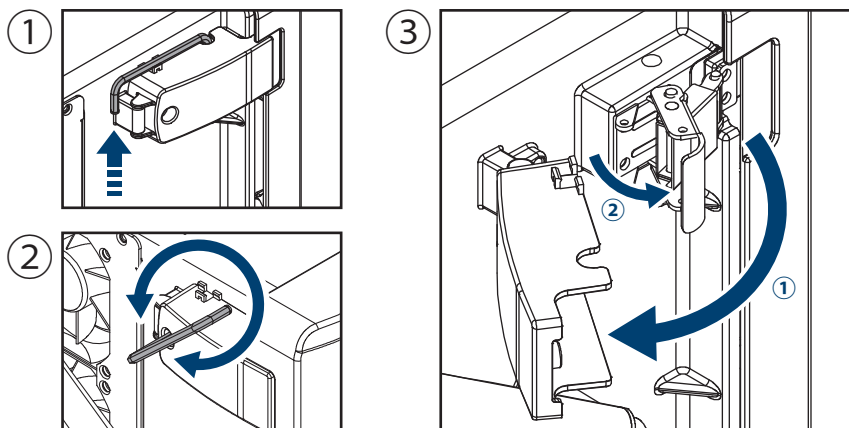
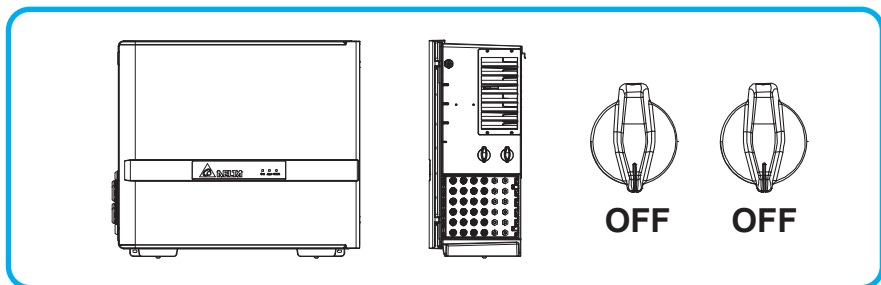
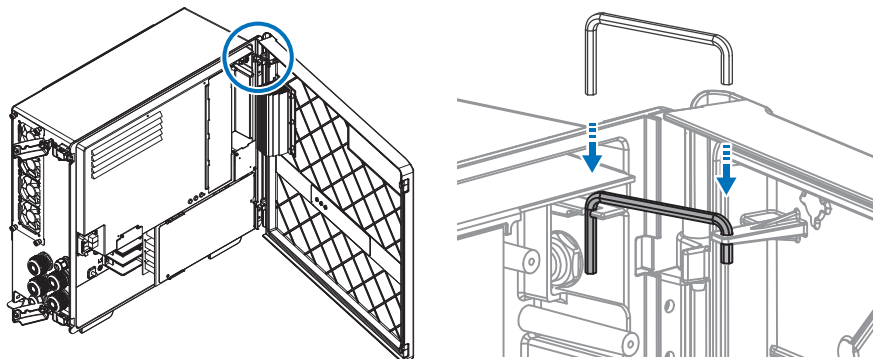


圖 5-1：開啟與關閉前蓋



注意



- 開啟前蓋後，請利用板手將前蓋進行固定，避免因為強風導致前蓋搖晃。

圖 5-2：利用板手將前蓋進行固定

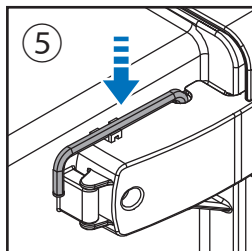
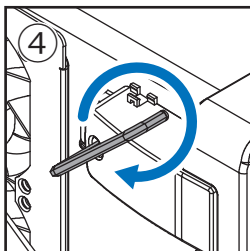
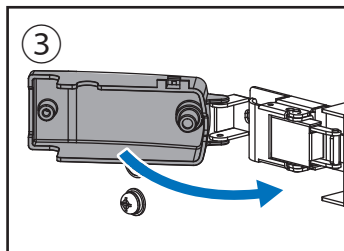
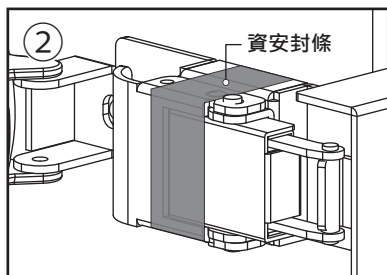
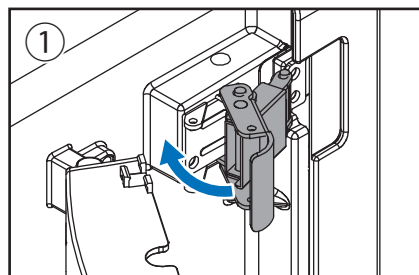


圖 5-3：資安封條黏貼

5.2 更換雷擊保護裝置 (SPD)

交流與直流側的雷擊保護裝置 (SPD) ，如圖5-4所示 。

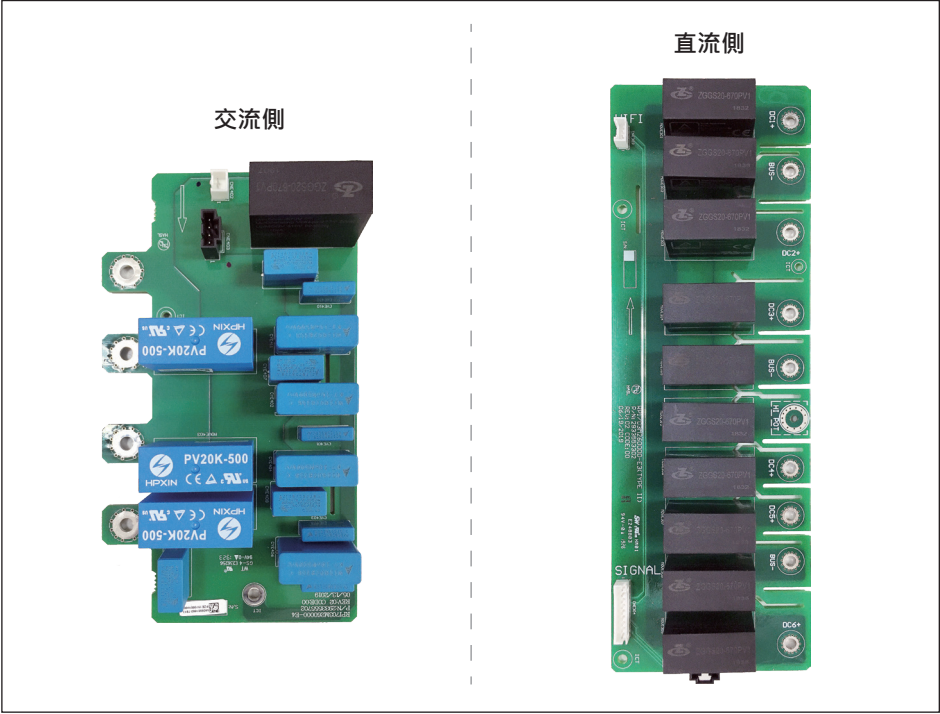


圖 5-4 : 交流與直流側的雷擊保護裝置

雷擊保護裝置是為了保護較為敏感的電路元件，避免當其受到雷擊或電壓驟變時損壞。

雷擊保護電路位於變流器內部，當APP或DSS 故障訊息出現 " AC Surge" 或 "DC Surge" 時，請按照下頁順序進行更換。

請參考圖5-5 所示，依據LED燈號進一步判斷SPD 損壞與否。



圖 5-5 : SPD故障時的面板顯示

- 開啟前蓋步驟
 1. 將直流與交流電源關閉，並等待LED 燈號熄滅。
 2. 遵照5.1.1章節順序開啟前蓋，施工時請勿長時間開啟前蓋。
- 依據以下順序更換SPD模組：

交流與直流雷擊保護器位置如圖5-6 所示。

• 更換異常的AC SPD模組

1. 旋鬆A蓋板上的4顆具防脫落功能的螺絲。(螺絲扭矩值: 0.8 N·m)
2. 從AC SPD電路板上拆下2條信號排線。(4pinx1 ,2pinx1)
3. 拆下AC SPD電路板連接到AC端子的4顆防脫落螺絲。
4. 拆下電路板右側和左側的2顆防脫落螺絲。
5. 取下異常AC SPD電路板並更換新模組。
6. 按反順序使用上述步驟安裝新的AC SPD。

將6個螺絲鎖緊至扭矩值如圖5-7所示。

• 更換異常的DC SPD模組

1. 取下B蓋板。
2. 取下DC SPD電路板上的Signal，FAN與Wi-Fi(選配)信號排線。
3. 拆下DC SPD電路板上的A與G的防脫落螺絲。
4. 取下異常DC SPD電路板並更換新模組。
5. 按反順序使用上述步驟安裝新的DC SPD。

將12個螺絲鎖緊至扭矩值如圖5-8所示。

注意

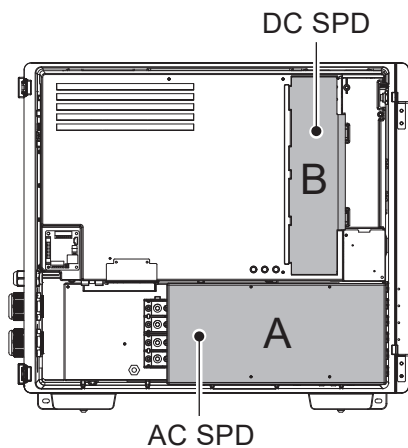


- 鬆開防脫落螺絲時可能造成銅柱鬆動，重新安裝SPD前請確保銅柱已牢固擰緊。

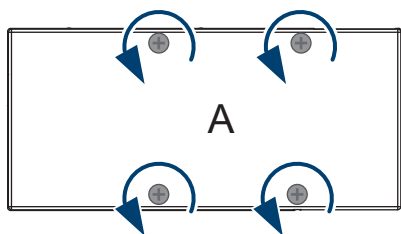
- 關上前蓋

請依據5.1.2 章節說明，關閉前蓋。

1



2



* 螺絲扭矩值:
 $0.8 \text{ N} \cdot \text{m}$



鎖附前，請先使用手動預鎖。

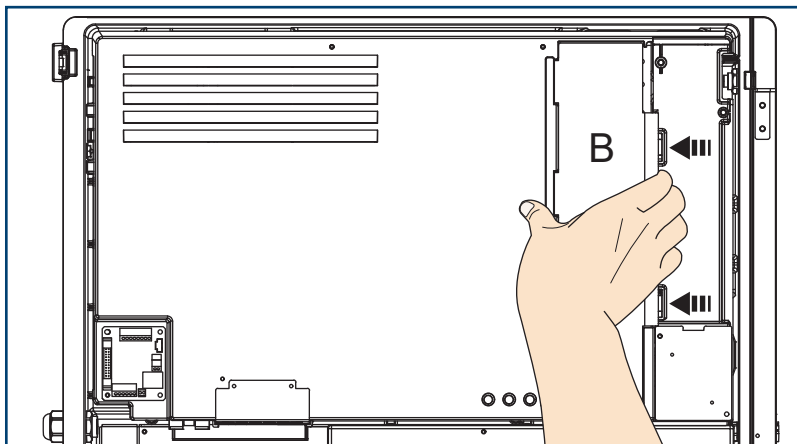


圖 5-6：SPD更換步驟

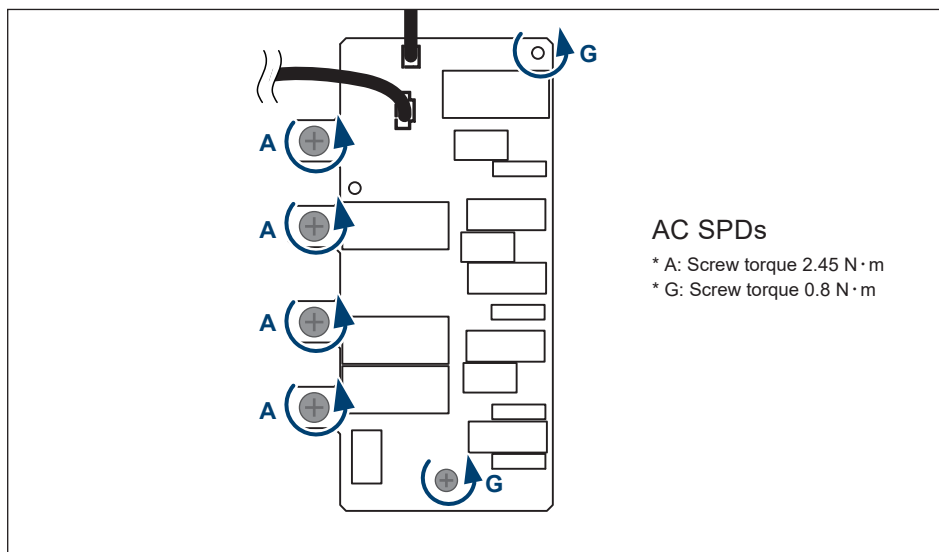


圖 5-7 : 移除AC SPD 螺絲與排線

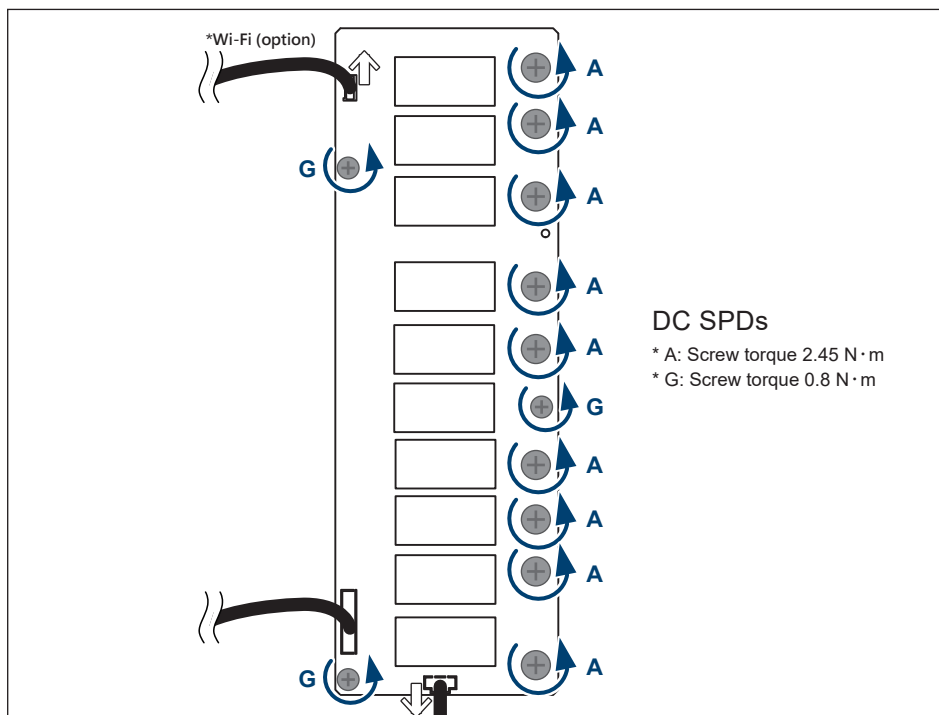
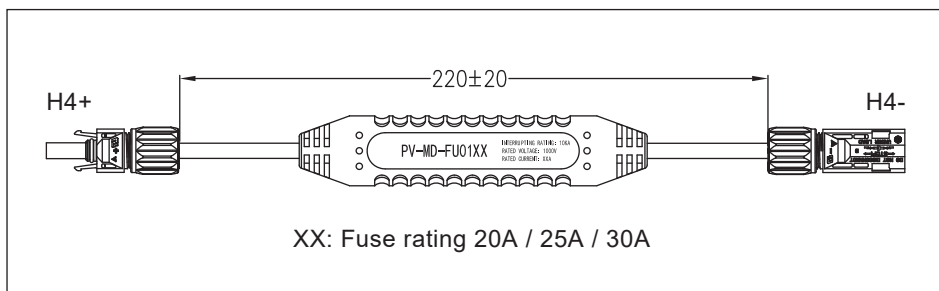


圖 5-8 : 移除DC SPD 螺絲與排線

5.3 外接式保險絲

請視當地法規要求與否，聯繫客服人員安裝外接式保險絲。



5.4 智慧風扇更換與濾網清潔

M70A_263 提供具可控型的智慧風扇冷卻變流器系統，此章節中說明濾網清潔與組裝，以及在案場中更換風扇得方式說明。

此風扇模組具有高可靠度，並且結合控制器提供一個"智能化"的長效型冷卻系統。當控制器偵測到風扇系統異常時，會產生"FAN-FAIL"的故障警報，此時變流器會在安全的運作範圍內進行降載運作。

依據功能性不同，變流器所使用的風扇安裝於兩個位置：

- 功率模組部位
- 變流器內部位置

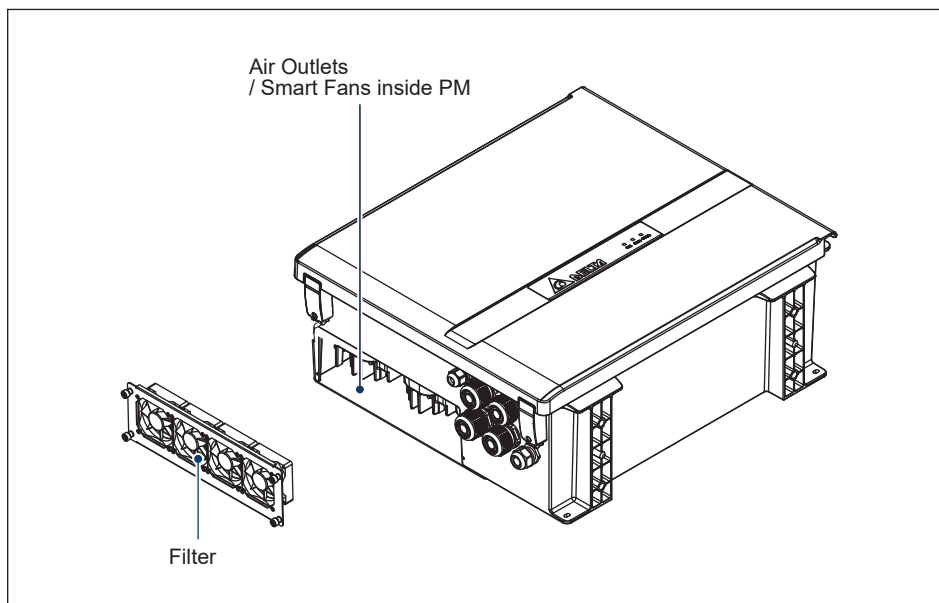


圖 5-9：功率模組之智能型風扇位置

注意



需要定期的將風扇和過濾器清潔，以確保長壽命和可靠性。

- 風扇及濾網清潔頻率由當地環境決定。
- 正常環境條件使用下，每四個月需清潔風扇及濾網一次。
- 若安裝於嚴苛環境，建議每個月或每一季需清潔風扇及濾網一次。

因該冷卻系統採用模組化設計，因此具有易清潔與易維護更換的特性。

警告！

- 在開始任何維護程序之前，請將交流斷路器和直流開關關閉以避免電擊危險！

5.4.1 功率模組專用風扇

變流器電子設備主要是利用對流進行冷卻。

而主要的功率元件則必須利用變流器後方的風扇組進行散熱，藉由隔離的配置將熱量透過散熱鰭片通過空氣流動達到散熱的功能。

功率模組使用的風扇組，採用風扇架將四顆風扇進行模組化，同時可進行全速運轉亦可進行轉速調節；當變流器在額定輸出且高溫狀態，風扇將以全速運轉，當風扇故障時，變流器發電狀態則進入降載模式運行。同時在風扇組的入風與出風口處，均有濾網進行保護。

請參閱圖5-10並按照下面列出的步驟操作：

1. 卸下入風口過濾網外蓋的四顆螺絲。

此步驟進行後，同時確認過濾網狀態，必要時進行清潔。

進行風扇維護時，請繼續執行以下步驟。

2. 取下每個風扇電源排線。(要釋放卡扣，請從兩側按位置A和位置B。)
3. 從機箱中取出風扇托盤。

要單獨拆卸風扇時，請卸下其固定到風扇托架的四顆螺釘。

重新安裝風扇架時，請按照上述步驟的順序重新組裝並鎖緊螺絲。

扭矩值如圖5-10所示。

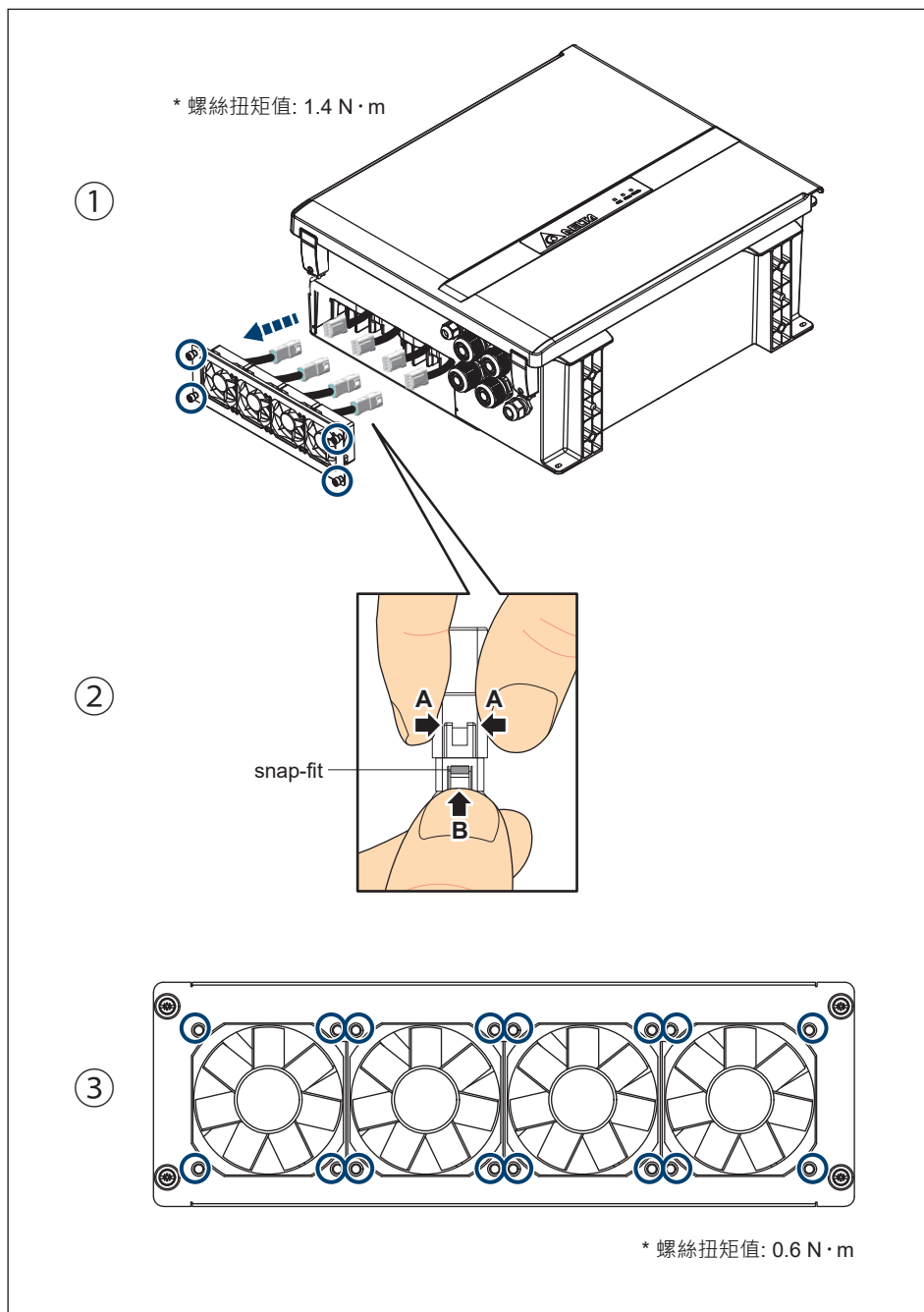


圖 5-10: 風扇架拆卸示意圖

5.4.2 內部風扇1

拆裝內部風扇1步驟

- (1) 拆下B蓋。
- (2) 鬆開圖5-11中所示的兩顆防脫落螺絲，然後拆下風扇架。
- (3) 取下DC SPD板上的電源連接排線。
- (4) 取下風扇組件。(如圖5-12所示)
- (5) 清潔風扇組件或更換新風扇。(如圖5-13所示)
- (6) 使用0.8N·m的扭矩重新組裝。

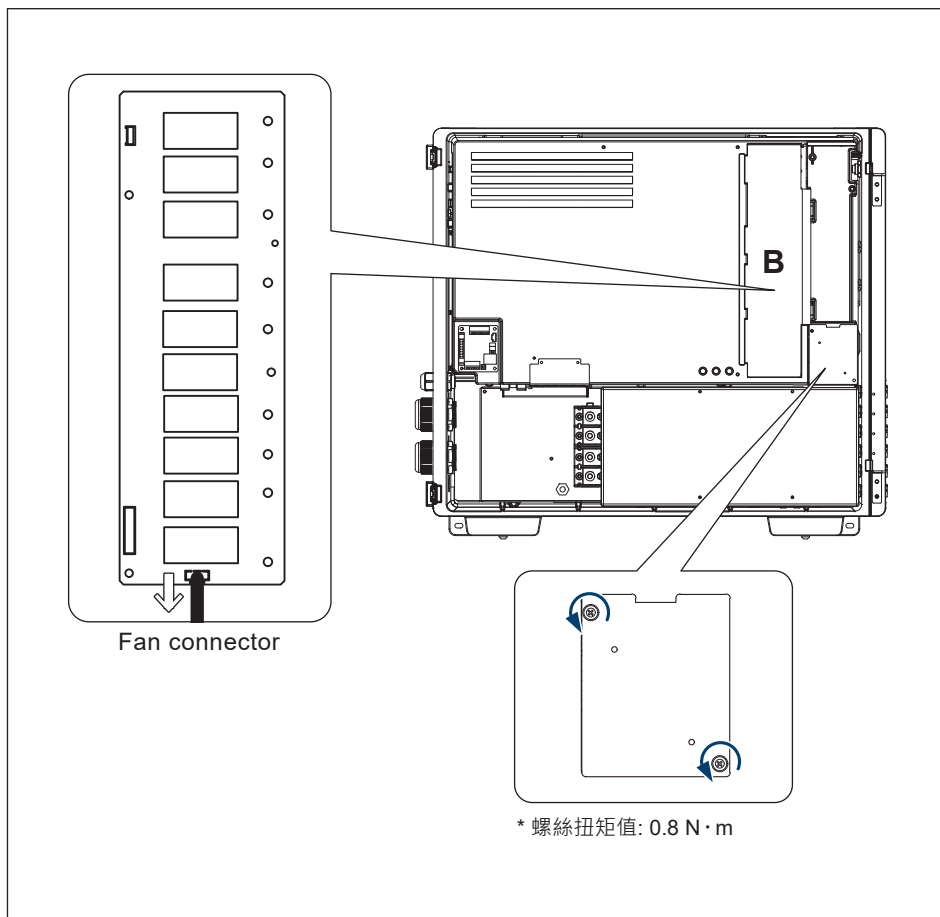
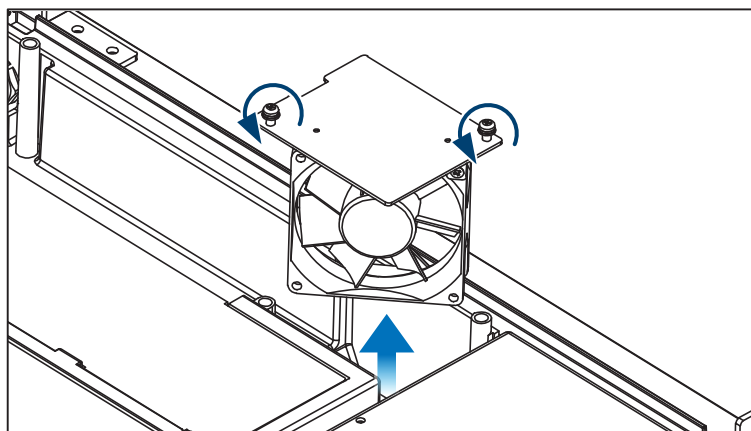
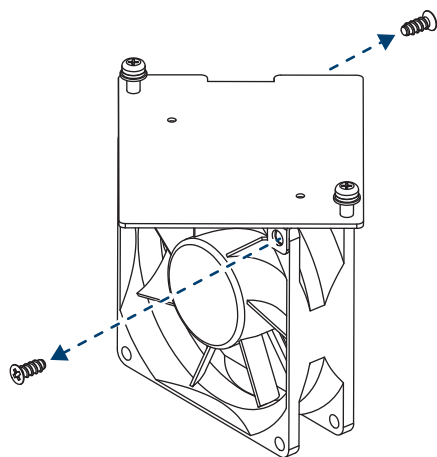


圖 5-11：內部風扇1 位置與拆裝示意圖



* 螺絲扭矩值: $0.8 \text{ N} \cdot \text{m}$

圖 5-12 : 取下內部風扇1示意圖



* 螺絲扭矩值: $0.6 \text{ N} \cdot \text{m}$

圖 5-13 : 更換風扇示意圖

5.4.3 內部風扇2

拆裝內部風扇2步驟

- (1) 鬆開圖5-14中所示的兩顆防脫落螺絲，然後拆下風扇架。
- (2) 取下通訊板上的電源連接排線。
- (3) 取下風扇組件。(如圖5-15所示)
- (4) 清潔風扇組件或更換新風扇。(如圖5-16所示)
- (5) 使用 $0.8\text{ N}\cdot\text{m}$ 的扭矩重新組裝。

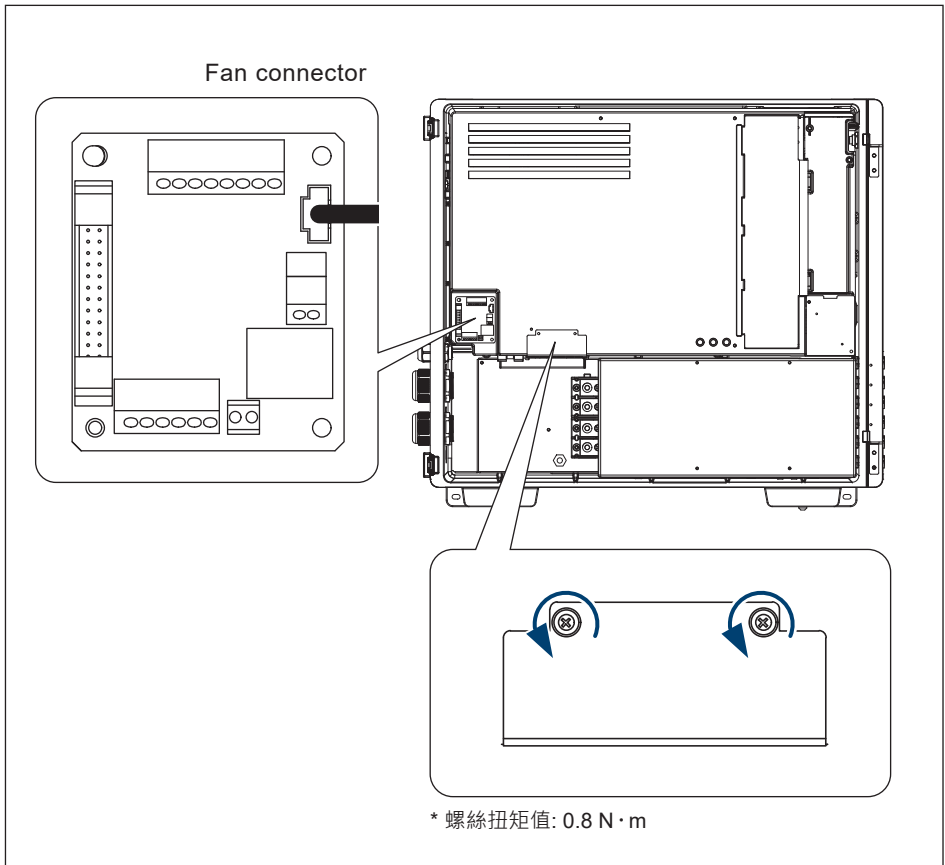


圖 5-14：內部風扇2 位置與拆裝示意圖

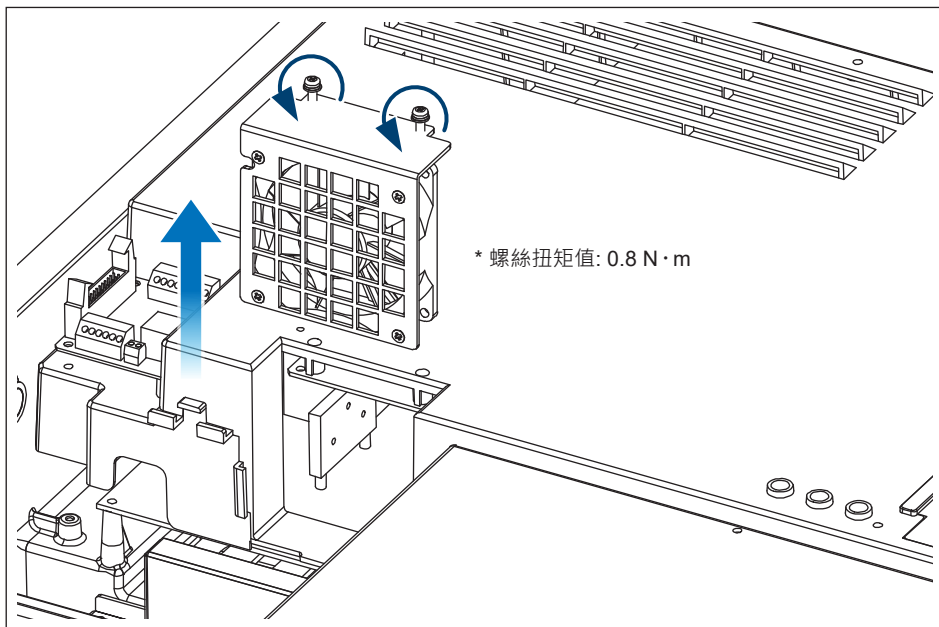


圖 5-15：取下內部風扇2示意圖

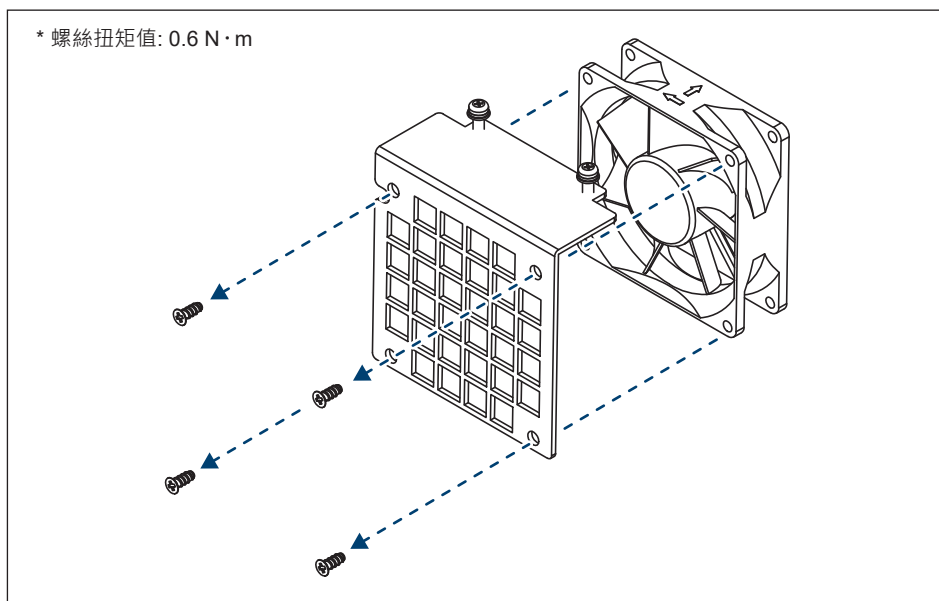


圖 5-16：更換風扇示意圖

5.5 終止運轉

當機器需要停止運轉進行維護或保存時，請依照下面指示進行。

危險:觸電危險!!



- 為避免嚴重傷亡，請依照下列步驟進行。

- 關斷外部AC斷路器或開關確認與市電解離。
- 關閉兩組DC開關。
- 使用H4端子專用工具移除光伏模組之直流輸入H4端子，由於移除作業時，不可處於帶電狀態，因此務必確認直流開關必須為OFF，且無直流電流狀態。

■ RS-485 Communication module

1. 切離與通訊板連接的所有通訊線路。
2. 從通訊板組件上拆下接線。

注意: 表面高溫 請勿觸碰 !



- 變流器剛中斷時，請注意表面高溫。
- 直到表面降至適當溫度前，請勿碰觸變流器。

注意: 可能造成傷害 !



- M70A_263重達 69 公斤。
- 若在搬運或從壁掛架拆卸過程中意外掉落可能造成傷害。
- 操作人員應配戴手套並穩固變流器底座以防止受傷。

注意



- 螺絲螺帽移除後請留意，切勿將他們遺漏於機器內。

6 錯誤告警及排除問題

台達致力於打造高可靠標準的電子產品，若出現變流器無法正常動作的情況時，請使用故障排除指南 (表6-1~6-4) 中的說明，進行故障排除；若經過排除後仍無法解決問題，請聯繫客服中心尋求技術協助。

6.1 錯誤訊息(配置端故障)

表 6-1A: 錯誤訊息 (配置端故障)

資訊顯示	可能原因	故障排除
AC Freq High (E01)	市電頻率過高	1. 檢查變流器端的市電頻率 2. 檢查國家與電網設定
AC Freq Low (E02)	市電頻率過低	
Island (E03,E04,E05)	市電中斷	檢查AC 斷路器
AC phase jump (E06)	市電相位異常	當重複發生時，請聯繫客服人員，尋求技術支援
Grid Quality (E07)	在電網或靠近變流器附近非線性的負載	當重複發生時，請聯繫客服人員，尋求技術支援
AC phase abnormal (E08)	AC端連接錯誤	檢查AC連接，必須和使用手冊一致
No Grid (E09)	1. AC 斷路器跳開 2. AC 接頭未正確連接	1. 斷開AC 斷路器 2. 檢查連接AC接頭並確認其連接至變流器
AC Volt Low (E10)	1. 市電電壓過低 2. 電網設定錯誤 3. AC端連接錯誤	1. 檢查市電與變流器端的連接 2. 檢查國家或電網設定 3. 檢查AC接頭連接
AC Volt High (E11)	1. 市電電壓過高 2. 電網設定錯誤	
EPO (E25)	緊急關斷按鈕被啟動	請解除EPO按鈕
DC Volt High (E30)	輸入電壓超過 1000Vdc	修正solar array設定並使得Voc小於1000Vdc
Insulation Fault (E34)	太陽能模組與接地間發生隔離阻抗問題	1. 檢查太陽能模組接地是否確實 2. 檢查變流器接地是否確實 3. 檢查直流斷路器是否受潮
Remote OFF (E36)	外部通訊執行遠端關機	請檢查外部通訊Remote OFF設定

6.2 故障代碼(變流器故障)

表 6-2A: 錯誤訊息 (變流器故障)

資訊顯示	可能原因	故障排除
DC Injection (F01,F02,F03,F04)	市電波形異常	請聯繫客服人員，尋求技術支援
Temperature High (F05)	變流器內部環溫或功率模組溫度過高	檢查設備的周遭和環境
Amb Temp Fault (F06)	功率模組溫度偵測電路異常	請聯繫客服人員，尋求技術支援
Temperature Low (F07)	變流器內部環溫或功率模組溫度過低	檢查設備的周遭和環境
Boost Temp Fault (F08)	功率模組溫度偵測電路異常	請聯繫客服人員，尋求技術支援
Bidir. Temp Fault (F09)	功率模組溫度偵測電路異常	請聯繫客服人員，尋求技術支援
Inveter Temp Fault (F10)	功率模組溫度偵測電路異常	請聯繫客服人員，尋求技術支援
AC RLY Fault (F13)	1. 繼電器驅動電路異常 2. 繼電器異常	請聯繫客服人員，尋求技術支援
FW Unmatch (F14)	韌體不相容	請聯繫客服人員，尋求技術支援
AC Sensor Fault (F15)	輔助電源電路異常	1. 請確認直流端子極性(當同時出現W08時) 2. 請聯繫客服人員，尋求技術支援
Vdc Sensor Fault (F16)	輔助電源電路異常	請聯繫客服人員，尋求技術支援
Idc Sensor Fault (F17)	輔助電源電路異常	1. 請確認直流端子極性(當同時出現W08時) 2. 請聯繫客服人員，尋求技術支援
AC Sensor Fault (F18)	輔助電源電路異常	1. 請確認直流端子極性(當同時出現W08時) 2. 請聯繫客服人員，尋求技術支援
Idc Sensor Fault (F19)	輔助電源電路異常	請聯繫客服人員，尋求技術支援
Red COMM Fault (F22)	變流器內部通訊異常	請聯繫客服人員，尋求技術支援
DSP COMM Fault (F23)	變流器內部通訊斷線	請聯繫客服人員，尋求技術支援

表 6-2B: 錯誤訊息 (變流器故障)

資訊顯示	可能原因	故障排除
Ground Cur. High (F24)	太陽能模組與接地隔離阻抗異常	1. 檢查輸入端的絕緣 2. 請聯繫客服人員，尋求技術支援
Iac Unbalance (F26)	1. 變流器內部的電源線未連接 2. 電流回授電路無效	檢查AC接頭連接
RCMU Fault (F27)	RCMU連接中斷	請聯繫客服人員，尋求技術支援
AC RLY Short (F28)	AC 繼電器短路	請確認端子座配線與市電端配線是否正確
AC RLY Open (F29)	AC 繼電器開路	請聯繫客服人員，尋求技術支援
Bus Unbalance (F30)	變流器內部直流電壓不平衡	重新啟斷DC開關
Bus Voltage High (F31, F32, F33, F34, F35)	Bus 電容電壓過高	1. 請重新啟動DC開關 2. 修正太陽能板設定，並使得Voc 小於 1000Vdc (當同時出現E30時)
AC Current High (F36, F37, F38, F39, F40, F41)	操作期間突波發生	請聯繫客服人員，尋求技術支援
AC CT Fault (F42)	交流側R相電流感測器異常	請聯繫客服人員，尋求技術支援
AC CT Fault (F43)	交流側S相電流感測器異常	請聯繫客服人員，尋求技術支援
AC CT Fault (F44)	交流側T相電流感測器異常	請聯繫客服人員，尋求技術支援
AC Current High (F45)	交流電流輸出過大	重新啟斷DC開關
ZC Circuit Fault (F50)	相位偵測電路異常	請聯繫客服人員，尋求技術支援
Inv Circuit Fault (F51)	電壓轉換電路異常	請聯繫客服人員，尋求技術支援
Boost Circuit Fault (F52)	升壓電路異常	請聯繫客服人員，尋求技術支援
Arc Circuit Fault (F58)	1. 電弧偵測硬體異常 2. 電弧偵測測試異常	請檢查電弧偵測電路，確認接線正確
Arc Fault (F59)	變流器偵測到電弧異常	1. 請檢查直流側接線有無異常或毀損 2. 更換直流側接線並到DSS解除ARC鎖機狀態 3. 請聯繫客服人員，尋求技術支援

表 6-2C: 錯誤訊息 (變流器故障)

資訊顯示	可能原因	故障排除
DC Current High (F60,F61,F70,F71)	直流端過電流保護	重新啟斷DC開關
Ext COMM. Fault (F74)	外部通訊異常	1. 請檢查外部通訊接線是否異常 2. 請聯繫客服人員，尋求技術支援

6.3 警告代碼(配置端警告)

表 6-3A: 警告代碼 (配置端警告)

資訊顯示	可能原因	故障排除
De-rating (W07)	1. 本體及環境溫度過高 2. 實功率限制功能作動 3. P-F功能作動 4. P(V) 功能作動 5. 市電電壓過低 6. 輸入電壓過低 7. 輸入電壓過高 8. 爬升功能	1. 確認安裝機器本體及環境溫度 2. 確認國別及最大功率限制參數設定 3. 確認市電頻率是否異常 4. 確認市電電壓是否異常 5-1. 確認市電電壓是否異常 5-2. 確認虛功控制功能設定 6. 確認PV panel輸入電壓是否過低 7. 確認PV panel輸入電壓是否過高 8. 確認爬升功能設定
String fault (W08)	1. 直流端子極性錯誤 2. 太陽能組串不匹配 3. 組串電流偵測電路異常	1. 確認直流端子極性 2. 確認PV panel各組串的開路電壓是否異常 3. 請重開直流開關與交流斷路器 4. 請聯繫客服人員，尋求技術支援
String Current Low (W23)	DC端子連接異常	1. 請檢查直流配線與保險絲 2. 請聯繫客服人員，尋求技術支援

6.4 警告代碼(變流器警告)

表 6-4A: 警告代碼 (變流器警告)

資訊顯示	可能原因	故障排除
Fan Fail (W11)	1. 一個或多個風扇鎖死 2. 一個或多個風扇無效 3. 一個或多個風扇未連接	請聯繫客服人員，尋求技術支援
DC SPD Fault (W17) AC SPD Fault (W18)	一個或多個DC/AC SPD 無效	1. 檢查DC/AC SPD的連接線 2. 更換DC/AC SPD板
Aux Power Fault (W19)	Aux power異常	請聯繫客服人員，尋求技術支援
Boost Circuit Fault (W30)	升壓電路異常	請聯繫客服人員，尋求技術支援

7 技術資料

表 7-1A: 規格

Model	M70A_263
直流輸入	
最大輸入電壓	1000 V *1
工作電壓範圍	200 - 1000 V
MPP 電壓範圍 (全功率)	460 - 800 V *2
啟動電壓	> 250 V
額定電壓	600 V
最大輸入電流	Each MPPT *3: 26 A, Total: 156 A
最大輸入功率	Each MPPT: 15.7 kW
允許最大短路電流	50 A / MPPT
MPP 追蹤	6
接頭種類	2 strings / MPPT (無須保險絲) Amphenol H4 Connector
直流開關	內建
電流監控	內建
電弧偵測功能	內建
保護	Type II SPD (內建) ; Type I+II SPD (選配)
交流輸出	
額定輸出功率	70 kW
最大輸出功率	77kVA *4 (77kW when PF=1)
最大輸出電流	111.6 A
額定輸出電壓	220 / 380V, 230 / 400V (3Ø3W or 3Ø4W)
工作電壓範圍	80% to 130% of Nominal AC Voltage
工作頻率範圍	50 / 60 Hz ± 5Hz
功率因數	0.8 ind - 0.8 cap (Adjustable)
保護	Type II SPD (內建) ; Type I+II SPD (選配)
T.H.D	< 3%
夜間耗電 *5	< 3.5 W

*1 The max withstand voltage is 1100V/dc. (inverter stop output when input is over 1000Vdc)

*2 AC 400V - Ambient < 35°C: 460 - 900V ; Ambient < 40°C: 460 - 800V ; Ambient < 50°C: 520 - 720V
AC 380V - Ambient < 35°C: 490 - 820V ; Ambient < 40°C: 490 - 800V ; Ambient < 50°C: 520 - 720V

*3 Model for korea: Idc max. /string =16A

*4 Ambient < 40°C

*5 Night time consumption with standby communication.

表 7-1B: 規格	
Model	M70A_263
效率	
最高效率	98.8 %
歐洲效率	98.4 %
資訊	
通訊介面	RS-485 / 藍牙
規範認證	
	VDE-AR-N 4110 VDE-AR-N 4105 VDE 0124-100 NB/T 32004: 2018 GB/T 19964: LVRT IEC 62109-1/-2 EN 61000-6-2 EN 61000-6-3 CNS 15382
一般數據	
操作溫度範圍	-25 to +60°C (Derating Above 50°C)
防水防塵等級	IP66
操作海拔範圍	< 4000 m
冷卻模式	Smart fan air cooling
噪音	67.3 dBA @1m, Amb25°C
尺寸 (W x H x D)	699 x 629 x 264 mm
重量	69 kg

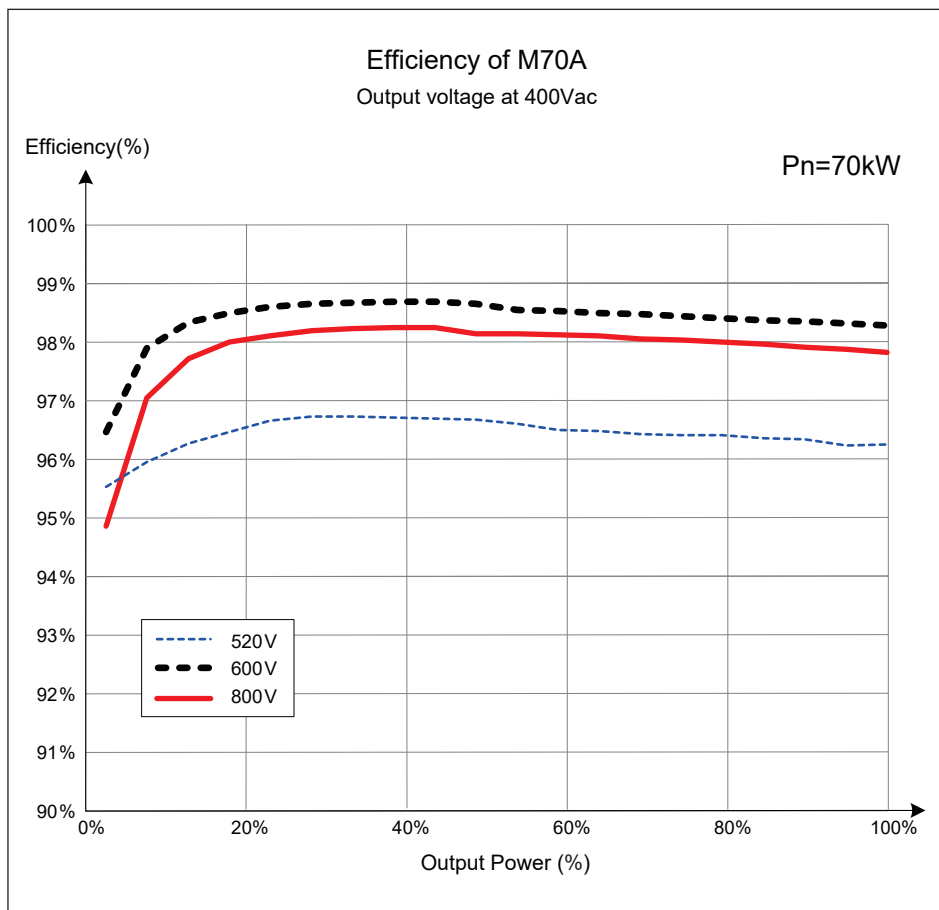


圖 7-1: 效率曲線圖

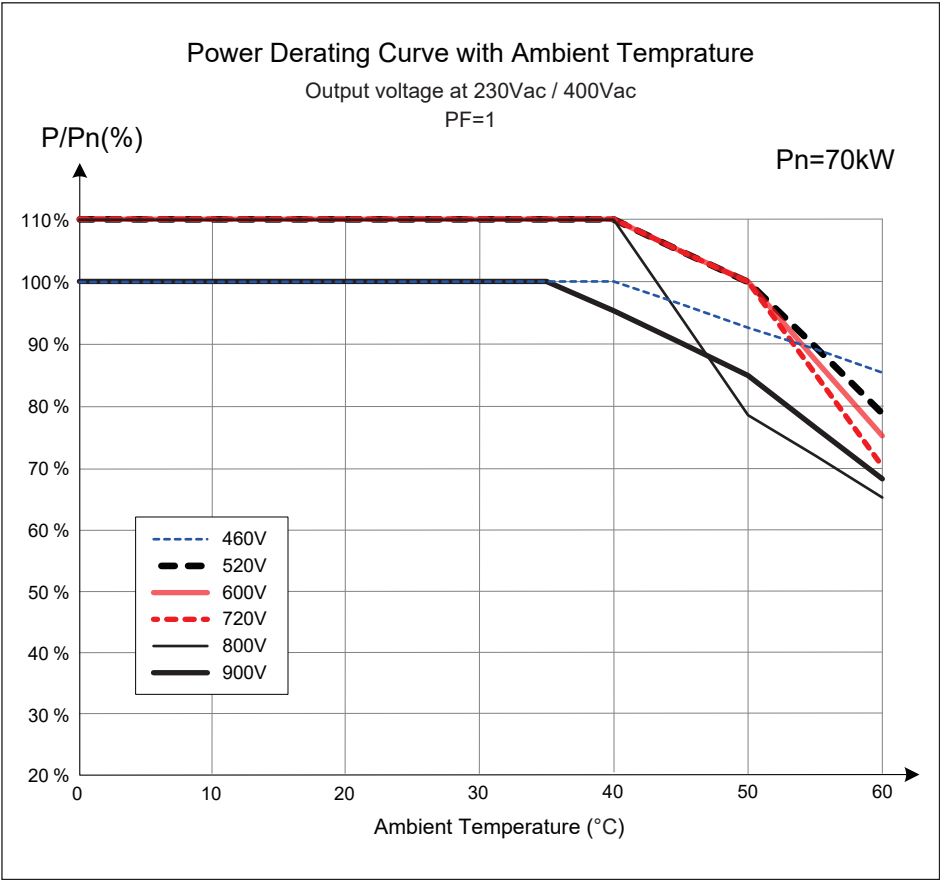


圖 7-2: 環溫對應降額曲線圖(PF=1)

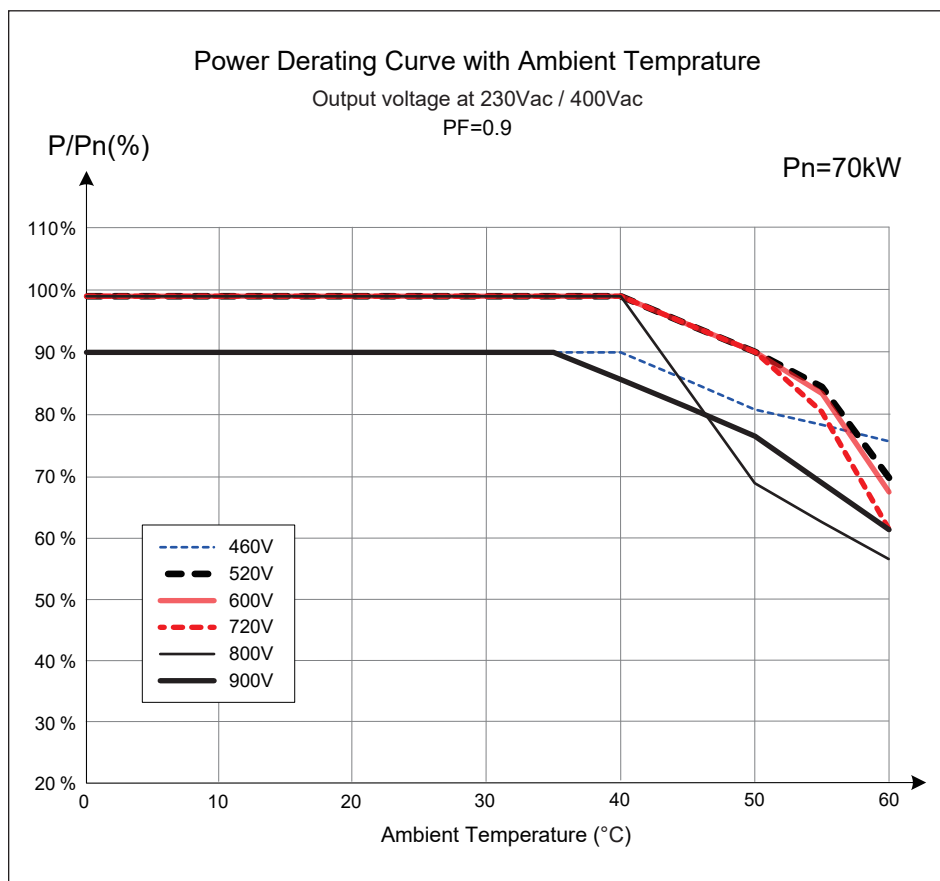


圖 7-3: 環溫對應降額曲線圖(PF=0.9)

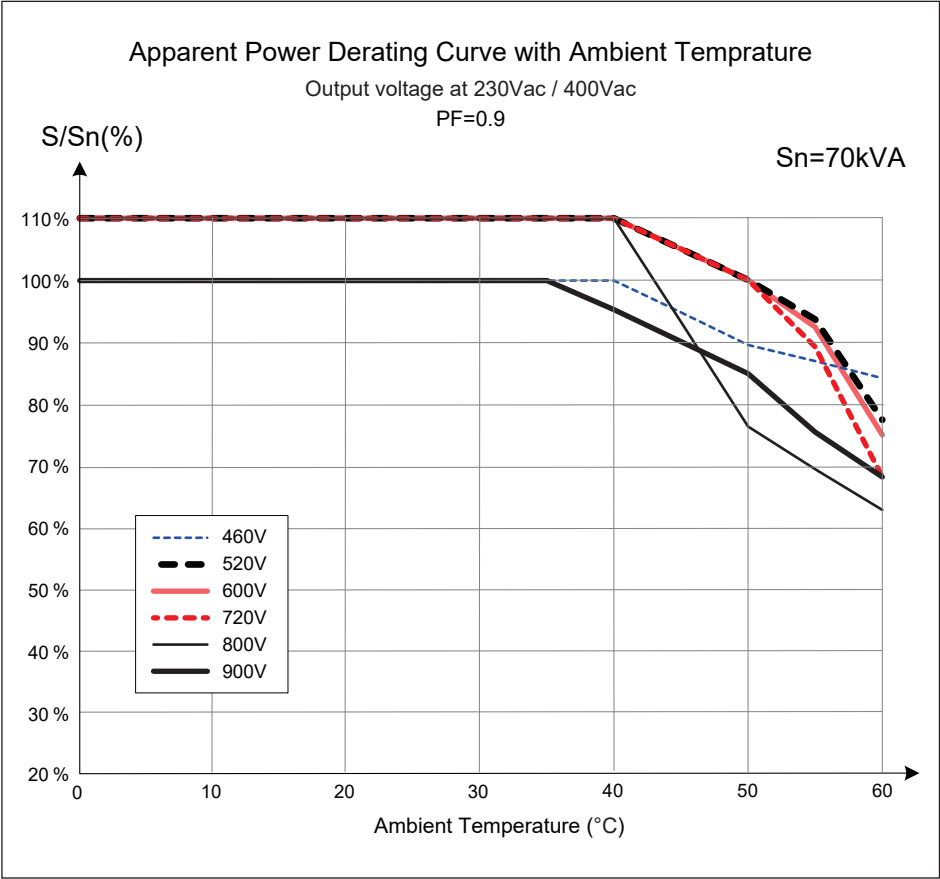
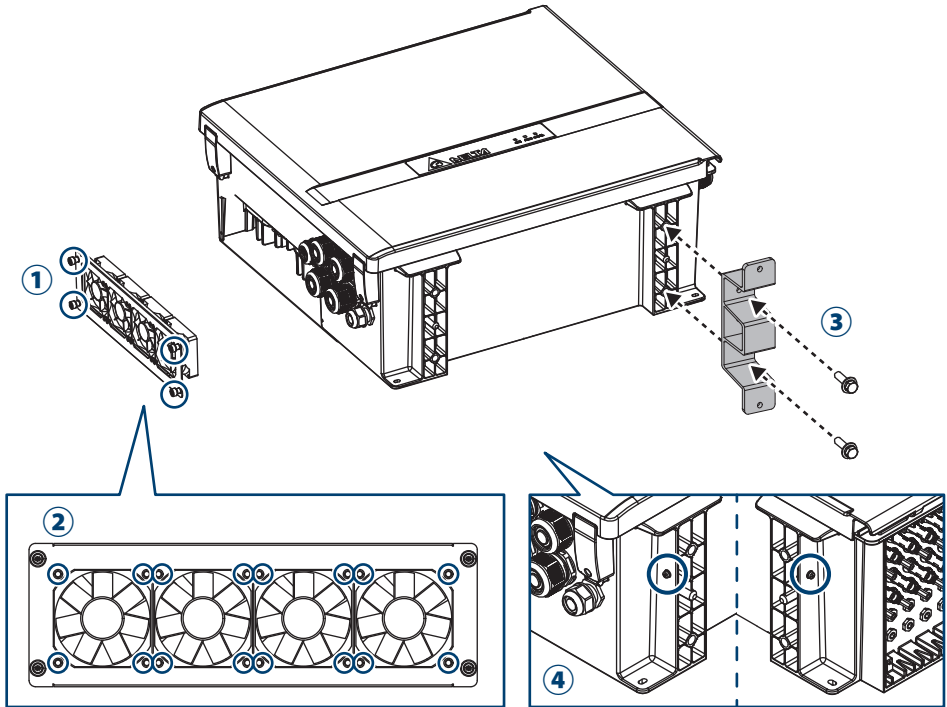


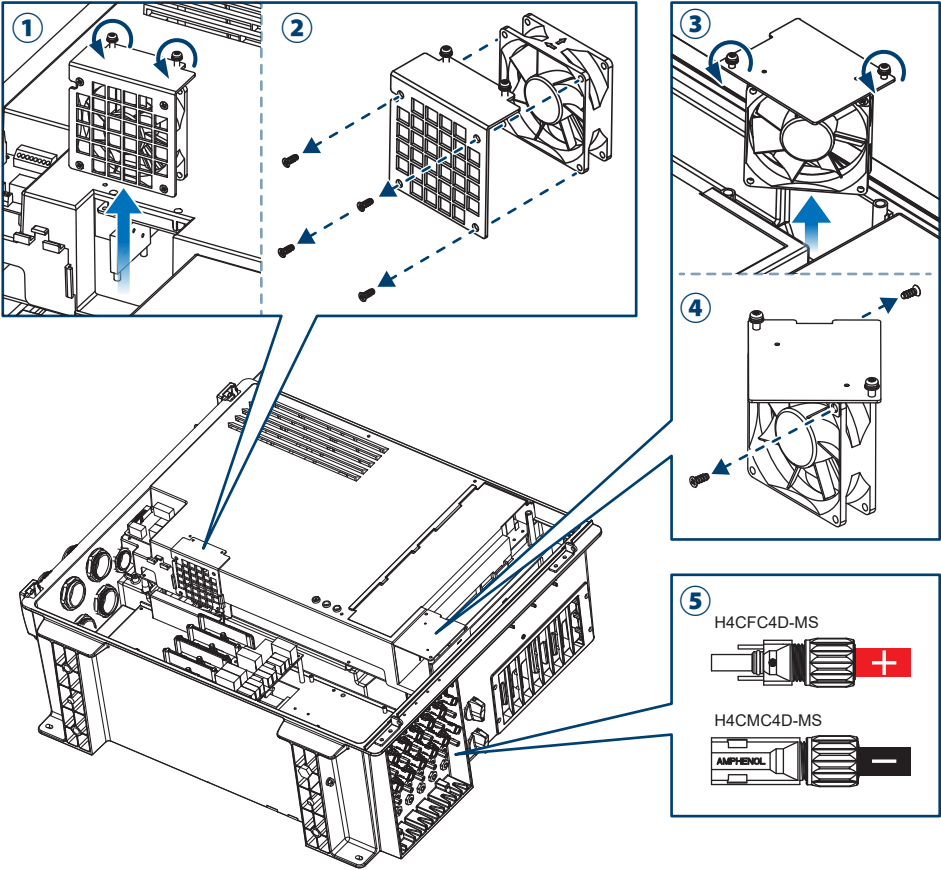
圖 7-4: 環溫對應視在功率降額曲線圖(PF=1)

附錄: 組裝說明



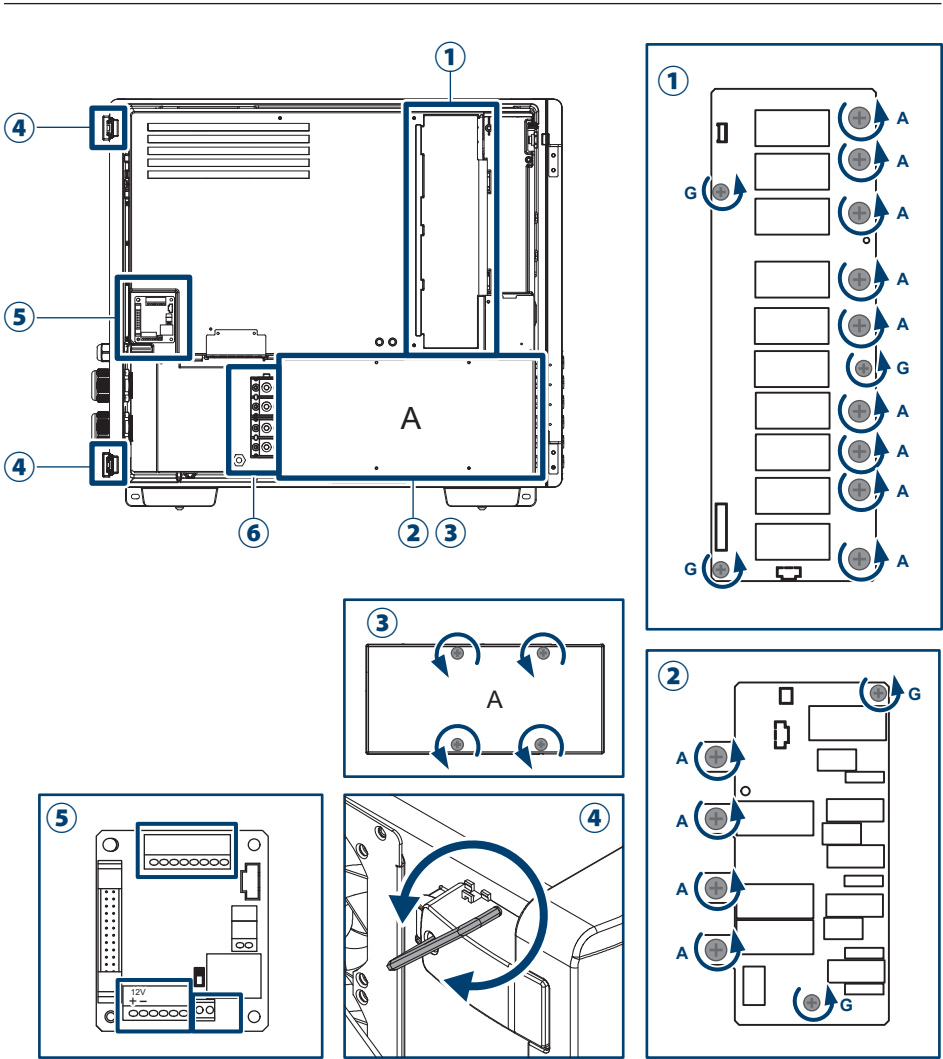
附錄-1: 組裝說明-1

NO	位置	螺絲扭力
1	濾網外蓋	14 kgf-cm (1.4N·m)
2	風扇托盤	6 kgf-cm (0.6N·m)
3	落地支架	250 kgf-cm (24.5N·m)
4	設備接地 (M6)	40 kgf-cm (3.9N·m)



附錄-2: 組裝說明-2

NO	位置	螺絲扭力	導體橫截面
1	內部風扇架 2	8.0 kgf-cm (0.8N · m)	-
2	內部風扇組件 2	6.0 kgf-cm (0.6N · m)	-
3	內部風扇架 1	8.0 kgf-cm (0.8N · m)	-
4	內部風扇組件 1	6.0 kgf-cm (0.6N · m)	-
5	H4 導線	-	12/10 AWG (4/6mm²)



附錄-3: 組裝說明-3

NO	位置	螺絲扭力	導體橫截面
1	直流側雷擊保護裝置	A: 25 kgf-cm (2.45N·m)	-
2	交流側雷擊保護裝置	G: 8.0 kgf-cm (0.8N·m)	
3	交流絕緣蓋	8.0 kgf-cm (0.8N·m)	-
4	鎖扣外蓋	25 kgf-cm (2.45N·m)	-
5	通訊模組	-	20 AWG (0.5mm ²)
6	交流端子	L1,L2,L3,N 317 kgf-cm (31N·m)	Cu: 35 mm ² (1 AWG)~120 mm ² (250 kcmil)
		PE 150 kgf-cm (14.7N·m)	Al: 60 mm ² (2/0 AWG) ~ 120 mm ² (250 kcmil)

