Grid-tie Transformerless Solar Inverter

M125HV_111

Operation and Installation Manual

www.deltaww.com

Smarter. Greener. Together.

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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, and L3 terminal to ground; to do so will damage the inverter and void the product warranty.

1.2.1 Condition of Use

- M125HV_111 is a transformerless solar inverter with single MPP tracking input, which converts the variable direct current generated by the solar array into a utility frequency grid-compliant balanced three-phase AC current and feeds it into the utility grid.
- The Photovoltaic modules used must be compatible with the inverter. PV modules with a high parasitic capacitance to ground may only be utilized if the capacitive coupling does not exceed 20μF.
- The inverter must only be operated in countries for which it is approved by Delta and the grid operator.

1.2.2 Symbols

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

DANGER!

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

WARNING !

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

CAUTION !

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

ATTENTION

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

INFORMATION

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

DANGER : ELECTRICAL HAZARD!!

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

CAUTION : HOT SURFACES, DO NOT TOUCH!

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

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

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

2 Introduction

M125HV_111 transformerless 3Ø PV inverters are designed to enable the highest levels of efficiency and provide longest operating life by use of state-of-the-art high frequency and low EMI switchmode technology. It is suitable for outdoor use.

ATTENTION

- 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, and L3 to ground.

2.1 Valid Model

The user manual is valid for the following device types:

• M125HV_111

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

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

2.2 Product Overview

The components of M125HV_111 is shown as ***Figure 2-1***.

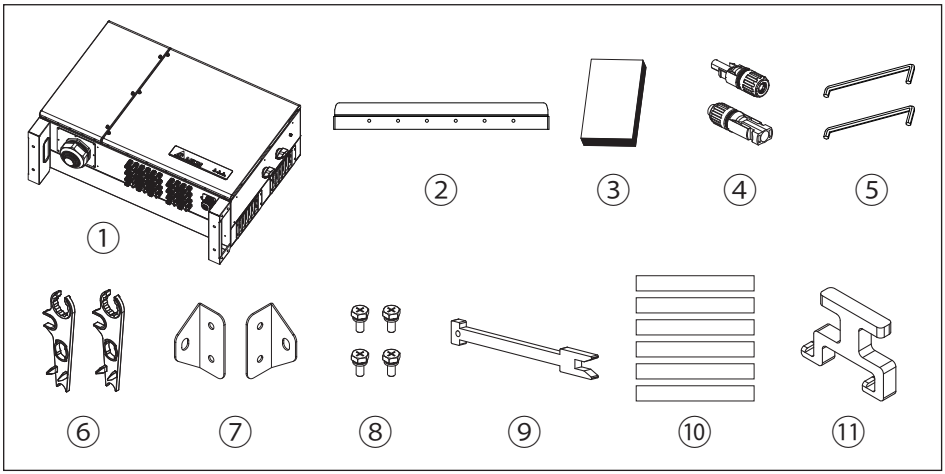


Figure 2-1: Components

Table 2-1: Packing list

	Object	Qty	Description
1	Delta Solar Inverter	1 pc	Solar inverter
2	Mounting Bracket	1 pc	Wall mounting bracket (Material: Aluminum/Thickness: 3mm)
3	User Manual	1 pc	Important instructions for solar inverter. Safety instructions should be followed during installation and maintenance
4	H4 Plus Connector	20 pairs	DC String inputs
5	Hexagon Driver	2 pcs	Fixture for both front doors Prevent it from closing
6	H4 Wrench	2 pcs	For disconnecting H4 connector
7	Reinforce Bracket	2 pcs	Wall mount brackets for stands on each side
8	Screw M8x16L	4 pcs	To lock reinforce bracket with foot
9	Calibration Tool	1 pc	To reinforce the base mount fuse holder
10	Security Seal	6 pcs	Tamper stickers for Taiwan use only
11	Fuse Puller	1 pc	Tool to remove the fuse holder

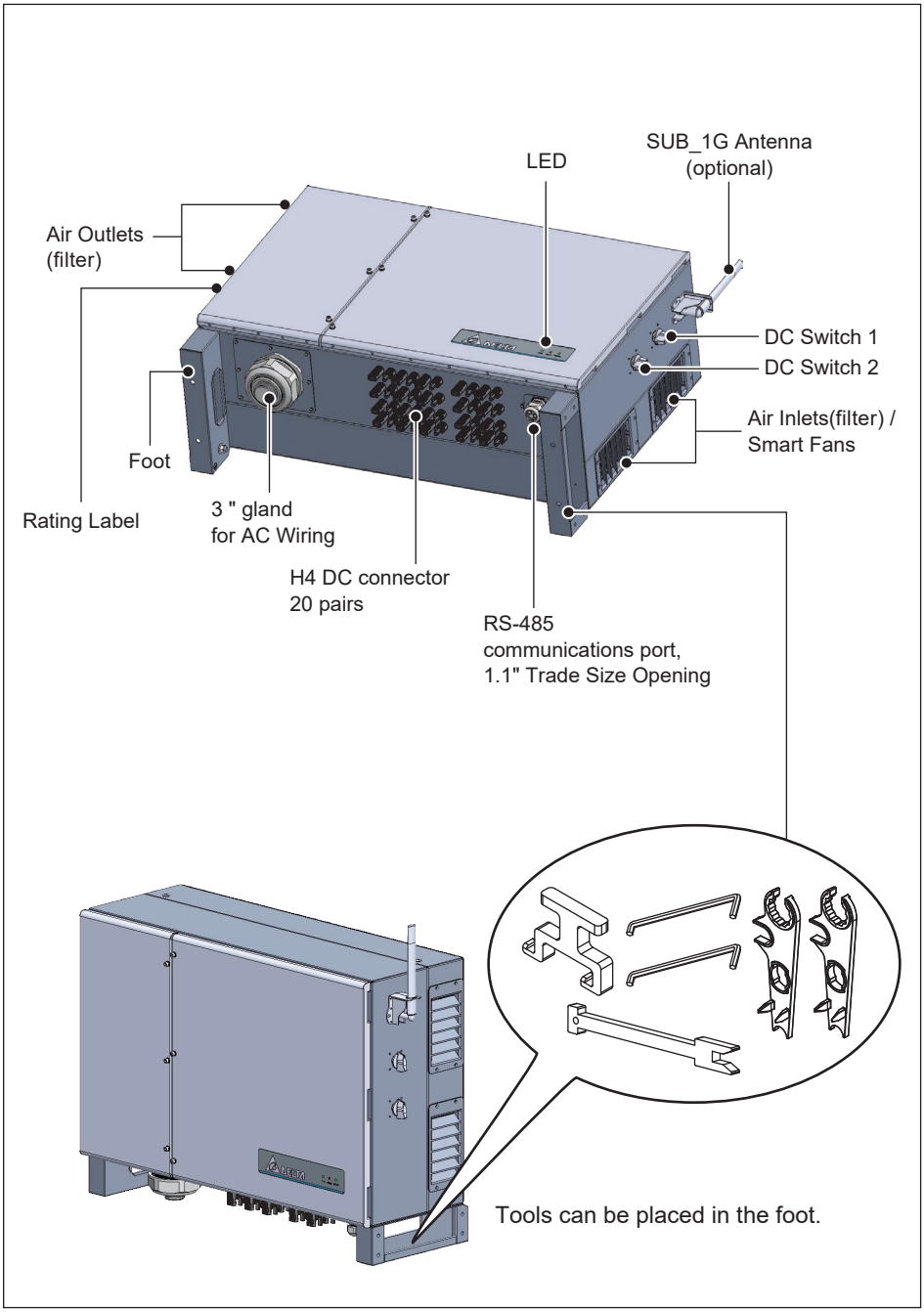


Figure 2-2: Overview

Figure 2-3 shows the rating label of M125HV_111, and ***Table 2-2***, defines the symbol markings on this label.

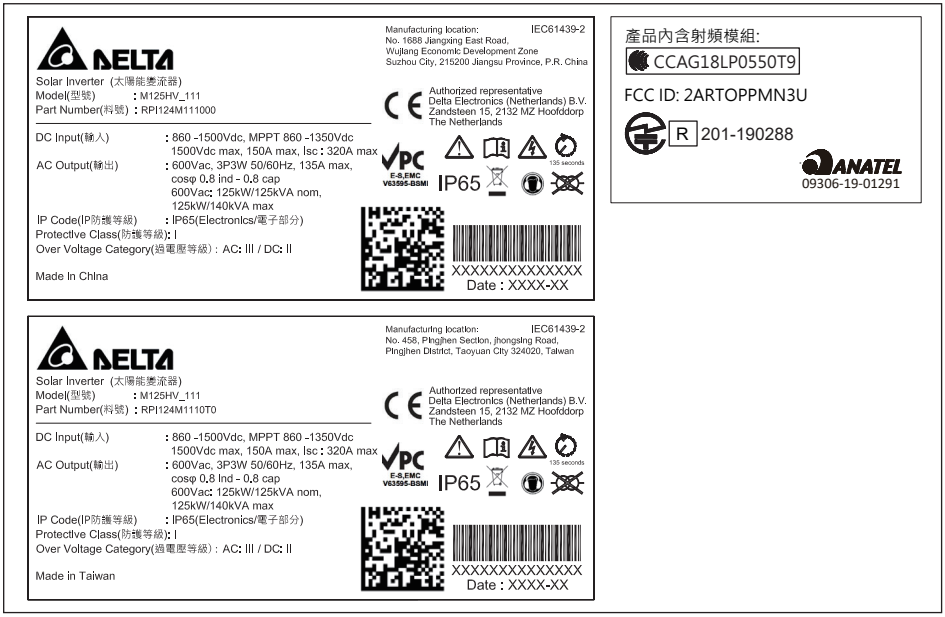


Figure 2-3: Rating label

Table 2-2: Rating label explanation

Symbol	Definition		
135 seconds	**Danger to life through electric shock** Potentially fatal voltage is applied to the inverter during operation. This voltage persists even 135 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.		
	Before working with the inverter, you must read the supplied manual and follow the instructions contained therein.		Please be aware of noise protection.
	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.		
ANATEL	M125HV_111 model complies with Anatel certification standards.		

In the following pages, ***Figures 2-4*** illustrate the general layout of and wiring area. ***Figure 2-5*** and ***Table 2-3*** provides detailed description of each wiring area option. The wiring area includes terminals for connection of the output (AC) wiring, AC surge protection devices (SPD).

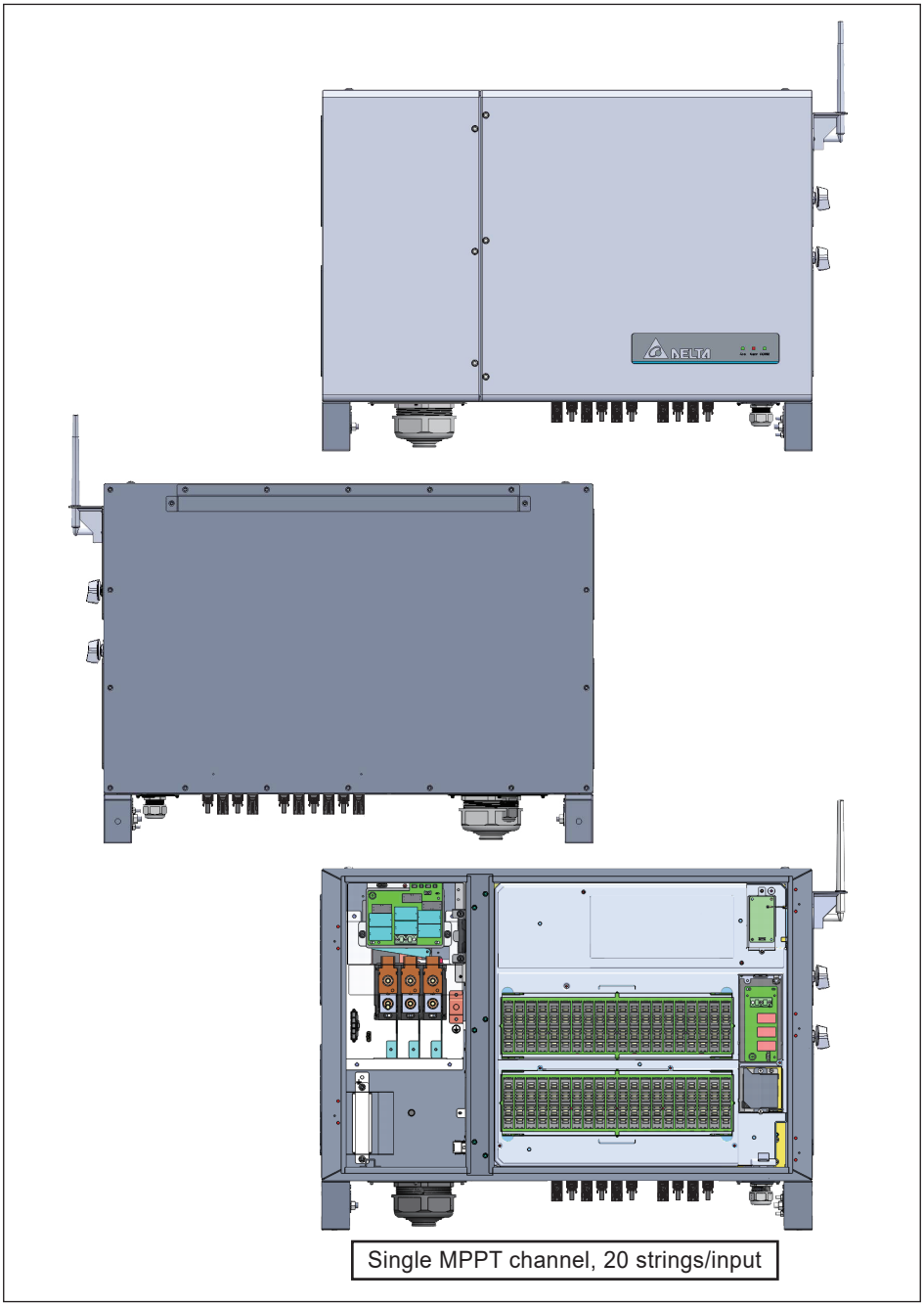


Figure 2-4: External/ internal view

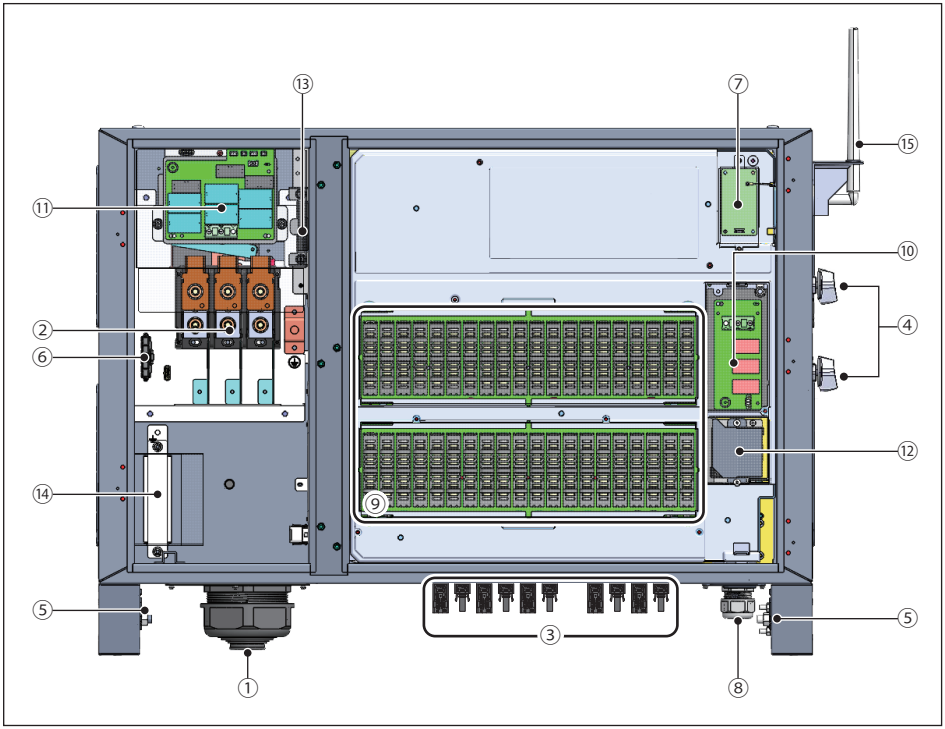


Figure 2-5: Layout

Table 2-3: Layout description

NO.	Component	NO.	Component	NO.	Component
1	3” cable opening for AC	6	Power connect of Din Rail SPD	11	Type II AC SPD
2	AC terminal	7	N3U_SB1	12	Internal fan 1
3	H4 connectors (20 pairs)	8	Communication port	13	Internal fan 2
4	DC switches	9	Fuse holder	14	Din rail for AC SPD (optional)
5	Grounding (M6/10 threaded stud)	10	Type II DC SPD	15	SUB_1G Antenna (optional)

3 Installation

CAUTION !

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

WARNING !

- Do not install the unit near or on flammable surfaces.
- Inverter must be mounted securely to a solid / smooth surface.
- M125HV_111 is not intended for use in a residential environment, it may cause radio interference, in which case the user may be required to take additional mitigation measures against electromagnetic interference.

The chapter contains instructions for
(1) Mechanical installation
(2) Electrical Installation
(3) Communication setup
Figure 3-4 provides the mechanical dimensions of the inverter.

CAUTION !

- Failure to comply with following mounting instructions including permitted orientations and designated clearances may result in derated power output and may void the warranty. To avoid these issues follow the instructions above!

3.1 Unboxing & Review

Unpacking the M125HV_111, please follow the order of ***Figure 3-1***.
It could be transported by 2 people (***Figure 3-2***) or crane (***Figure 3-3***).

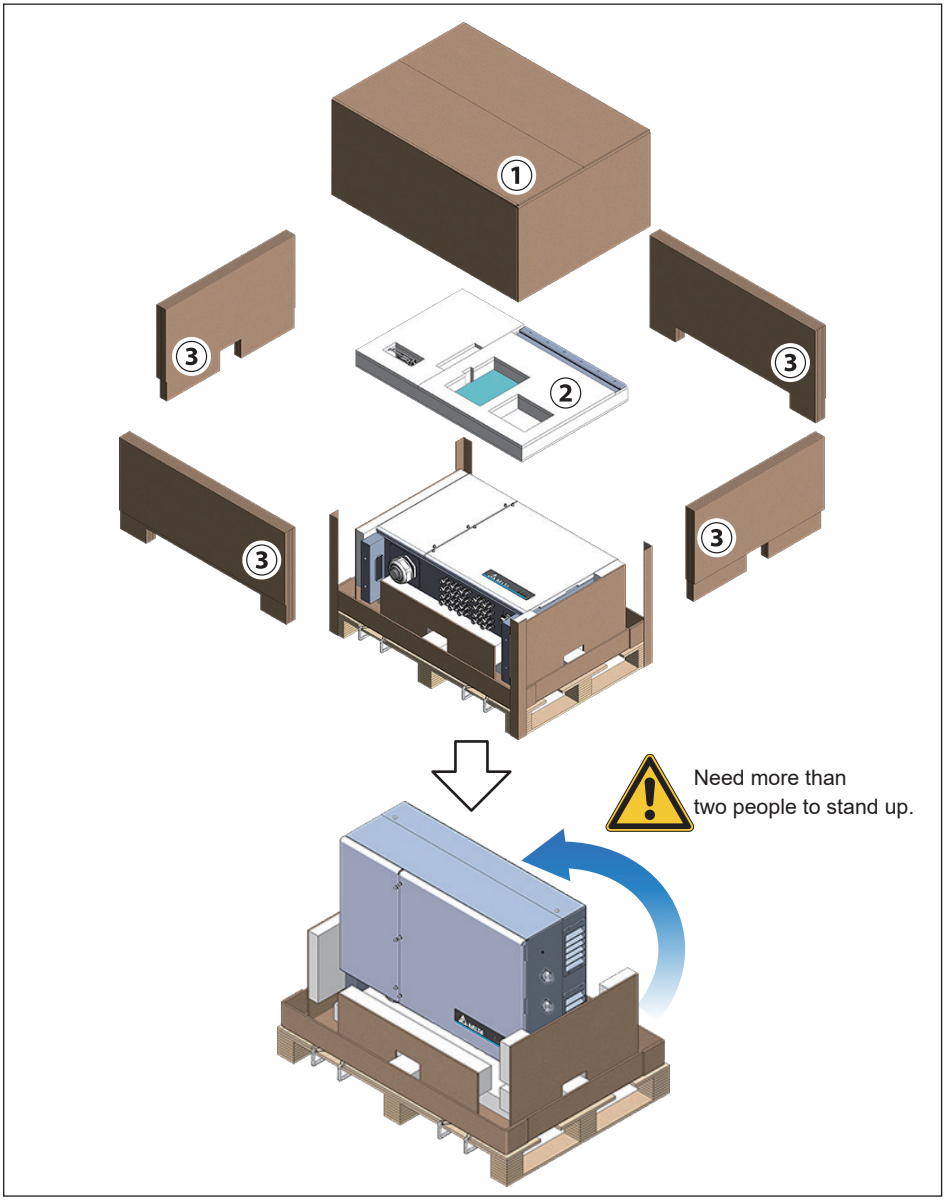


Figure 3-1: The step to unpacking the inverter

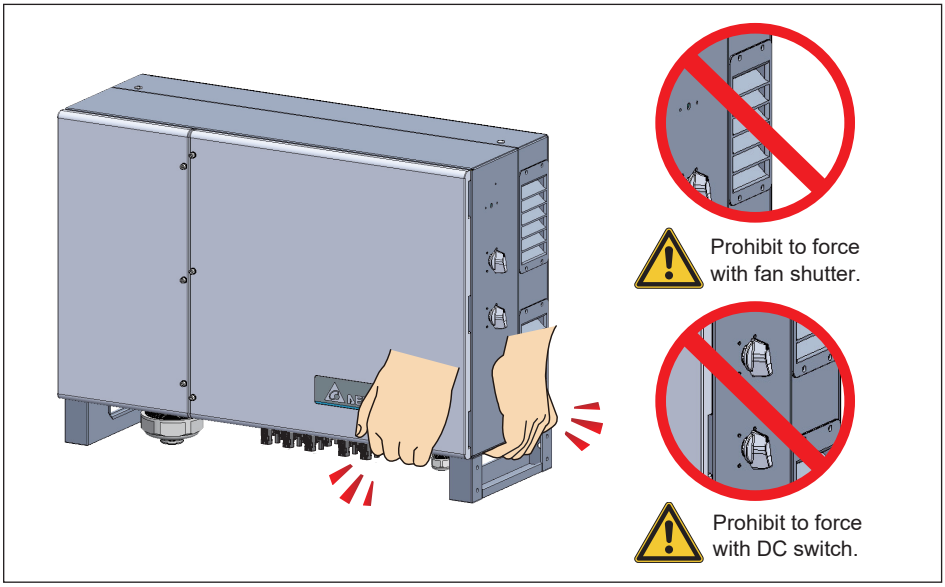


Figure 3-2: Handle position for handling

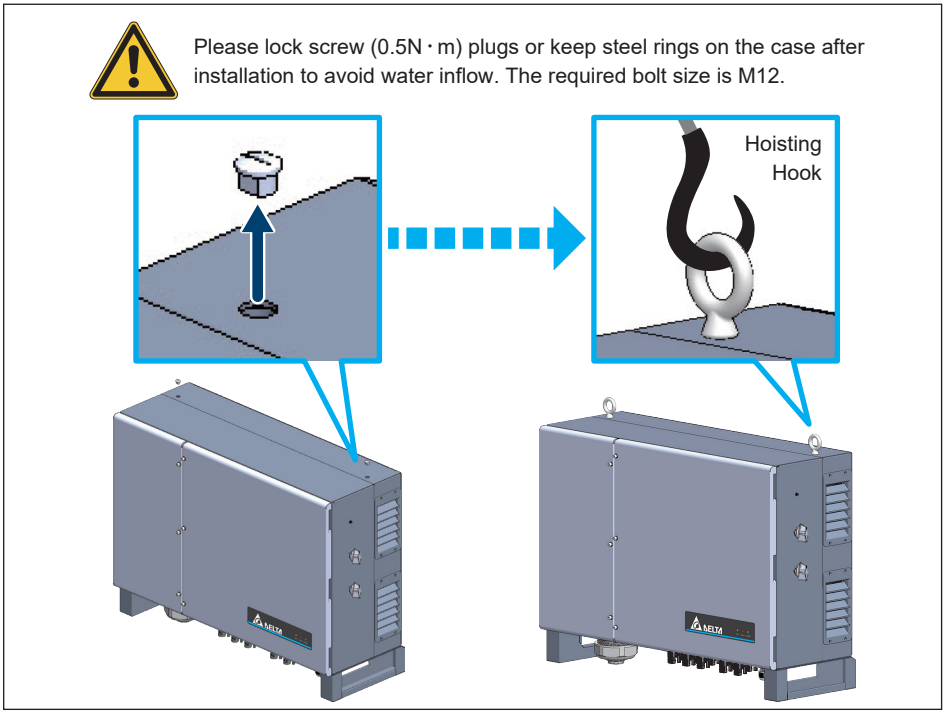


Figure 3-3: Attaching the Hoisting hooks

3.2 Mechanical Installation

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

3.2.1 Vertical Wall Mount

Refer to ***Figures 3-5*** through ***Figures 3-9.***

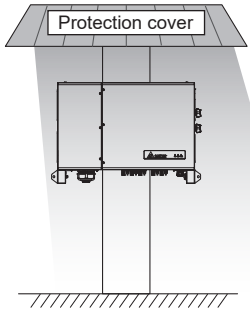
1. Ensure the surface to which the unit is to be mounted is sufficiently strong enough to carry the weight.
2. Orient the wall bracket horizontally (perpendicular to the floor), with the large plate at the bottom, and mark required mounting hole locations per ***Figure 3-5.***
3. Secure the mounting bracket on the wall with 6 M10 screws.
4. Hang the inverter on the wall mounting bracket.
5. Secure the inverter by inserting and tightening 2 M10 screws per ***Figure 3-9.***

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 6 M10 screws. (5 screws at least)

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.



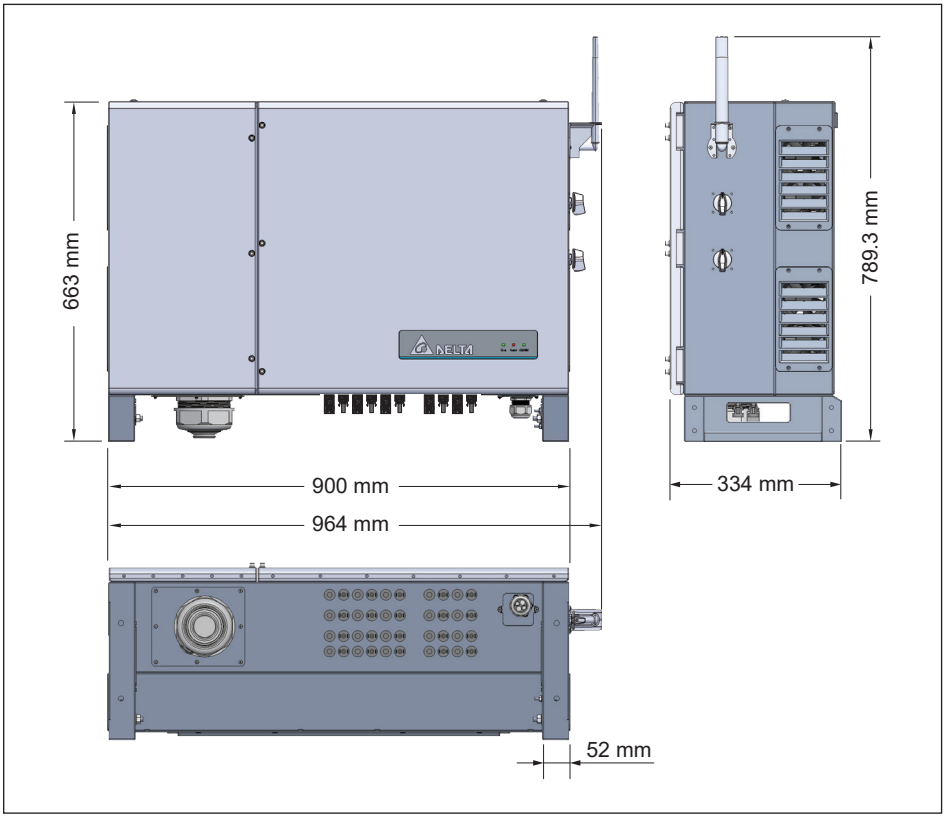


Figure 3-4: Inverter dimensions

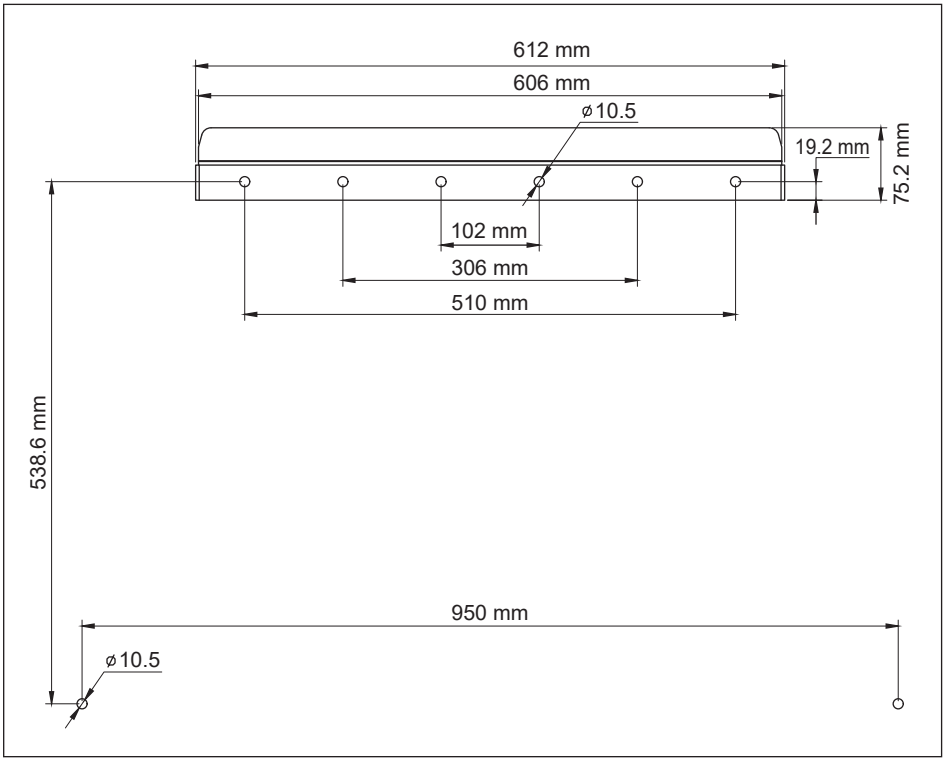


Figure 3-5: Mounting bracket dimensions

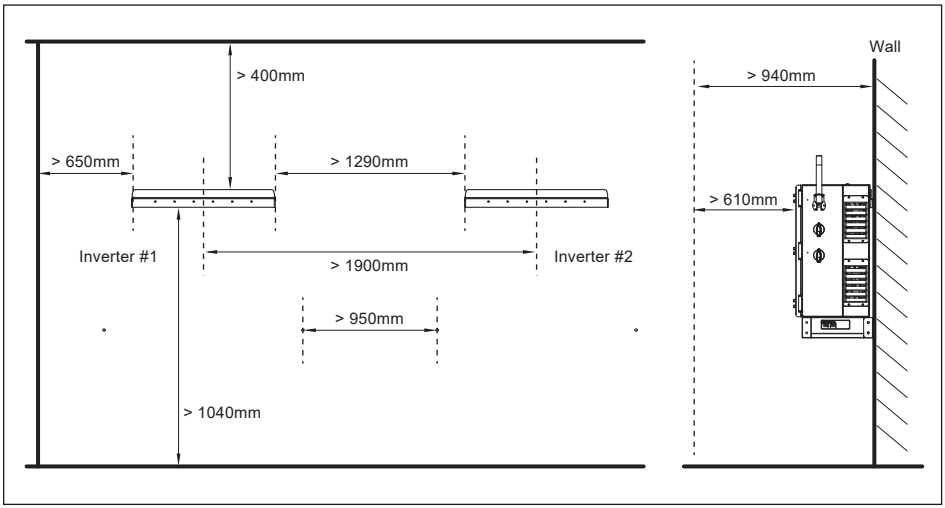
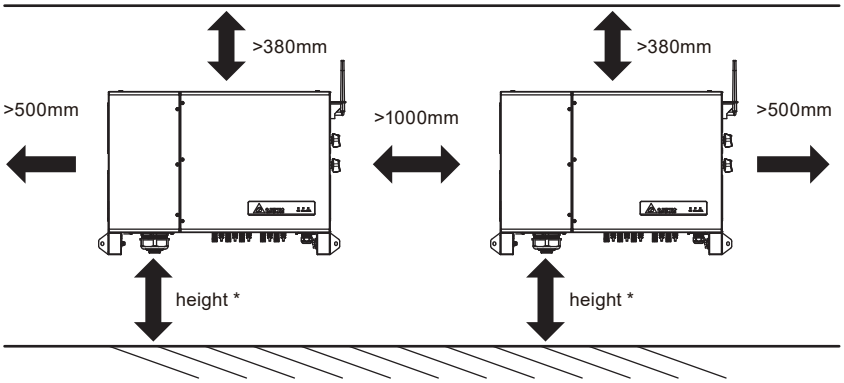


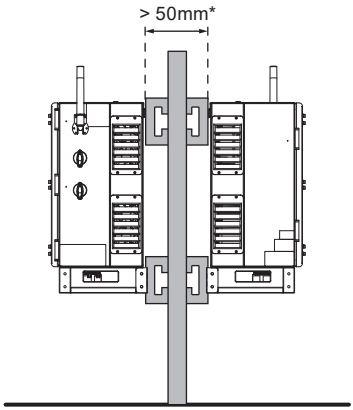
Figure 3-6: Required mounting clearances



* For wall mount installation, make sure it is high enough to have sufficient space for wiring.

Back to Back

When mounted back to back, clapboards must be installed on both sides.



* Clapboard is unnecessary when back to back distance > 500mm.

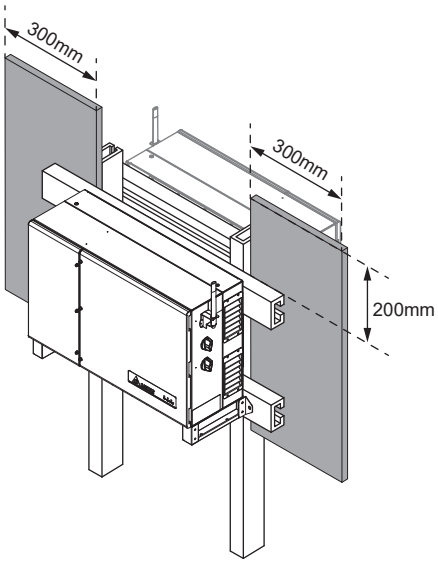


Figure 3-7: Separation distance of plural inverters

After installing the reinforce brackets on the foots (***Figure 3-8***), secure the reinforce brackets to the wall with two screws per ***Figure 3-9.***

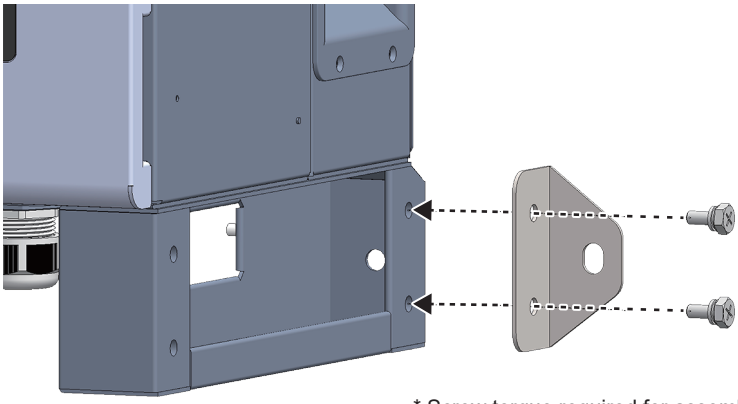


Figure 3-8: Install the unit on the foots

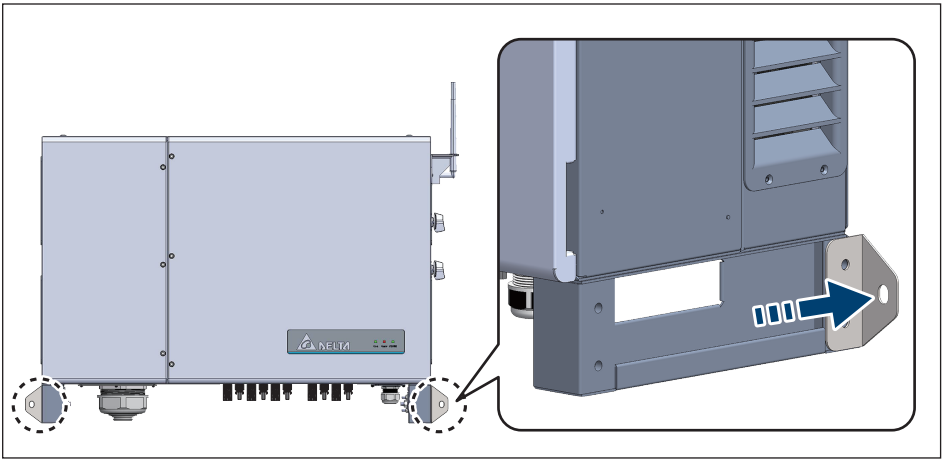


Figure 3-9: To secure inverter reinforce brackets to wall-mounting bracket

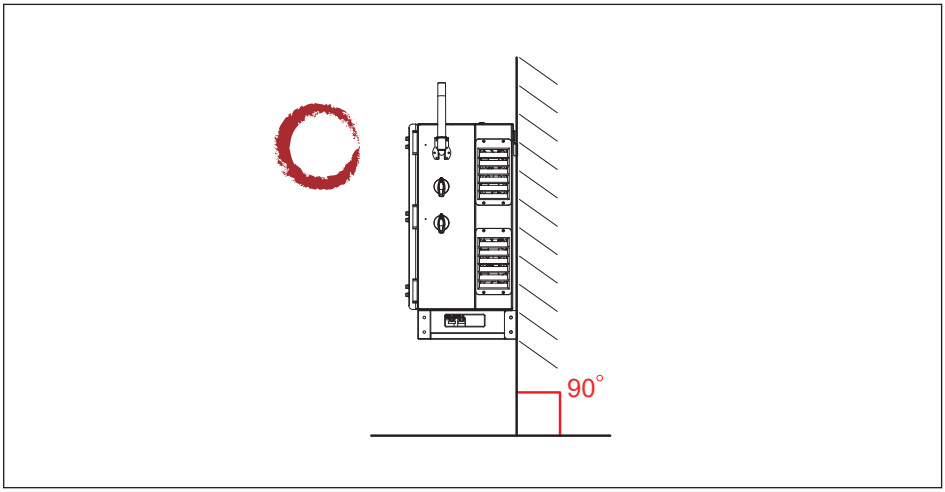


Figure 3-10: Permitted mounting positions

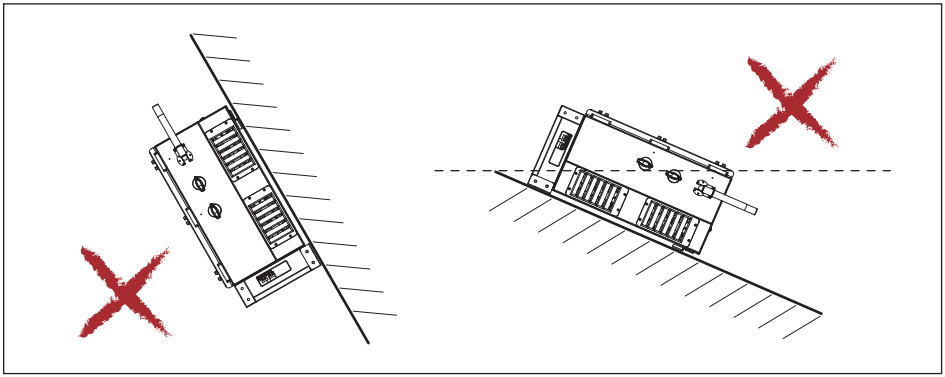


Figure 3-11: Prohibited mounting positions

O : Permitted / X : Prohibited

3.2.2 Ground Mount (Optional)

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

1. Ensure the grounded base to which the unit is to be mounted is sufficiently strong enough to carry the weight.
2. The grounded base horizontally (perpendicular to the floor), and mark required mounting hole locations per ***Figure 3-13***.
3. Lock the grounded brackets to foots with 8 screws. (***Figure 3-12***)
5. Set the inverter on the ground mounting base.
4. Secure the grounded brackets on the grounded base with 4 M10 screws per ***Figure 3-13***.

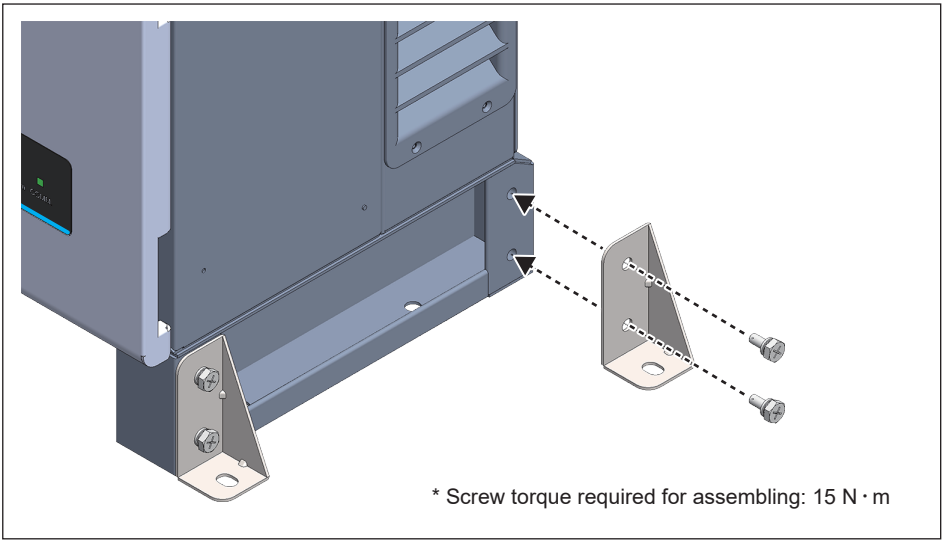
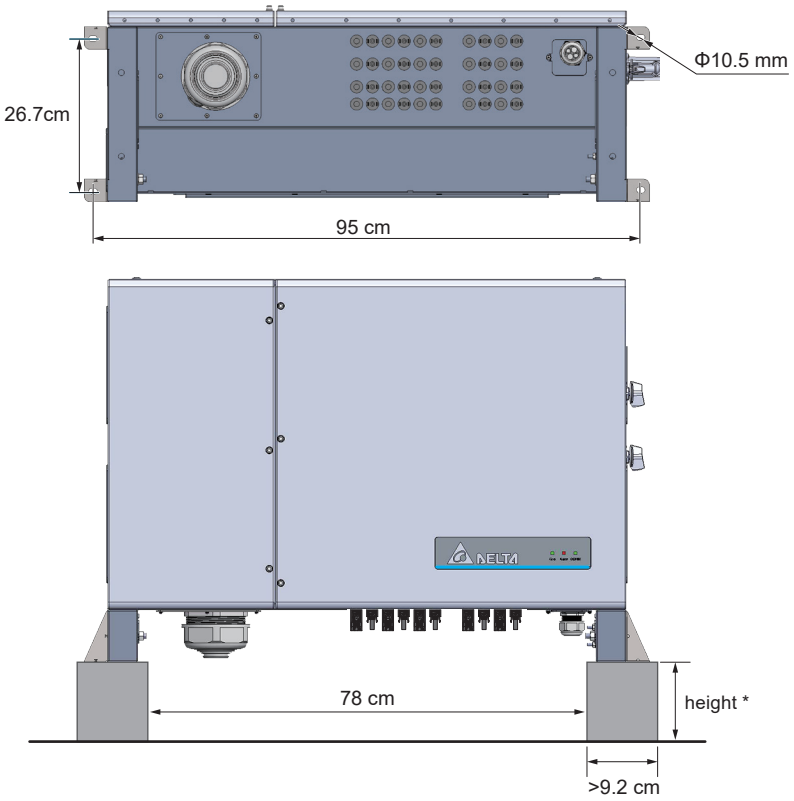


Figure 3-12 : Lock the grounded brackets to foots



* For ground mount installation, make sure the cement base is high enough to have sufficient space for wiring.
(ex: the height of cement base will require 30cm for using 70mm^2 XLPE cable)

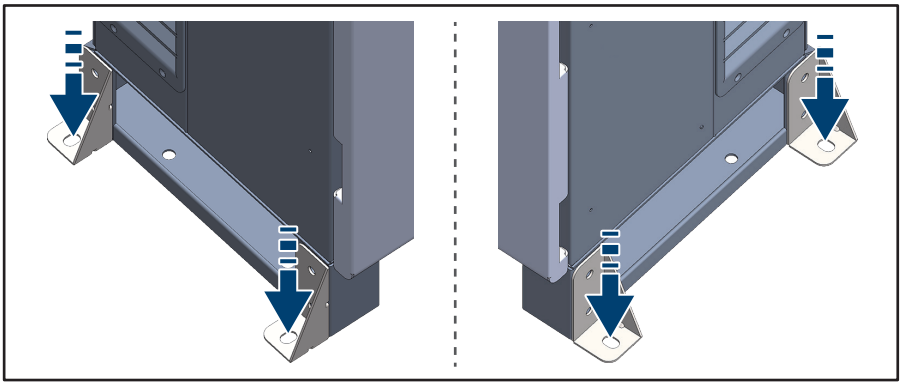
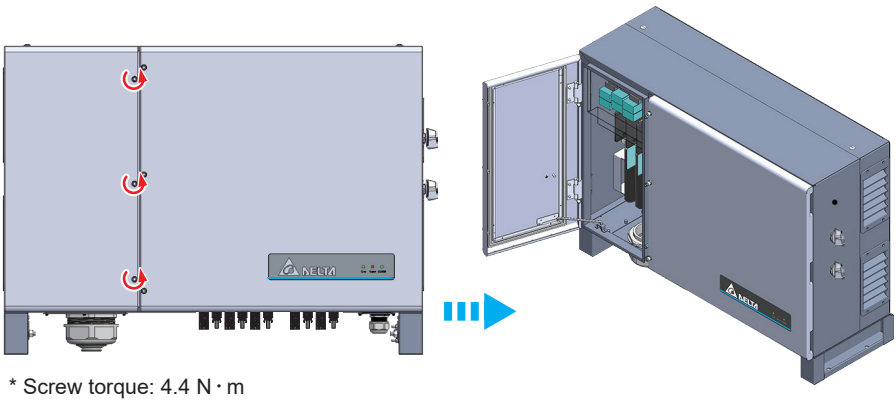


Figure 3-13: To secure inverter grounded brackets to ground-mounting base

3.3 Door

In order to guarantee proper long-term operation of the inverter, procedures in **Section 5.1** must be followed.

For the first time installation, only need to open the AC side (left) door for wiring.



* Screw torque: 4.4 N · m

Figure 3-14: First installation of M125HV_111

INFORMATION

- Use Hexagon Driver (Table2-1, Item5) or other proper tool to untighten door screws.
- Door screws are captive screw type. Do not disassemble door screws.
- Please follow the recommended torque to lock-on door screw with torque wrench.

DANGER!

- It is forbidden to open both doors at the same time.

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.

DANGER!

- It is forbidden to open both doors at the same time.

WARNING !

- Code compliance is the installer's responsibility.
- Inverter warranty void if the DC input voltage exceeds 1600 Vdc.

CAUTION : INVERTER AND EQUIPMENT DAMAGE MAY OCCUR !

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

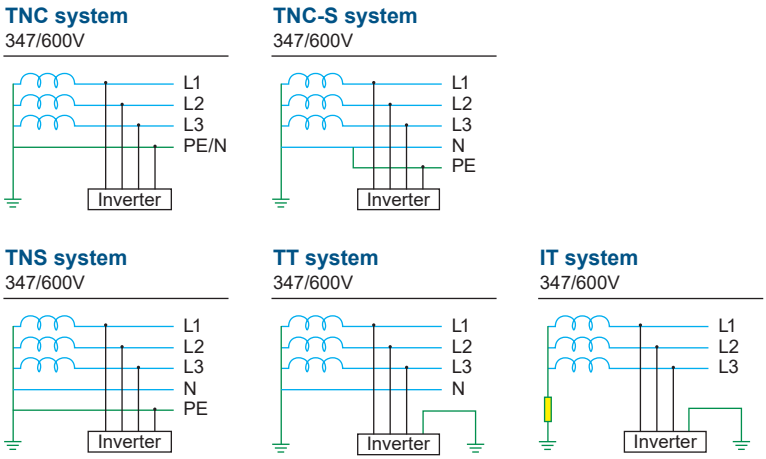
CAUTION: WRONG AC WIRING !

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

3.4.1 AC Grid Types and Connections

ATTENTION

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



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.

Table 3-1: Recommended AC circuit breaker rating

Rated voltage	min. 600 V
Rated current	min. 175 A
Breaking Capacity	min. 10 kA

3.4.3 AC Wiring Preparation

Below is the procedure for preparing the AC conductors for connection to the AC terminals:

- It is important to choose the proper size for AC cable. Refer to ***Figure 3-15***.
- The cross-sectional area for each AC conductor is 50~185 mm^2 for Cu. (95~185mm^2 for Al)
- The maximum width of each terminal lugs should be within 31mm, the diameter of screw hole should be within Φ10.5mm, as shown in ***Figure 3-16.***
- Terminal can use for Cu lug (Tin plated).

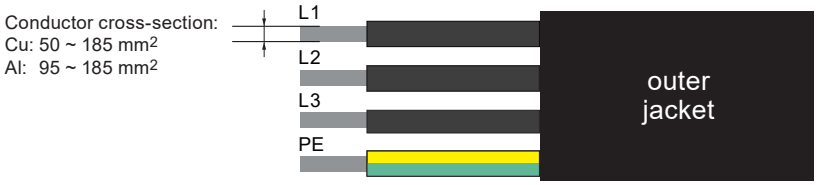


Figure 3-15: Size of AC conductors

AC Terminal (tin-plated)

Conductor	Compatible Lug
Cu	Cu(Tin-Plated)
	Cu(Nickel-Plated)
	Pure Cu
	Stainless steel
Al	Aluminum (Tin-Plated)*
	Bi-metal*

PE Connection (Nickel-plated)

Conductor	Compatible Lug
Cu	Cu(Tin-Plated)
	Pure Cu
Al	Aluminum (Tin-Plated)*
	Bi-metal*

* It is recommended to apply electrical grease before fitting wire conductor into terminal lug for best protection.

The working temperature of power cable should be at least 90°C.

Figure 3-16: Dimension of lug

3.4.4 AC Side –Prewire Set-Up

Prior to installing conductors on terminal complete the following procedure to make terminals ready for connections.
For each of the AC terminals (L1, L2, L3, PE):
Tighten/Lose nuts with 17mm socket. If an electric socket is utilized insure the torque setting is low enough to NOT OVER-TORQUE the screw. Once nut bottoms out, do not turn it any further.

NOTICE

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

To ensure a safe and reliable contact, **always** perform the following work steps:
- ► Please select the Al wire size according to rules due to lower conductivity of Al.
- ► Keep the installation location as free as possible from moisture or corrosive atmospheres.
- ► Connect the aluminum cables quickly.
- ► Tighten the clamping screw in the clamping body with the maximum permissible tightening torque.

3.4.5 AC Wiring

Refer to ***Figure 3-15*** in **Section 3.4** for the procedure to prepare AC conductors for connection to the AC terminals.
Ensure the AC conductors used are sized to the correct ampacity per NEC or other local code. Refer to ***Figure 3-15***.

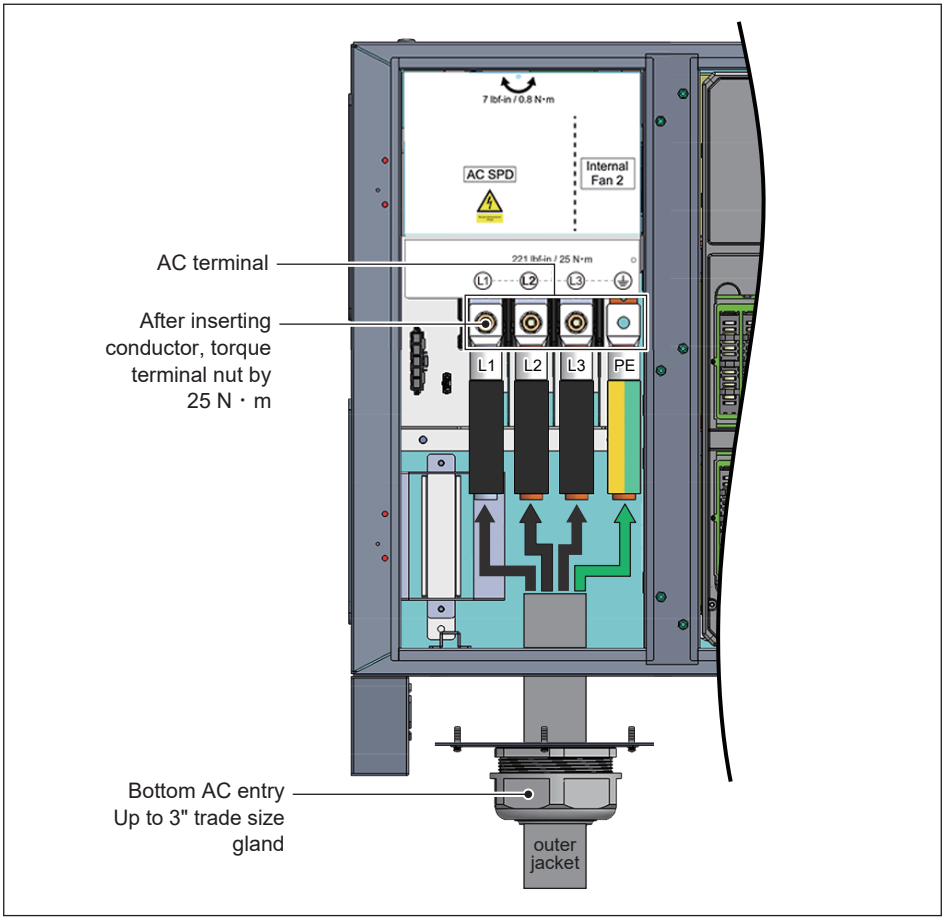


Figure 3-17: Location for AC terminal

Figure 3-17 illustrates the location of the AC conduit entry and connections to the AC terminal block:
- Unscrew all AC terminal nuts as noted in **Section 3.4.4.**
- Ensure the correct conductor is connected to the appropriate terminal.
- After conductor is inserted, use M10 nuts to tight L1~L3, PE terminal with a torque of 25 N · m.

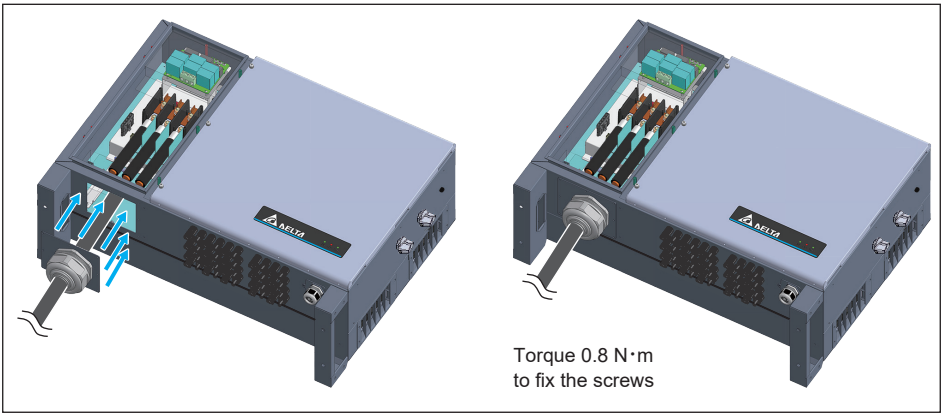
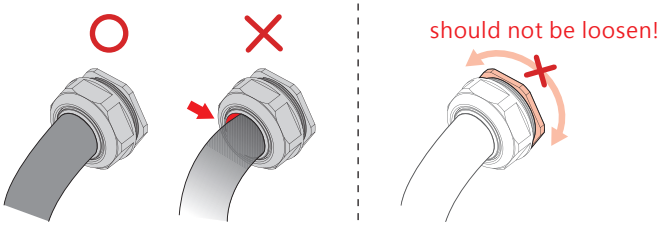


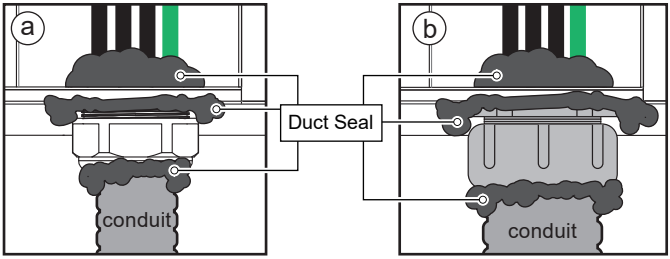
Figure 3-18 : AC gland assembling

CAUTION !

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



- The cable gland is suitable for multi-core cable, if wiring is using single-core cable with 3" flexible metal conduit, please follow below suggestions to avoid water intrusion:
  a. Insert the flexible metal conduit to cable gland and seal the conduit from both inside and outside the wiring box and the gap between gland and conduit by using duct seal to prevent living creature or moisture enter the wiring box.
  b. Replace the cable gland to 3" EMT connector and seal the conduit from both inside and outside the wiring box and the gap between gland and conduit by using duct seal to prevent living creature or moisture enter the wiring box.



ATTENTION

-This inverter is compliant with the “Technical Specification for Security Inspection of Solar Inverter and Monitoring Units” required by BSMI.

- After completing the wiring operation and ensuring the cover no longer needs to be opened, please refer to ***Figure 3-19*** to apply a brand new one-time-use security seal (item 10, ***Table2-1***) .
- We will not be liable or responsible for any security incident caused by an improper application of the sticker.

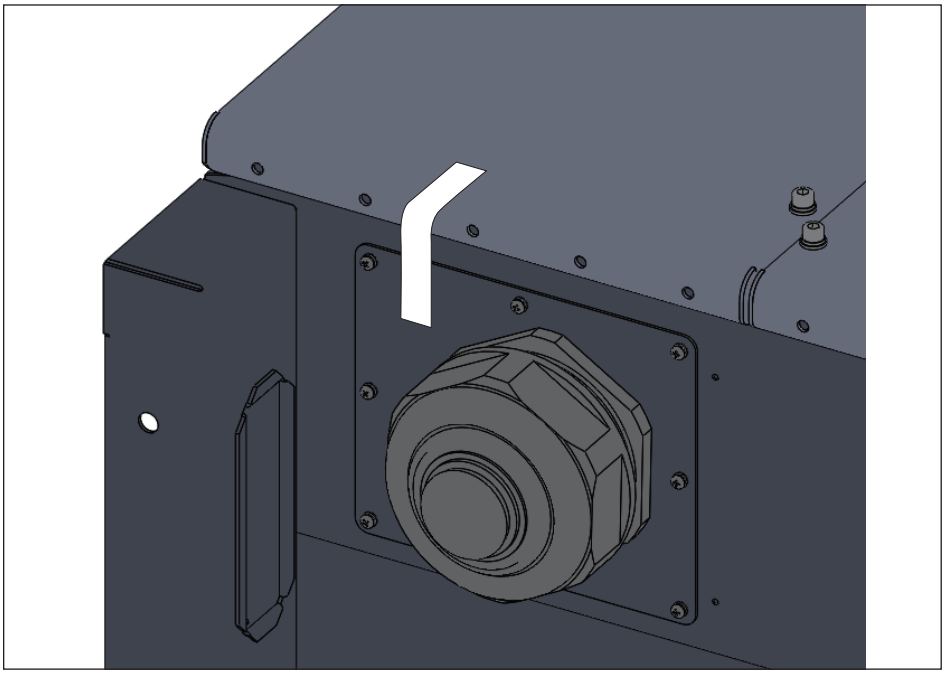


Figure 3-19: Apply a security seal on AC side door and AC gland plate

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.

DANGER!

- It is forbidden to open both doors at the same time.

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 1600V 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 minutes later.

ATTENTION

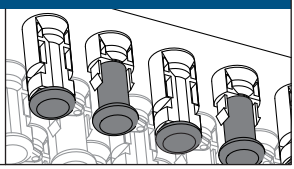
- The PV Array current carrying conductors (positive or negative) must not be referenced to ground.

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

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



To ensure a better operating performance of the inverter, recommended configuration for the PV array are shown below:

1.To ensure the inverter operates with the highest performance, the DC input voltage should greater than the AC Line-Line Voltage * 1.5 (or AC phase Voltage *2.6)
If the DC input voltage is lower than above value, inverter will not operates normally.
Ex: Nonimal Vac = 600Vac, Vmp should be > 600Vac*1.5 = 900Vdc

2.PV array configuration should be designed considering the lowest environment temperature and make sure the Voc of the PV array is within 1500Vdc.

3.Inverter will be damaged if the DC input voltage is higher than 1600Vdc, and the product warranty will be voided.

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 (4/6mm^2) .

The Standard H4 Plus connector in accessories ***(Figure 3-20)*** support cable O.D. from 5.0~7.8mm, if PV cable O.D. over 7.8mm, please refer to ***Table 3-2*** and contact survice to select H4SxC8DM series connector as optional accessory.

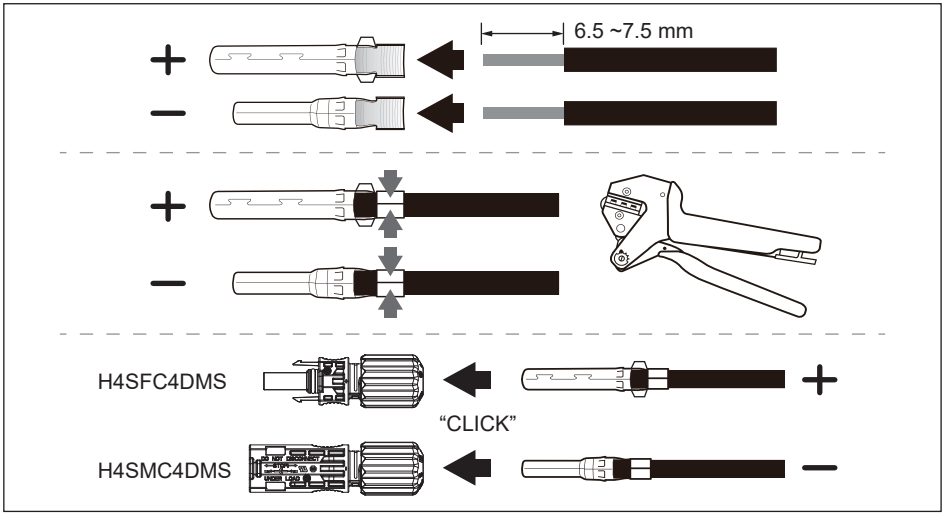


Figure 3-20: DC Wiring illustration

Table 3-2: H4 series connector

Ref. Cable diameter	H4SxC4DM plus connector (standard) Support cable O.D.: 5.0~7.8mm	H4SxC8DM plus connector (optional) Support cable O.D.: 7.5~8.8mm
12 AWG (4 mm^2)	O	X
10 AWG (6 mm^2)	O	X
8 AWG (10 mm^2)	X	O

DC wiring polarities are divided into positive and negative, and the layout of the connectors is shown in ***Figure 3-21.***

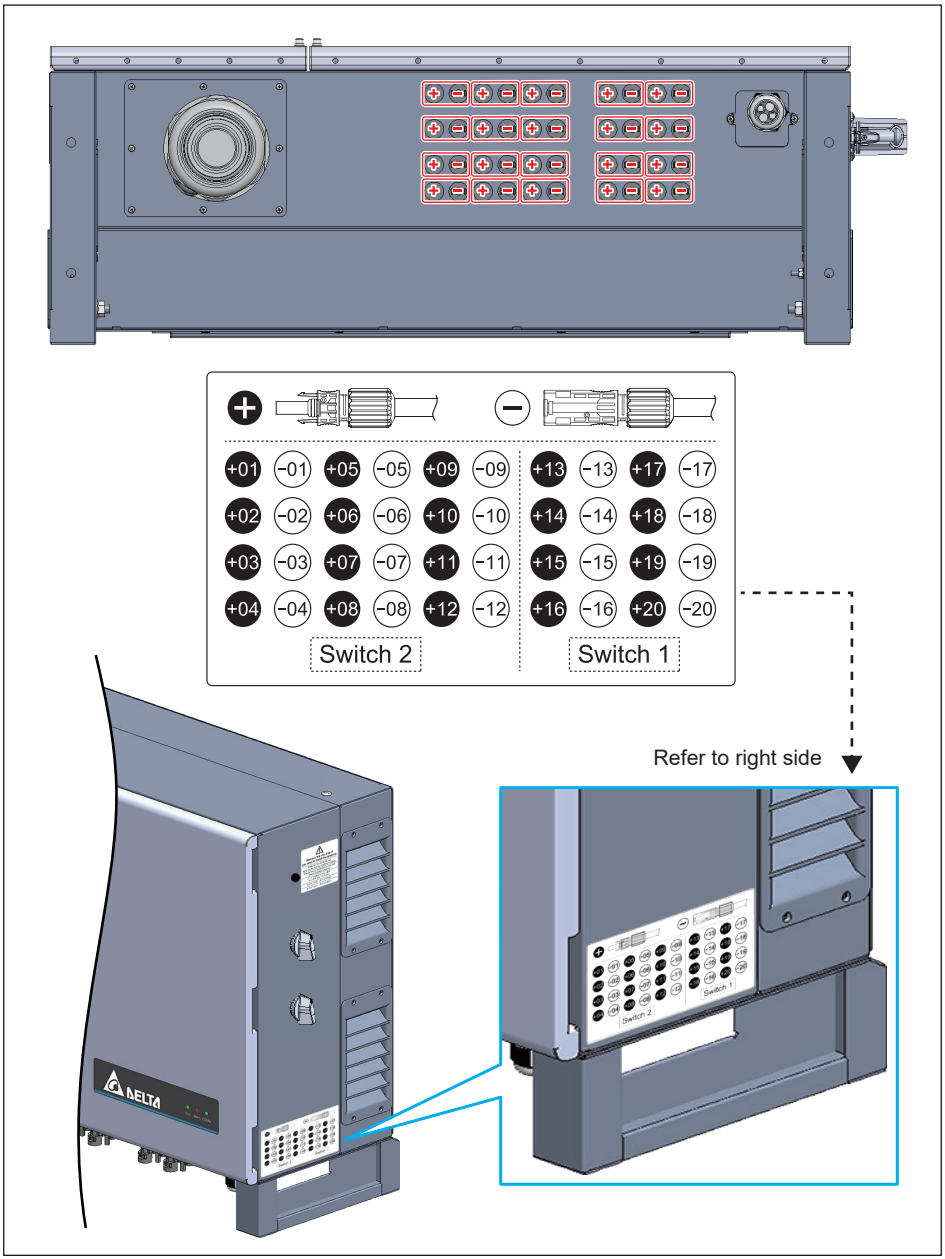


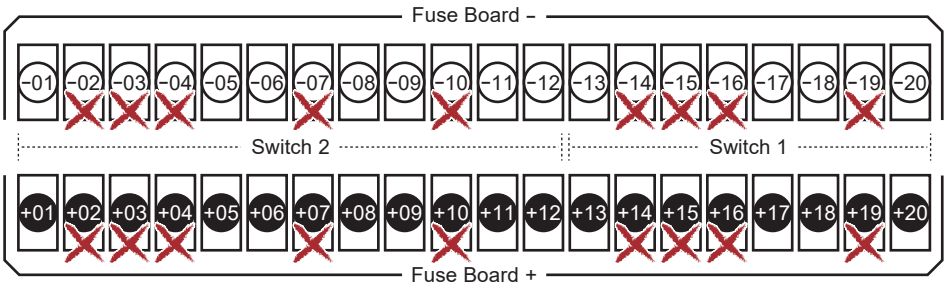
Figure 3-21: Location of H4 connectors to connect array wiring (DC)

■ DC Side Y connection

M125HV_111 is compatible with 1500V/30A CE listed fuse, however, the designer must be beware of the following requirements:

- The max Isc-stc of a connected array (sum of all paralleled strings) cannot exceed the rated Isc limit of the inverter, that is no more than 320A total.
- Because of internal current limitations and higher string currents allowable with 30A fuses, inputs 2、3、4、7、10、14、15、16 and 19 must **NOT** be used.

Recommend fuse models
1. Vendor: Mersen Vendor P/N: HP15M30 2. Vendor: EATON(Bussmann Series) Vendor P/N: PV-30A10F85L 3. Vendor: Littelfuse Vendor P/N: SPXV 30



CAUTION !

- When 30A string fuses are utilized do **NOT** use input 2、3、4、7、10、14、15、16 and 19 on either MPPT channel.

3.5.2 Equipment Grounding

To ground the inverter, please crimp the grounding wire to the ring terminal lug and fix it on the grounding point shown as ***Figure 3-22***.

mounting torque: M6/ 7 N · m
M10/ 25 N · m

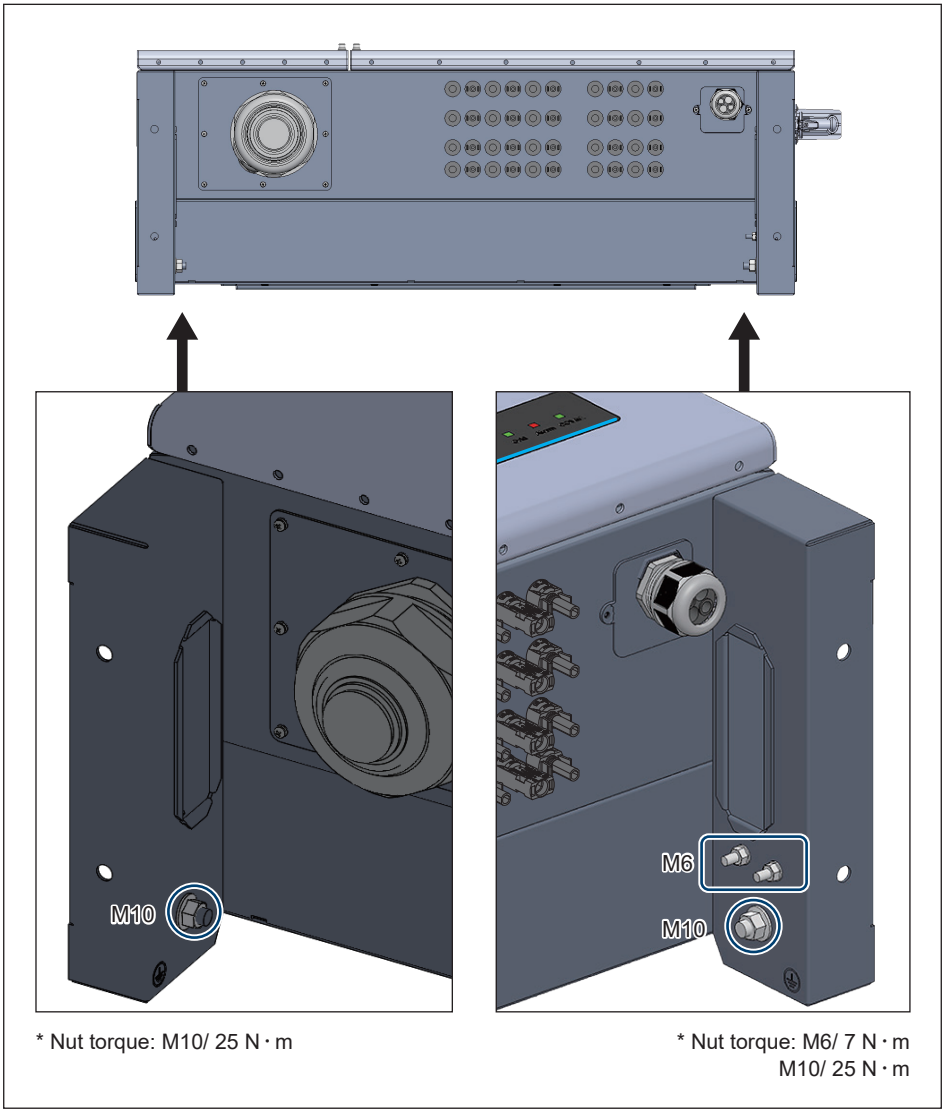


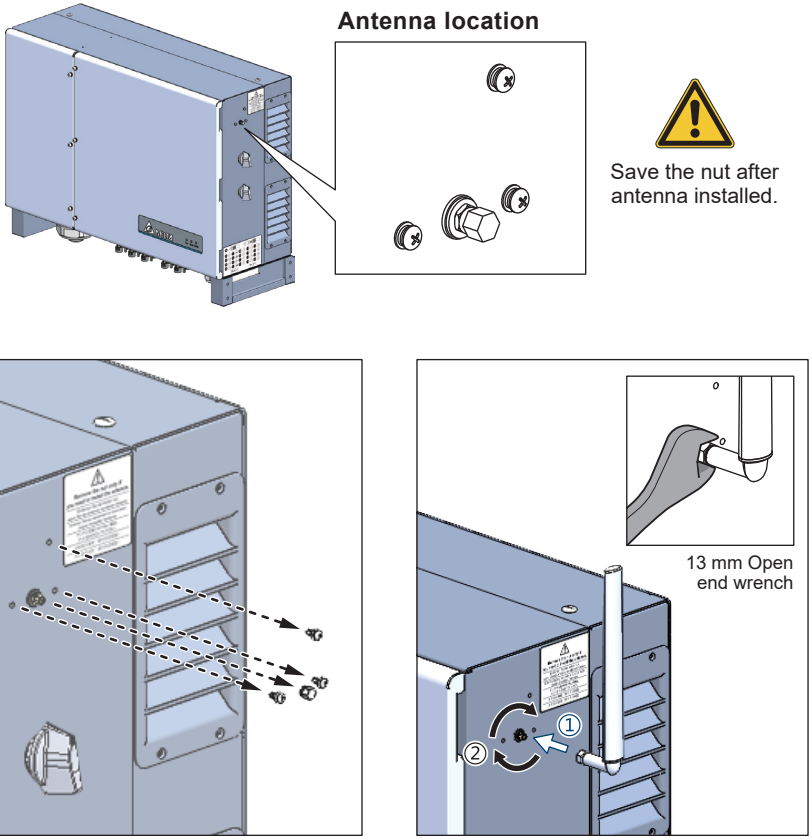
Figure 3-22: Mount the equipment grounding

3.6 SUB_1G Antenna (optional)

There is an antenna for SUB_1G, it must be installed with 1.2 N·m and some installation notice include antenna and bracket are shown in ***Figure 3-23 ~ 3-25.***

ATTENTION

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

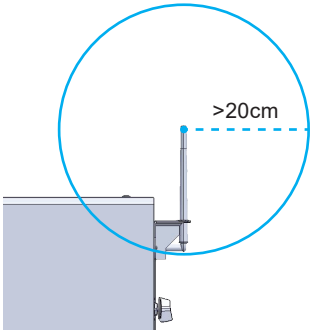


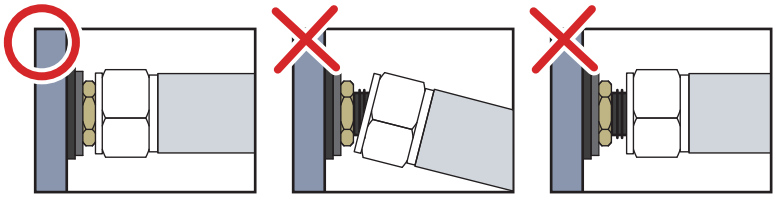
Remove the nut and 3 screws.

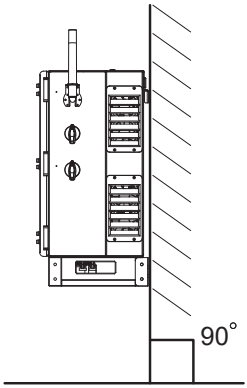
Use the 13 mm open end wrench to lock the antenna with 1.2 N·m torque.

Figure 3-23: Installation of antenna

There must be no obstacles within 20 cm around the antenna.

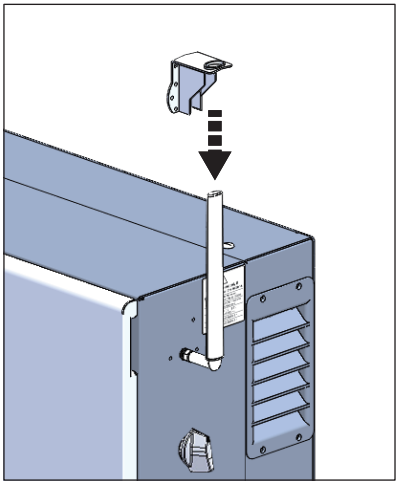




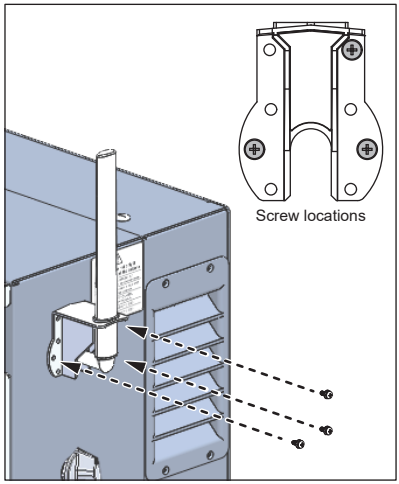


Keep antenna pointing upright.

Figure 3-24: Attentions of installing antenna



Put on the bracket from the top of antenna until matching screw holes.



Tighten the 3 M4 screws to antenna bracket with 0.98 N·m torque.

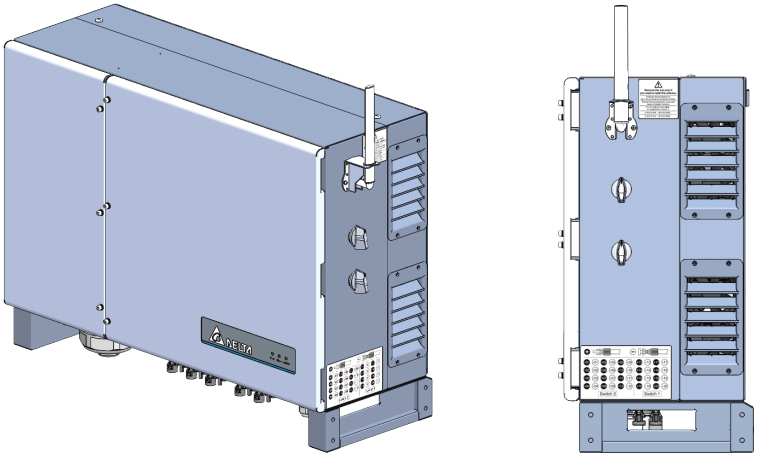


Figure 3-25: Attentions of installing antenna bracket

ATTENTION

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

3.7 Communication Module Connections

The communication module of M125HV_111 is shown in ***Figure 3-26***.
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.

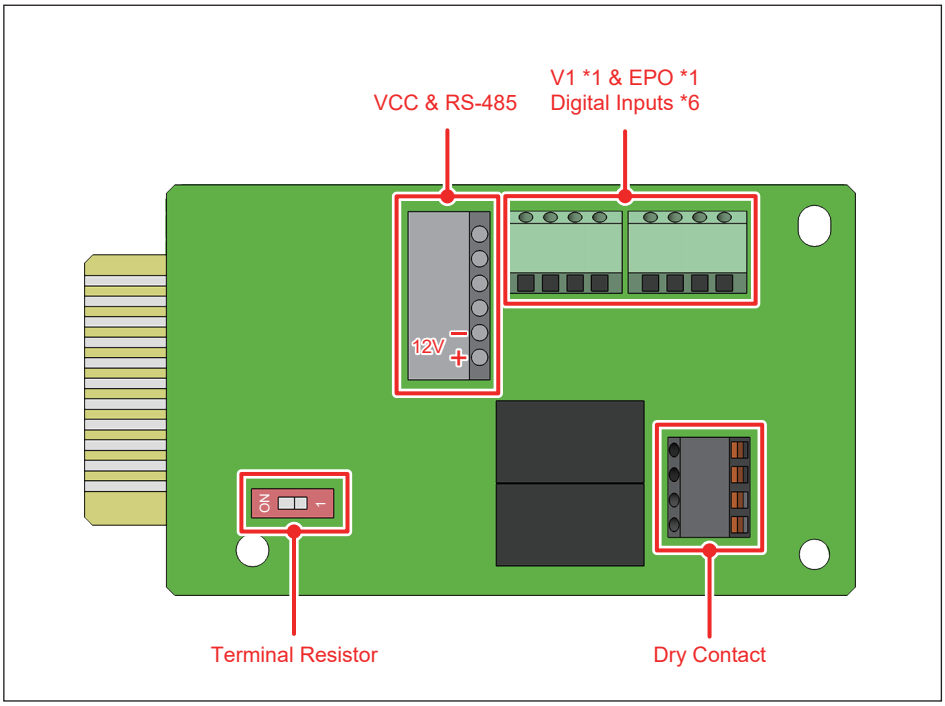
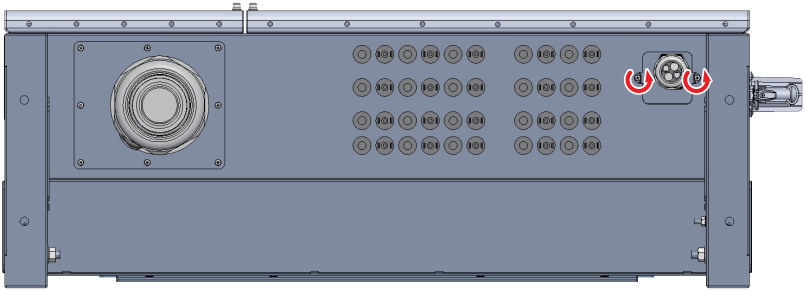


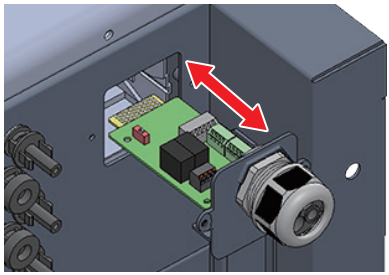
Figure 3-26: Communication Module Layout

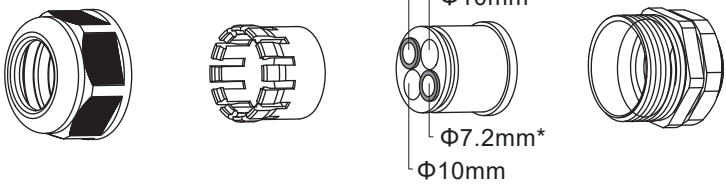
3.7.1 Accessing the Communication Module

The communication module consists of an assembly with a PCB and a plastic carrier. It is located in a slot through the bottom of the chassis.
It is accessed from the bottom exterior of the chassis. The carrier is secured to the chassis by two self-retaining screws. See ***Figure 3-27***.
To access the communication module, loosen the two self-retaining screws to loosen the carrier from the chassis. Once loosened completely, the card/carrier module can be withdrawn from the chassis by gently pulling the carrier straight out from the chassis.
After pulling the desired signal cable(s) through the wiring gland provided or a connected conduit, and connected electrically as shown in the following sections, the module can be reinstalled by reversing the above directions. Ensure the assembly is oriented into the chassis so as to allow the edge connector to engage properly.



Screw torque required for assembling: 0.8 N·m





* Remove the rubber stopper in the Φ7.2 mm hole can extend it to Φ8.7 mm for use.

Figure 3-27: Location and access to Communication Module

ATTENTION

-This inverter is compliant with the “Technical Specification for Security Inspection of Solar Inverter and Monitoring Units” required by BSMI.

- After completing the wiring operation and ensuring the cover no longer needs to be opened, please refer to ***Figure 3-28*** to apply a brand new one-time-use security seal (item 10, ***Table2-1***) .
- We will not be liable or responsible for any security incident caused by an improper application of the sticker.

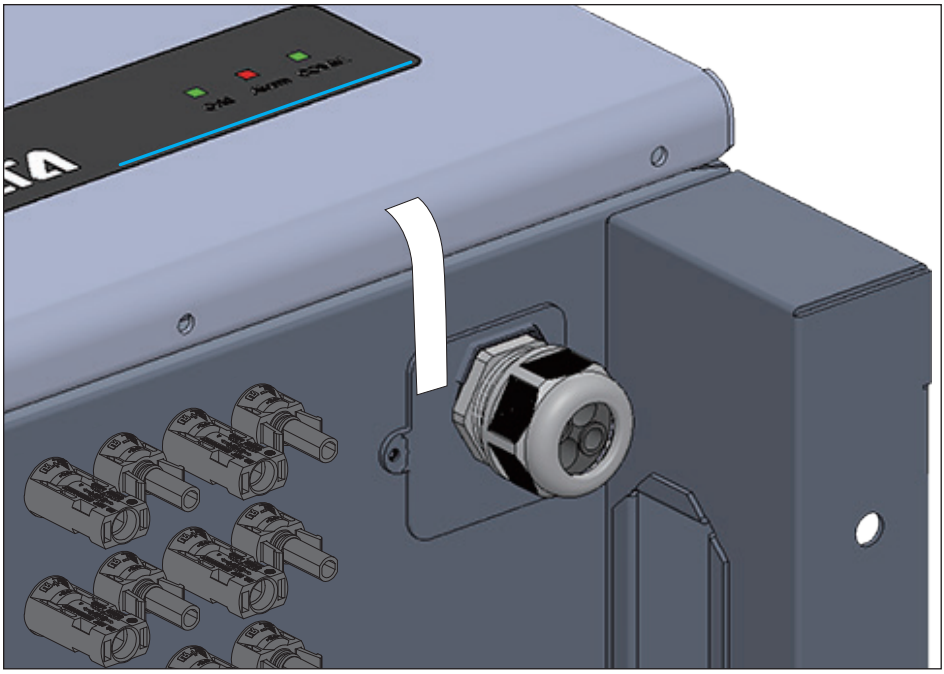


Figure 3-28: Apply a security seal on DC side door and Communication Module

3.7.2 RS-485 Connection

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

- Pins 1 and 2 provide a 12VDC bus for use with accessories.
  (If use of 12VDC bus is necessary, place switch 1 in ON position.)
- 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 3-26***), refer to ***Table 3-4*** for the switch function. Different RS-485 connection scenarios require different set up for the 120ohm bus termination resistor.

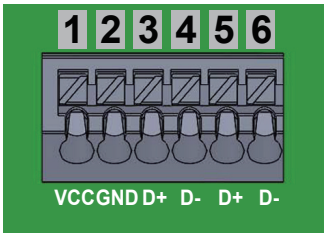
- When several inverters are cascaded (i.e., "daisy-chained") only the last inverter in the chain must have its bus termination resistor switched ON.(***Figure 3-29***)
- If the length of any RS-485 bus is greater than 610m, the use of Belden 3105A cable (or eq.) is recommended to insure communication quality.
- The length of RS-485 cable is recommended to be less than 30m in general.

ATTENTION

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

Table 3-3: RS-485 Terminal block wiring

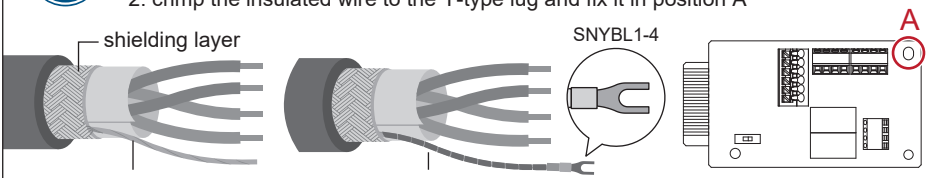
Pin	Function
1	VCC (+12V)
2	GND (It is not the PE)
3	DATA+
4	DATA-
5	DATA+
6	DATA-



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



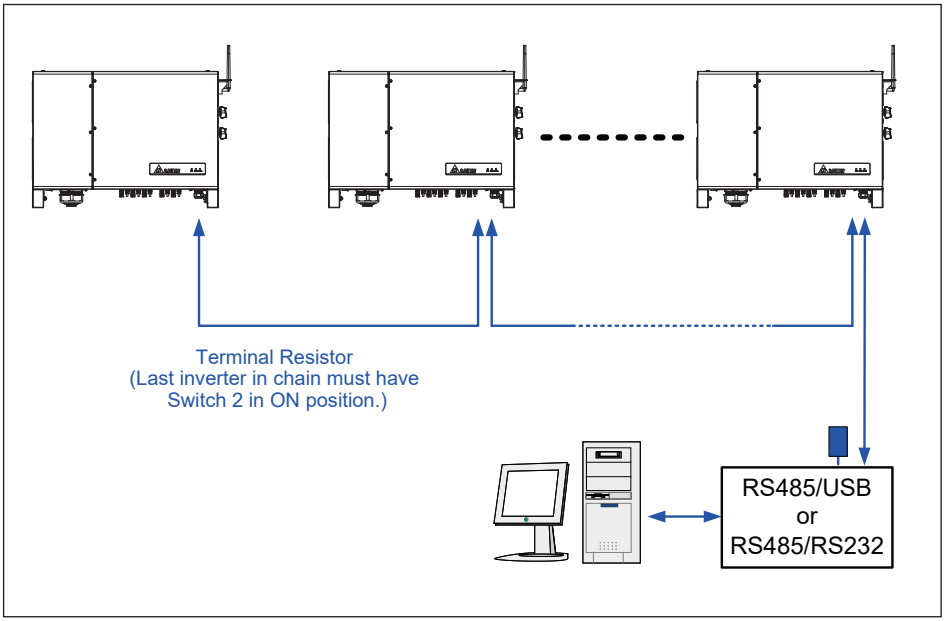


Figure 3-29: Multiinverter connection illustration

Table 3-4: Vcc and Bus Termination switch settings

	Switch 1
ON	Terminal Resistor ON
1	Terminal Resistor OFF

3.7.3 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 3-30: 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 [V1 & 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 3-5***, below.

Table 3-5: Definition of digital input & EPO function

Short terminals	Inverter's action
V1 & K0	Emergency power off (EPO)
V1 & K1	0% active power
V1 & K2	Maximum 30% rated power
V1 & K3	Maximum 60% rated power
V1 & K4	Maximum 100% rated power
V1 & K5	Reserved
V1 & K6	Reserved

3.7.4 Dry Contact Connection

M125HV_111 provides a dry control contact pair that may be used to control external devices based on the status of operation of the inverter.

The terminal block for this function is shown in ***Figure 3-31***. 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 the APP or DSS.

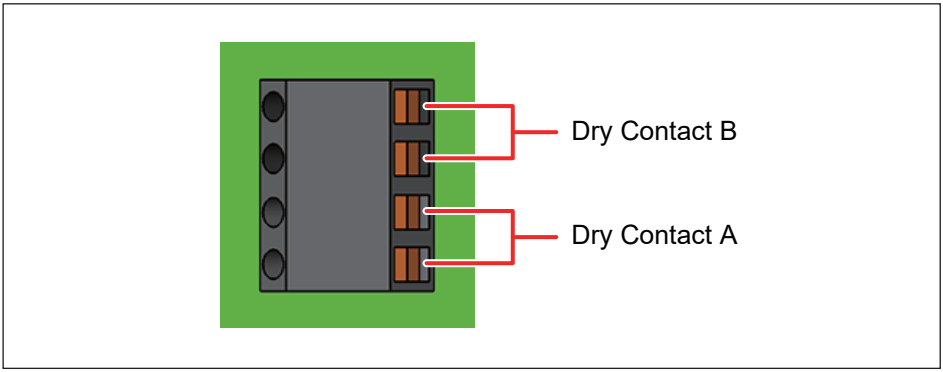


Figure 3-31: Dry Contact connection

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

M125HV_111 with 3 LEDs allow visual display of the inverter's data and status as shown in ***Figure 4-1***.
Please refer to ***Table 4-1*** for information as to the information provided by the LED indicators.

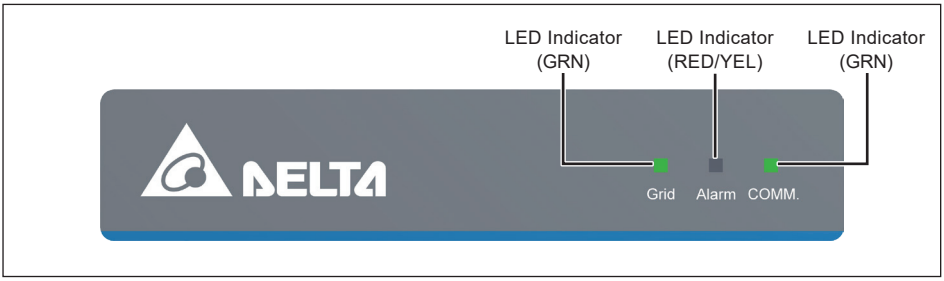


Figure 4-1: Front Panel Display

Table 4-1: LED indicator

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

*FLASH: ON 1s / OFF 1s
FLASH FAST: ON 0.25s / OFF 0.25s
FLASH SLOW : ON 5s / OFF 10s

Table 4-2: Wireless communication status

SUB_1G Condition	COMM. (Green)
Work	FLASH
Offline	OFF

* FLASH: ON 3s / OFF 2s

4.2 Auto ID Commission

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 4.3*** for operation manual.)

4.2.1 Commission Setting (DSS)

① Select the corresponding model

② Click “RS485“

③ Select communication port (automatic detection by the system).

④ Click ▶

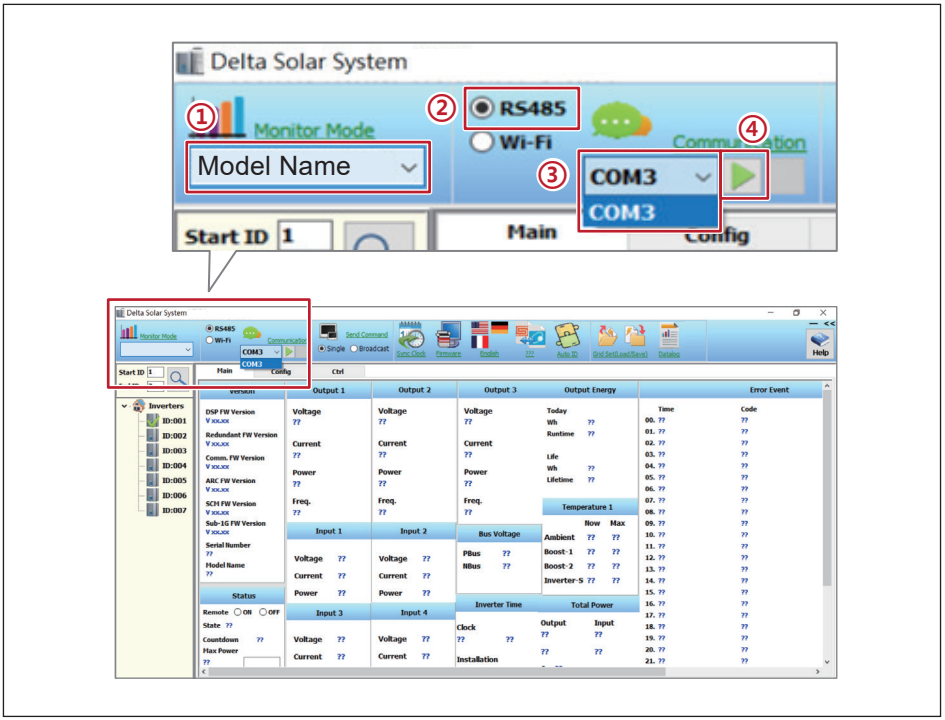


Figure 4-2: DSS Commission setting

4.2.2 Scan inverter

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

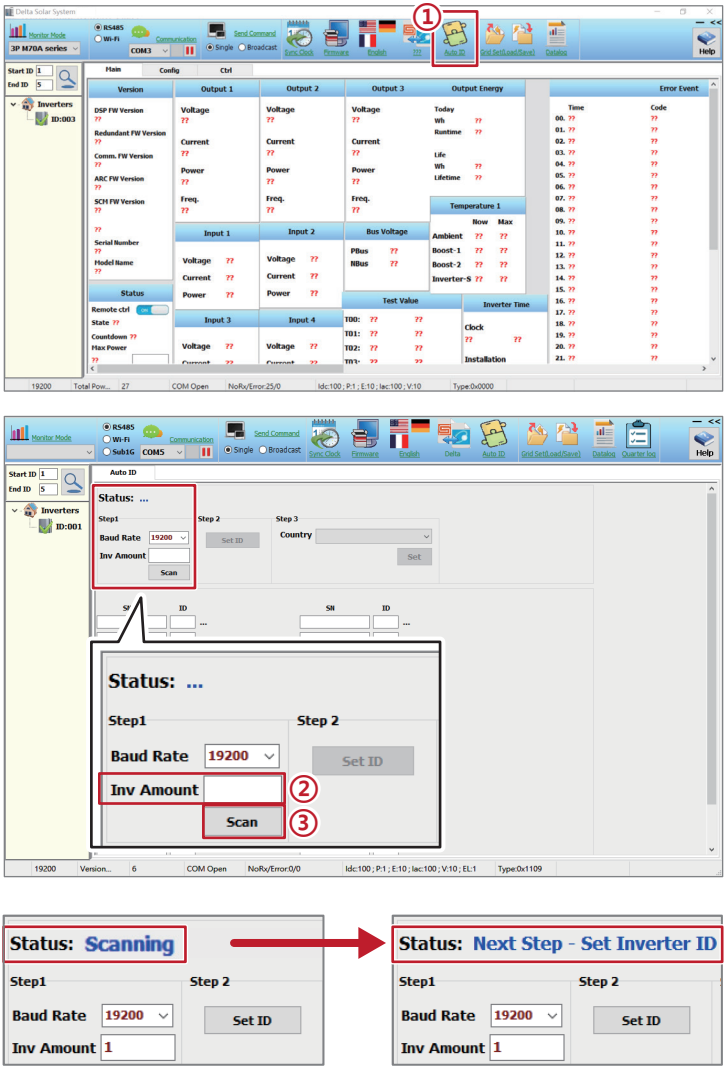


Figure 4-3: Steps of scanning inverters

4.2.3 Set ID

① The serial number of the successfully scanned device will be displayed, the default ID can be changed.

② After ID setting is completed, click “Set ID”.

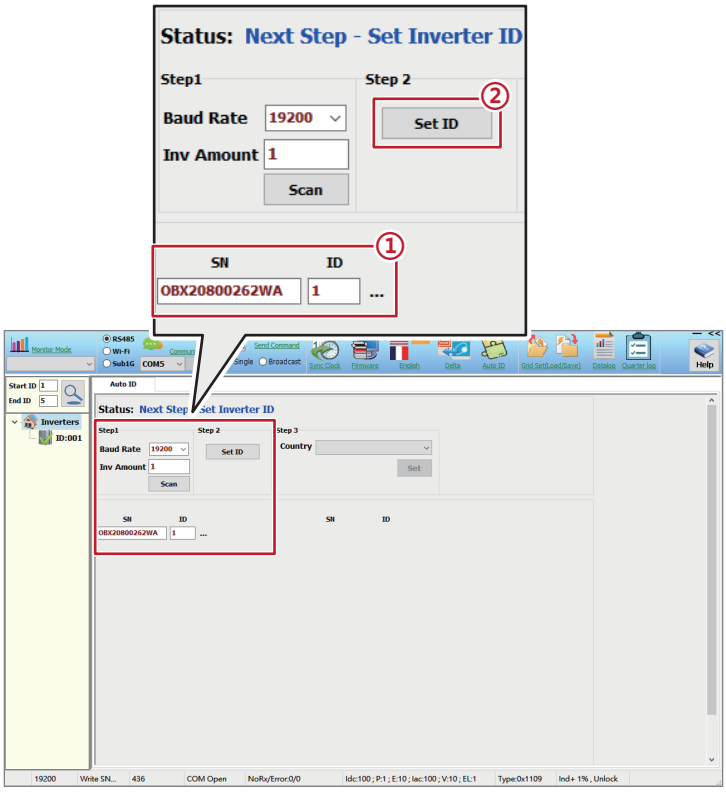


Figure 4-4: Steps of ID setting

4.2.4 Set Country

① Click to select the country of inverter.

② Click “Set”.

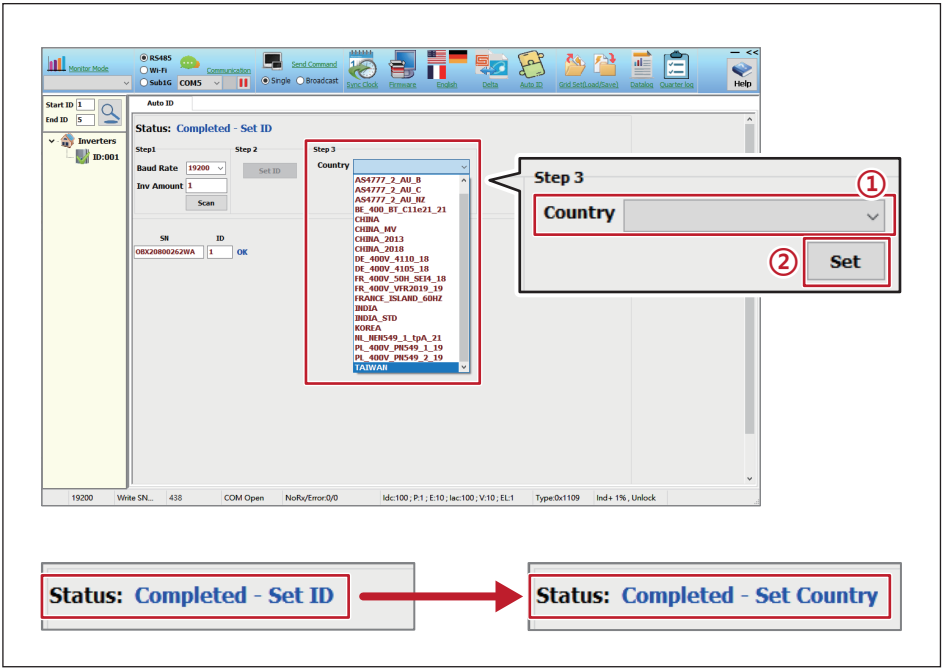


Figure 4-5: Steps of country setting

4.2.5 Synchronize time

Click “Sync Clock  ” to Synchronize time.

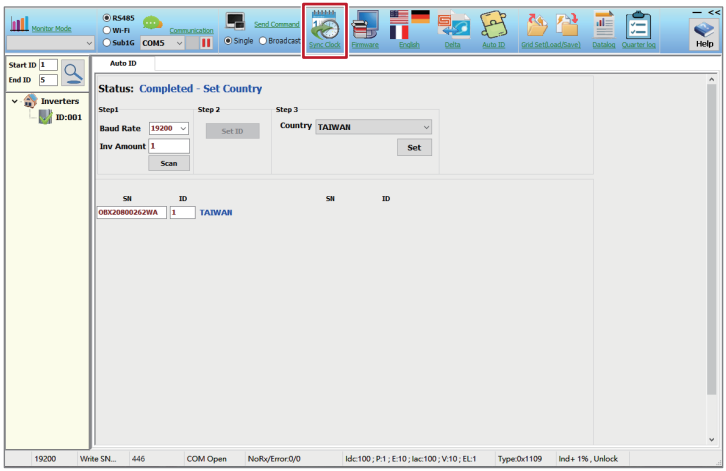


Figure 4-6: Steps of time synchronization

4.3 Delta Function Setting

Delta offers two setting tools:

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

Function	
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 cosφ	Dry contact
Fixed Q(%)	Arc fault detection
Auto ID	Pro EL mode

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:

- Mobile App > DeltaSolar APP Operation 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.

WARNING !

- Please make sure AC and DC power are both off prior to any maintenance procedures to avoid risk of electric shock.
- **It is forbidden to open both doors at the same time.**

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 ~ Figure 5-3.*** To fix door by hexagon driver per ***Figure 5-2.***

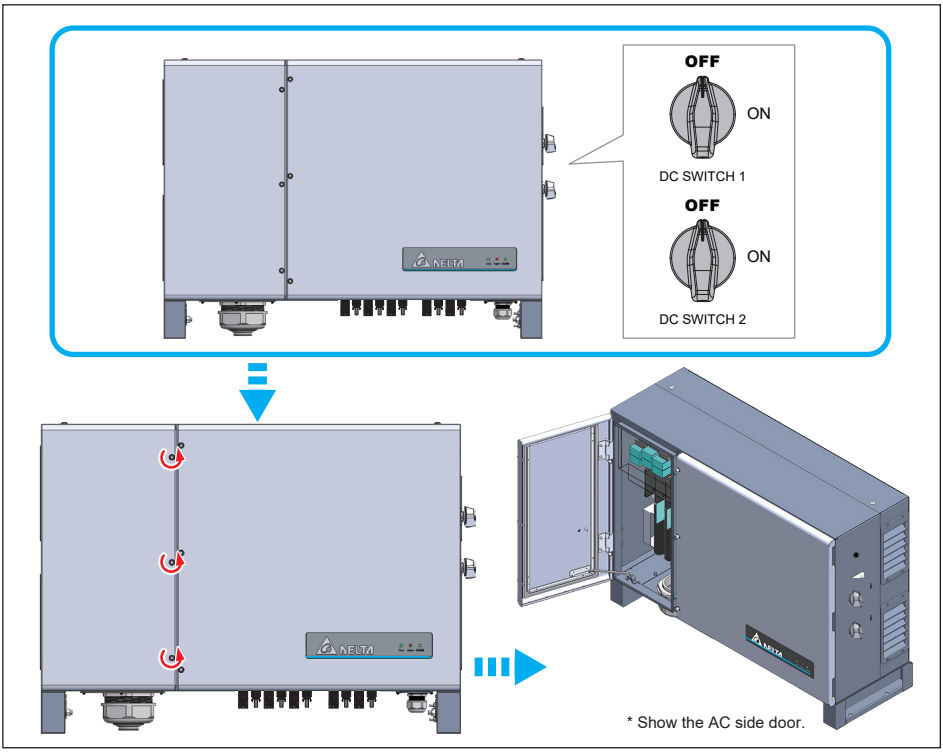
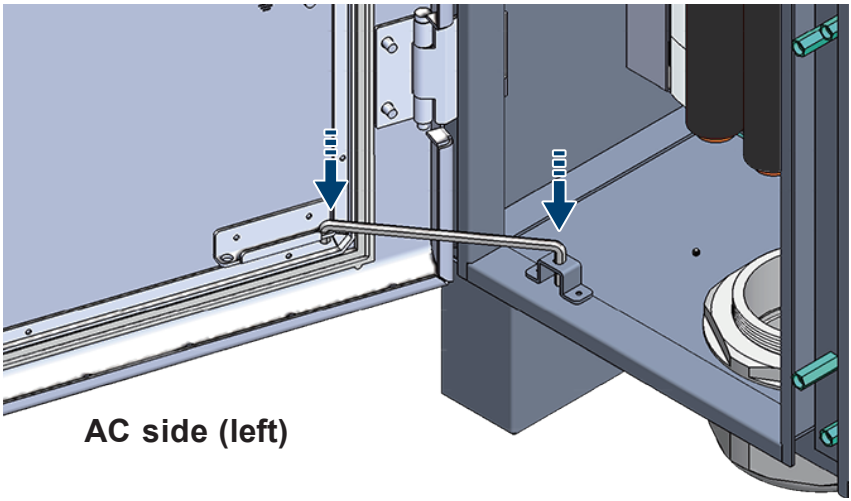


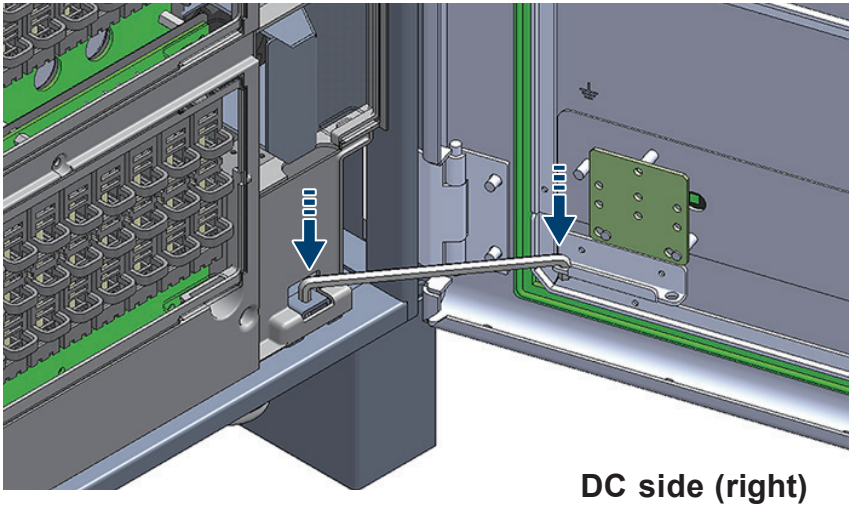
Figure 5-1: Open and close the door

INFORMATION

- Use Hexagon Driver (***Table2-1***, Item5) or other proper tool to untighten door screws.
- Door screws are captive screw type. Do not disassemble door screws.



or



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

5.1.1 Open the Door

- Do not attempt to open the door under raining condition.
- Before opening the front door, please wipe the inverter case if it is wet to avoid water seepage.
- AC / DC power off and wait until LED display turns off.
- Loosen the 3 screws on the door and open its.
- Use care not to contaminate the door's gasket and mating surfaces.

Do not open the door for long periods of time.

5.1.2 Close the Door

Before closing the door:

1. Ensure rubber sealant and mating surface are clean and in good condition.
2. The rubber sealant has to be properly mounted on the enclosure.

When closing the door:

Tighten the door screws to 4.4N · m of torque with torque wrench.

After closing the door:

Make sure the screws are locked securely as ***Figure 5-3.***

Apply a brand new one-time-use security seal as ***Figure 3-19*** (AC side) and ***Figure 3-28*** (DC side).

ATTENTION

-This inverter is compliant with the "Technical Specification for Security Inspection of Solar Inverter and Monitoring Units" required by BSMI.

- After completing the wiring operation and ensuring the cover no longer needs to be opened, please refer to ***Figure 3-19***(AC side) and ***Figure 3-28***(DC side) to apply a brand new one-time-use security seal (item 10, ***Table2-1***) .
- We will not be liable or responsible for any security incident caused by an improper application of the sticker.

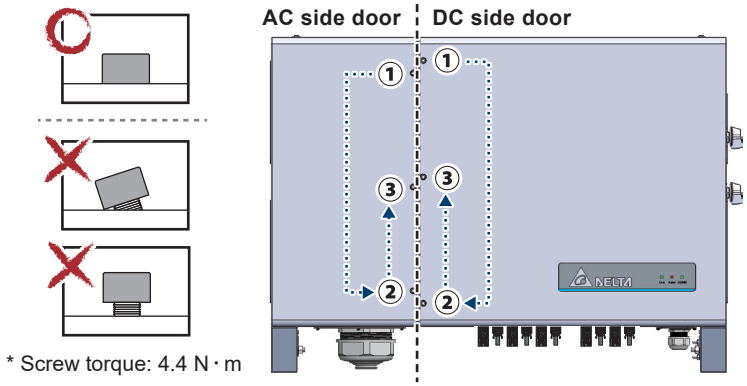


Figure 5-3: Closing process for the door

5.2 Replacement of Surge Protection Devices (SPD)

M125HV_111 have the surge protection device (SPD) at both AC and DC side as shown in ***Figure 5-4***. ***Table 5-1*** summarizes the specifications of AC and DC SPD.

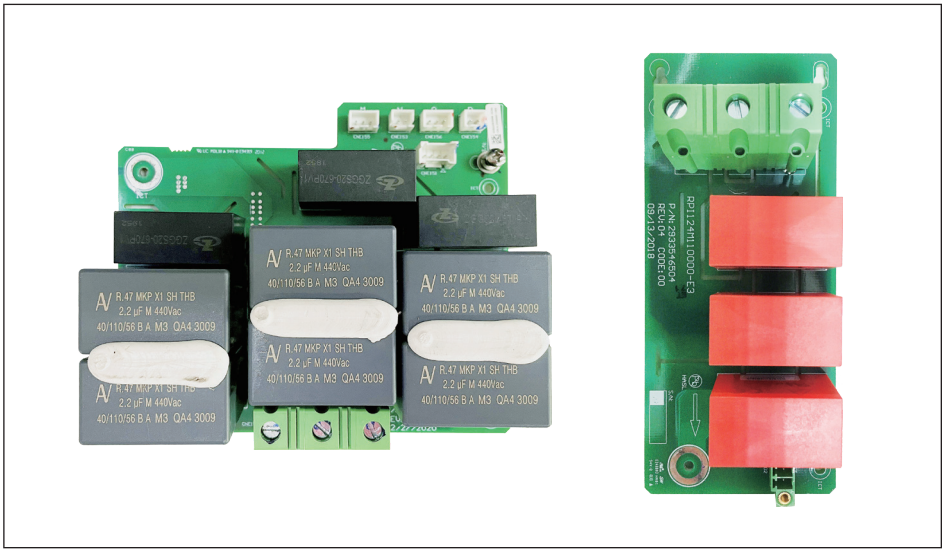


Figure 5-4: AC and DC SPD modules

Table 5-1: SPD Specifications

Description		**Value**
Working voltage:	AC Module	1190VRMS
	DC Module	1800VDC
Working Current (8/20us)		10kA
Rated Current (IMAX – 8/20us)		20kA
Operating Ambient Temperature Range		-40°C to 85°C
Manufacturer:	Sichuan Zhongguang Lightning Protection Technologies Co., Ltd	

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 if the SPD unit is damaged. See ***Figure 5-5.***

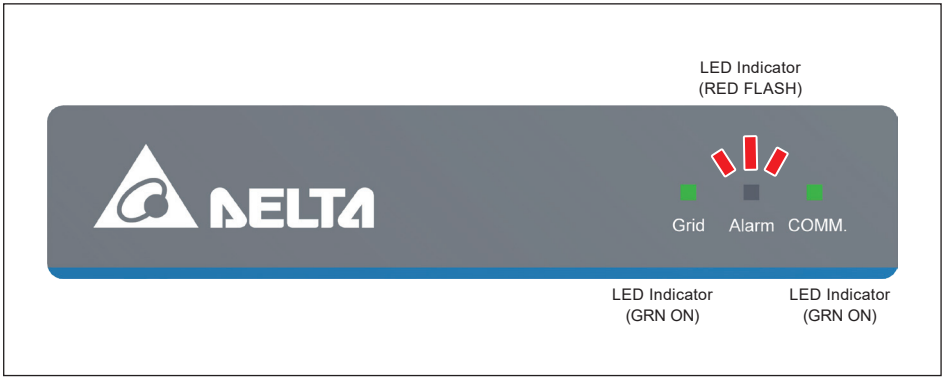


Figure 5-5: Display Indicating AC and DC SPD failure

• Accessing the door

1. Switch DC 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** (*Figure 5-7*)

1. Disengage the 5 signal wiring connectors from the AC SPD PCB. (4-pin x 1, 3-pin x 2, 2-pin x 2)
2. Disengage the 3 power wirings from the AC SPD PCB.
3. Remove two self-retaining screws located on the left (AC) side of the AC SPD PCB.
4. Lift and remove the entire AC SPD PCB and replace with new unit.
5. Install the new AC SPD using the above procedure in reverse order. Tighten the five screws to a torque value shown in ***Figure 5-7.***

• To remove the defective **DC SPD** (*Figure 5-8*)

1. Disengage 1 signal wiring connector from the DC SPD PCB.
2. Disengage the 2 power wirings from the DC SPD PCB.
3. Remove two self-retaining screws located on the right (DC) side of 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 five screws to a torque value shown in ***Figure 5-8.***

• Closing the door

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

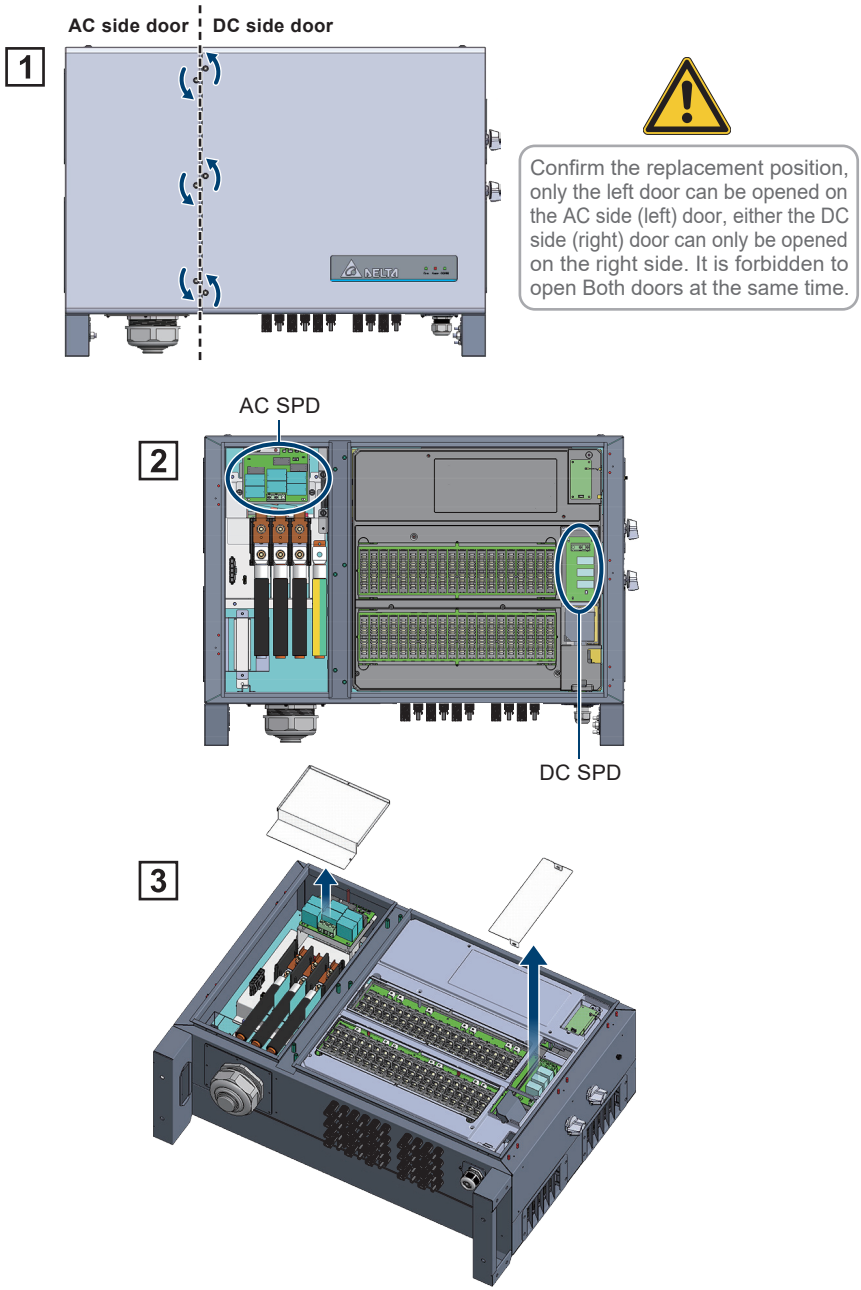


Figure 5-6: Steps of changing SPDs

AC SPDs

* A/G: Screw torque 0.8N · m

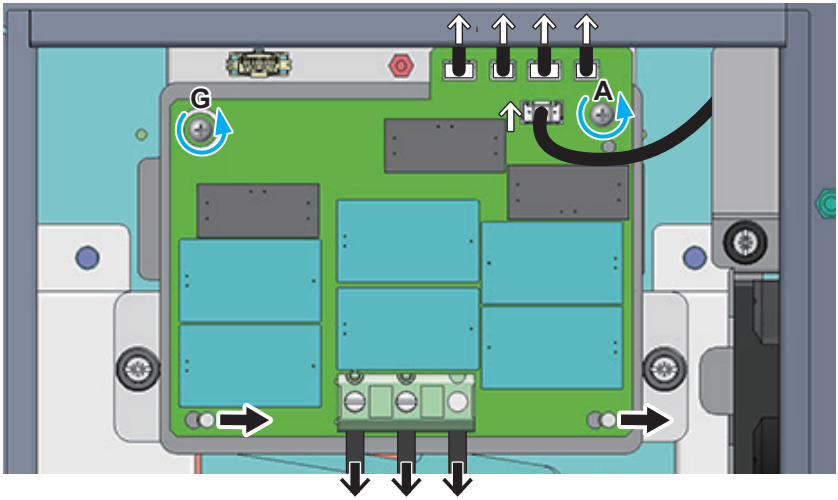


Figure 5-7: Remove wirings as connectors of AC SPD

DC SPDs

* A/G: Screw torque 0.8N · m

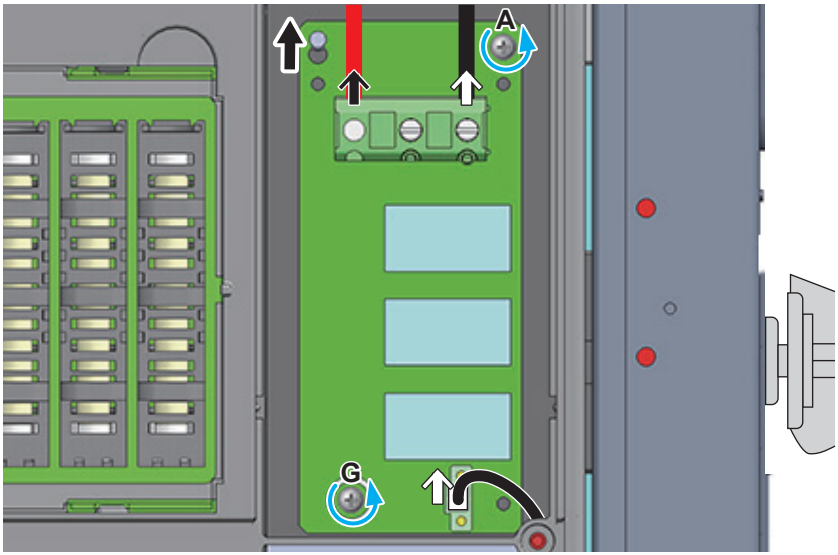


Figure 5-8: Remove wirings as connectors of DC SPD

5.3 Replace Internal String Fuse

M125HV_111 have independent MPPT inputs.
The combiners utilize standard 10mm x 85mm PV combiner fuses and associated fuse holders. Because of the TL design, all strings are floating with respect to ground, and two fuses are required per string input connected in series with the positive and negative string leads.
Any 10mm x 85mm listed PV fuse (15A / 20A) can be used for replacement purposes. The standard builded in M125HV_111 is 20A Fuse.
The specifications for the required fuse and fuse brands used in the factory are listed below.

Table 5-2: Combiner Fuse Specification

Rated current	20 A
Rated voltage	1500 V
Operating Class	Solar PV
Fuse Type	10x85 ferrule

IEC listed	IEC 60269-6
Typical Mfr	Littelfuse, Bussmann
Mfr P/N	SPXV 20, PV-20A10F85L

DANGER : ELECTRICAL HAZARD!!

- Ensure DC and AC cables are always de-energized during the maintenance to avoid the shock hazard risk!
- Before removing the fuses, please turn off DC switch and make sure the inverter has stopped working, then remove the corresponding H4 Plus connector.

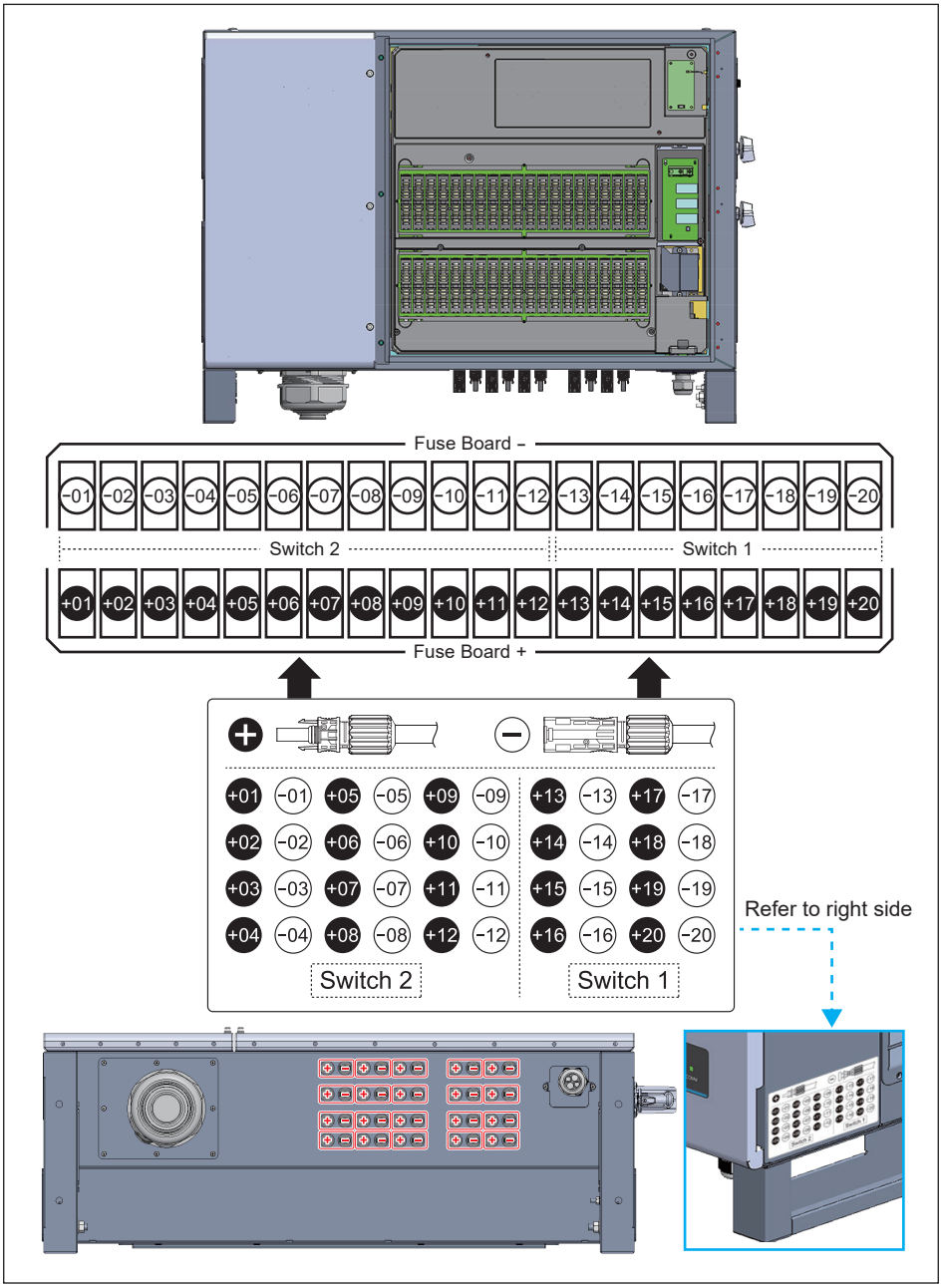


Figure 5-9: Layout of fuse board and location of H4 connectors

M125HV_111 is equipped with 40 combiner fuses in “pull-out fuse holders, which support connection of up to 20 strings. The fuse holders are mounted on two PWBs. The pull-out fuse holders allow safe removal of fuses which are inserted into a carrier.
Figure 5-10 shows the location of the combiner fuse holders and shield cover, and ***Figure 5-11*** provides details to remove a fuse; refer to ***Figure 2-5*** for additional information.

Check the combiner fuses if the power generation of inverter is abnormal using the following procedure:

1. Check to determine if any string current measurement is zero, which will most probably indicate a blown fuse.
2. AC and DC power off and wait until LED display turns off.
3. ***To access the DC side (right) door, use procedure found in Section 5.1.1***
4. Based on step 1, check the corresponding fuse locations by pulling out the fuse holder (***Figure 5-11***) and checking continuity of the fuse.
5. Replace the fuse if necessary.
6. ***Closing the DC side (right) door, using the procedure found in Section 5.1.2***

1. Remove the shield cover.

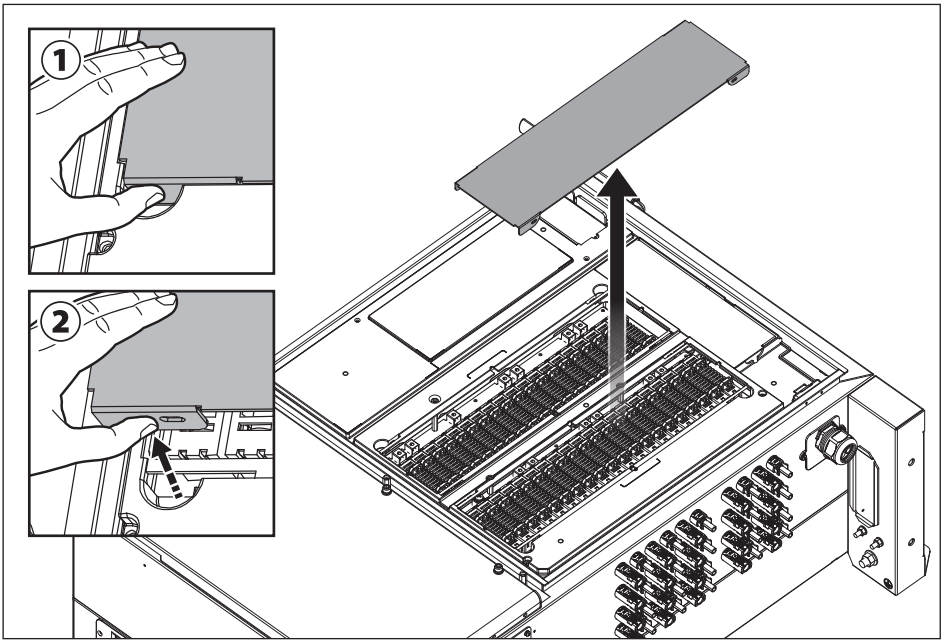


Figure 5-10: Fuse holder locations

2. Pull the fuse puller vertically to remove the fuse holder.
   (The fuse holders should be removed or installed vertically.)

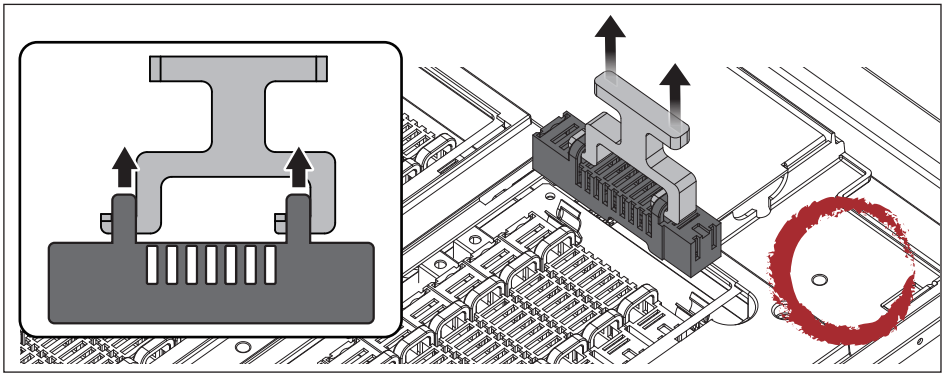


Figure 5-11: Accessing the individual fuses

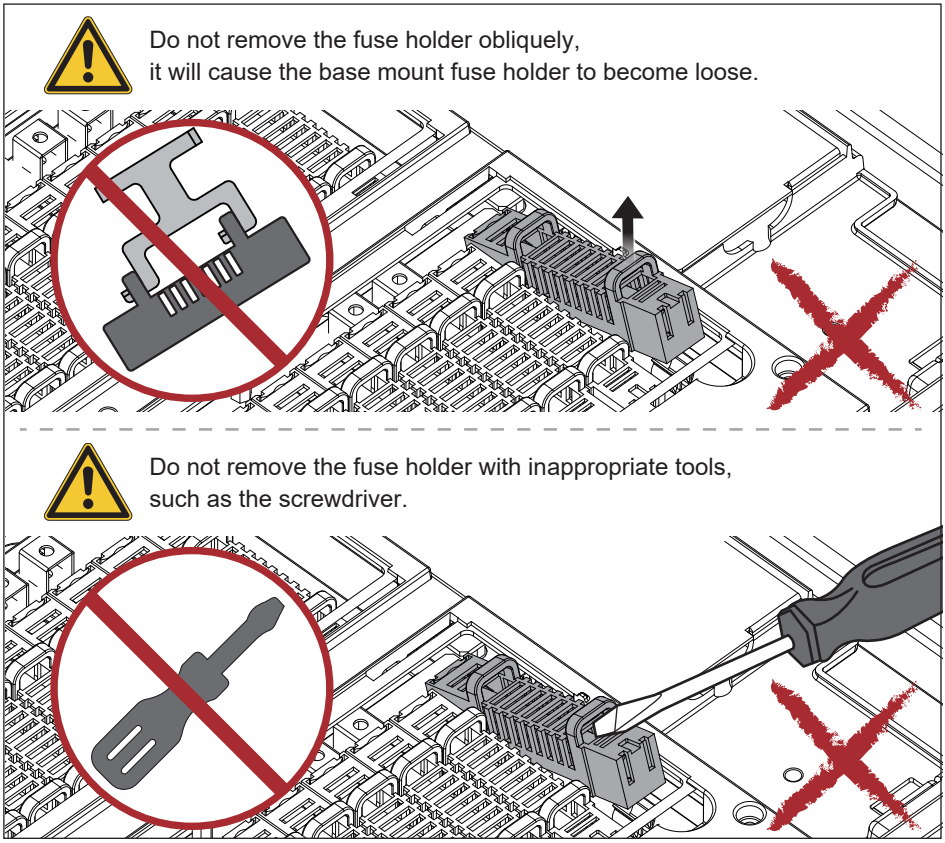


Figure 5-12: Incorrect remove method

3. Open the lid of the fuse holder.
4. Tilt the fuse holder slightly to take out the fuse.
* Please be careful not to drop the fuse at this time.

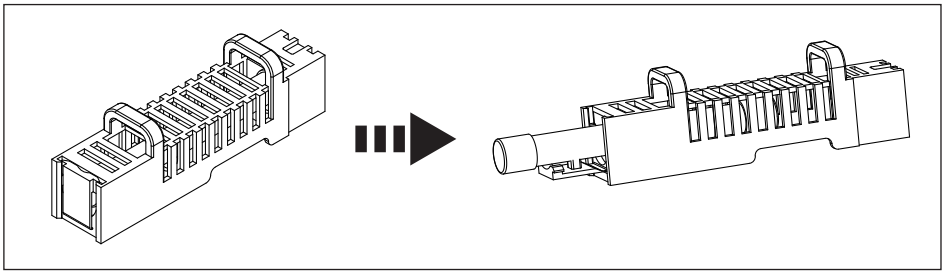
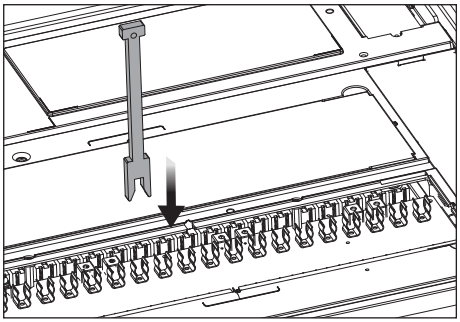
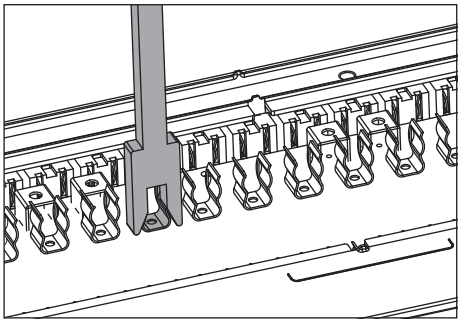


Figure 5-13: Replace the fuse

5. Insert the calibration tool vertically downward to the clamp of the fuse holder, and then pull it out.





6. Vertically install the fuse holder.
7. Re-attach the shield cover.

ATTENTION

Please keep the fuse puller and the calibration tool clean before using it.

5.4 Smart Fans Replacement and Filter Cleaning

M125HV_111 is provisioned with processor-controlled "smart fans" for cooling of the electronics. This section provides procedures for cleaning filters associated with these fans, and instructions for field replacement of the fans.
The fans utilized have high reliability ratings and coupled with use of processor controls provide a "smart" cooling system design with a long life. The system features tachometer detection of a failed fan, and generates a "FAN-FAIL" signal that is interfaced to the inverter control to trigger a FAN-FAIL alarm and places the inverter in a power de-rate mode as required for safe operation.

Depending upon the model, fans are installed at two locations within inverter:
• Power Module (PM) compartment
• Inside the inverter compartment
Figures 5-16 illustrates the PM fan locations.
Figures 5-17, 5-18, 5-19, 5-20 illustrates the internal fan 1 locations.
Figures 5-21, 5-22, 5-23, 5-24 illustrates the internal fan 2 locations.

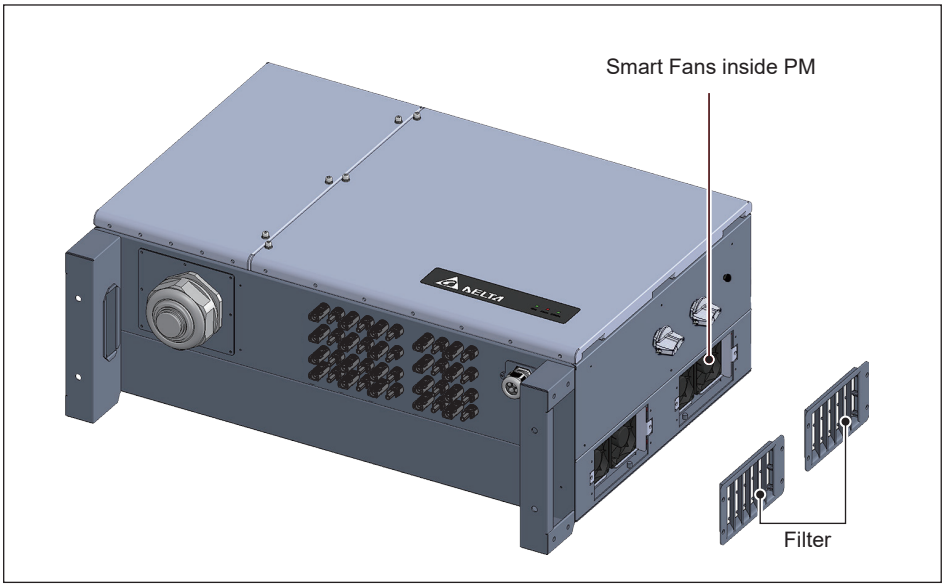


Figure 5-14: Smart Fans location on Power Module chassis

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.

DANGER : ELECTRICAL HAZARD!!

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

5.4.1 Location of failure fan

If the Error-code comes **"W11-Fan Fail"**, please refer to the corresponding code shown on DSS and procedure in following chapters to remove the fan.

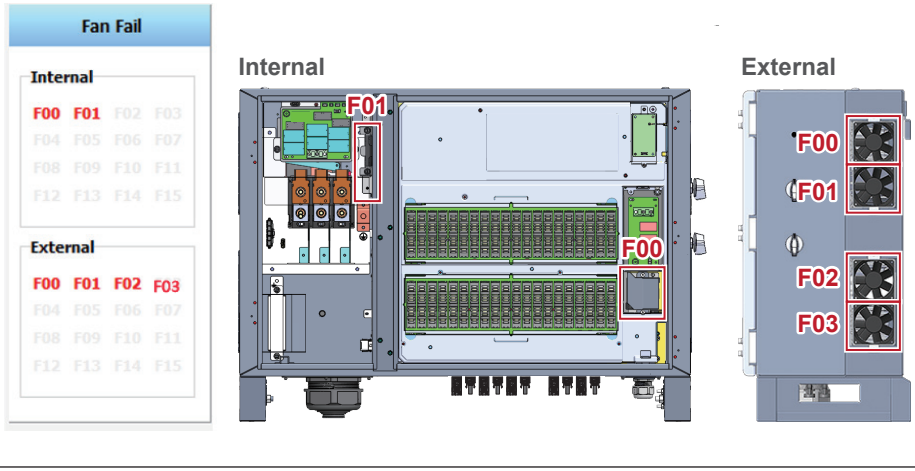


Figure 5-15: The corresponding fan location to the fan fail code on DSS

5.4.2 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.

The order of fan is shown in ***Figure 5-15.***
Follow the warning "FXX" to replace the fan which was broken.

Refer to ***Figure 5-16*** 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.On the right side, remove two screws for each fan tray.
3.On the right side, unplug fan power connectors for each fan.
  (To release snap-fit, press location A and location B from both side .)
4.Pull fan tray out from PM chassis.
  To disassemble fan , remove four screws that secure it to fan tray.

To reassemble reverse the order of the above procedure and tighten screws to torque values indicated in ***Figure 5-16.***

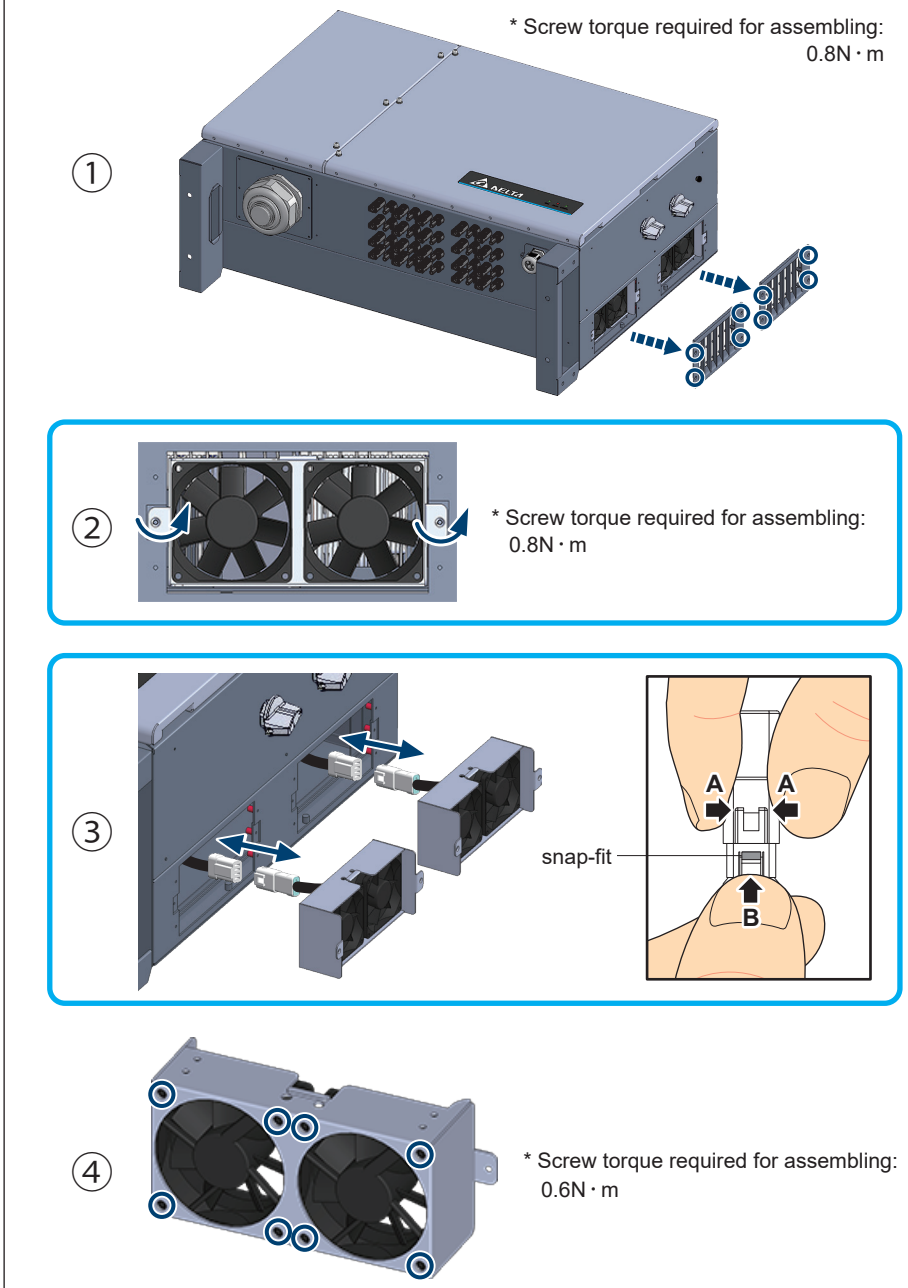


Figure 5-16: Disassembling fan tray from PM chassis

5.4.3 Internal Fan 1

When used, the DC side (right) compartment is provisioned with a single fan module. (See ***Figure 5-17, 5-18, 5-19, 5-20***)

If the warning **"Fan Fail- Internal F00"** show on the DSS / APP, please follow the procedure below to remove Internal Fan 1.

(1) Remove the shield cover.

(2) Loosen two screws shown in ***Figure 5-18*** and remove the fan cabinet.

(3) Disconnect the power connector.

(4) Lift the entire fan assembly from the DC side (right) compartment. (shown in ***Figure 5-19***)

(5) Clean assembly or replace with a new fan. (shown in ***Figure 5-20***)

(6) Reassemble using a tightening torque of 0.8 N · m.

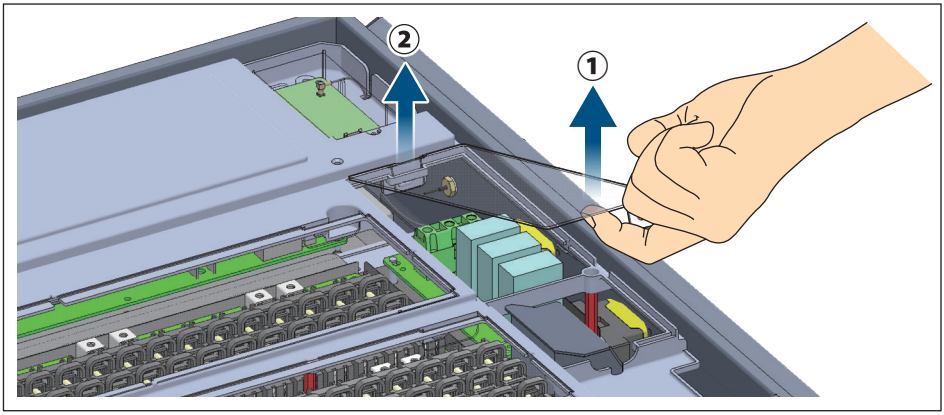


Figure 5-17: Remove the internal fan 1 shield cover

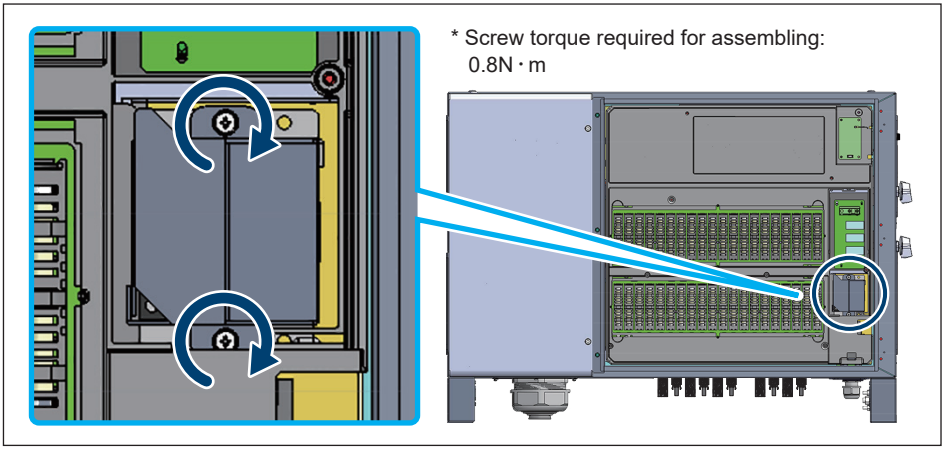


Figure 5-18: Internal fan 1 location

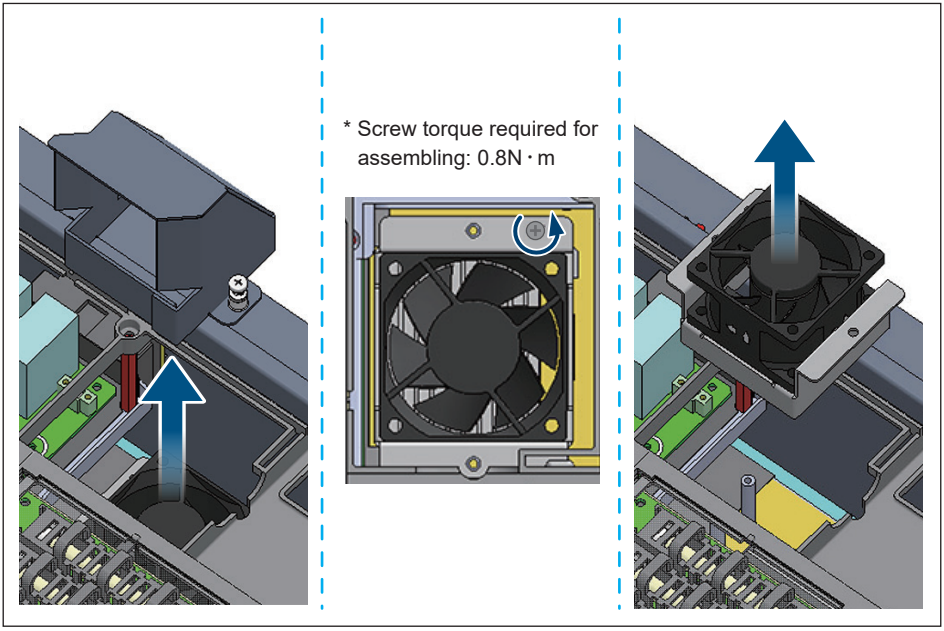


Figure 5-19: Take off the internal fan 1

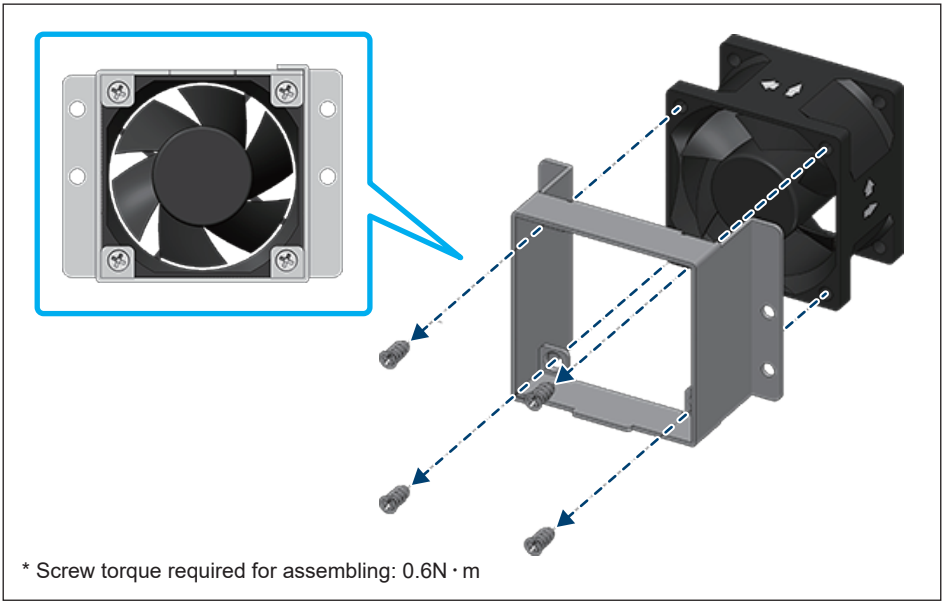


Figure 5-20: Replace with a new fan

5.4.4 Internal Fan 2

When used, the AC side compartment is provisioned with a single fan module. (See ***Figure 5-21, 5-22, 5-23, 5-24***)

If the warning **"Fan Fail- Internal F01"** show on the DSS / APP, please follow the procedure below to remove Internal Fan 2.

(1) Remove the shield cover. (shown in ***Figure 5-21***)

(2) Remove the two screws shown in ***Figure 5-22***.

(3) Disconnect the fan power connector.

(4) Lift the entire fan assembly from the left compartment. (shown in ***Figure 5-23***)

(5) Clean assembly or replace with a new fan. (shown in ***Figure 5-24***)

(6) Reassemble using a tightening torque of 2 N · m.

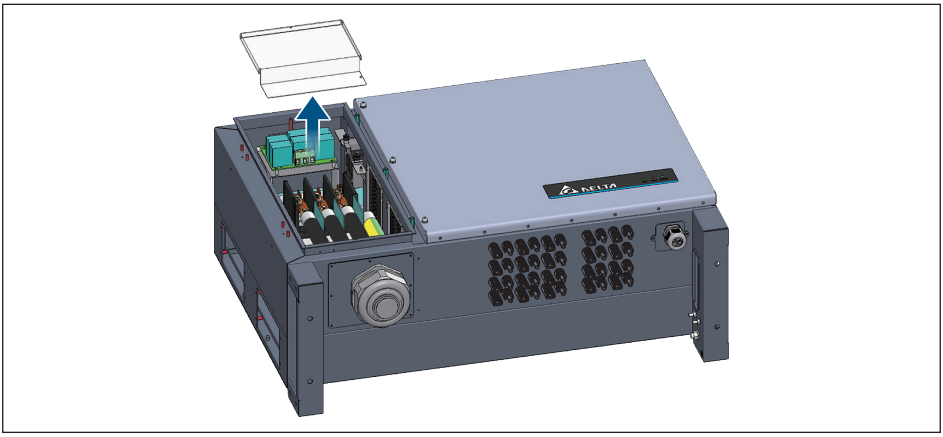


Figure 5-21: Remove the internal fan 2 shield cover

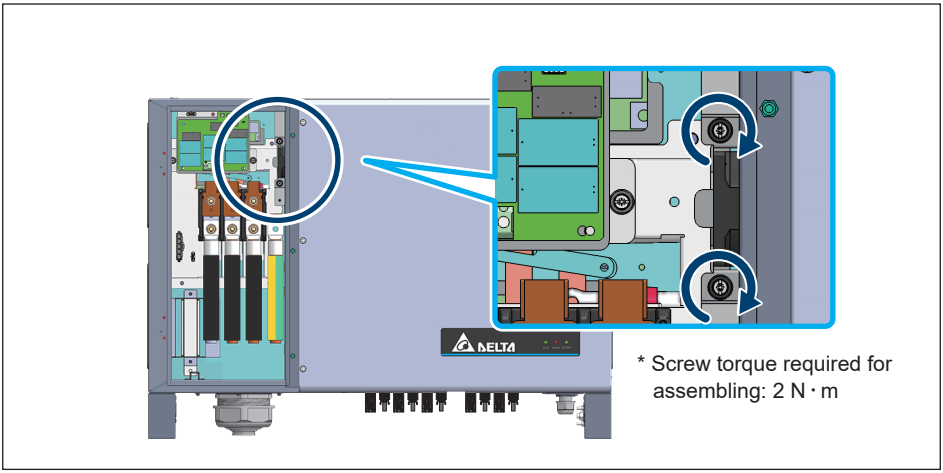


Figure 5-22: Internal Fan 2 location

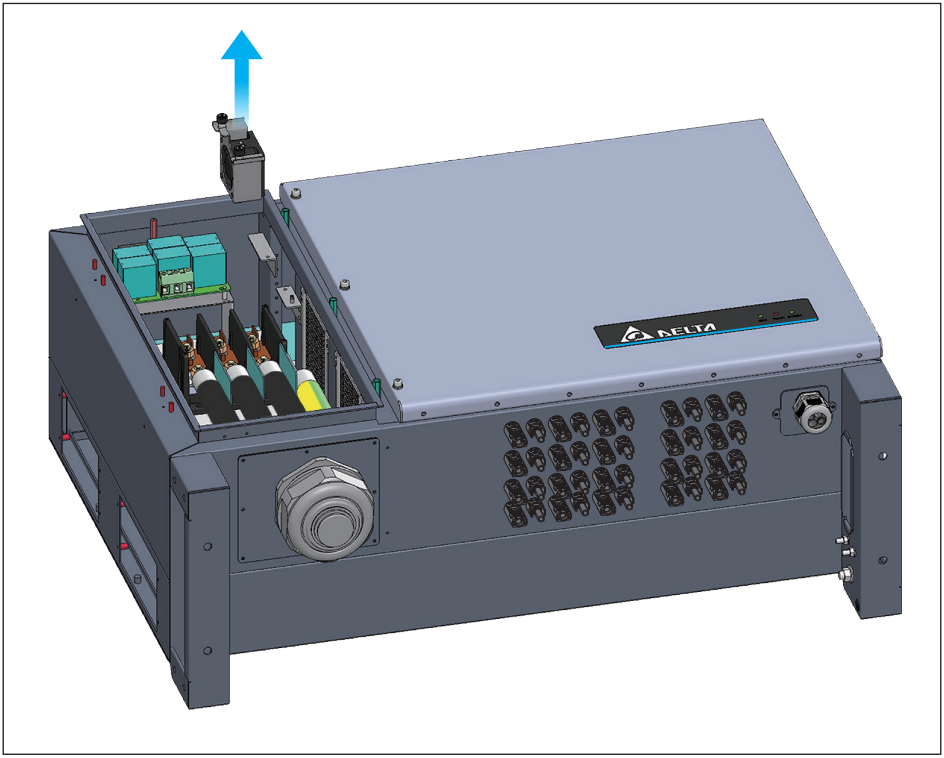


Figure 5-23: Take off the internal Fan 2

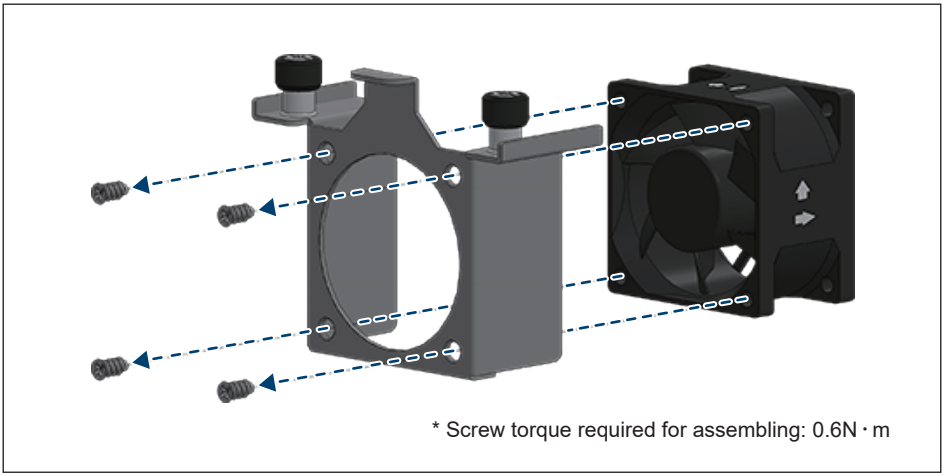


Figure 5-24: Replace with a new fan

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, use following procedures.

- 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 : POSSIBILE INJURY !

The inverter weighs 80 kg.
There is risk of injury if the inverter is carried incorrectly or dropped during transport or when attaching or removing it from the wall mounting bracket. Personnel should wear suitable gloves to protect against injury and maintain firm control of the inverter chassis.

ATTENTION

Do not leave loosen screws and nuts inside the case.

6 Error Message and Trouble Shooting

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

6.1 Error Codes (Field Fault)

Table 6-1A: Error Codes (Field Fault) & 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 terminal	Check the AC connection in accordance with the user manual
No Grid (E09)	1. AC breaker is OFF 2. Disconnect in AC terminal	1. Check switch or AC breaker turn on 2. Check the connection in AC terminal and make sure it connects to inverter
AC Volt Low (E10)	Grid voltage low	1. Check the utility voltage within the suitable range 2. Check Grid code & Grid setting 3. Check the connection in AC terminal
AC Volt High (E11)	Grid voltage high	
EPO (E25)	EPO is operated by user	Release the EPO button
DC Voltage High (E30)	Input voltage is over 1500Vdc	Modify the solar array setting, and make the Voc less than 1500Vdc
Insulation Fault (E34)	Insulation problem of PV array to ground	1. Check if panel enclosure ground conpletely 2. Check if inverter ground conpletely 3. Check if the DC breakers get wet
Remote OFF (E36)	Remote OFF by extern 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)	One of inner ambient NTC and inverter module NTCs is over high temperature limit	Check the installation ambient and environment
Amb Temp Fault (F06)	The ambient NTC temperature >105 ℃ or <-40 ℃	***Contact customer service for technical support***
Temperature Low (F07)	One of inner ambient NTC and inverter module NTCs is under low temperature limit.	Check the installation ambient and environment
Inveter Temp Fault (F10)	The inverter NTC temperature >125 ℃ or <-40 ℃	***Contact customer service for technical support***
AC RLY Fault (F13)	Grid relay open	***Contact customer service for technical support***
FW Unmatch (F14)	Firmware Incompatibility	***Contact customer service for technical support***
AC Sensor Fault (F15)	DSP Iac or Vac sensor circuit defective	1. Check the polarity of PV connection (if the error code comes along with **W08**) ***2. Contact customer service for technical support***
AC Sensor Fault (F18)	Red Vac sensor circuit defective	***Contact customer service for technical support***
Red COMM Fault (F22)	The internal communication connection is disconnected	***Contact customer service for technical support***
DSP COMM Fault (F23)	The communication connection is disconnected	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. Check the capacitance (+ <-> GND & - <-> GND), must < 10uF. Install external transformer if necessary
Iac Unbalance (F26)	1. Power line is disconnected inside the inverter 2. Current feedback circuit is defective	Check the connection in AC terminal
RCMU Fault (F27)	RCMU circuit is disconnected	***Contact customer service for technical support***
AC RLY Short (F28)	Grid relay short	Check the connection and Grid voltage in AC terminal

Table 6-2B: Fault Codes (inverter fault) & Messages		
Message	**Description**	**Action**
AC RLY Open (F29)	Grid relay open	***Contact customer service for technical support***
Bus Unbalance (F30)	Inverter Vbus voltage unbalance	Restart inverter by DC switches
Bus Voltage High (F31, F33, F35)	Voc of PV array is over 1500Vdc	Restart inverter by DC switches
Bus Voltage Low (F32, F34)	Inverter Vbus voltage significant unbalance	***Contact customer service for technical support***
AC Current High (F36,F37,F38 F39,F40,F41)	Surge occurs during operation	***Contact customer service for technical support***
AC CT Fault (F42)	Phase R CT is defective	***Contact customer service for technical support***
AC CT Fault (F43)	Phase S CT is defective	***Contact customer service for technical support***
AC CT Fault (F44)	Phase T CT is defective	***Contact customer service for technical support***
AC Current High (F45)	AC current over range	Restart the inverter by DC switches
ZC Circuit Fault (F50)	The zero crossing circuit defective	***Contact customer service for technical support***
Inv Circuit Fault (F51)	The inverter circuit defective	***Contact customer service for technical support***
Thermal Fuse Fault (F55)	Thermal fuse detected abnormal temperature	***Contact customer service for technical support***
Arc circuit fail (F58)	Arc circuit fail	***Contact customer service for technical support***
Arc fault (F59)	Arc fault	1. Check If any damage of DC connector and DC wire 2. ***Contact customer service for technical support***
DC Current High (F60, F70)	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. DC Connectors polar is incorrect 2. String current monitoring function is failure	1. Check the polarity of PV connection 2. Restart DC switch and AC breaker ***3. 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 ore more fans are disconnected	**Ext Fan Fail** 1. Remove the object that stuck in the fan(s) 2. Check the connections of all fans 3. Replace the defective fan(s) **Int Fan Fail** ***Contact customer service for technical support***
DC SPD Fault (W17) AC SPD Fault (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 Aux-Power defective	***Contact customer service for technical support***
String COMM Fault (W22)	String monitor communication fail	***Contact customer service for technical support***
String Current Low (W23)	Disconnect in DC connectors	1. Check String Connector and Fuse 2. ***Contact customer service for technical support***

7 Technical Information

7.1 Technical of M125HV_111

Table 7-1A: Specifications	
Model	**M125HV_111**
DC Input	
Occasionally Max. voltage	1600V *1
Operating voltage range	860 – 1500V
MPP voltage range	860 – 1350V *2
Rated voltage	1050V
MPP tracker	1
Max. operating current	150A
Max. allowable array Isc	320A
String fuse provisioned	20A/1500V PV fuses
Connection	20 pairs of H4 series connectors *3
Surge protection	Type II SPD (option type I, type I+II)
DC switch	YES
String current monitoring	YES
AC Output	
Rated output power	125kW / 125kVA
Max. output power	125kW / 140kVA
Max. output current	135A
Max. inrush current	300A, 100μs
Max. output fault current (rms)	160A
Max. output overcurrent protection	175A
Rated voltage	3P/PE, 600Vac
Operating voltage range	Vac600V: -36% ~ +15%
Operating frequency range	50/60Hz ±5Hz
Power factor	0.8 ind ~ 0.8 cap adjustable (1~0.9 at maximum power)
Surge protection	Type II SPD (option type I, type I+II)
T.H.D	<3%
Connection	Ring terminal lug with Terminal block (Max. 185mm^2 Cu or Al wire)
Night time consumption *4	< 3.5W

*1 The max withstand voltage is 1600Vdc. (the inverter stops to operate when the PV voltage is over 1500Vdc)

*2 Ambient < 25°C : 860~1350V ; Ambient < 40°C : 860~1250V

*3 Accessories H4 Plus for field wiring, suitable size : 4 / 6 / 10(optional) mm² copper conductor

*4 Night time consumption with standby communication.

Table 7-1B: Specifications	
Model	**M125HV_111**
Efficiency	
Peak efficiency	>99 %
Euro efficiency	98.7 %
Information	
Communication	RS-485 (Delta / Sunspec) / SUB_1G (optional)
Indicator	LED (Grid, Alarm, COMM.)
Regulation	
	Enedis-PRO-RES_64E UTE C 15-712-1 VDE AR-N 4110 TRF_EN50549-2_2019a EN 61000-6-2 EN 61000-6-3 IEC 62109-1/-2 IEC 61439-2 IEC 61727 IEC 62116 IEC 62910 IEC 62109
General Data	
Smart inverter functionality	Voltage/Frequency Ride through, Volt/Var, Volt/Watt, Power curtailment, Frequency/Watt
Max. inverter backfeed current to the array	0A
Pollution degree	3
Overvoltage category	AC output :III, DC Input :II
Protective class	I
AC connection type	Ring terminal lug with Terminal block (Max. 185mm^2 Cu or Al wire)
Operating temp. range	-30°~60°C (>50°C de-rating)
Protection level	IP65 (Electronics)
Relative humidity	0% – 100% non-condensing.
Operating elevation	<3000m, Outdoor, wet locations
Cooling	Forced air cooling with Smart Fan control
Noise	71.5 dBA @1m, Amb25°C
Dimension (W x H x D, mm)	900 x 663 x 334
Weight (kg)	80

If the input voltage is higher than 1350V, the inverter may derate the output power. The relationship between the input voltage and the output power derating is shown in ***Figure 7-1***.

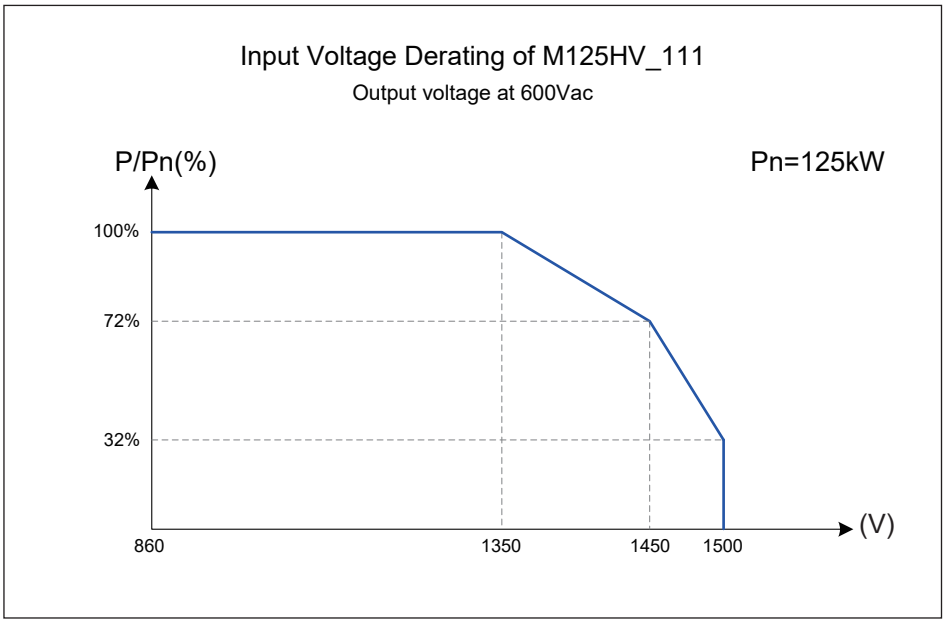


Figure 7-1: Input Voltage Derating Curve

Either power module temperature or inverter internal temperature exceeds the upper limit, the inverter will derate power until the temperature drops within the permissible range.

- Power will derate when ambient temperature is over 50°C. Derating curve is shown in ***Figure 7-4.***
- Apparent power could be 110% with ambient temperature is under 40°C. Derating curve with PF=0.9 is shown in ***Figure 7-5.***

The width operation input voltage with full power can fulfill high latitudes application with up to 2 times dc/ac ratio. When doing panel configuration design of the solar field, please refer to the input voltage derating curve. Input voltage derating curve with PF=1 and PF=0.9 is shown in ***Figure 7-6*** and ***Figure 7-7.***

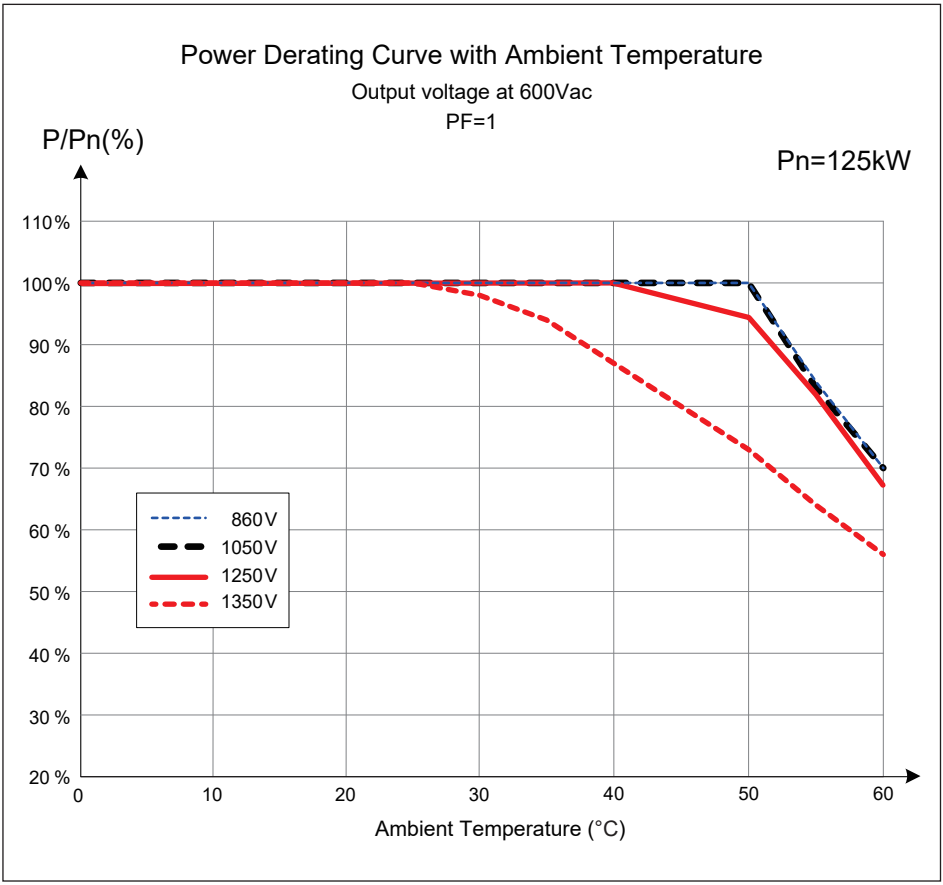


Figure 7-2: Power Derating Curve with Ambient Temperature (PF=1)

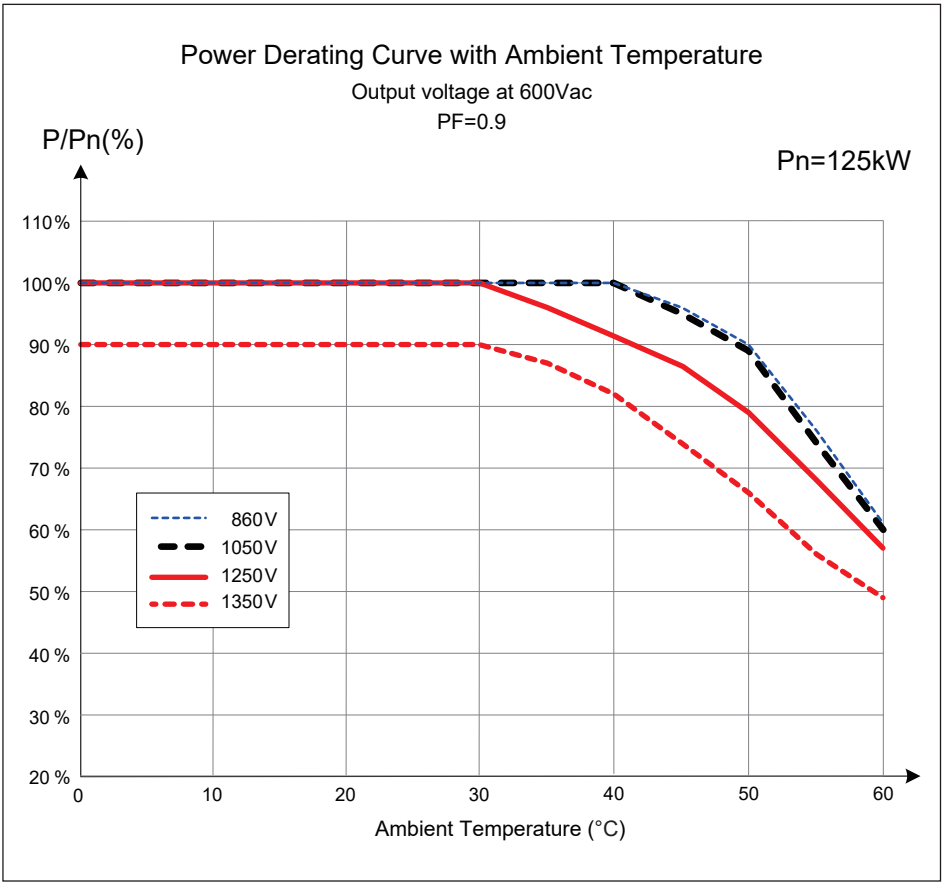


Figure 7-3: Power Derating Curve with Ambient Temperature (PF=0.9)

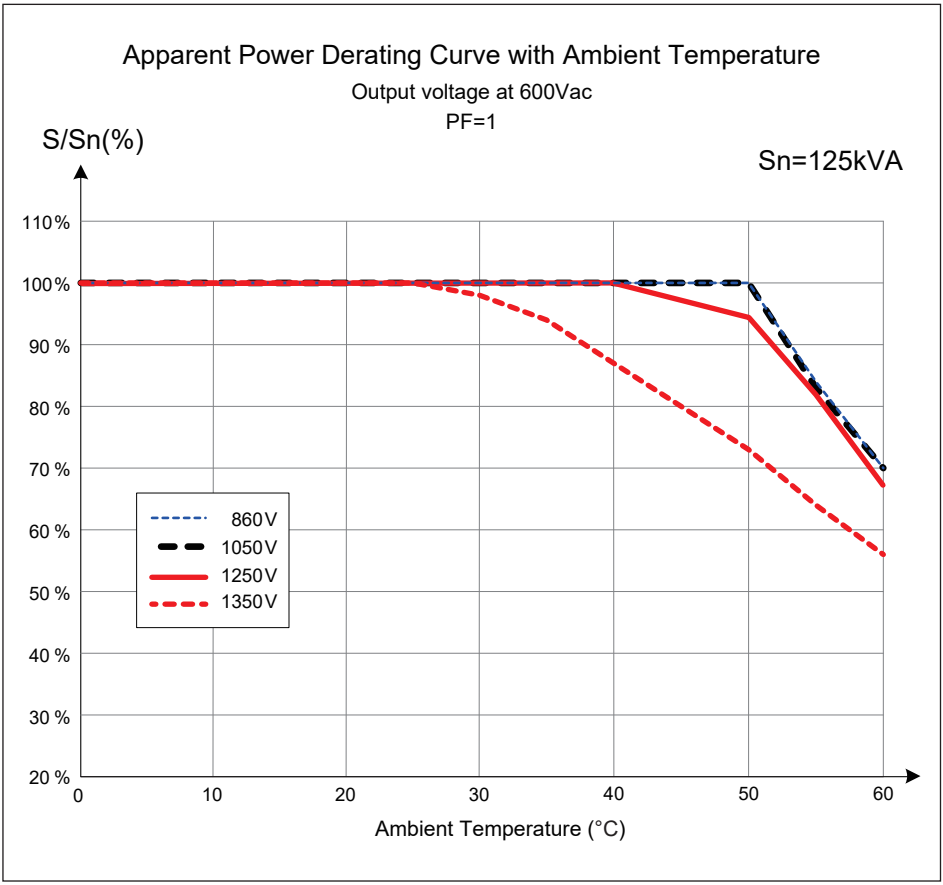


Figure 7-4: Apparent Power Derating Curve with Ambient Temperature (PF=1)

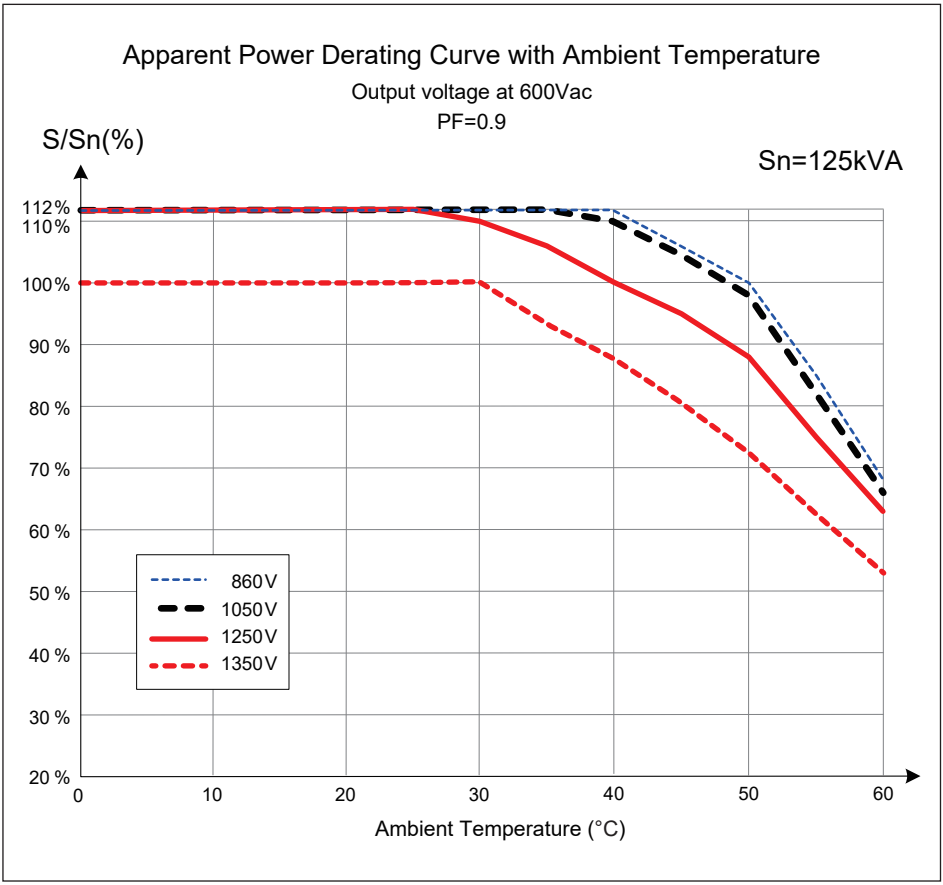


Figure 7-5: Apparent Power Derating Curve with Ambient Temperature (PF=0.9)

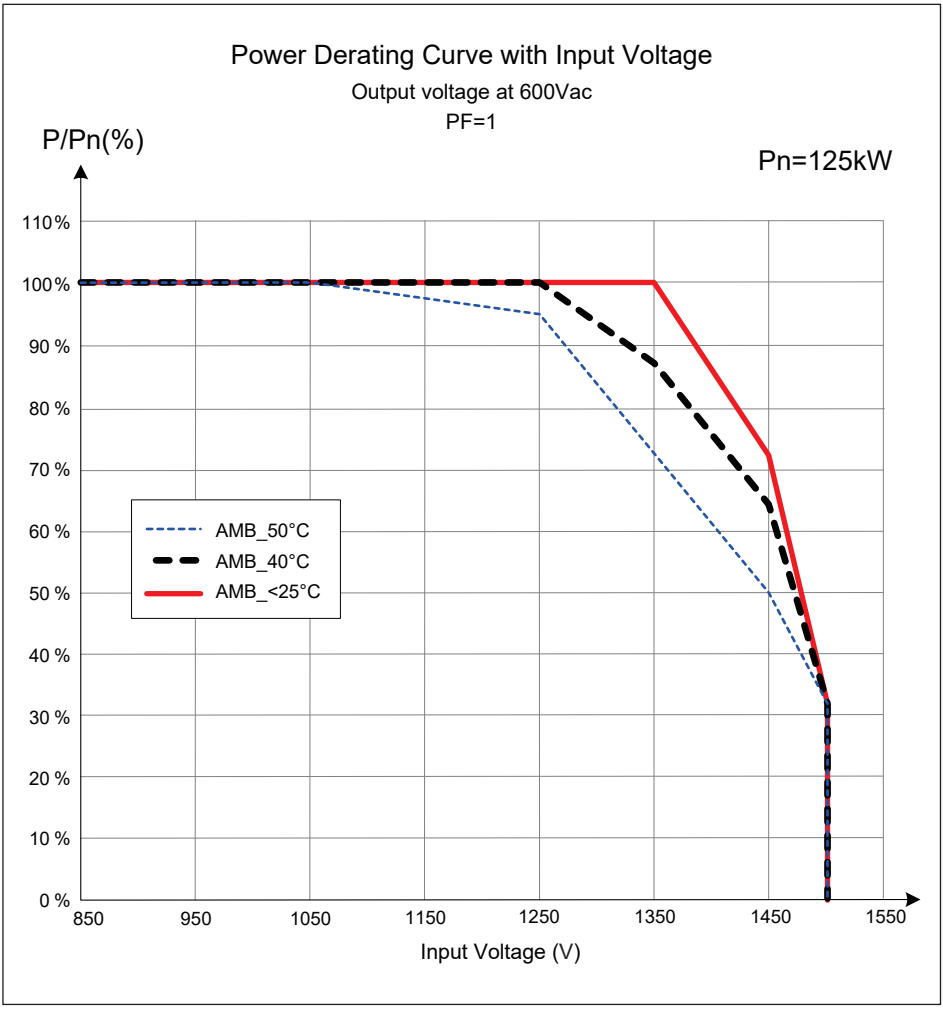


Figure 7-6: Power Derating Curve with Input Voltage (PF=1)

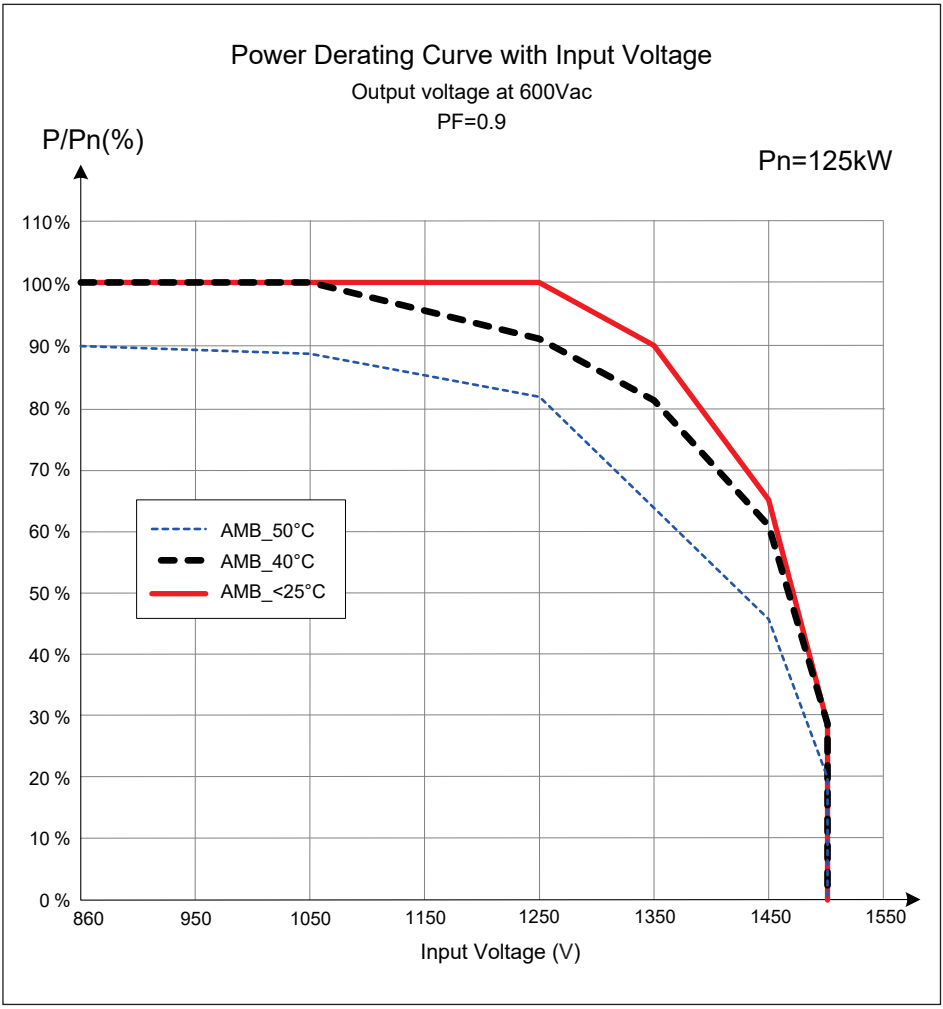


Figure 7-7: Power Derating Curve with Input Voltage (PF=0.9)

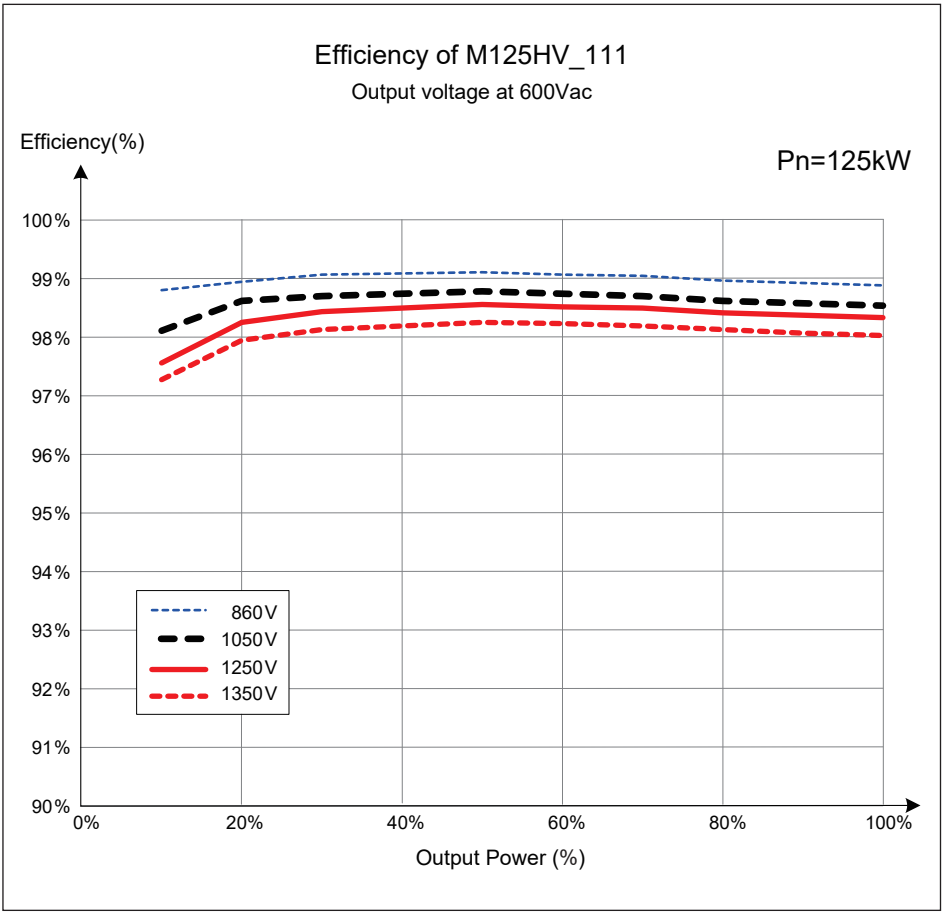


Figure 7-8: Efficiency Curve

Appendix A: Installation of DIN Rail SPD (Optional)

M125HV_111 support the spare parts of DC DIN rail SPDs with typeI and typeII.

- Exchange DC SPD, there are some spare parts for exchange SPD, such as PE wiring, track and nuts are shown in ***Figure A-2***.

WARNING !

- Prior to beginning any maintenance procedures outside AC breaker and DC switch off to avoid risk of electrical shock!
- Confirm the replacement position, only the AC side (left) door can be opened on the left side, either the right door can only be opened on the right side. It is forbidden to open Both doors at the same time.

DC DIN Rail SPD

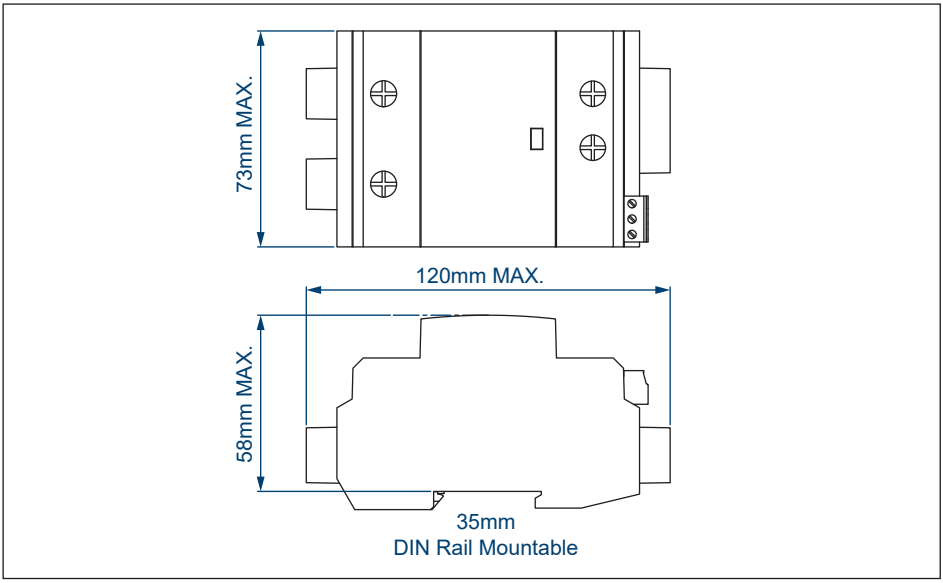


Figure A-1: DC DIN Rail SPD Select

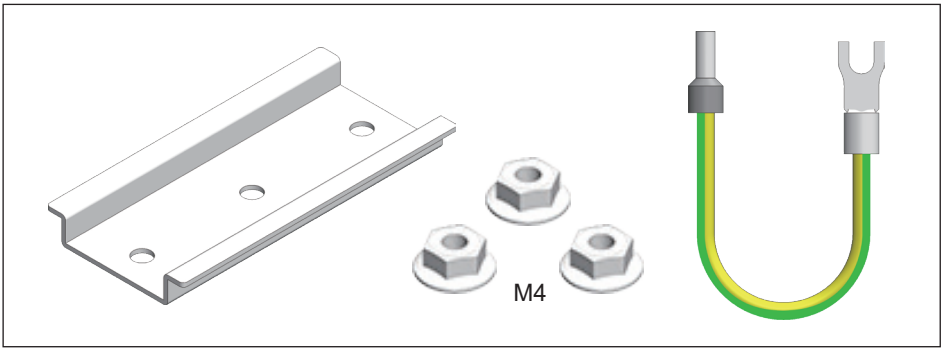


Figure A-2: DC SPD spare parts

The step of exchange DIN rail SPD:

1. Open the shield cover. (***Figure A-3***)
2. Disassemble and remove two screws and DC SPD PCB refer ***Figure A-4***.
3. Remove the Copper column (***Figure A-4*** ③)
4. Lock the track with 2N · m torque (***Figure A-5*** ①) and PE wire.
5. Install the SPD to the track. (***Figure A-5*** ②)
6. SPD wiring of power and signal please refer DIN rail manual.
7. Cover the shield.

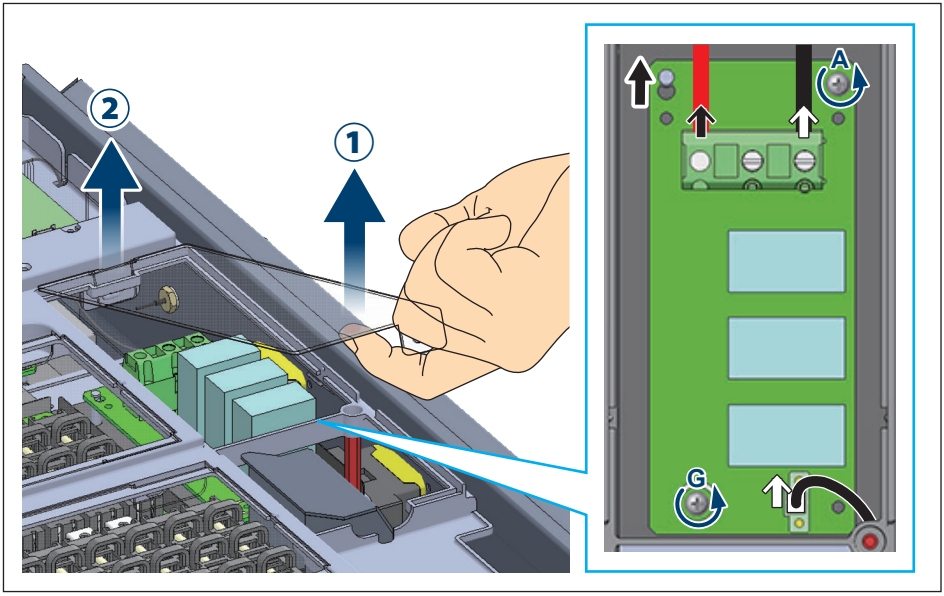


Figure A-3: Open the DC SPD shield cover

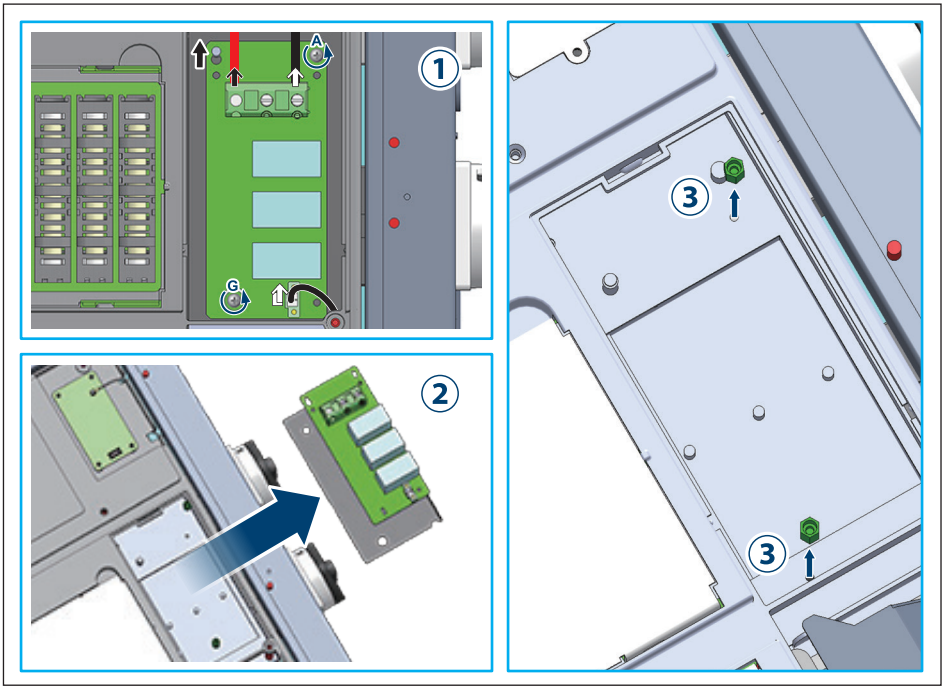


Figure A-4: Disassemble and remove two screws to remove DC SPD PCB

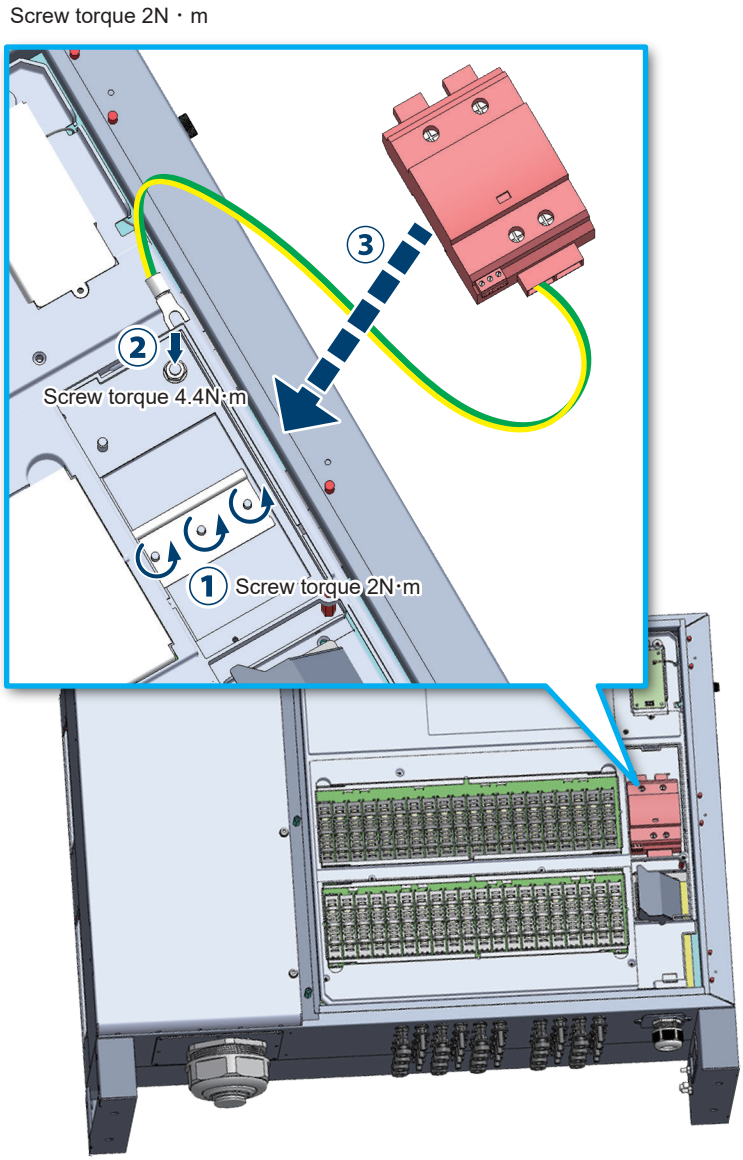
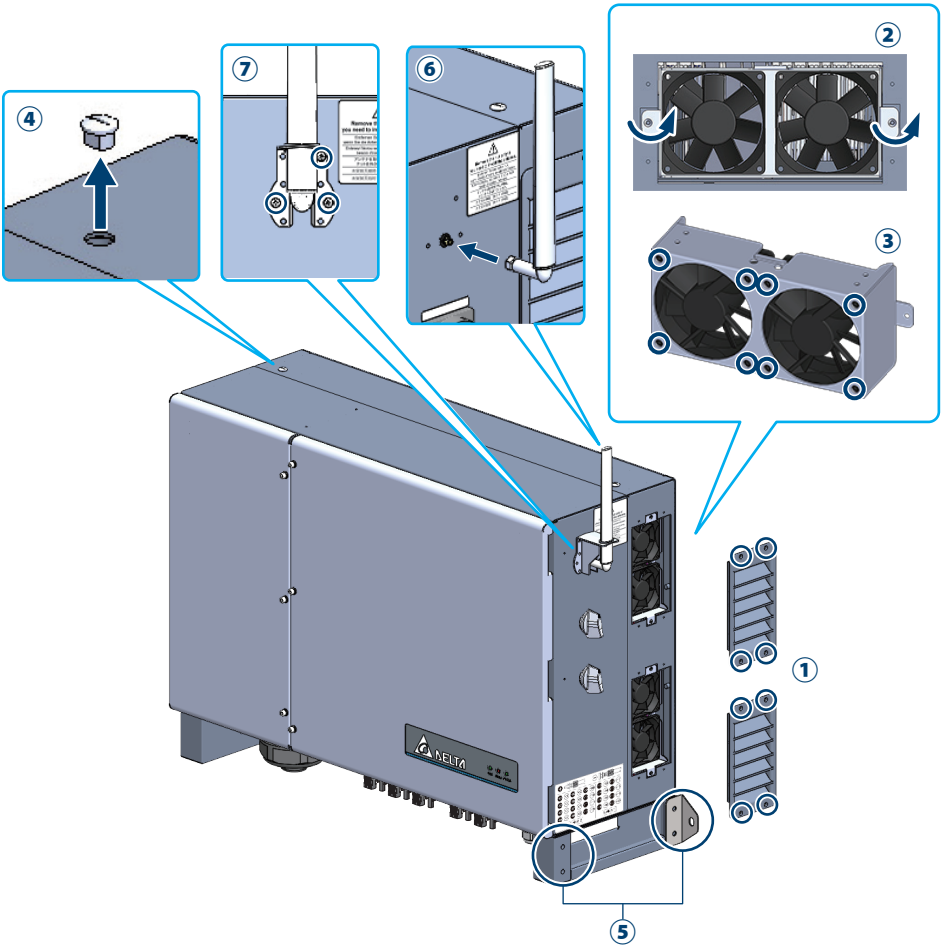


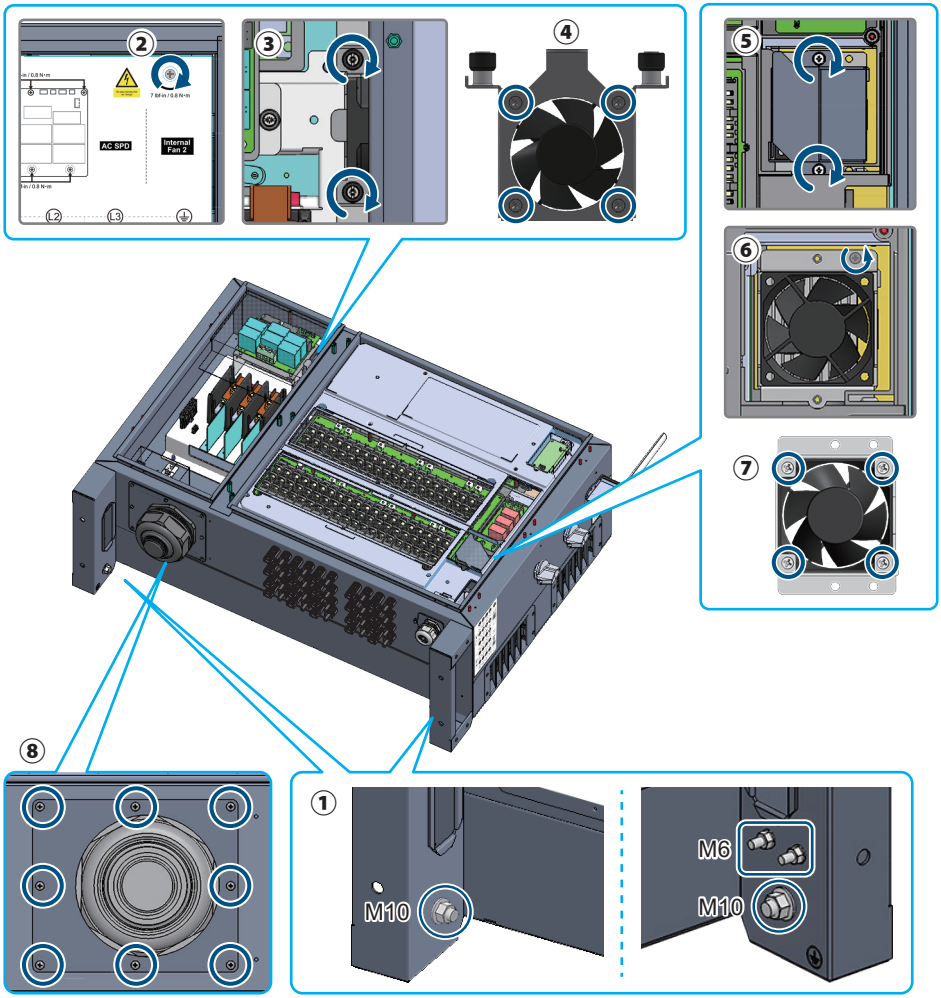
Figure A-5: Lock track and Install

Appendix B: Assembly Note



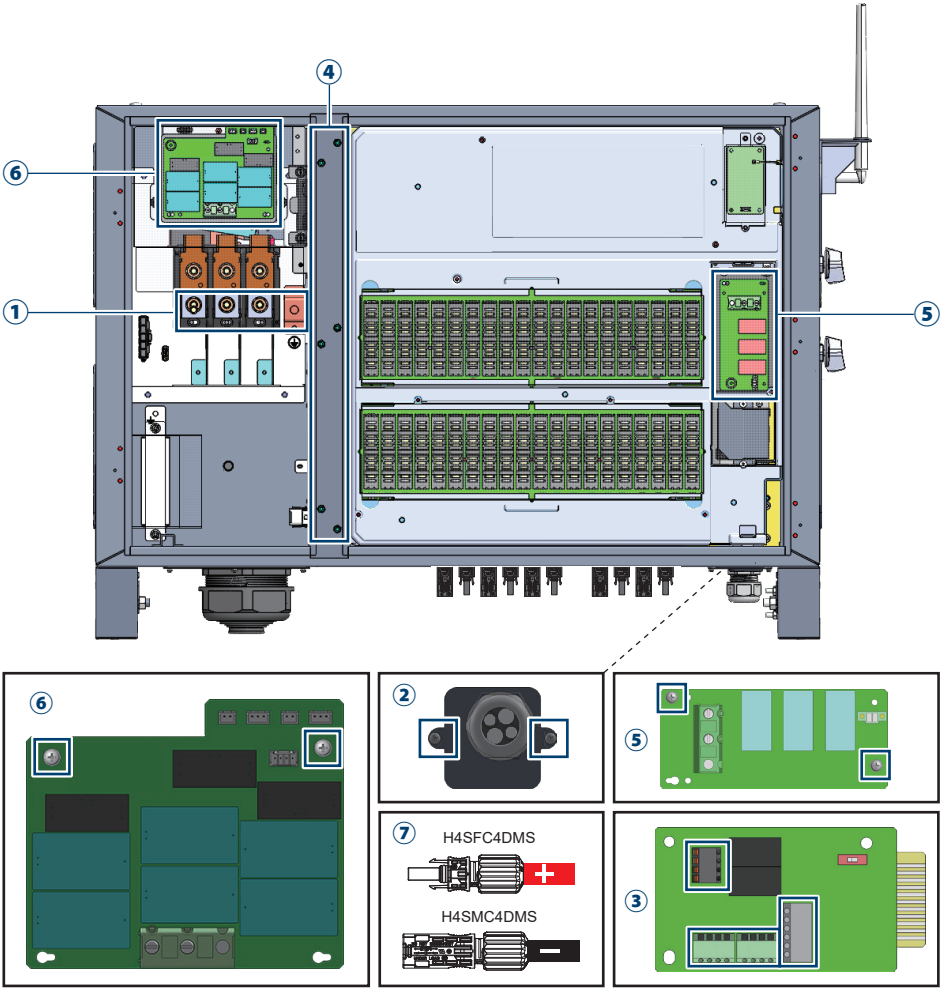
Appendix B-1: Assembly Note-1

NO	Location	Screw torque
1	Filter	8.0 kgf-cm (0.8N·m)
2	Fan Tray	8.0 kgf-cm (0.8N·m)
3	Fan	6 kgf-cm (0.6N·m)
4	Screw Plug	5.0 kgf-cm (0.5N·m)
5	Reinforce Bracket / Grounded Bracket	150 kgf-cm (15N·m)
6	Antenna	12 kgf-cm (1.2N·m)
7	Antenna Bracket (M4)	10 kgf-cm (0.98N·m)



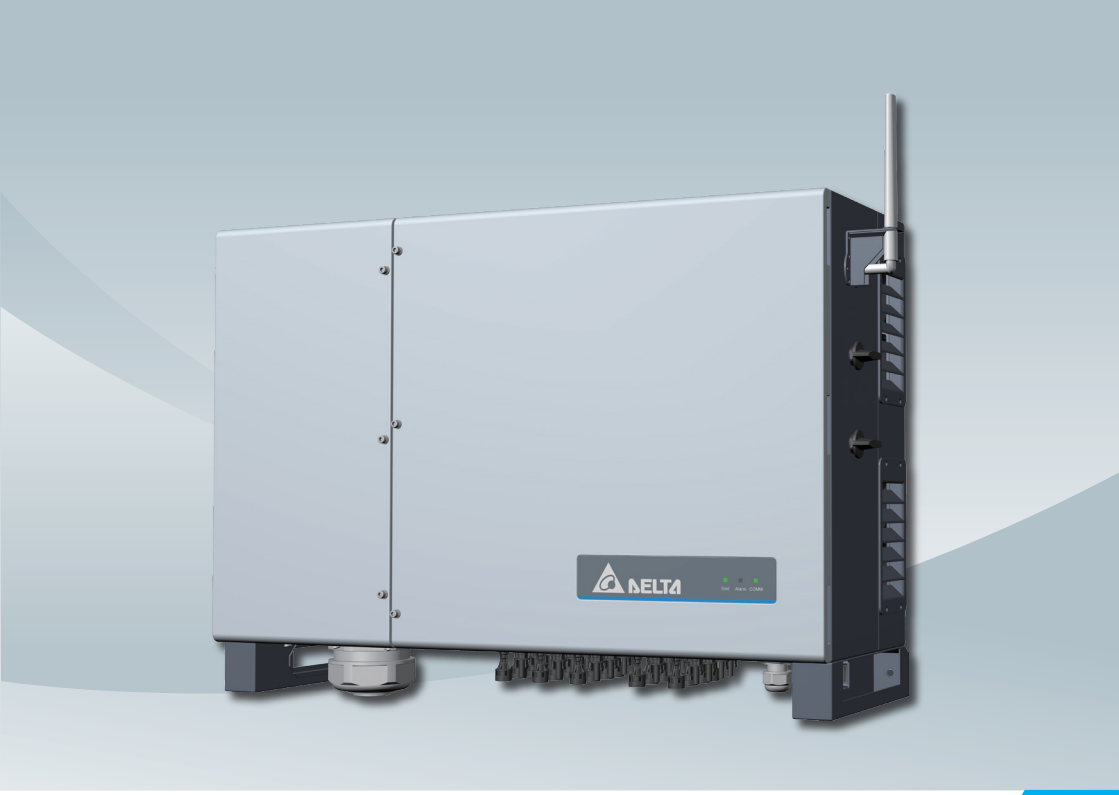
Appendix B-2: Assembly Note-2

NO	Location		Screw torque
1	Grounding	M6	71 kgf-cm (7.0N·m)
		M10	254 kgf-cm (25N·m)
2	AC Cover		8.0 kgf-cm (0.8N·m)
3	Internal Fan 2 Cover		20 kgf-cm (2.0N·m)
4	Internal Fan 2 Tray		6 kgf-cm (0.6N·m)
5	Internal Fan 1 Cover		8.0 kgf-cm (0.8N·m)
6	Internal Fan 1 Tray		8.0 kgf-cm (0.8N·m)
7	Internal Fan 1 Tray		6 kgf-cm (0.6N·m)
8	AC gland plate		8.0 kgf-cm (0.8N·m)



Appendix B-3: Assembly Note-3

NO	Location	Screw torque	Conductor cross-section
1	AC terminal	254 kgf-cm (25N·m)	Cu: 50 ~ 185 mm² Al: 95 ~ 185 mm²
2	Communication cover	8.0 kgf-cm (0.8N·m)	–
3	Communication port	–	20 AWG (0.5mm²)
4	Crossbeam	45 kgf-cm (4.4N·m)	–
5	DC SPD board	8.0 kgf-cm (0.8N·m)	–
6	AC SPD board	8.0 kgf-cm (0.8N·m)	–
7	H4 Plus wire	–	12/10 AWG (4/6mm²)



三相併網型變流器

M125HV_111
操作手冊

www.deltaww.com

Smarter. Greener. Together.

Contents

Figure

Table

1 安全規範

1.1 變流器資料

1.1.1 免責聲明

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（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！

- 請詳閱所有指示並保存本說明書以供後續使用。

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太陽能模組進行隔離。
- 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 禁止連接至地。

1.2.1 使用條件

- M125HV_111 為單一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 20μF。
- 本產品僅可在經DELTA及市電業者許可之國家運行。

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!!

- 此警語表示可能會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，請待表面溫度下降後再進行需接觸的工作。

- 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

M125HV_111 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禁止連接至地。

2.1 適用機種

本說明書適用以下機種:

• M125HV_111

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。

危險！

- 禁止同時打開左右兩扇門。

2.2 產品概述

M125HV_111 內容物如**圖2-1**所示。

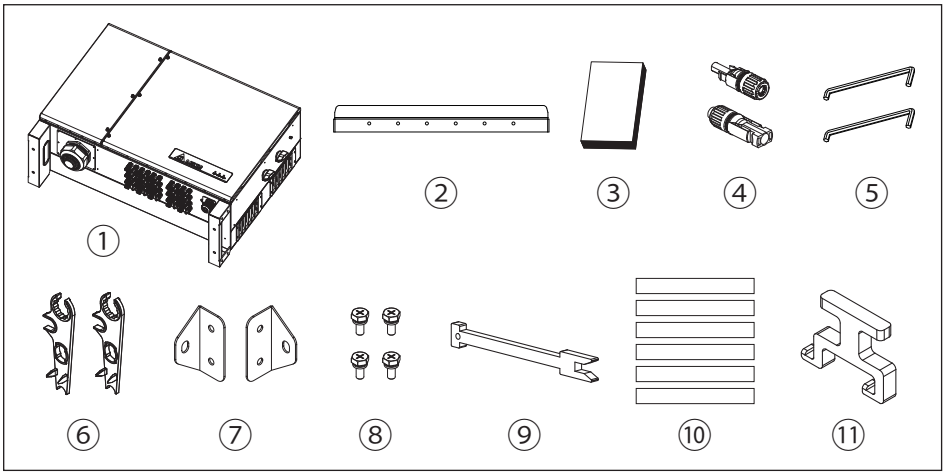


圖2-1 : 內容物

表2-1 : 內容清單

M125HV_111			
	物件	數量	描述
1	DELTA太陽能變流器	1	太陽能變流器
2	壁掛架	1	將變流器掛起之壁掛架 (材質: 鋁 / 厚度: 3mm)
3	操作手冊	1	安裝及維運過程中務必參考本說明書中的安全指示
4	H4+ 端子	20 對	直流組串輸入接頭
5	六角板手	2	固定前蓋用門閂
6	H4 板手	2	H4 接頭拆除工具
7	壁掛支撐架	2	用於變流器兩側的壁掛支撐架
8	M8x16L 螺絲	4	用於固定壁掛支撐架
9	保險絲底座矯正工具	1	加固保險絲座基座
10	資安封條	6	用於資安檢測的一次性貼紙
11	保險絲拔除工具	1	拆卸保險絲座的工具

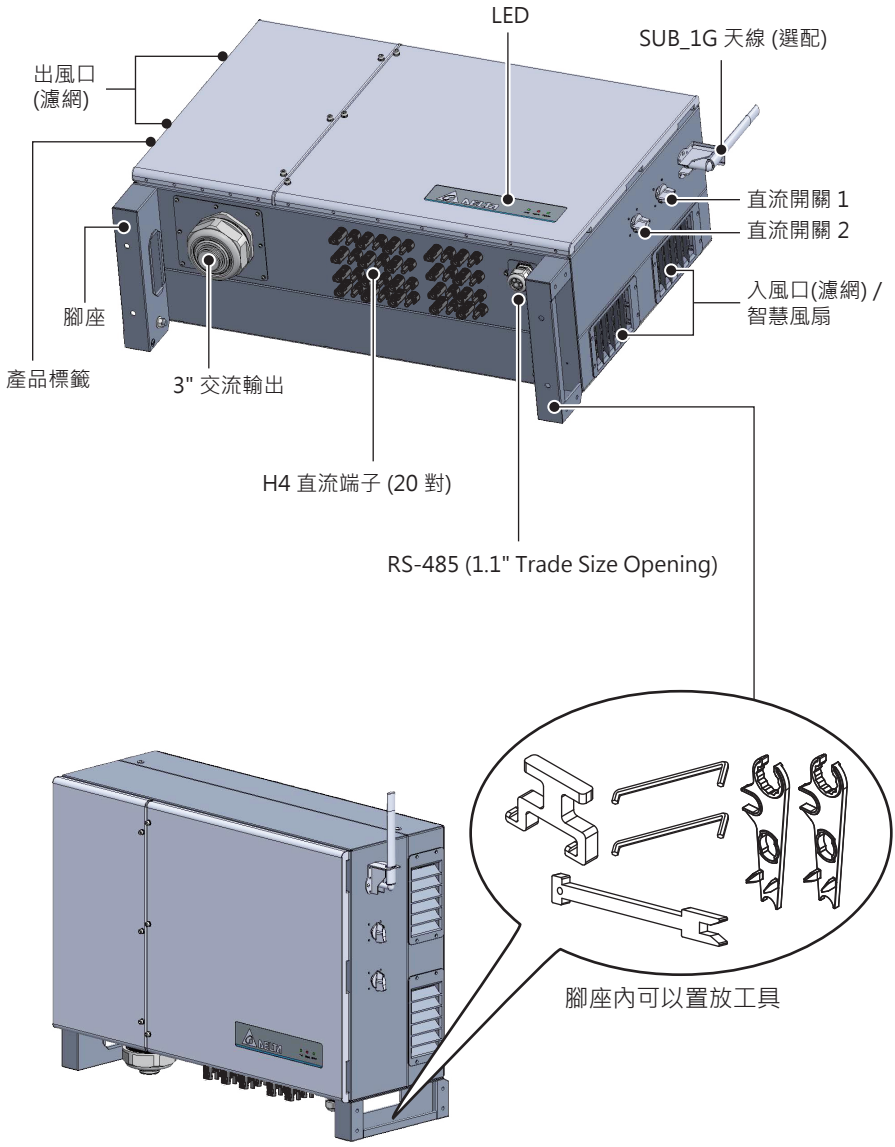

LED
SUB_1G 天線 (選配)
出風口
(濾網)
直流開關 1
直流開關 2
入風口(濾網) /
智慧風扇
腳座
產品標籤
3" 交流輸出
H4 直流端子 (20 對)
RS-485 (1.1" Trade Size Opening)
腳座內可以置放工具

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。

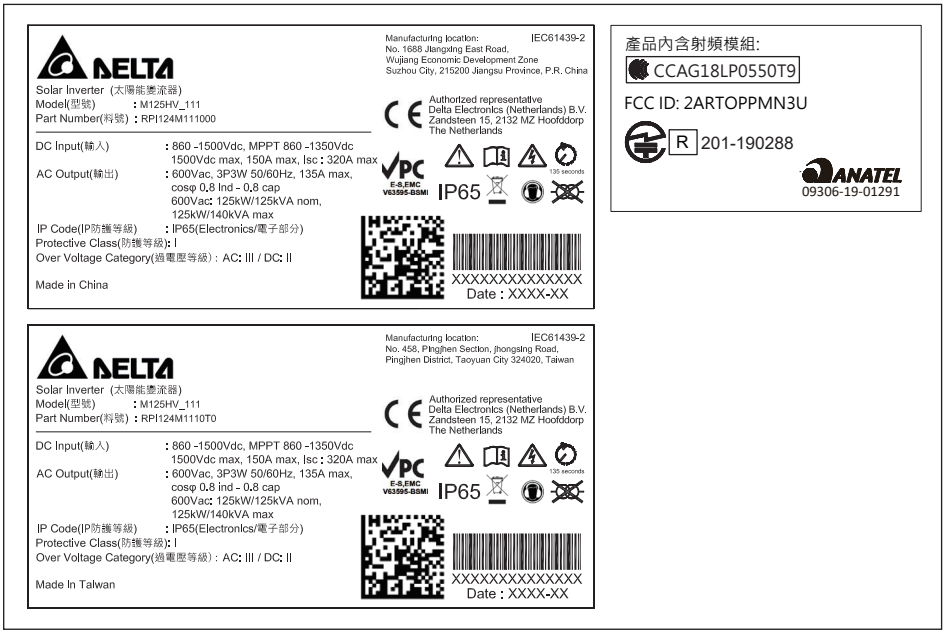


圖2-3 : 產品標籤

表2-2 : 標籤內容描述

符號	定義		
135 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135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。		
	使用此變流器前, 請詳閱說明書。		請注意噪音防範。
	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。		
ANATEL	M125HV_111 符合 Anatel 認證標準		

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)。

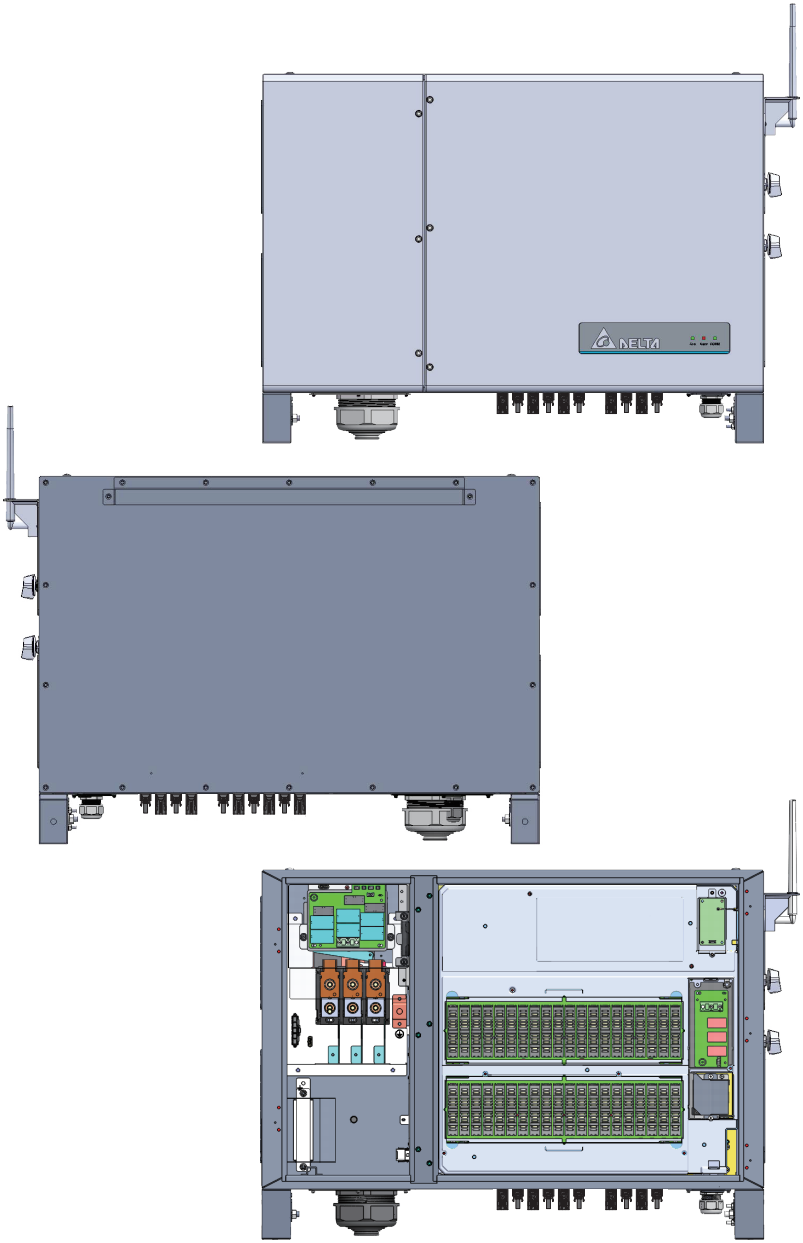


圖 2-4 : 外部/ 內部 結構

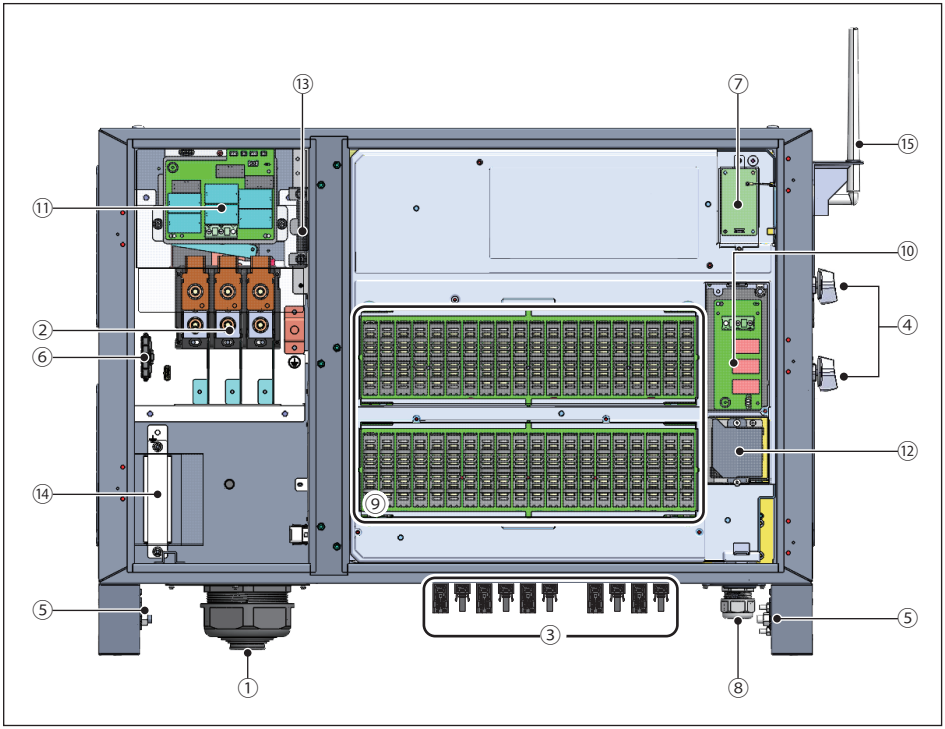


圖2-5 : 配線箱架構圖

表2-3 : 內部架構內容

NO.	Component	NO.	Component	NO.	Component
1	3” cable opening for AC	6	Power connect of Din Rail SPD	11	Type II AC SPD
2	AC terminal	7	N3U_SB1	12	Internal fan 1
3	H4 connectors (20 pairs)	8	Communication port	13	Internal fan 2
4	DC switches	9	Fuse holder	14	Din rail for AC SPD (optional)
5	Grounding (M6/10 threaded stud)	10	Type II DC SPD	15	SUB_1G Antenna (optional)

3 安裝

注意！

- 本產品不建議安裝在直接日照曝曬處。

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。
- 變流器可能造成電磁干擾，不適合安裝於居家環境，或者需採取緩解措施。

本章節包含以下指示
1.機構安裝　2.電氣安裝　3.通訊安裝

圖3-4提供變流器詳細尺寸

3.1 拆箱與檢視

請依照圖 3-1所示進行拆封。
建議兩人以上進行作業(圖 3-2)或以起重機搬運(圖 3-3)。

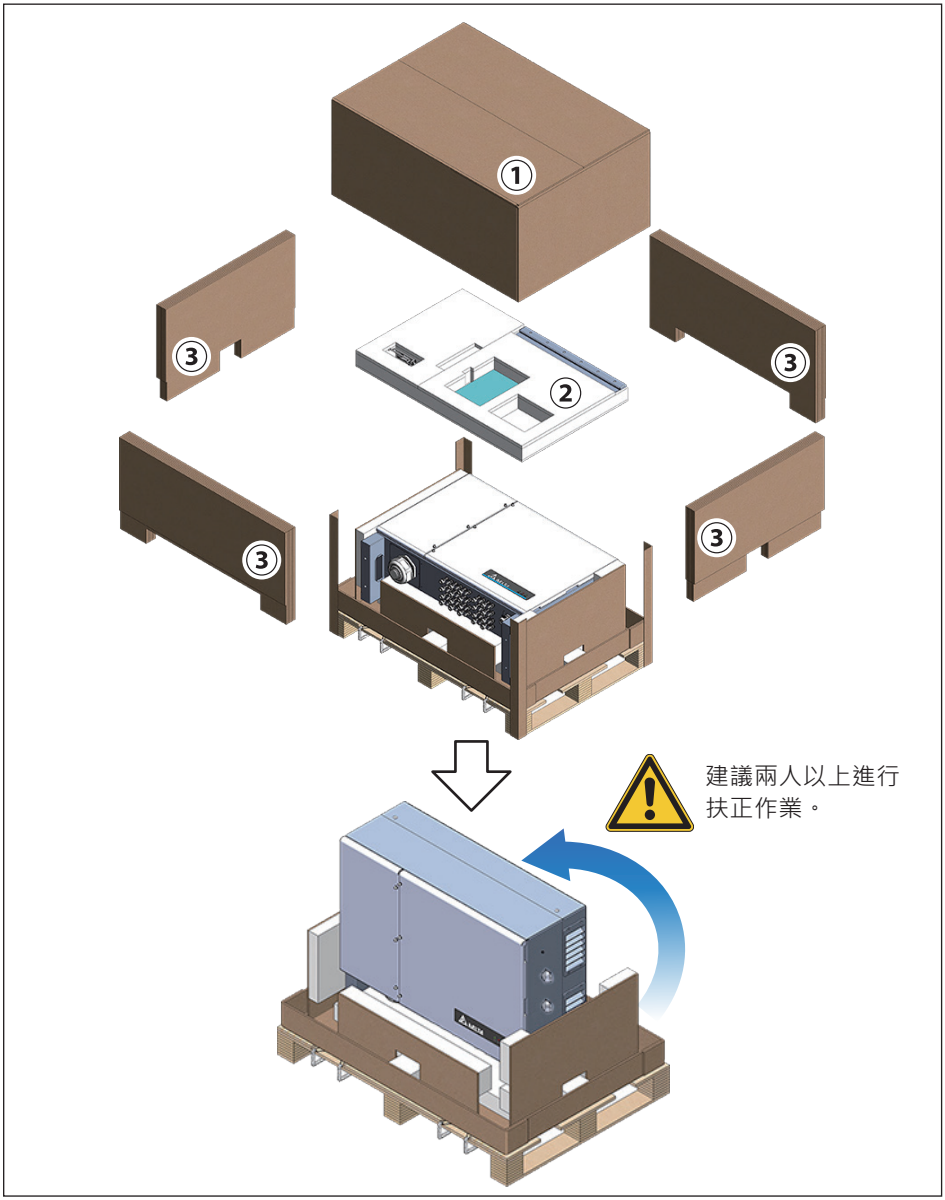


圖 3-1: 開箱步驟

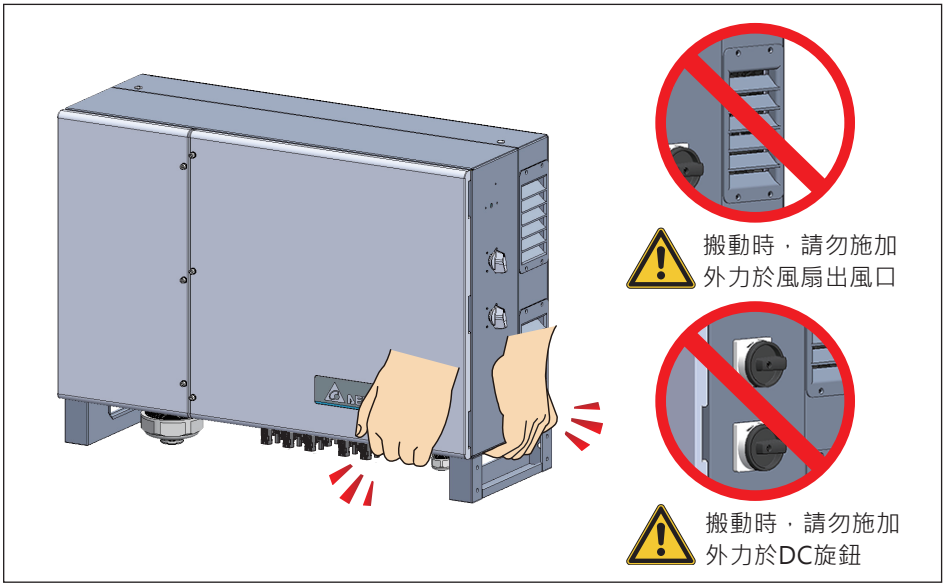


圖 3-2: 搬動施力位置

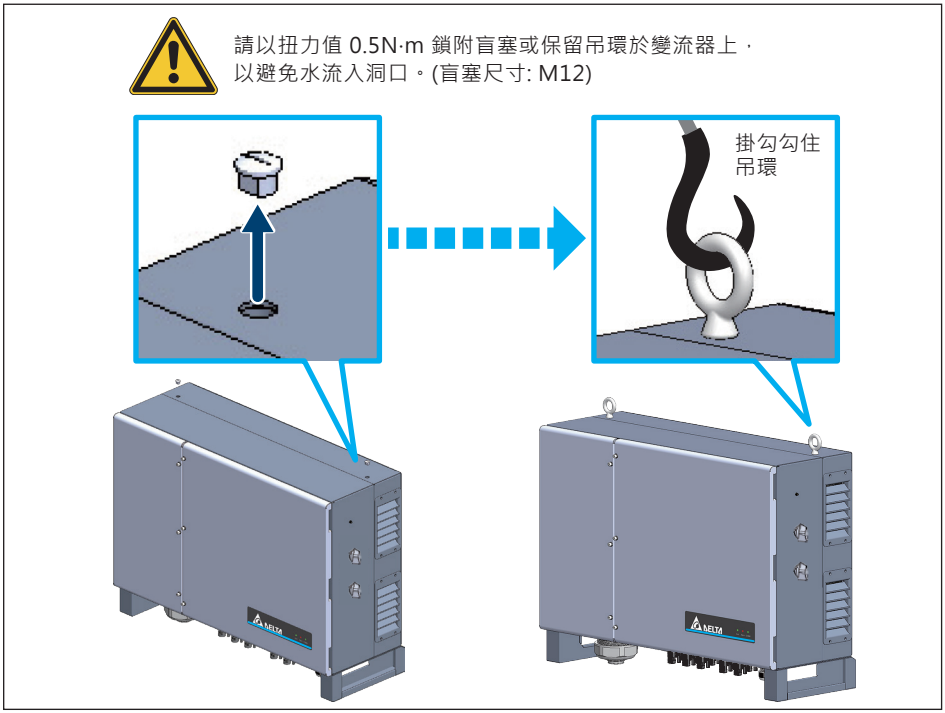


圖 3-3: 安裝吊掛鋼環

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；同時亦支援地上站立式安裝，請參考3.2.2章節。

3.2.1 直立壁掛式安裝

請參考圖3-5至3-9說明

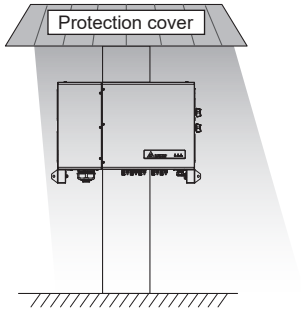
1. 首先請先確定產品安裝牆面足以承載產品重量。
2. 水平固定壁掛架(垂直於地板)，並依照圖3-5所示標記安裝孔洞位置。
3. 鎖附6枚M10螺絲於壁掛架上。
4. 將產品放置於壁掛架上。
5. 將產品鎖附上2枚M10螺絲如圖3-9。

注意！

- 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。
- 使用6枚M10螺絲將壁掛架固定牆上。(至少5枚)

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。



注意！

- 請依照本章節說明的方向和機器間隙安裝，以避免降額功率輸出及保固失效。

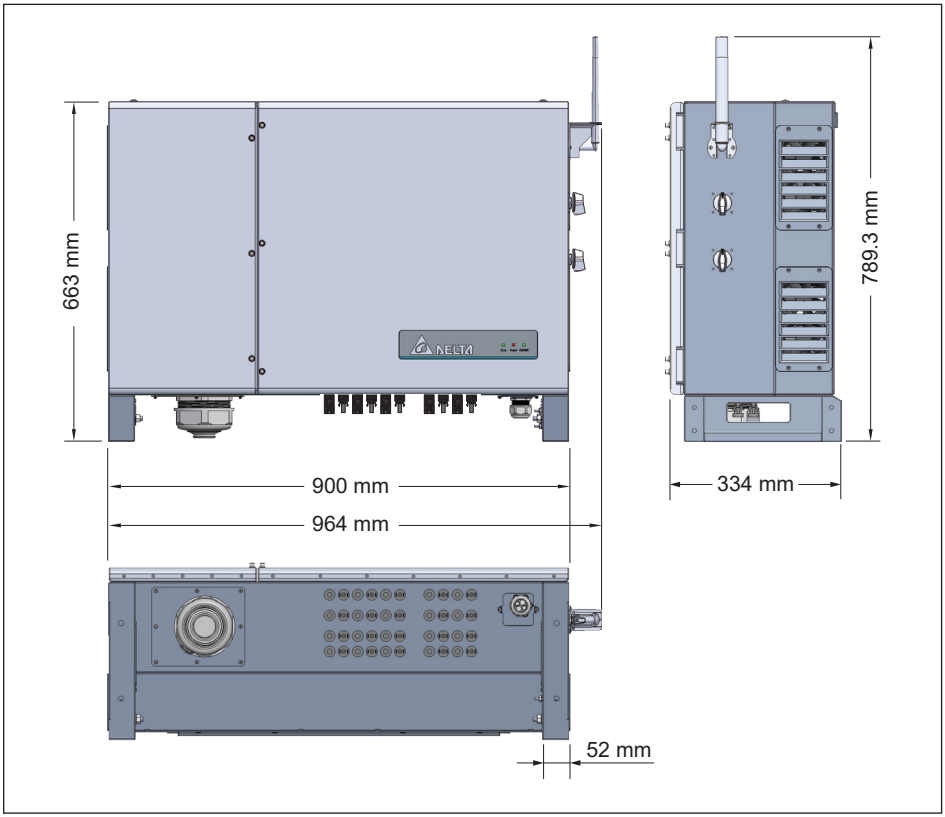


圖 3-4: 變流器尺寸

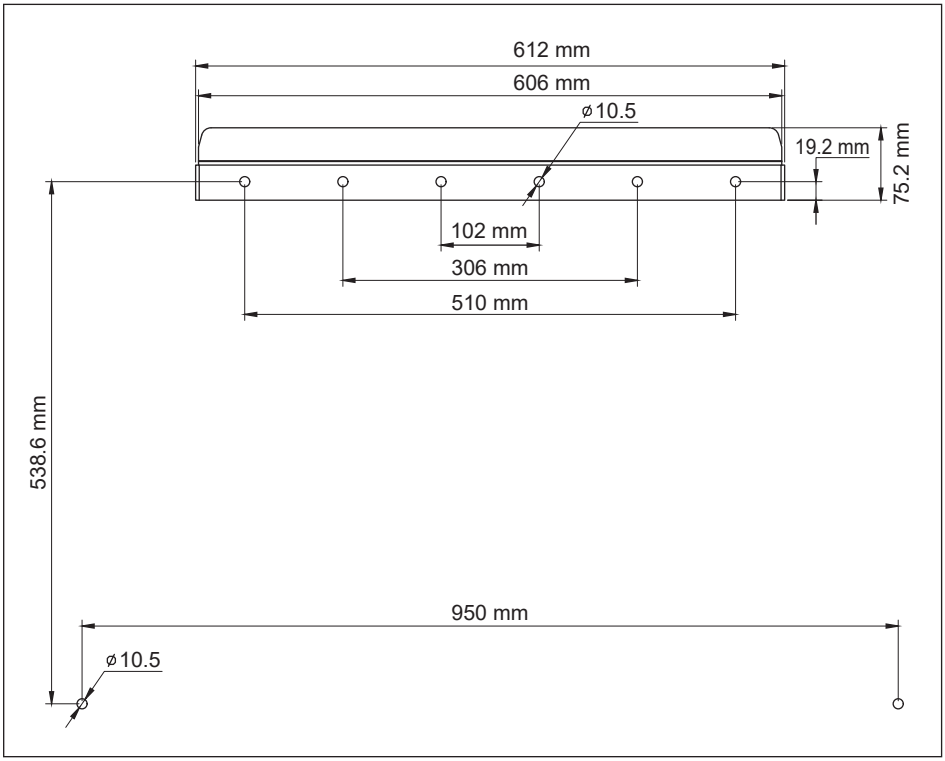


圖 3-5: 壁掛架尺寸

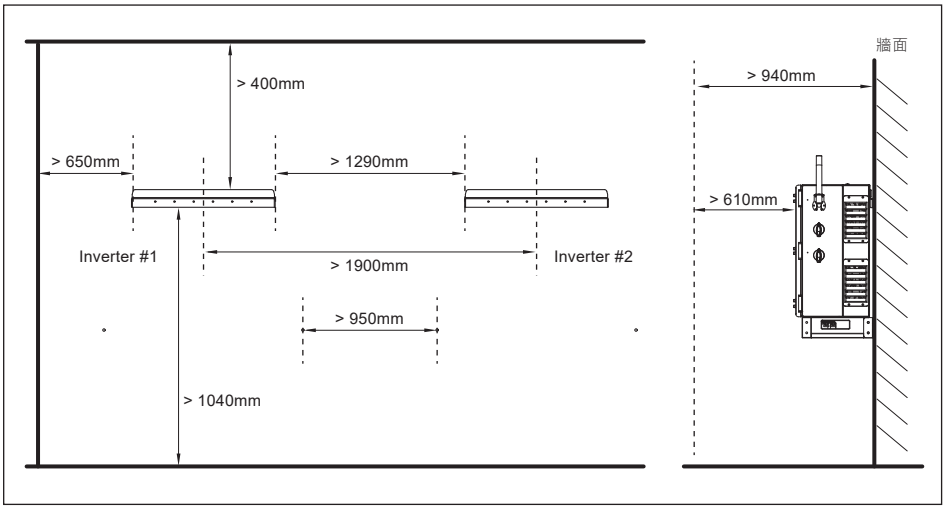
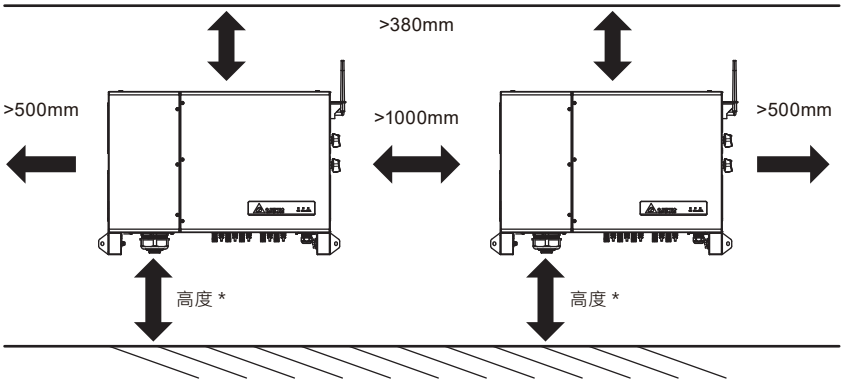


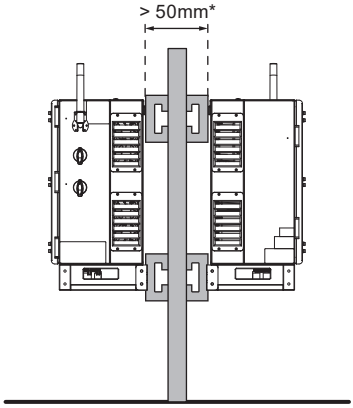
圖 3-6: 壁掛所需間距



* 壁掛安裝時，請確保安裝高度具有足夠的佈線空間。

背對背安裝

採背對背安裝時，須於左右兩側加裝隔板。
(背對背間隔>500mm時除外)



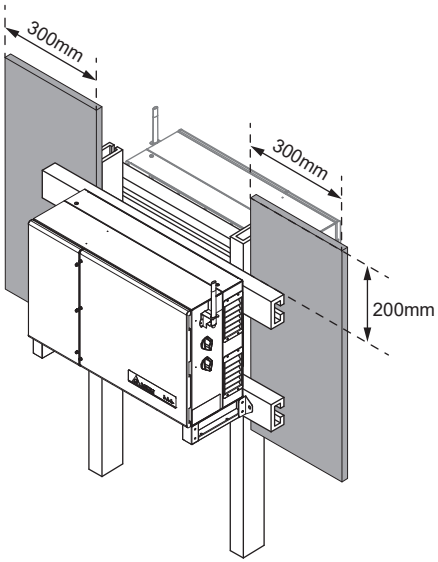


圖 3-7: 機台間最低要求距離

依圖3-8所示之扭力安裝壁掛支撐架於兩側之後，鎖附兩枚M8螺絲(圖2-1, 物件8)於牆面(如圖3-9)。

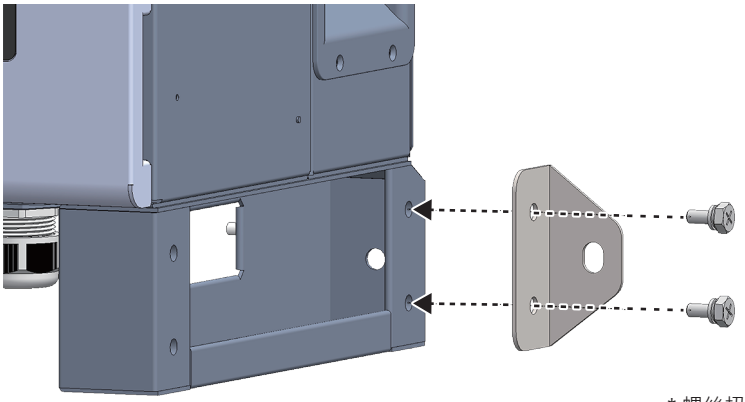


圖 3-8: 安裝壁掛支撐架

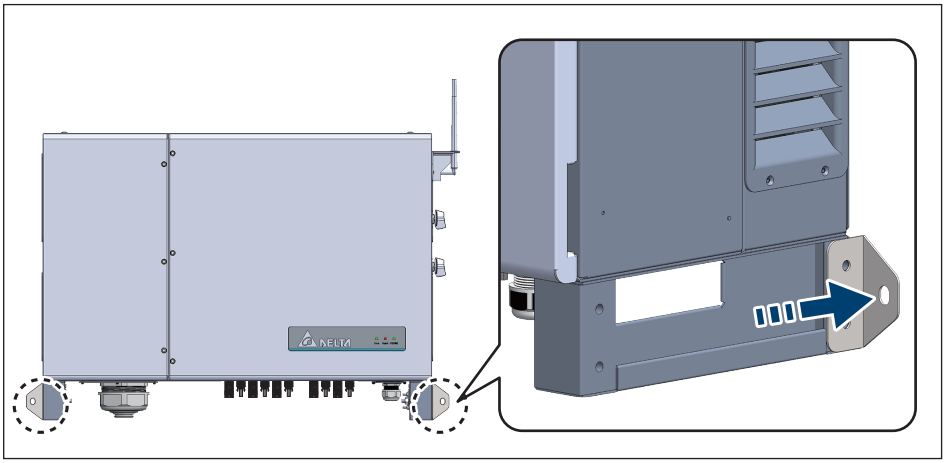


圖 3-9: 鎖附壁掛支撐架於牆面

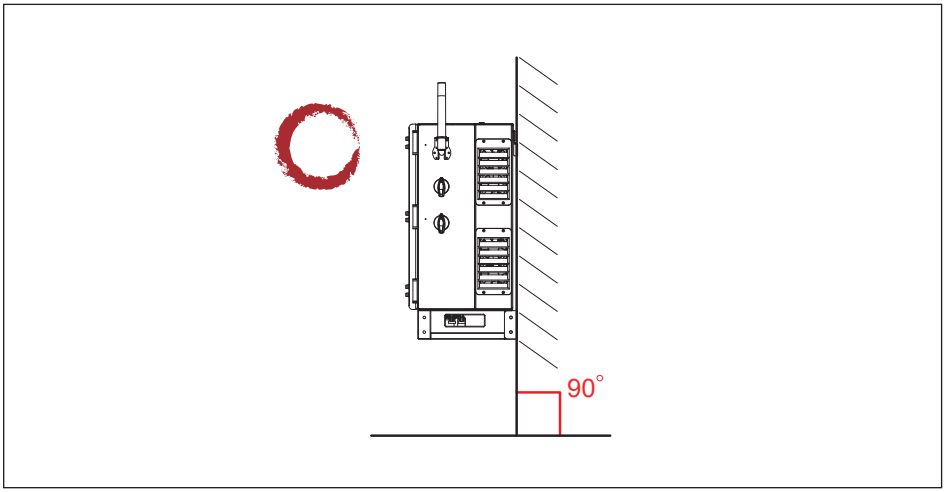


圖 3-10: 正確的安裝位置

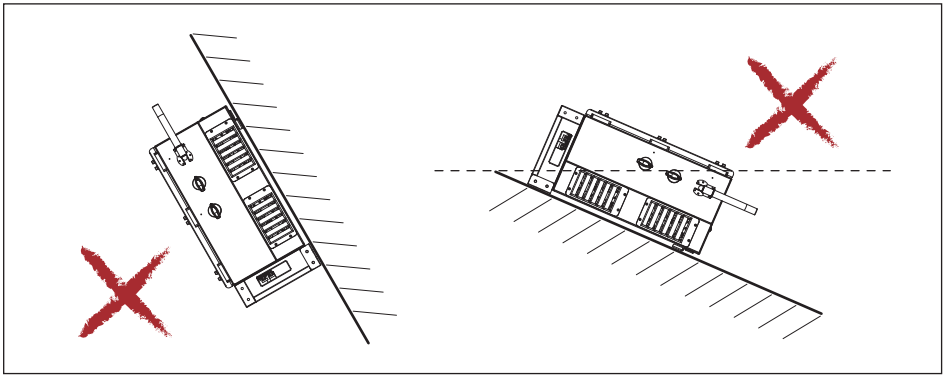


圖 3-11: 禁止的安裝方式

O : 正確 / X : 禁止

3.2.2 落地式安裝（選配）

落地支架為選配套件，請聯繫客服中心取得詳細資訊。

1.確保安裝設備的地面基座強度足以承載變流器重量。
2.水平安裝落地支架(垂直於地板)，並標記所需安裝孔位置如圖3-13所示。
3.用8個螺絲將落地支架固定到機器腳座上(圖3-12)。
4.將變流器放置在地面安裝基座上。
5.使用4個M10螺絲將落地支架固定於安裝基座上(圖3-13)。

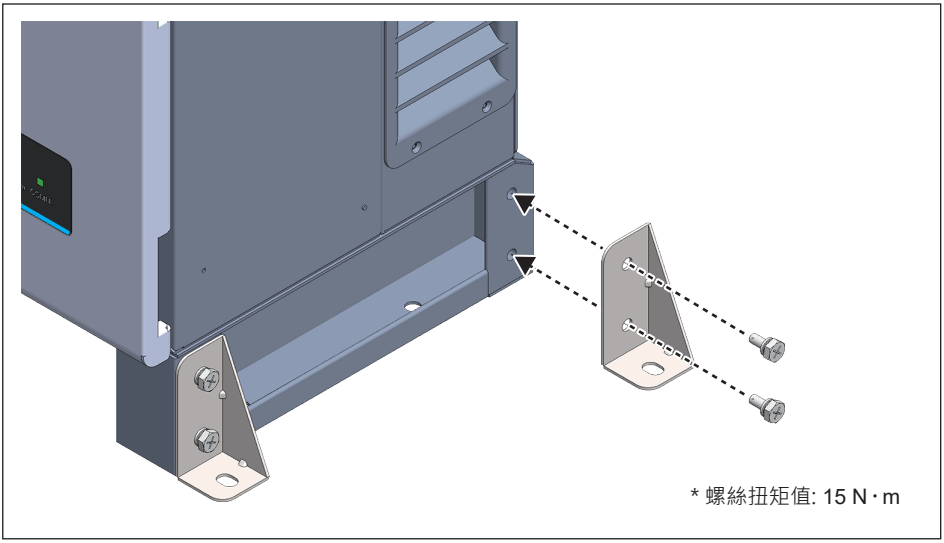


圖 3-12: 落地支架安裝

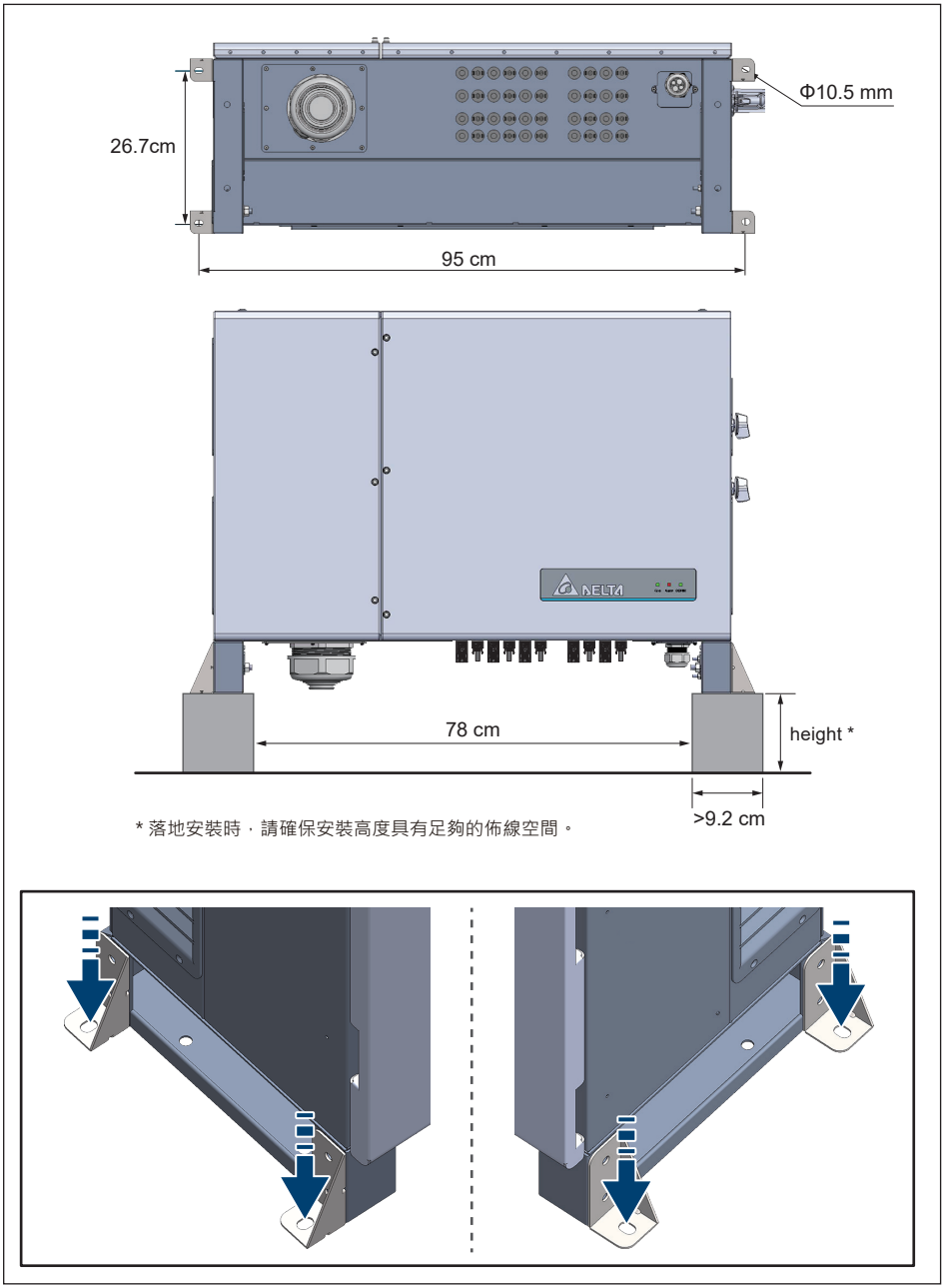
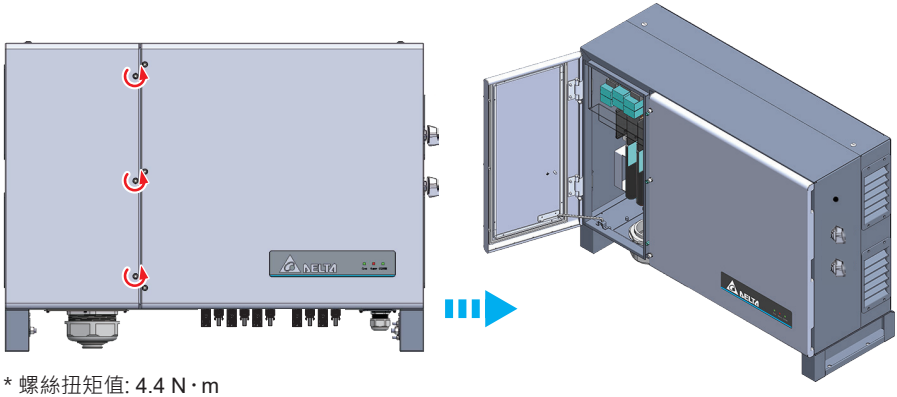


圖 3-13: 將變流器安裝在地面安裝基座上

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。
初次安裝M125HV_111時，只需打開交流側(左側)前蓋配線。請參考圖3-14。



* 螺絲扭矩值: 4.4 N·m

圖3-14 : 交流側(左側)前蓋

注意

- 請使用六角板手(圖2-1, 物件5)或其他適當的工具鬆開前蓋螺絲。
- 前蓋螺絲為固定式螺絲，請勿拆卸。
- 關門時，請使用扭力板手並依上圖扭矩值鎖附螺絲。

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。

危險！

- **禁止同時開啟兩側前蓋。**

警告！

- 遵守條文為安裝者的責任。
- 直流電壓超過1600V則保固失效。

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！

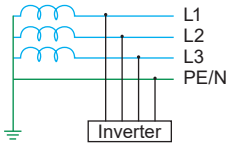
- 為了不損壞變流器中的組件，請確保將正確的線材連接到變流器上相應的交流端子。

3.4.1 交流形式與連接方式

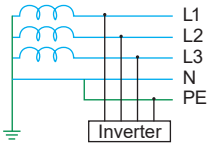
注意

機器初始設定為 3Ø-3W接線方式，也可變更為 3Ø-4W 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。

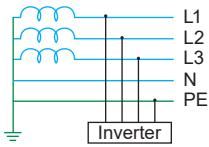
TNC system
347/600V



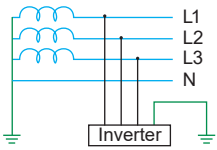
TNC-S system
347/600V



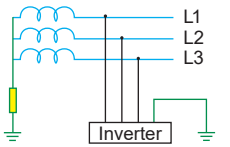
TNS system
347/600V



TT system
347/600V



IT system
347/600V



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。

表 3-1: 交流斷路器建議規格

額定電壓	min. 600 V
額定電流	min. 175 A
啟斷容量	min. 10 kA

3.4.3 交流配線準備

請遵循以下步驟組裝交流端子：

- 請選用適當線材尺寸(圖3-15)
- 線材表面積範圍: 銅線- 50~185 mm^2 / 鋁線- 95~185mm^2
- 每個壓接端子的最大寬度需小於31mm，內徑需小於 Φ10.5mm (圖3-16)
- 可以使用銅端子

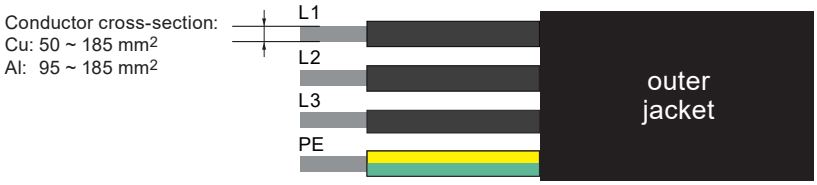


圖3-15 : 交流線材剝線

AC Terminal (tin-plated)

Conductor	Compatible Lug
Cu	Cu(Tin-Plated)
	Cu(Nickel-Plated)
	Pure Cu
	Stainless steel
Al	Aluminum (Tin-Plated)*
	Bi-metal*

PE Connection (Nickel-plated)

Conductor	Compatible Lug
Cu	Cu(Tin-Plated)
	Pure Cu
Al	Aluminum (Tin-Plated)*
	Bi-metal*

* 將導線插入端子接線片之前，建議塗抹凡士林 (須為中性、不含酸、鹼成分)，以獲得最佳保護。

選用的纜線操作溫度要有到 90°C。

圖3-16 : 壓接端子尺寸

3.4.4 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AC端子（L1，L2，L3，PE）：

請用17mm六角板手進行拆裝螺帽。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帽的扭力值。當AC鎖附螺帽頂到最低點時，請勿再進行鎖附，避免造成端子座損傷。

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

▶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。

▶安裝鋁線時請盡量在低濕度且低腐蝕性的環境下進行。

▶安裝過程需快速。

▶使用最大允許的壓接扭力進行壓接。

3.4.5 交流配線

有關用於連接交流端子的導線準備步驟，請參閱第3.4節。
確保所使用的交流導體尺寸符合NEC或當地電力法規的規範，參閱圖3-15。

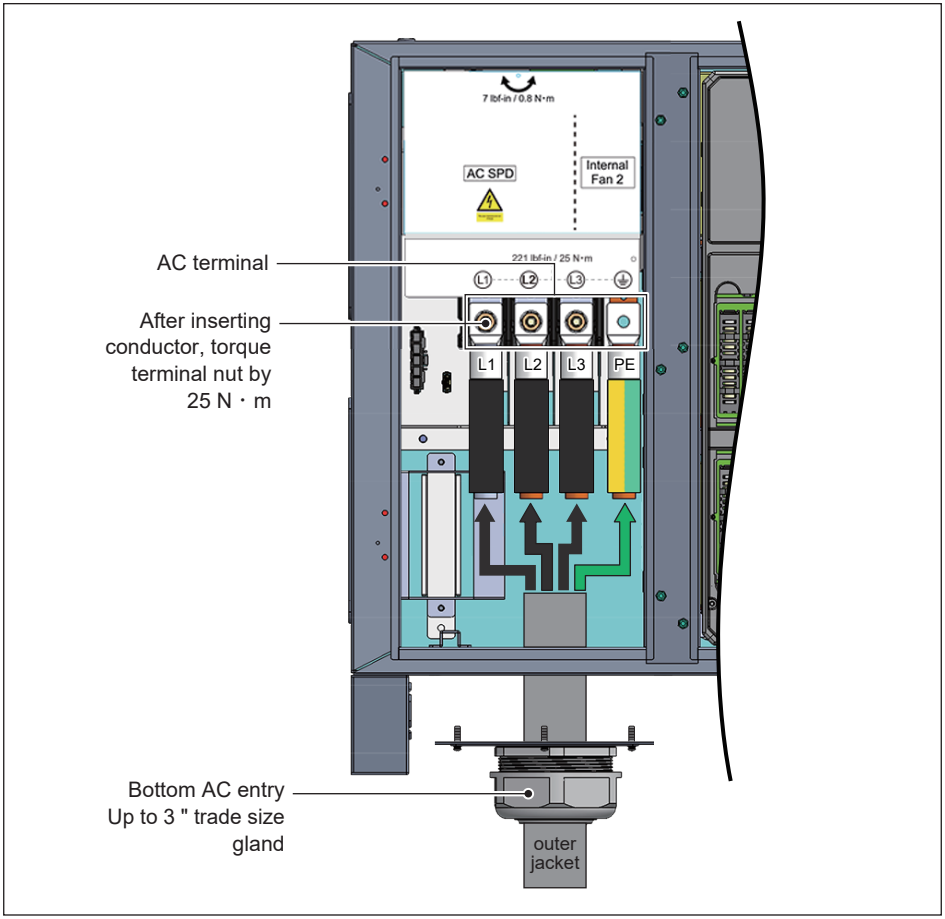


圖 3-17: 交流端子位置圖

圖3-17為交流導管安裝處和連接機器內部交流端子的位置圖：
- 如第3.4.4節所述，卸下所有交流端子上的六角螺帽
- 確保將正確的導線連接到相應的端子位置
- 插入導線後，使用M10螺母鎖緊L1~L3及PE端子，安裝鎖附扭力值為25 N·m

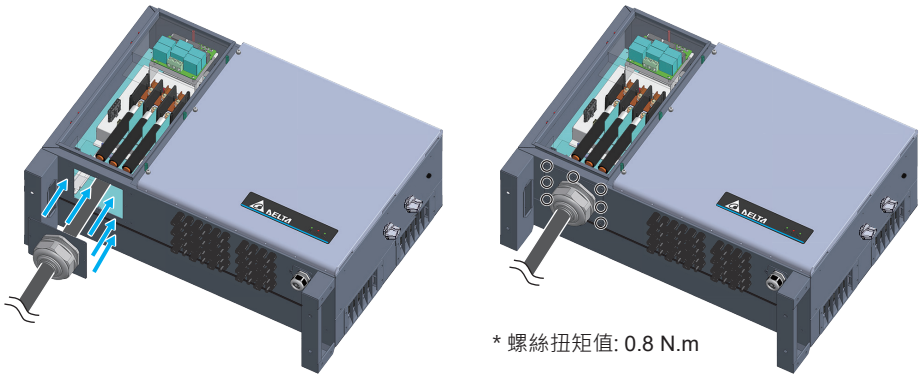
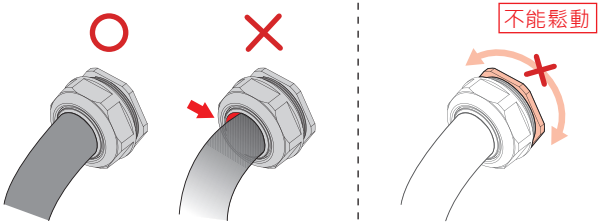


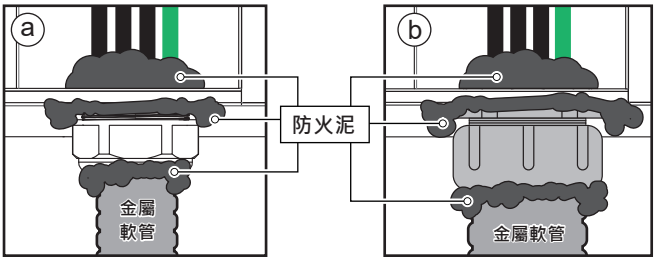
圖 3-18: 交流電纜安裝

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。



- 機器上的電纜接頭適用於多芯電纜，當使用單芯電纜搭配3” 金屬軟管配線時，請遵照下列建議預防水氣侵入:
  a. 將金屬軟管接入電纜接頭內，並使用防火泥填補軟管與接線盒內外部及電纜接頭與軟管間的縫隙
  b. 將電纜接頭更換為3” 金屬管接頭，並使用防火泥填補軟管與接線盒內外部及金屬管接頭與軟管間的縫隙



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」
-於配線作業完畢並確保不再開啟外蓋後，請參照**圖3-19**張貼全新專用資安封條(表2-1 項目10)
-如未確實張貼而因此導致資安事件，則本公司概不負責

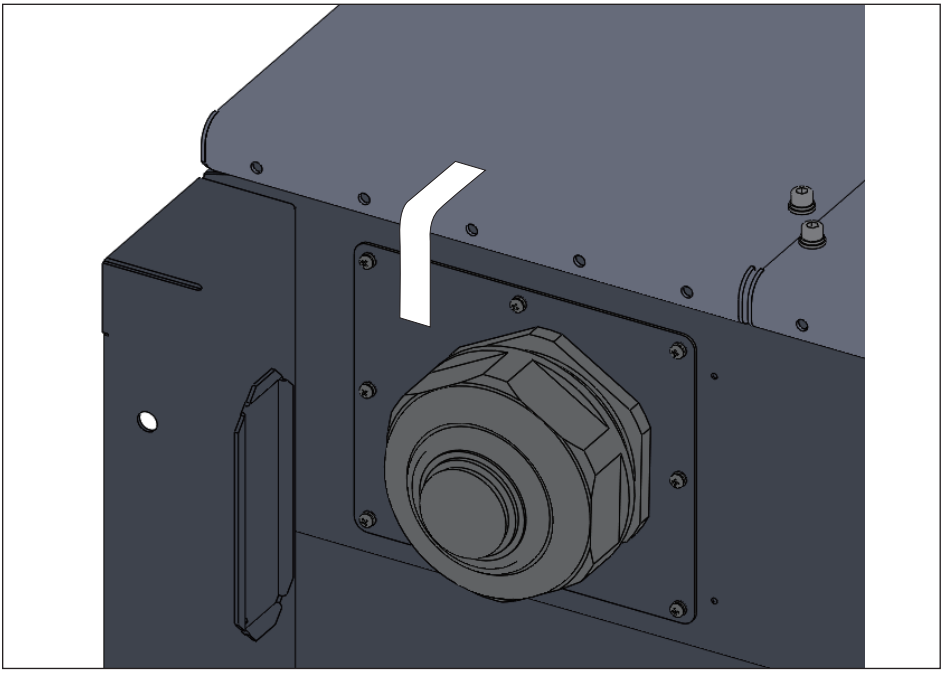


圖 3-19 : 資安封條黏貼於AC側

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。

危險！

- **禁止同時開啟兩側前蓋。**

警告!

- 直流及交流高電壓，存在觸電及火災危險。
- 僅允許使用有標示低於1600V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) 或間隔5分鐘。

注意

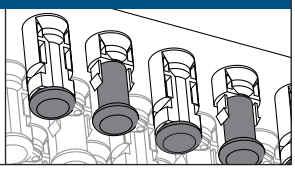
- 太陽能陣列的正或負端皆禁止接到地。

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

- 請勿拆除未使用的直流端防水塞，以避免水或異物侵入。



為確保變流器以較高效能運作，請參考下列模組組串配置建議：

1.直流輸入電壓應大於交流線電壓 x 1.5倍（或交流相電壓 x 2.6倍）
若直流輸入電壓低於上述值，則變流器將無法正常運轉。
例如:交流電壓 = 600Vac，直流輸入電壓(Vmp)需> 600Vac x 1.5 = 900Vdc

2.模組組串設計應考慮環境最低溫度，以確保模組組串的開路電壓低於1500Vdc。

3.當模組組串開路電壓高於1600Vdc時，變流器會有損壞的風險且會導致產品保固失效。

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 (4/6mm^2)。
- 直流端導線分為正負極配接，其配線方式如圖3-21所示。

配件包附有H4 Plus端子(圖3-20)適用導線外徑5.0~7.8mm。

若導線外徑超過7.8mm，請聯繫客服選配H4SxC8DM系列端子，適用線徑請參考表3-2。

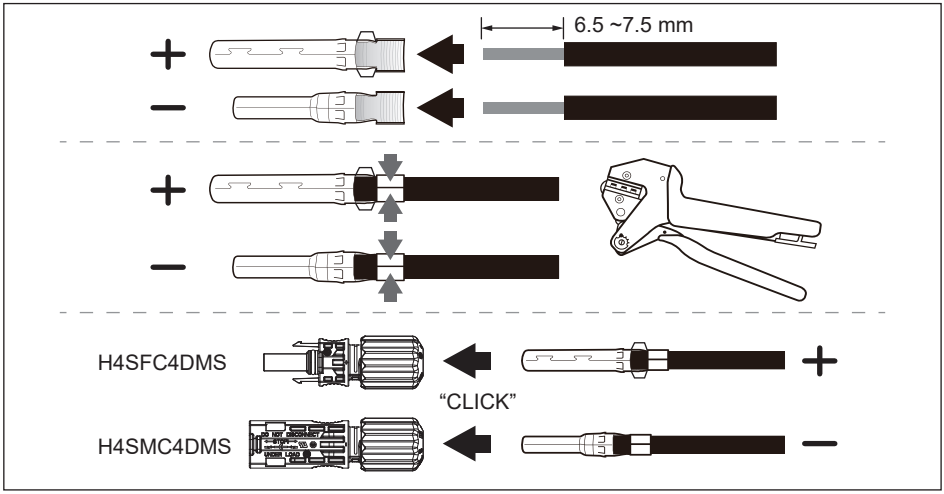


圖 3-20: 直流接線端子

表 3-2: H4 系列端子

導線橫截面積	H4SxC4DM Plus (標配) 適用外徑: 5.0~7.8mm	H4SxC8DM Plus (選配) 適用外徑: 7.5~8.8mm
12 AWG (4mm^2)	O	X
10 AWG (6mm^2)	O	X
8 AWG (10mm^2)	X	O

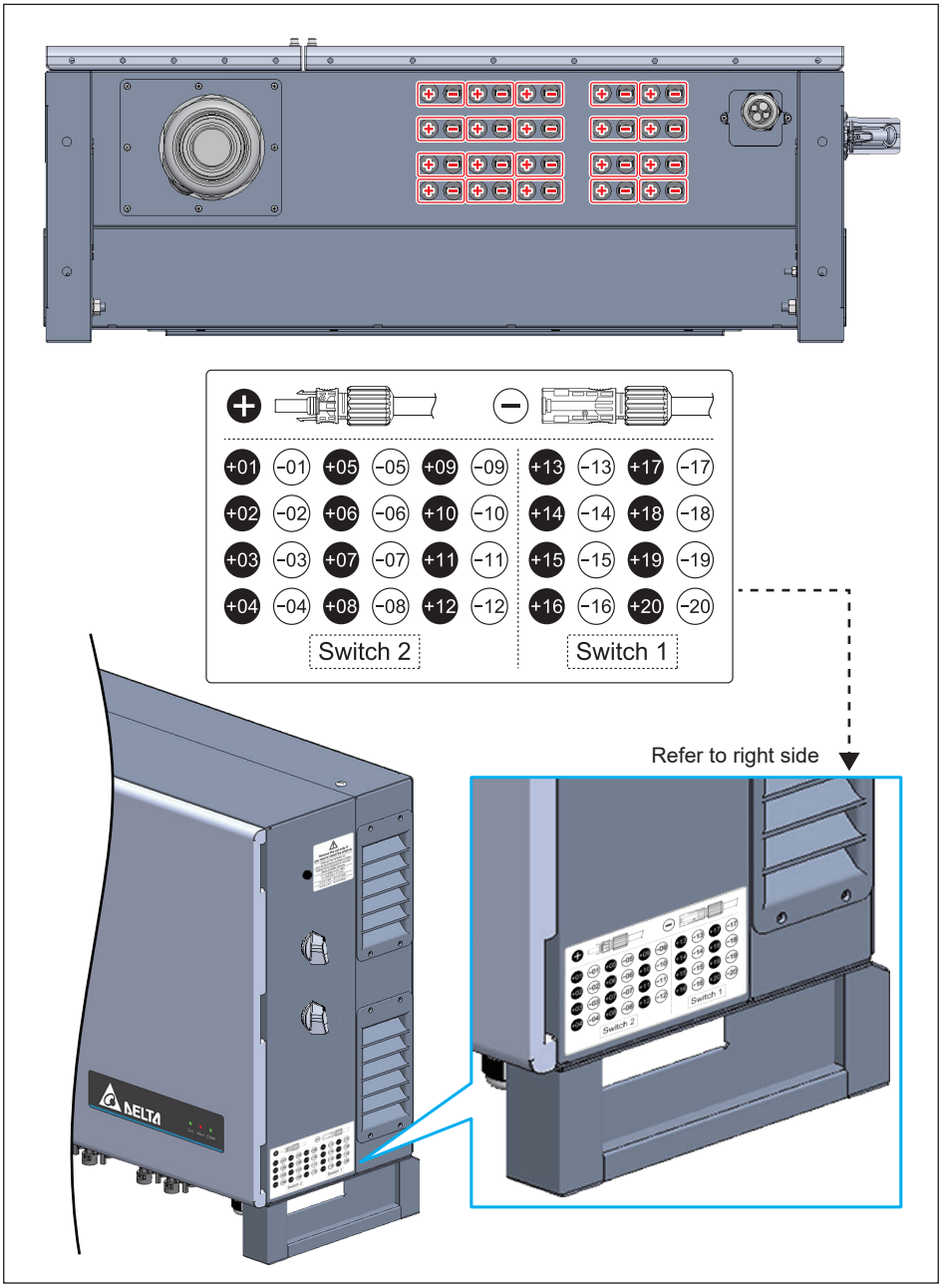


圖 3-21 : UTX 端子與直流光伏組串對照圖

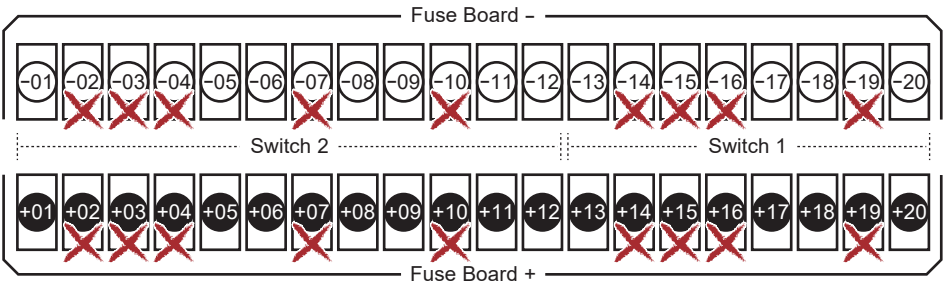
■ 直流側擴充端子

M125HV_111適用CE承認的1500V/30A保險絲，如下說明：

- 光伏電池並聯的最大短路電流(Isc-stc)需低於變流器之最大短路電流(320A)
- 內部電流裝配限制為30A保險絲，故第2、3、4、7、10、14、15、16及19組組串不能使用

建議保險絲型號

1. Mersen Vendor P/N: HP15M30
2. EATON(Bussmann Series) Vendor P/N: PV-30A10F85L
3. Littelfuse Vendor P/N: SPXV 30

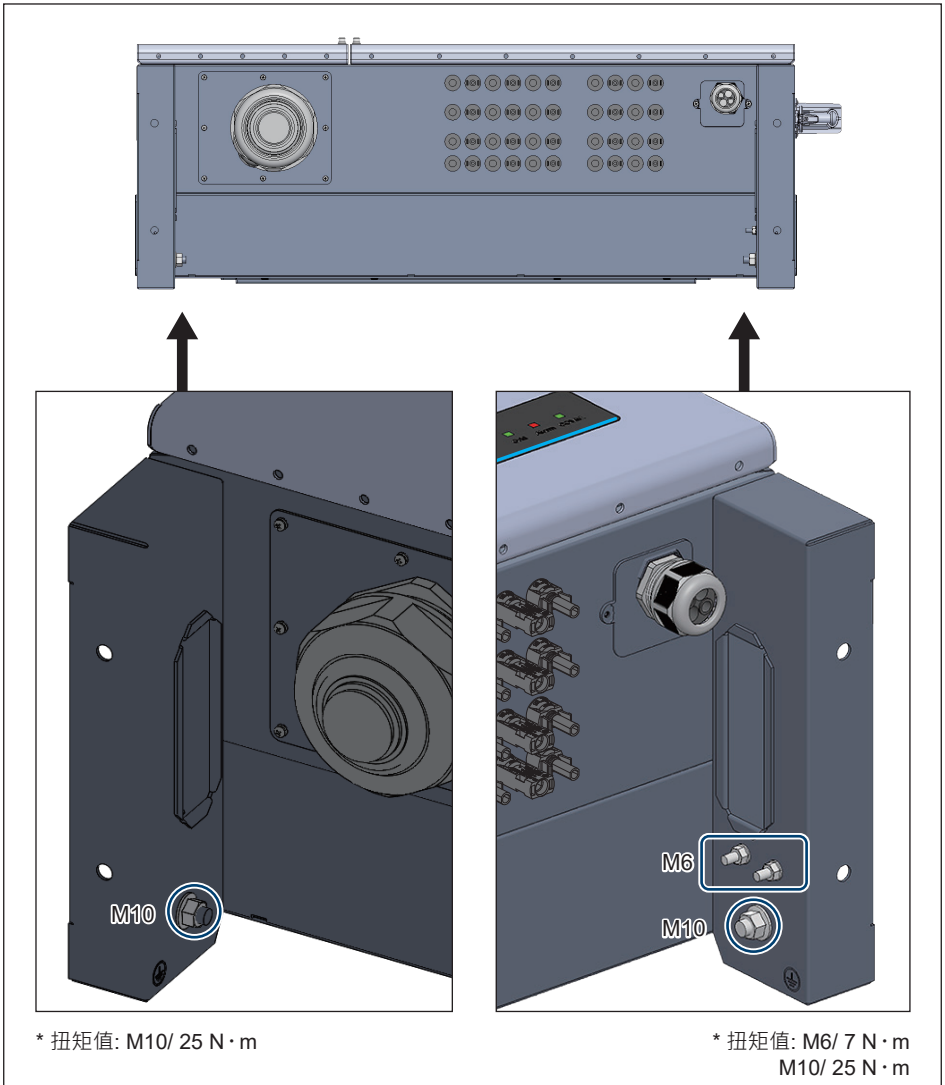


注意！

- 第2、3、4、7、10、14、15、16及19組串不能使用。

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(如圖3-22所示)。
安裝扭矩: M6/ 7 N·m
M10/ 25 N·m



* 扭矩值: M10/ 25 N·m

* 扭矩值: M6/ 7 N·m
M10/ 25 N·m

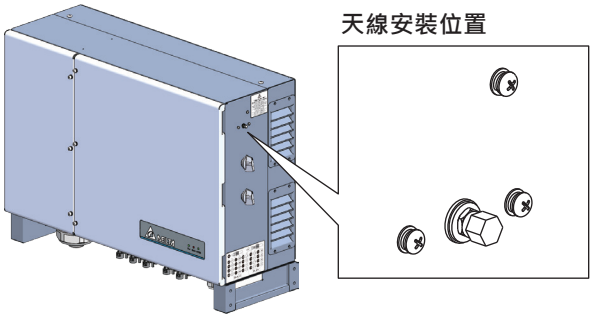
圖 3-22 : 設備接地

3.6 SUB_1G天線 (選配)

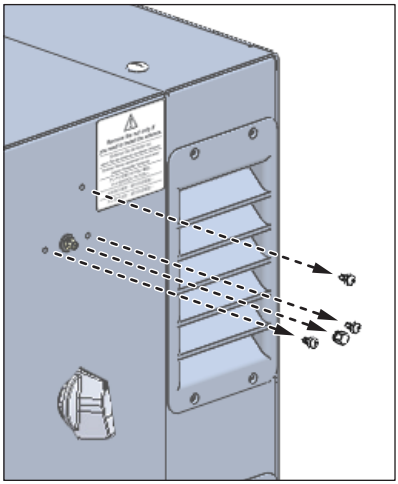
本機器支援SUB_1G無線通訊，使用前須採用1.2 N·m安裝專用天線。
安裝步驟及注意事項如圖3-23~3-25所示。

注意

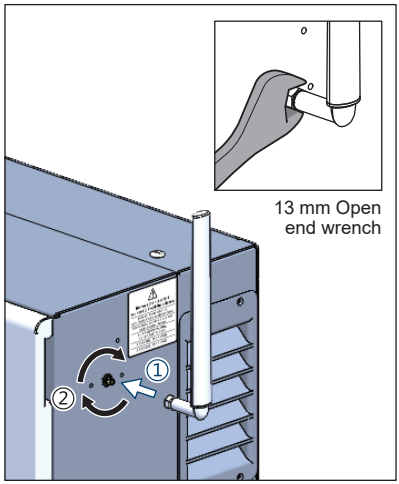
- 不使用天線時，請將防水螺母外蓋及天線支架的三顆M4螺絲鎖上。
- 安裝天線後，請妥善保存防水螺母外蓋。
- 防水螺母外蓋遺失時，請與DELTA聯繫。



安裝天線後，請妥善保存防水螺母外蓋。



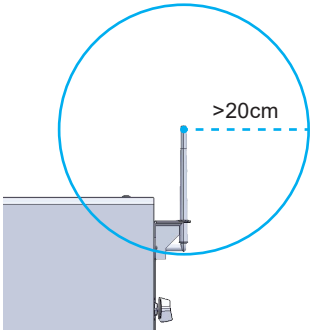
拆下防水螺母外蓋及螺絲

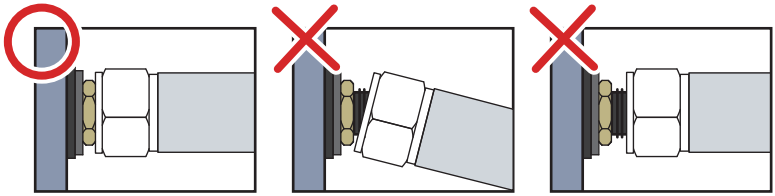


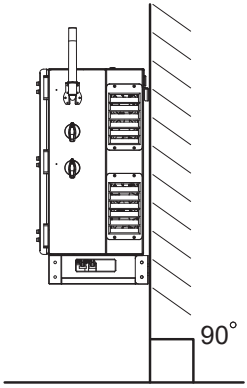
使用13 mm開口板手以1.2 N·m扭力鎖上天線

圖 3-23 : 天線安裝

為保持良好通訊品質，請確保天線
周圍20cm無遮蔽物

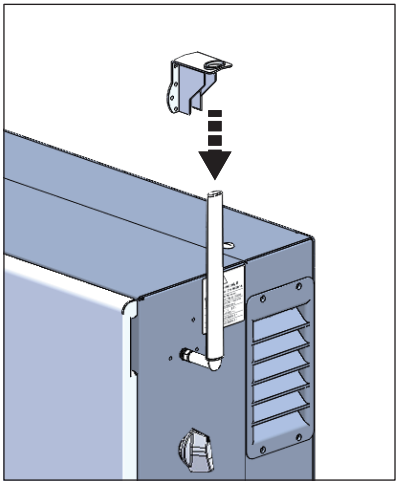




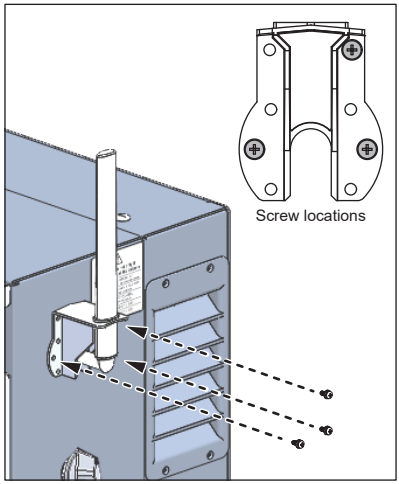


天線保持向上

圖 3-24 : 安裝天線的注意事項



從天線頂端套入天線支架至螺絲孔洞相符位置



以0.98 N·m的扭力鎖附3顆M4螺絲

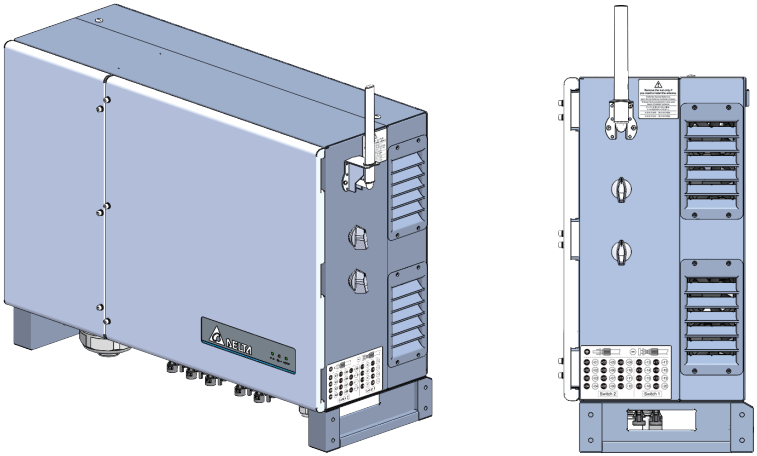


圖 3-25 : 安裝天線支架

注意

- 當配合DELTA PPM DC1_100使用時，請參閱PPM DC1_100使用說明書
  https://mydeltasolar.deltaww.com/?p=product_manual

3.7 通訊模組配接方式

M125HV_111的通訊模組如圖3-26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。

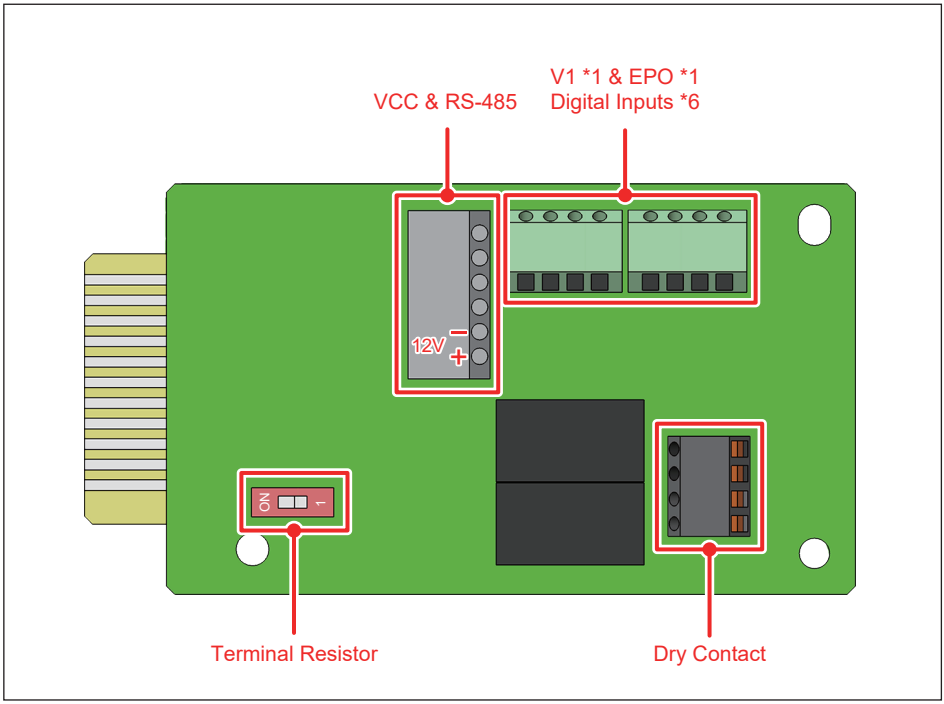
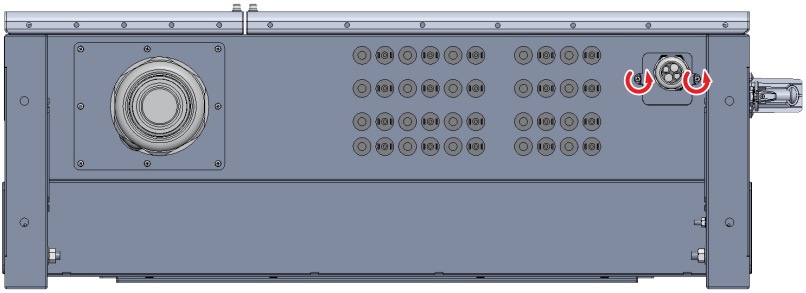


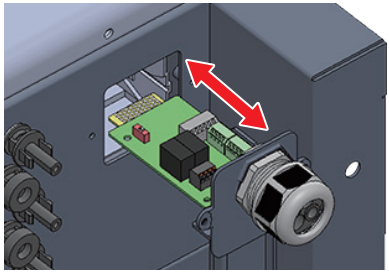
圖 3-26 : 通訊模組

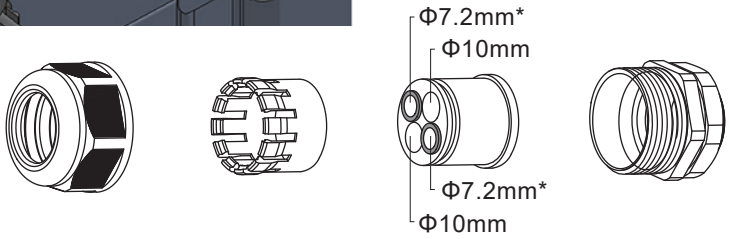
3.7.1 連接通訊模組

M125HV_111底部插槽中搭載通訊模組。模組托架以兩個防脫落螺絲固定於機箱上(圖3-27)。使用通訊模組時，請鬆開兩顆防脫落螺絲並取出拖架，拉出通訊模組後，將訊號線穿過防水導管，並按照以下各節所示進行電氣連接後，按上述步驟反序安裝模組，並確保組件與機箱正確接合。



* 螺絲扭矩值: 0.8 N·m





*拆下 Φ7.2 mm 孔內橡膠塞後孔徑可擴增為 Φ8.7 mm

圖 3-27 : 通訊模組位置與連接

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」

-於配線作業完畢並確保不再開啟外蓋後，請參照**圖3-28**張貼全新專用資安封條(表2-1 項目10)

-如未確實張貼而因此導致資安事件，則本公司概不負責

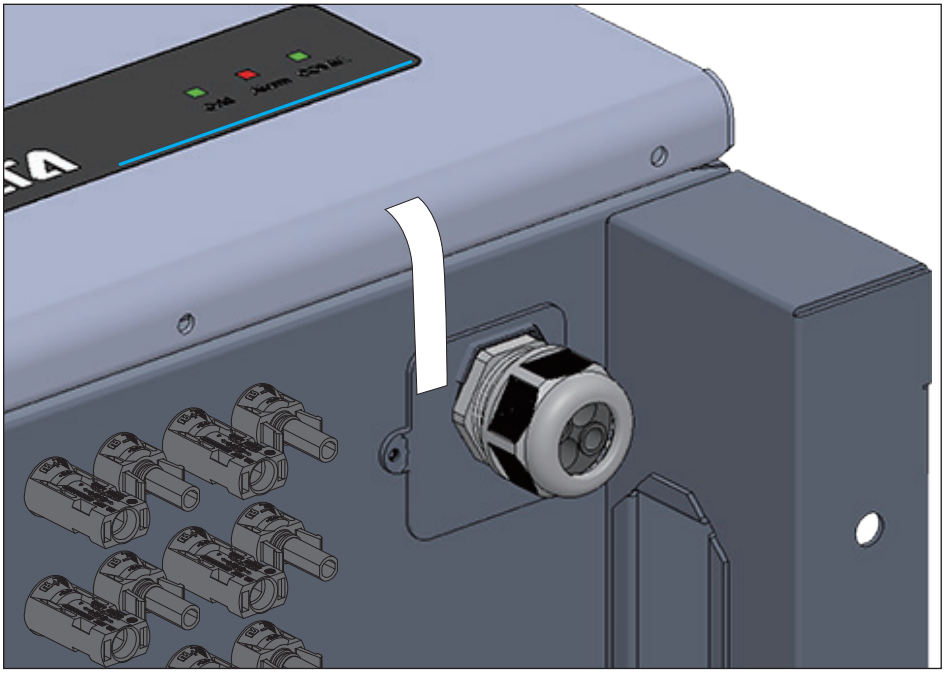


圖 3-28 : 資安封條黏貼於DC側

3.7.2 RS-485 連線

RS-485端子座腳位定義如**表3-3**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3-4**)。

不同的RS-485連接方式時，需使用不同的終端電阻設定方式。

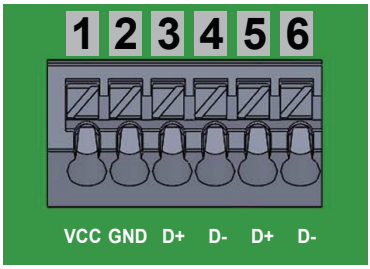
- 當多台變流器連接時，只有最後一台變流器必須將終端電阻接通如**圖3-29**。
- 如果RS-485總線長度大於610m，建議使用Belden 3105A電纜或同規品來確保通信品質。
- 一般情況下，RS-485線長建議小於30m

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 3-3: RS-485 端子座說明

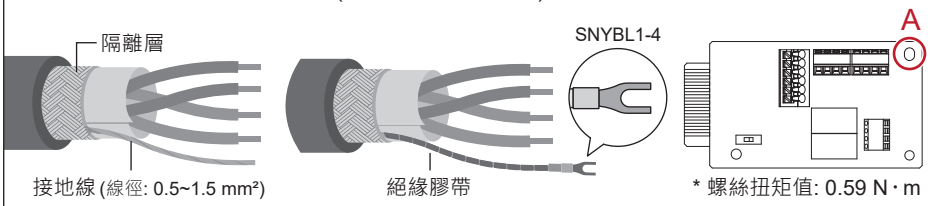
Pin	Function
1	VCC (+12V)
2	GND (非系統接地)
3	DATA+
4	DATA-
5	DATA+
6	DATA-



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



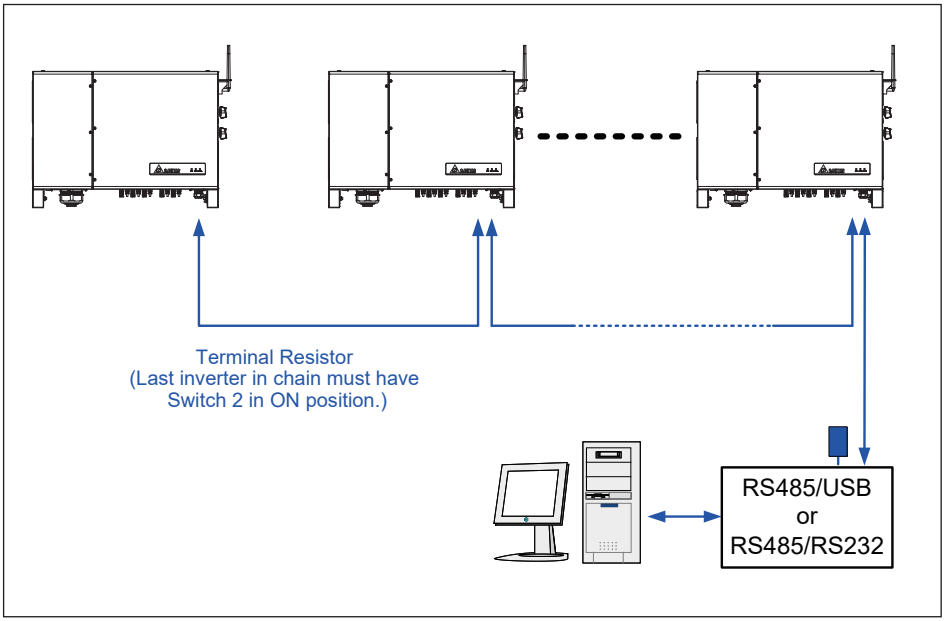


圖 3-29 : 多台併接通訊示意圖

表 3-4 : 終端電阻設定說明

	Switch 1
ON	Terminal Resistor ON
OFF	Terminal Resistor OFF

3.7.3 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 3-30 : 緊急關斷功能端子座

EPO功能可通過端子[V1＆K0]兩端連接繼電器觸點進行關閉變流器。

此外，可以透過功率降低控制功能限制變流器的輸出功率。
請依**表3-5**中所示的兩個端子之間放置硬件短路（跳線或繼電器），即可進行此功能的控制設置。

表 3-5: 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

3.7.4 乾接點連接說明

M125HV_111提供兩組乾接點端子，可依據變流器運行狀態控制外部裝置。
該功能的接線端子如**圖3-31**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DSS或APP進行設定。

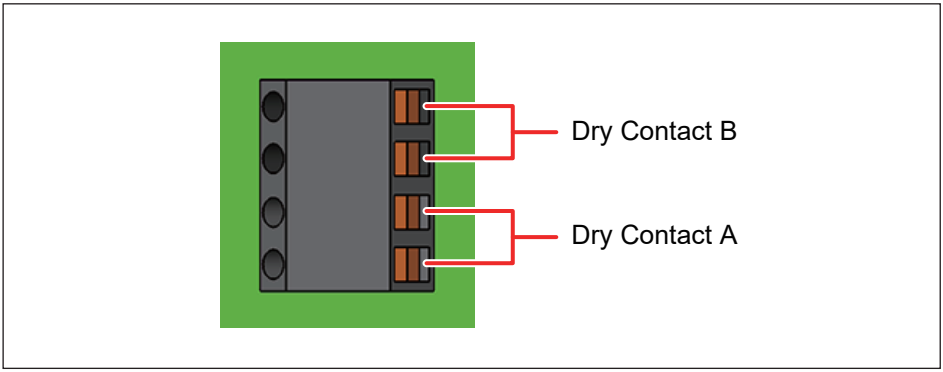


圖 3-31 : 乾接點連接位置圖

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

M125HV_111 提供3顆LED 燈號提供變流器的狀態顯示，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。

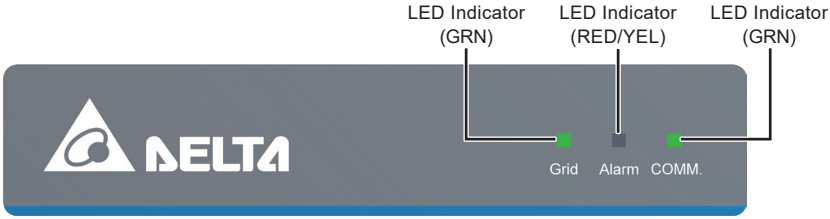


圖 4-1 : 顯示面板

表 4-1: LED 指示燈

狀況	Grid (綠)	Alarm (紅/黃)
Countdown	FLASH	OFF
On Grid	ON	OFF
Inverter Fault / Remote off	OFF	ON / OFF
Inverter Warning	ON (or OFF)	FLASH / OFF
Field Fault	OFF	OFF / ON
Field Warning	ON	OFF / FLASH
NO DC	OFF	OFF / FLASH SLOW
FW Upgrade	FLASH	FLASH / OFF
Standby	FLASH	OFF / FLASH
Check PV Power	FLASH FAST	OFF / FLASH FAST
System Lock	OFF	FLASH / FLASH

*FLASH: ON 1s / OFF 1s
FLASH FAST: ON 0.25s / OFF 0.25s
FLASH SLOW : ON 5s / OFF 10s

表4-2: 無線通訊指示燈

SUB_1G Condition	COMM (綠)
Work	FLASH
Fault	OFF

* FLASH: ON 3s / OFF 2s

4.2 自動ID設定

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DC1連接行動裝置(智慧型手機、平板等)，使用APP進行設定。

4.2.1 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 ▶

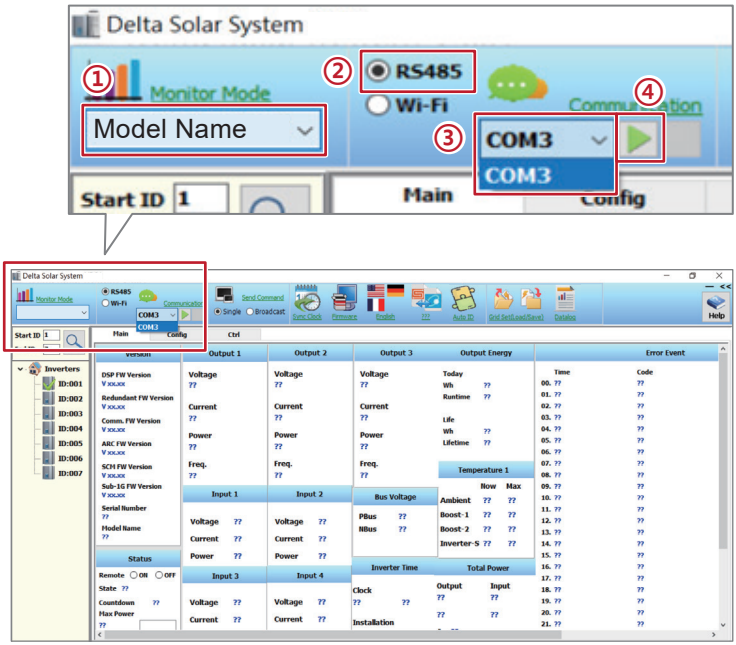
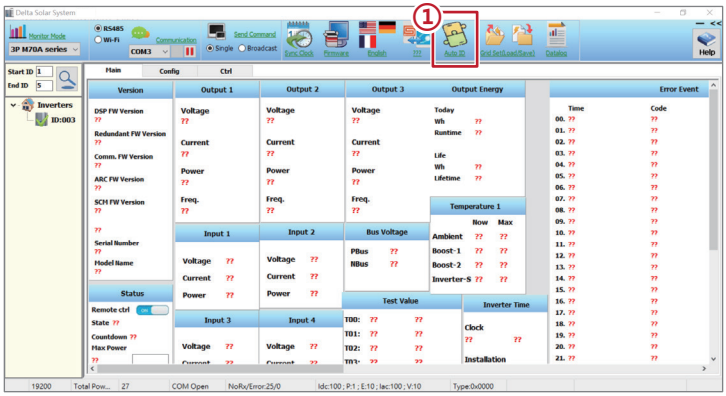
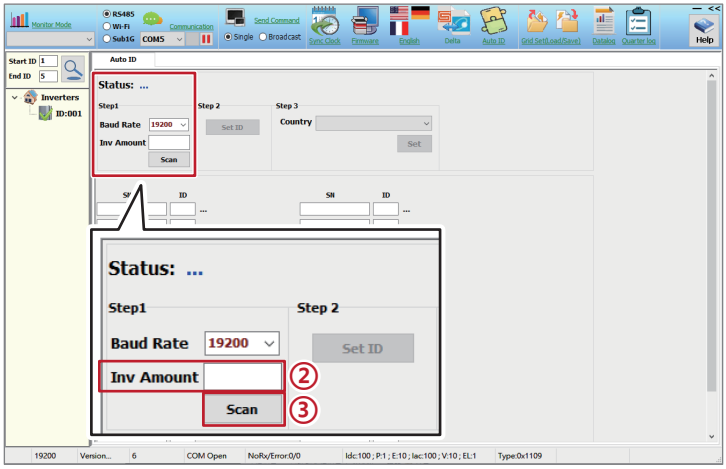


圖 4-2 : DSS連接

4.2.2 掃描變流器

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





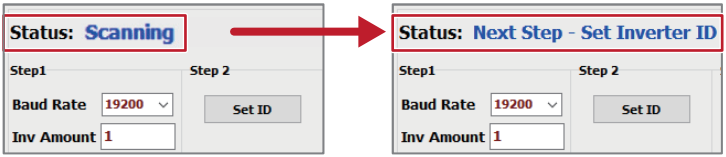


圖 4-3 : 變流器掃描

4.2.3 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”

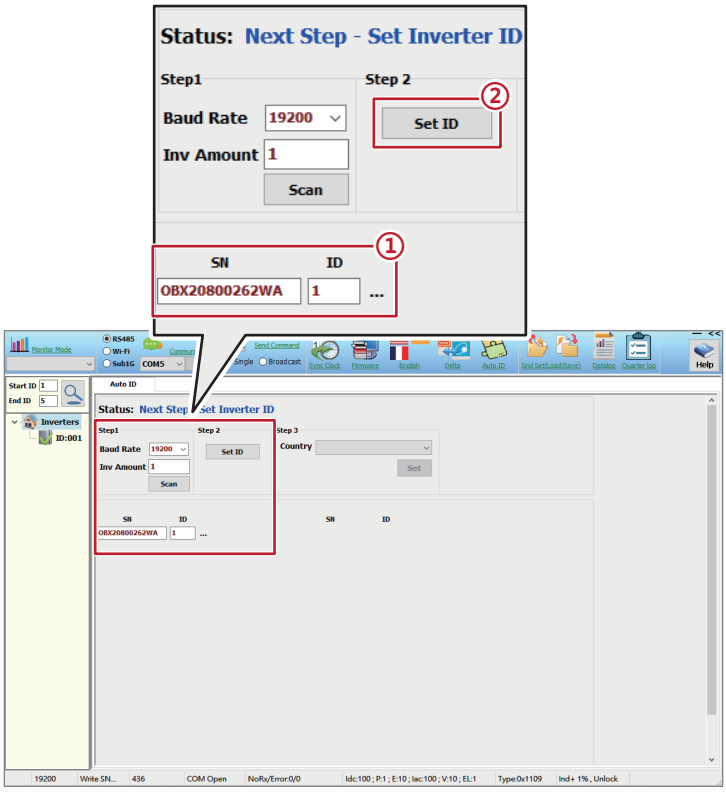


圖 4-4 : ID設定

4.2.4 國別設定

① 選取變流器國別

② 點擊 “Set”

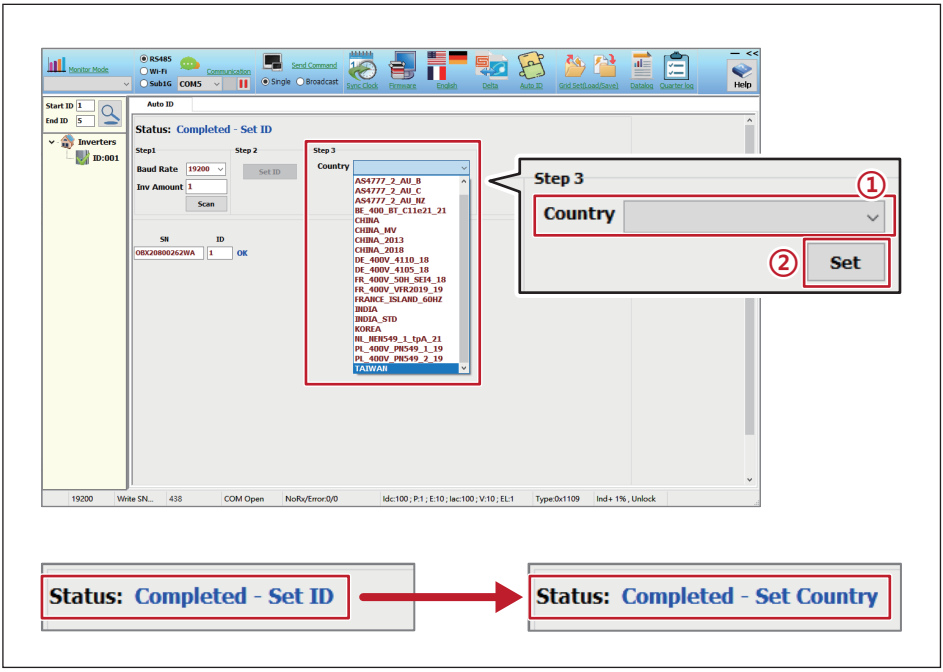


圖 4-5 : 國別設定

4.2.5 時間同步設定

點擊 “Sync Clock  ” 以同步時間設定

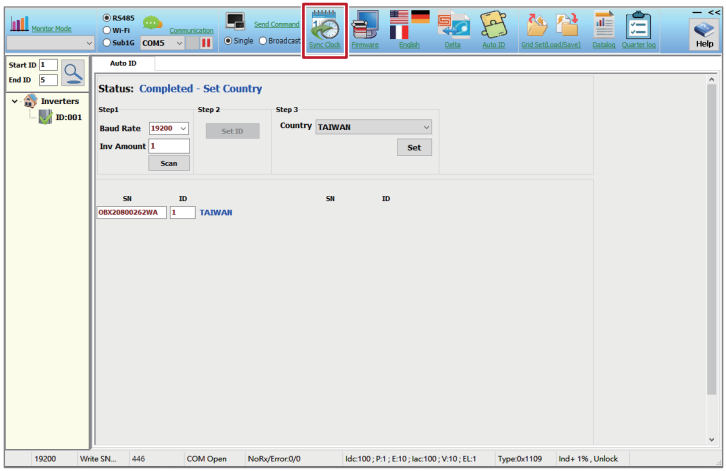


圖4-6: 時間同步設定

4.3 Delta功能設定

Delta 提供兩種機器設定方式 :

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

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 cosφ	Dry contact
Fixed Q(%)	ARC fault detection
Auto ID	Wi-Fi

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。

警告！

- 進行任何維修動作前，請確定交流/直流電源皆已切斷以避免觸電危險。
- **禁止同時開啟兩側前蓋。**

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5-1~5-3步驟。

開啟前蓋後，請依照圖5-2方式，將前蓋固定。

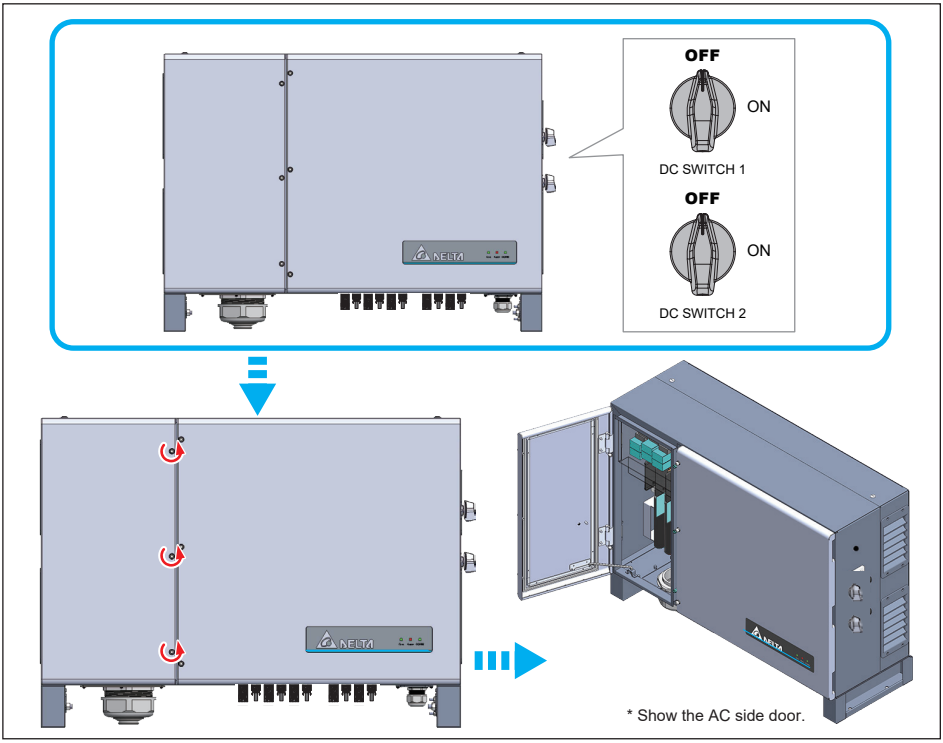
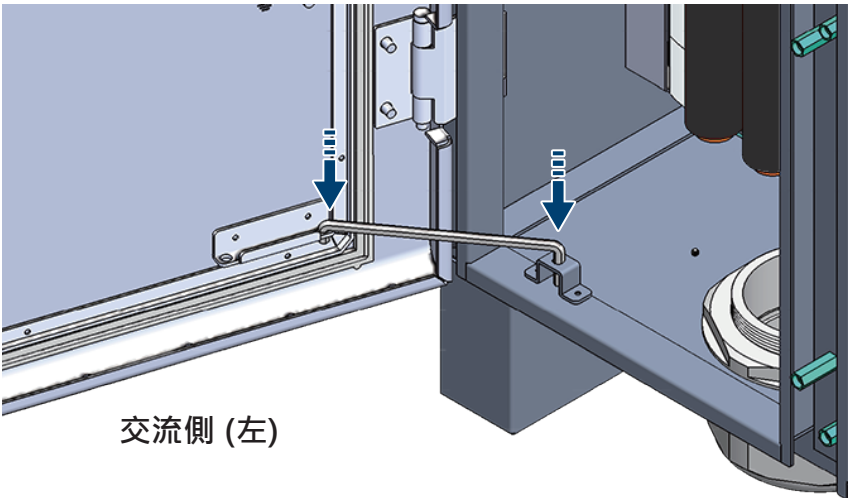


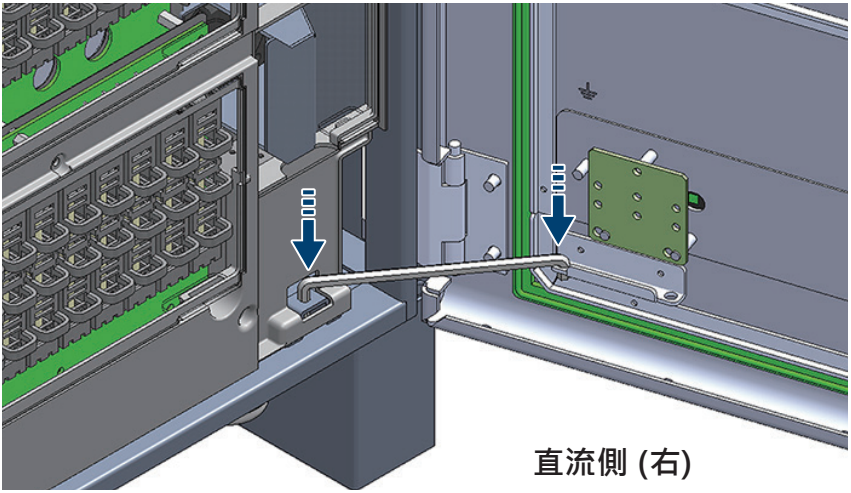
圖 5-1 : 開啟與關閉前蓋

注意

- 請使用六角板手(圖2-1, 物件5)或其他適當的工具鬆開前蓋螺絲。
- 前蓋螺絲為固定式螺絲，請勿拆卸。



or



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

5.1.1 開啟前蓋

- 在沒有雨遮的情況下，切勿在陰雨天氣下打開前蓋，以保護變流器。
- 當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。
- 關閉交流/直流電源並等待LED指示燈熄滅。
- 使用六角板手鬆開3個前蓋螺絲。
- 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：

請使用扭力板手依下圖之順序與扭力鎖附螺絲。

關閉前蓋後：

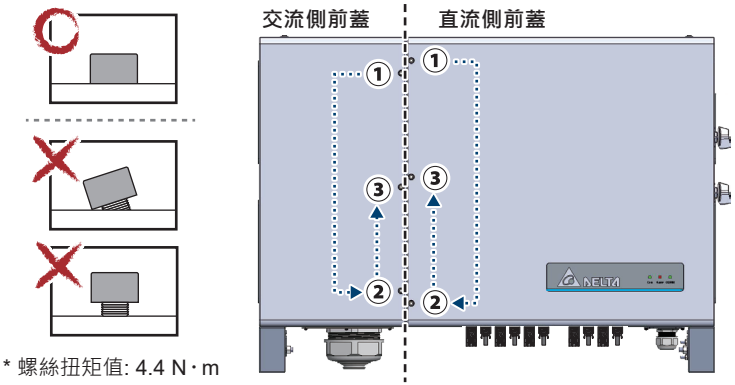
確認螺絲確實鎖附無歪斜後(**圖5-3**)，重新張貼配件包中的一次性資安封條(**圖3-19**(AC側)及**圖3-28** (DC側))

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」

-於配線作業完畢並確保不再開啟外蓋後，請參照**圖3-19**(AC側)及**圖3-28** (DC側)張貼全新專用資安封條(表2-1 項目10)

-如未確實張貼而因此導致資安事件，則本公司概不負責



* 螺絲扭矩值: 4.4 N·m

圖 5-3 : 關門步驟

5.2 更換雷擊保護裝置 (SPD)

M125HV_111 配置交流與直流側的雷擊保護裝置(SPD)，如圖5-4所示。
表5-1為交流與直流側雷擊保護裝置的規格。

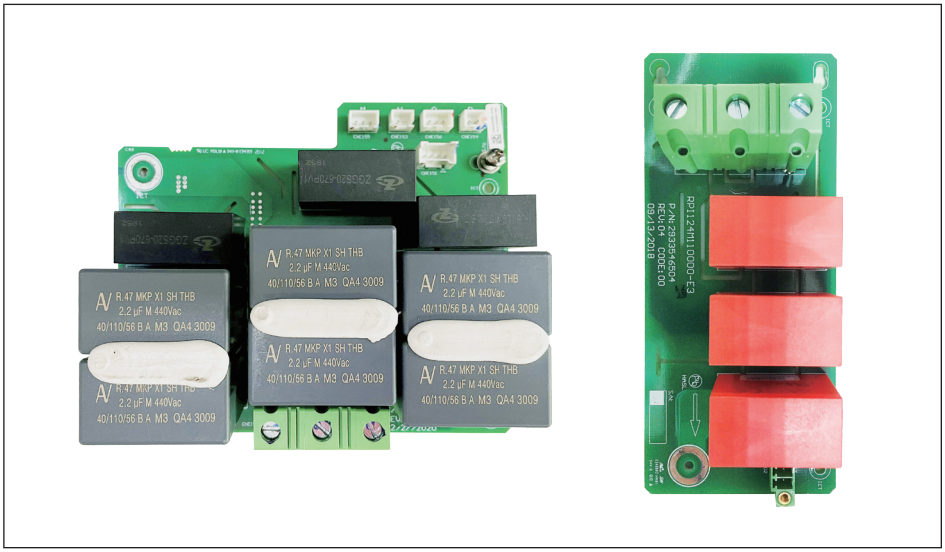


圖 5-4 : 交流與直流側的雷擊保護裝置

表 5-1 : 雷擊保護裝置規格

Description		Value
Working voltage:	AC Module	1190VRMS
	DC Module	1800VDC
Working Current (8/20us)		10kA
Rated Current (IMAX – 8/20us)		20kA
Operating Ambient Temperature Range		-40°C to 85°C
Manufacturer:	Sichuan Zhongguang Lightning Protection Technologies Co., Ltd	

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是否損壞。

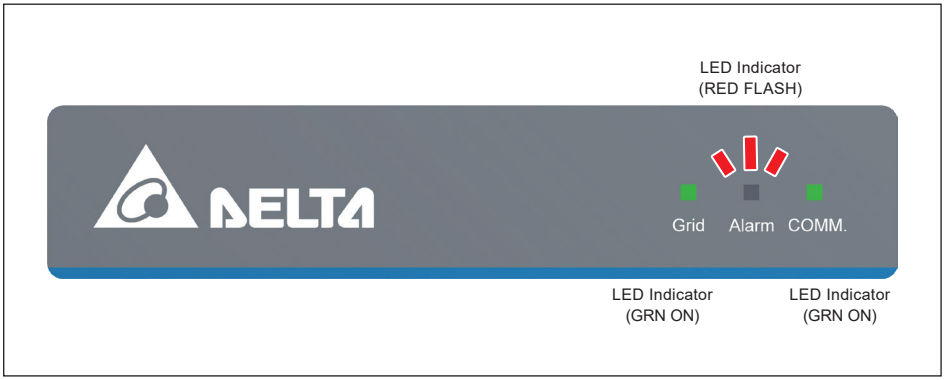


圖 5-5 : SPD故障時的面板顯示

- 開啟前蓋步驟
  1. 將直流電源關閉，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 (圖 5-7)

1. 從AC SPD電路板上拆下5條信號排線。(4-pinx1, 3-pinx2, 2-pinx2)
2. 從AC SPD電路板上拆下3條power wirings。
3. 拆下AC SPD電路板左側的2顆防脫落螺絲。
4. 取下異常AC 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AC SPD。
   將5個螺絲鎖緊至扭矩值如圖5-7所示。

• 更換異常的DC SPD模組 (圖 5-8)

1. 從DC SPD電路板上拆下1條信號排線。
2. 從DC SPD電路板上拆下2條power wirings。
3. 拆下DC SPD電路板右側的2顆防脫落螺絲。
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5個螺絲鎖緊至扭矩值如圖5-8所示。

- 關上前蓋
  請依據5.1.2 章節說明，關閉前蓋。

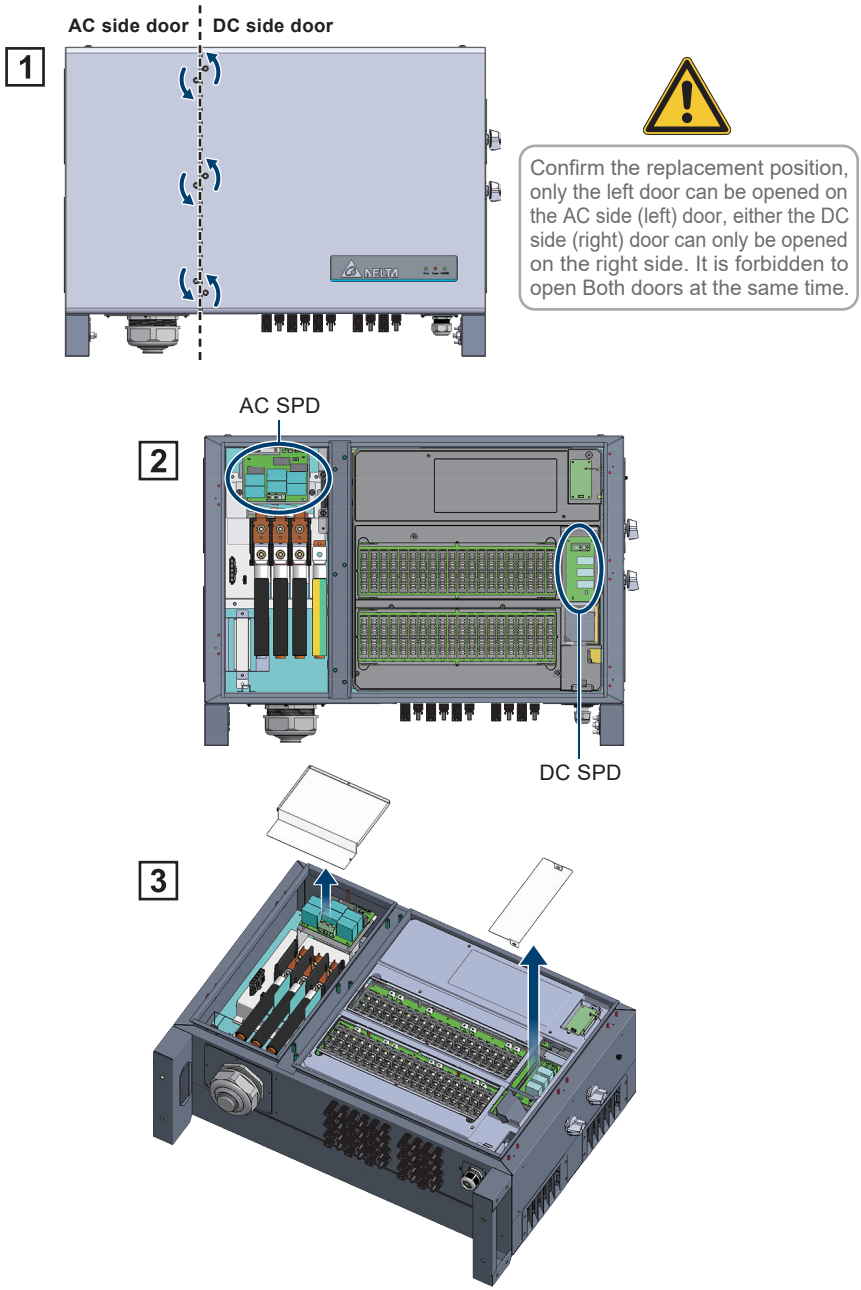

AC side door
DC side door
1
Confirm the replacement position, only the left door can be opened on the AC side (left) door, either the DC side (right) door can only be opened on the right side. It is forbidden to open Both doors at the same time.
AC SPD
2
DC SPD
3

圖 5-6 : SPD更換步驟

AC SPDs

* A/G 螺絲扭矩值: 0.8N・m

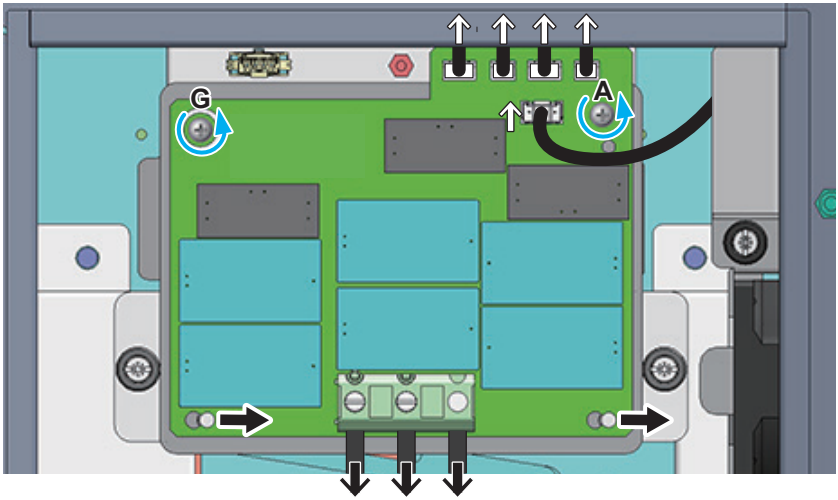


圖 5-7 : 移除AC SPD 螺絲與排線

DC SPDs

* A/G 螺絲扭矩值: 0.8N・m

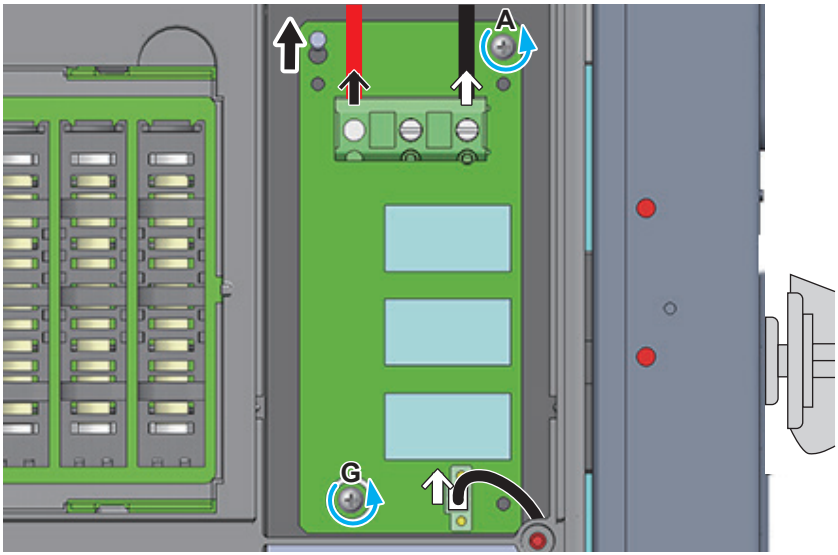


圖 5-8 : 移除DC SPD 螺絲與排線

5.3 更換保險絲

M125HV_111使用標準的10mm x 85mm PV保險絲和相關的保險絲座，由於採用TL設計，所有組串都不接地，並且每個組串輸入都需要正負極保險絲。
表5-2列出的保險絲品牌與規格均為10mm x 85mm PV保險絲（15A / 20A），皆可用於更換。M125HV_111標配為20A保險絲。

表 5-2 : 保險絲規格

Rated current	20 A
Rated voltage	1500 V
Operating Class	Solar PV
Fuse Type	10x85 ferrule

IEC listed	IEC 60269-6
Typical Mfr	Littelfuse, Bussmann
Mfr P/N	SPXV 20, PV-20A10F85L

危險：觸電危險!!

更換保險絲前，請關閉直流開關，並確保變流器停止運作。

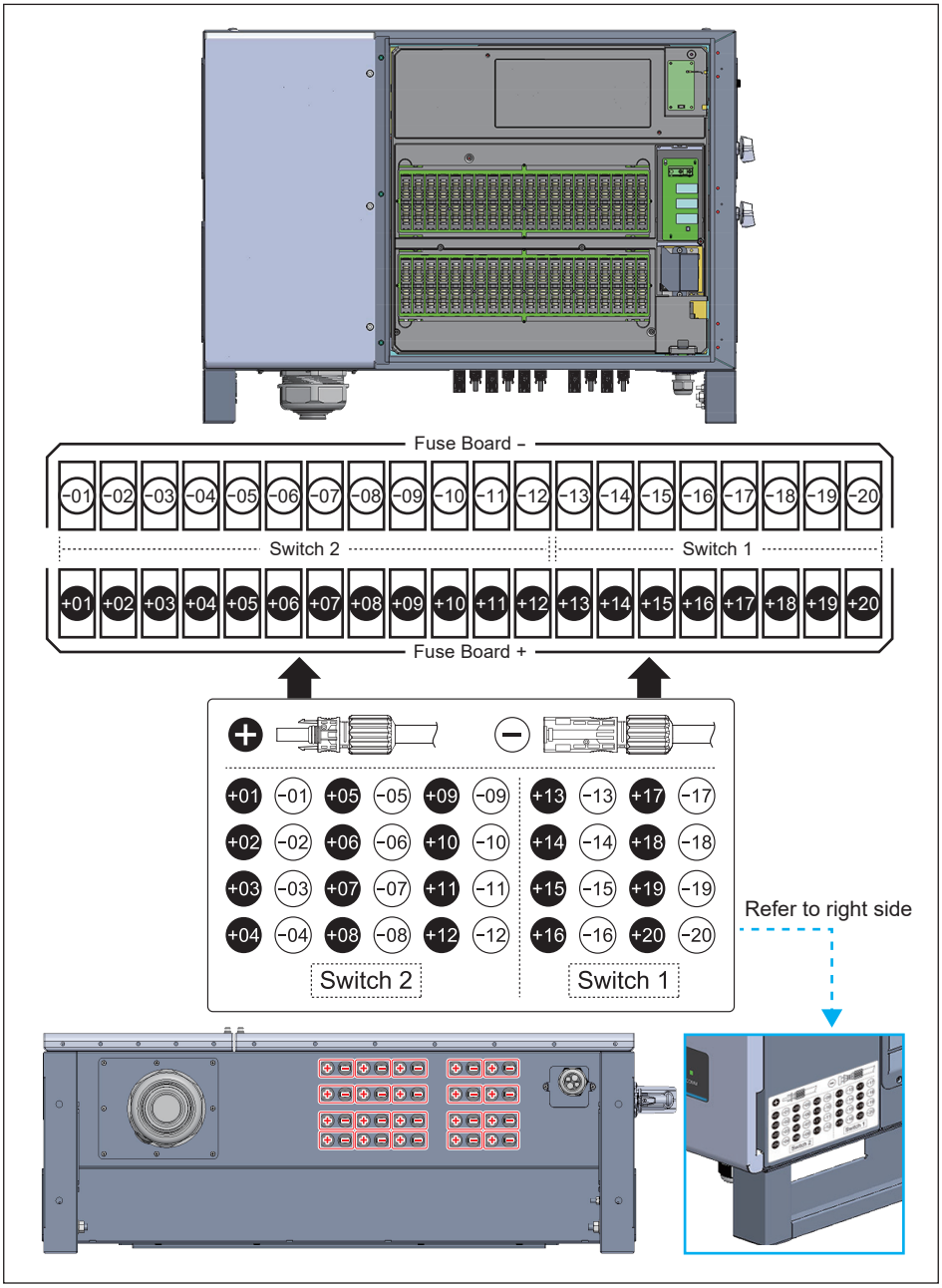


圖 5-9 : 內部保險絲與底部端子對照

M125HV_111配有40組保險絲，最多可連接20個組串。保險絲座安裝在兩個電路板上，可安全插拔保險絲。
圖5-10為組合式保險絲座和保護罩的位置，請依圖5-11所示拆卸保險絲。
詳細內部架構請參閱圖2-5。

若變流器發生發電異常，請依照下列步驟檢查保險絲：

1. 確認是否有組數顯示為零，若有則該組的保險絲有可能已經熔斷。
2. 切斷直流與交流電源並且等待液晶顯示面板熄滅。
3. 請參考5.1.1步驟開啟直流側(右側)前蓋。
4. 根據第一步驟，確認熔斷的保險絲位置並取下(圖5-11)，取下後請確認用三用電錶是否已熔斷。
5. 若需要請更換新的保險絲。
6. 請參考5.1.2步驟關閉直流側(右側)前蓋。

1. 移除保護罩

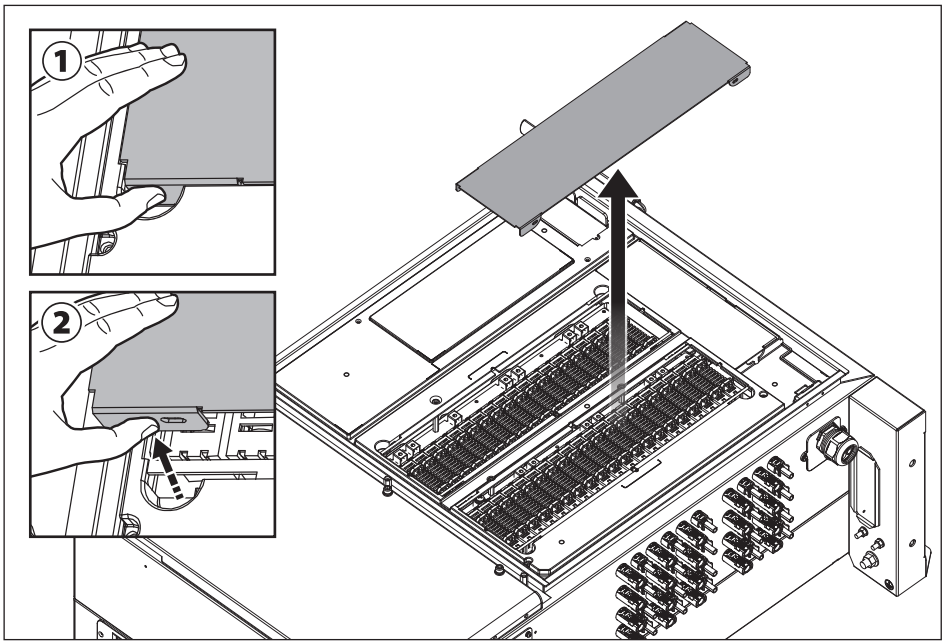


圖 5-10 : 保險絲座與保護罩位置

2. 垂直拉動保險絲拔除工具以卸下保險絲座。
(保險絲座請以直上方式拆卸；直下方式安裝)

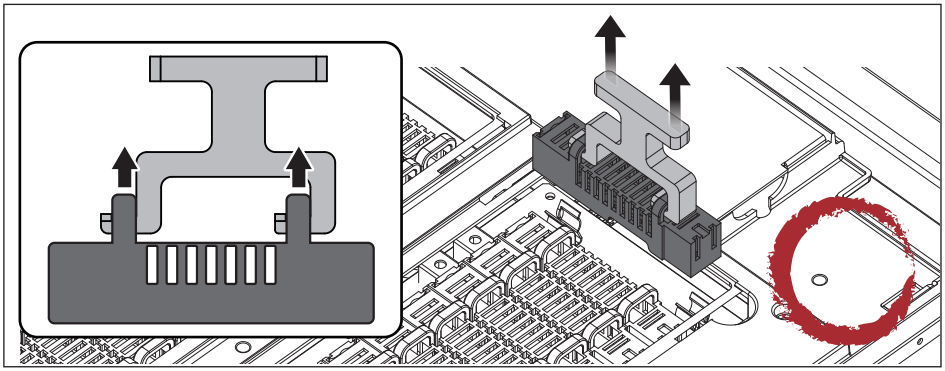


圖 5-11 : 保險絲座拆卸

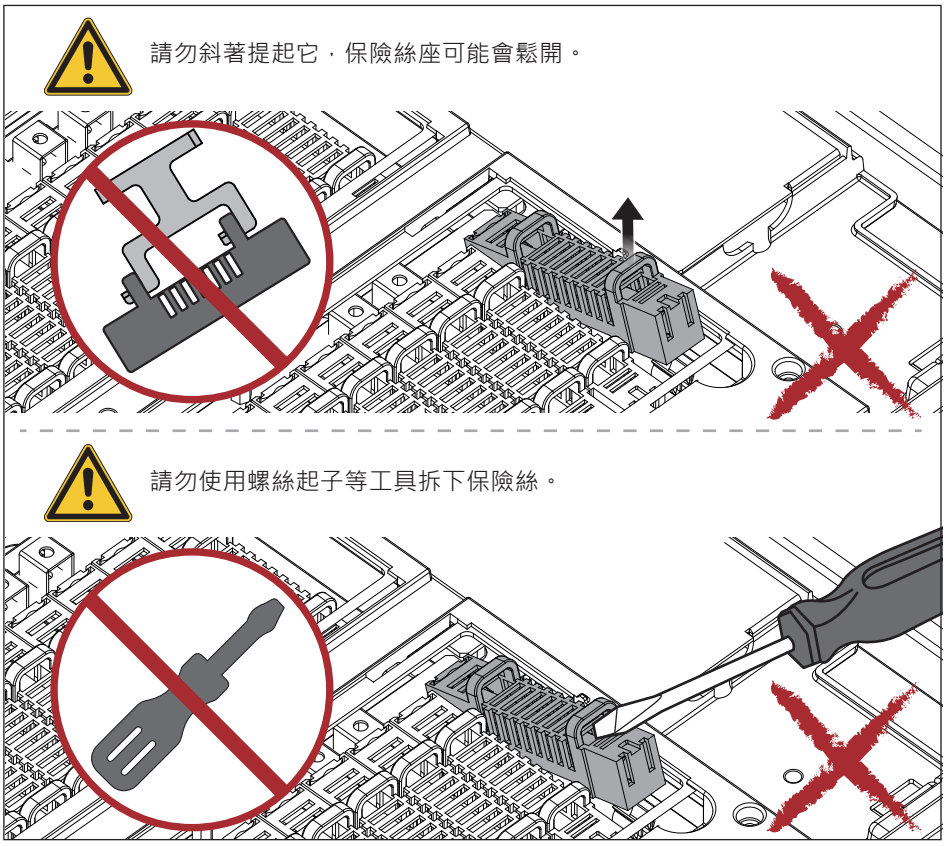


圖 5-12: 錯誤方式

3. 向上掀開保險絲座的蓋子
4. 稍微傾斜並取出保險絲

* 請注意一旦保險絲掉落，則須更換新的保險絲

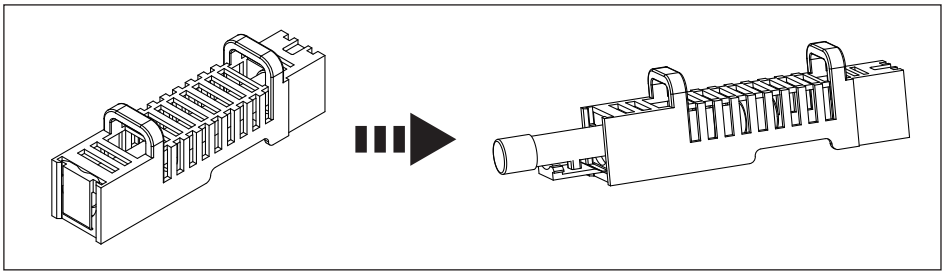
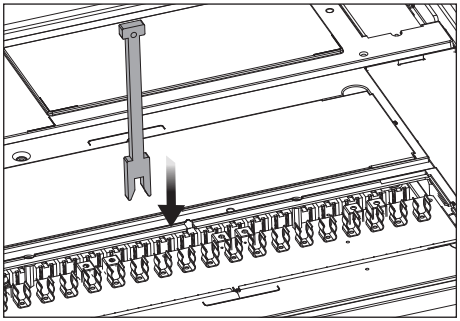
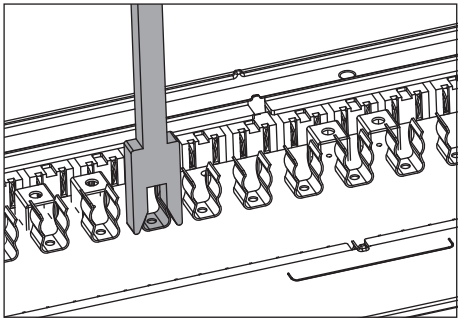


圖 5-13 : 更換保險絲

5. 將保險絲底座矯正工具垂直向下插入將底座夾緊後拔出。





6. 垂直向下安裝保險絲座。
7. 裝回保護罩

ATTENTION

使用前請確保保險絲拔除工具及保險絲底座矯正工具清潔。

5.4 智慧風扇更換與濾網清潔

M125HV_111提供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的方式說明。
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 5-16 為功率模組風扇位置。
圖 5-17, 5-18, 5-19, 5-20 為內部風扇1的位置。
圖 5-21, 5-22, 5-23, 5-24 為內部風扇2的位置。

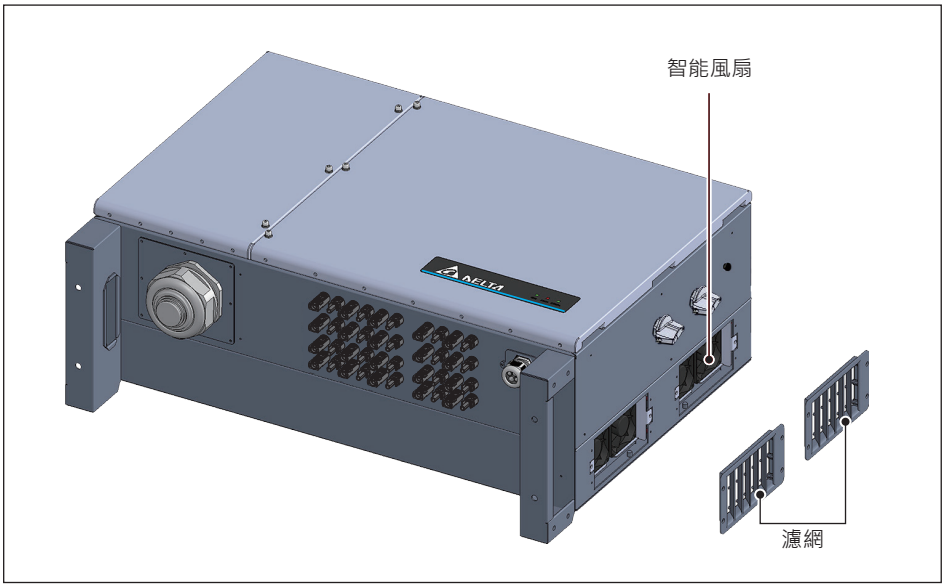


圖 5-14 : 功率模組之智能型風扇位置

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。

危險:觸電危險!!

- 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 風扇告警對應位置

當警告訊息顯示 **"W11-Fan Fail"**，請參考DSS上的錯誤代碼並依循以下章節的步驟，更換對應位置的風扇。

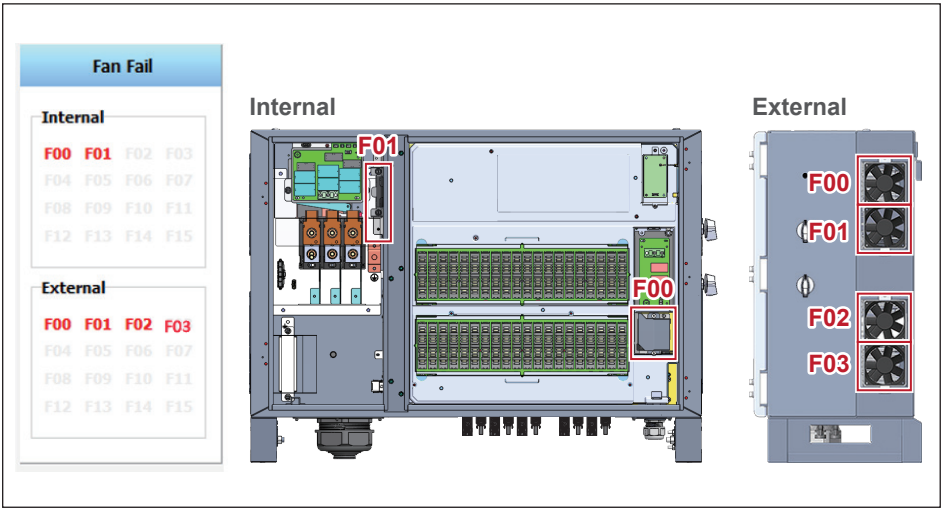


圖 5-15 : DSS錯誤代碼對應之風扇位置

5.4.2 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。

風扇順序如圖5-15所示。
依照告警 "FXX" 所示，更換故障的風扇。

請參閱圖5-16並按照以下步驟操作：
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. 卸下右側的風扇托盤上的兩顆螺絲
3. 拔除右側風扇電源線的防水端子
   (拔除端子時，請依圖5-16-③所示施力於A、B兩端)
4. 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，請按照上述步驟反序組裝並鎖緊螺絲。
螺絲所需扭矩值如圖5-16所示。

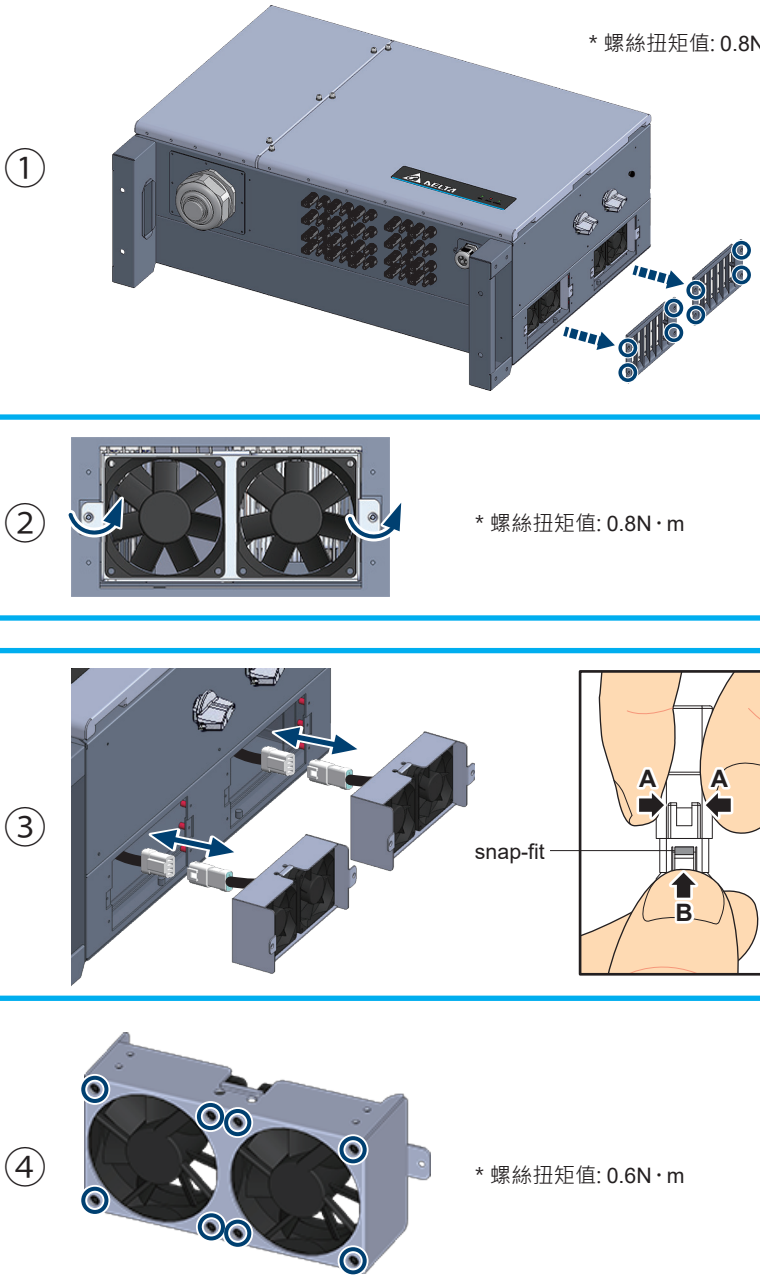


圖 5-16 : 風扇架拆卸示意圖

5.4.3 內部風扇1

直流側(右側)配有單一風扇模組(圖 5-17, 5-18, 5-19, 5-20)

拆裝內部風扇1步驟

(1) 拆下保護蓋。(如圖5-17所示)
(2) 鬆開圖5-18中所示的兩顆螺絲，然後拆下風扇架。
(3) 斷開風扇電源連接。
(4) 從直流側(右側)取下風扇組件。(如圖5-19所示)
(5) 清潔風扇組件或更換新風扇。(如圖5-20所示)
(6) 使用0.8N·m的扭矩重新組裝。

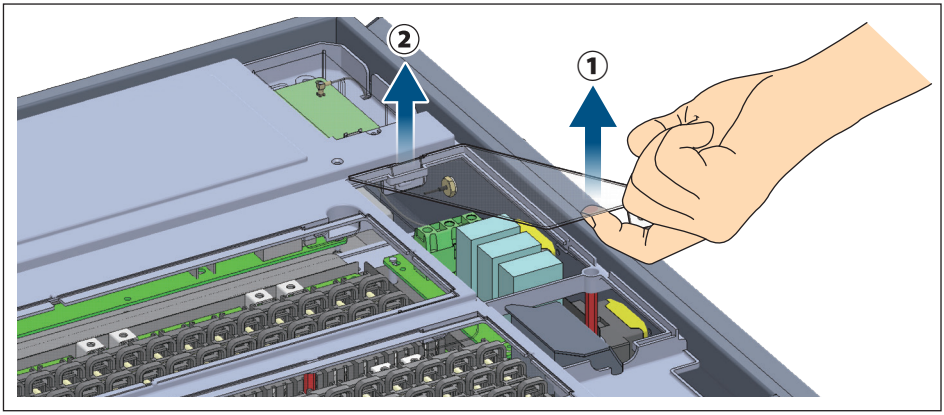


圖 5-17 : 拆下內部風扇1 保護蓋

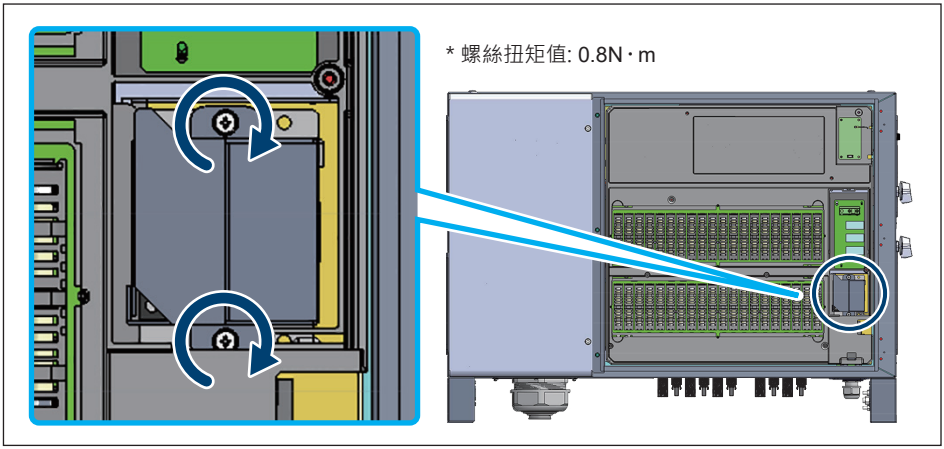


圖 5-18 : 內部風扇1 位置

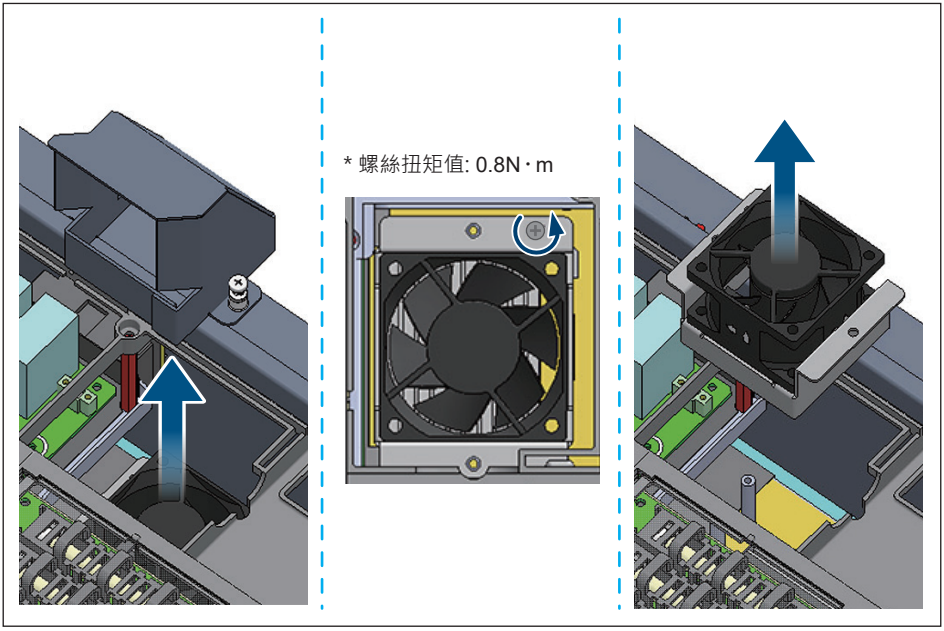


圖 5-19 : 取出內部風扇1

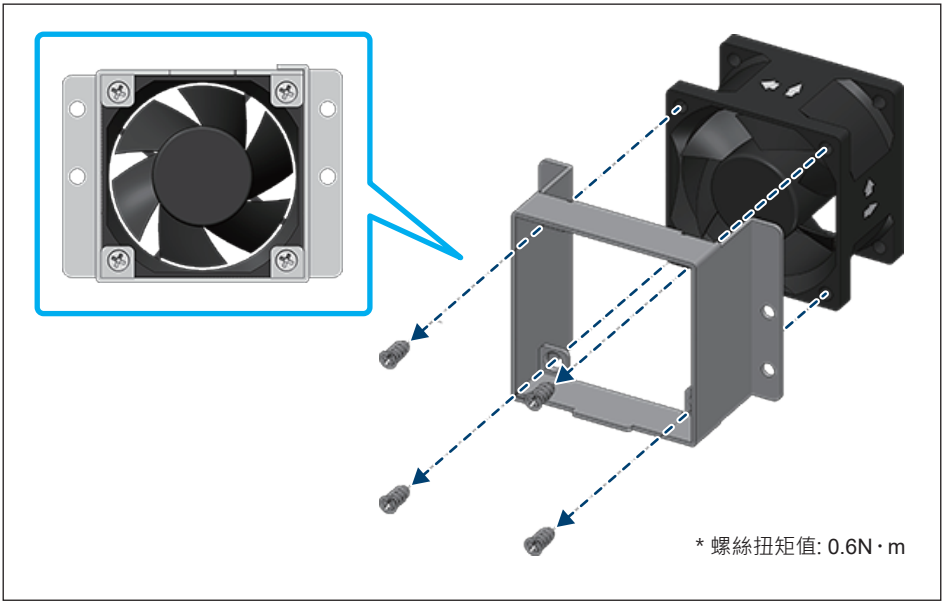


圖 5-20 : 更換新的風扇

5.4.4 內部風扇2

交流側(左側)配有單一風扇模組(圖 5-21, 5-22, 5-23, 5-24)

拆裝內部風扇2步驟

(1) 拆下保護蓋。(如圖5-21所示)
(2) 鬆開圖5-22中所示的兩顆螺絲。
(3) 斷開風扇電源連接。
(4) 從交流側(左側)取下風扇組件。(如圖5-23所示)
(5) 清潔風扇組件或更換新風扇。(如圖5-24所示)
(6) 使用2N·m的扭矩重新組裝。

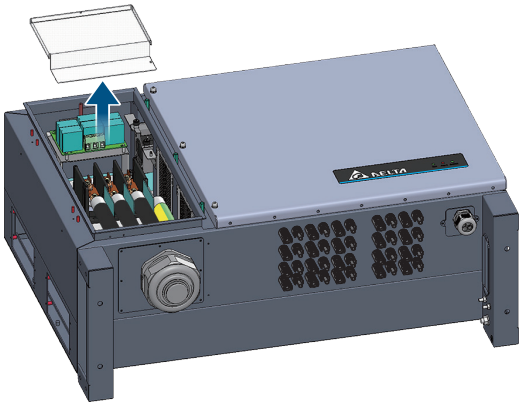


圖 5-21 : 拆下內部風扇2 保護蓋

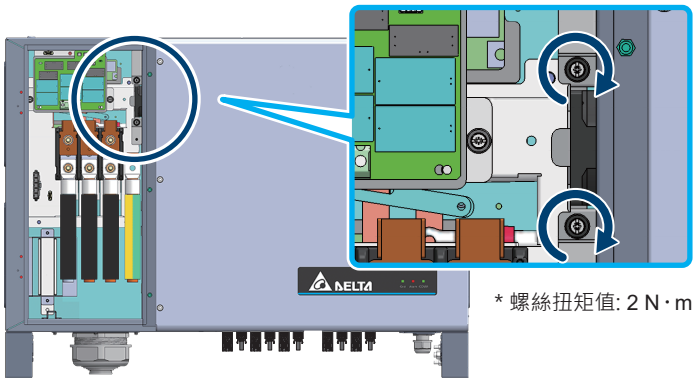


圖 5-22 : 內部風扇2 位置

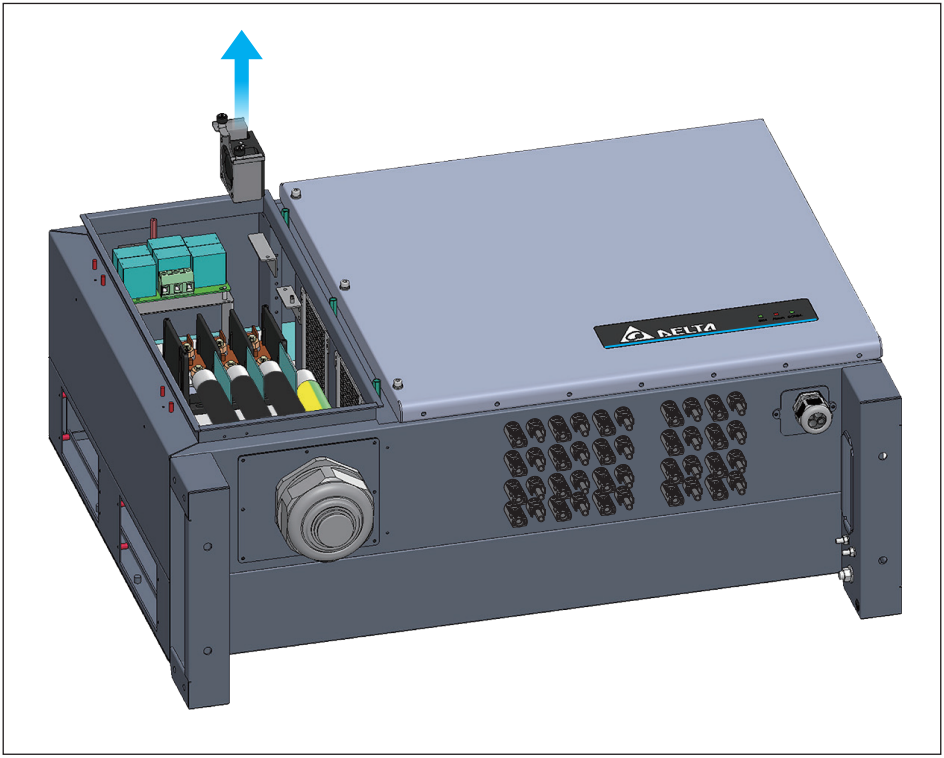


圖 5-23 : 取出內部風扇2

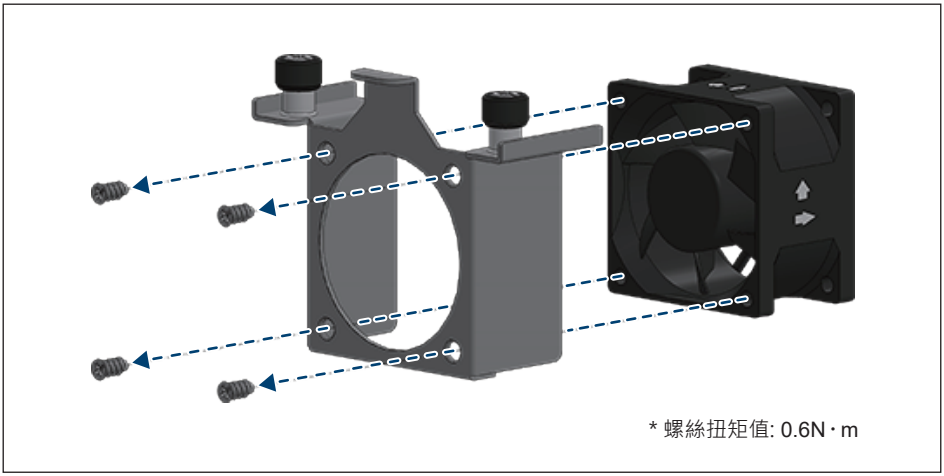


圖 5-24 : 更換新的風扇

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端子專用工具卸下安裝於變流器底部的直流輸入端子，移除作業時，**請務必確認變流器DC開關必須為OFF，且無直流電流狀態。**

■ RS-485 通訊模組

1.從變流器移除通訊模組。
2.切離與通訊板連接的所有通信線路。
3.從通信板組件上拆下接線。
4.重新安裝通訊板。

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！

- **變流器重達 80 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

- 螺絲與螺帽移除後請留意，切勿遺漏於機器內。

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6-1,6-2和6-3) 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。

由於孤島、過欠壓或過欠頻等電網故障，變流器將停止輸出電流並斷開交流繼電器。顯示故障請參見表6-1A。

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)	在AC介面連接錯誤	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. 市電中斷	1. 斷開AC 斷路器 2. 檢查連接AC介面並確認其連接至變流器
AC Volt Low (E10)	市電電壓過低	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介面連接
AC Volt High (E11)	市電電壓過高	
EPO (E25)	使用者執行緊急斷電	請解除EPO按鈕
DC Volt High (E30)	輸入電壓超過 1500Vdc	修正solar array設定並使得Voc小於1500Vdc
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 故障訊息(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)	環境溫度>105℃或<-40℃	**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
Inveter Temp Fault (F10)	變流器溫度>125℃或<-40℃	**請聯繫客服人員，尋求技術支援**
AC RLY Fault (F13)	AC relay 開路	**請聯繫客服人員，尋求技術支援**
AC Sensor Fault (F15)	交流電壓或電流回綏電路異常	**請聯繫客服人員，尋求技術支援**
AC Sensor Fault (F18)	交流電壓或電流回綏電路異常	**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**
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. 檢查電容值 (+ <-> GND & - <-> GND)，必須< 20uF. 必要時安裝外部的變壓器
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介面連接
RCMU Fault (F27)	RCMU連接中斷	**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**
AC RLY Short (F28)	AC relay 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 relay 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正負壓差過高	重新啟斷DC開關
Bus Voltage High (F31, F33, F35)	太陽能板Voc超過1500Vdc	重新啟斷DC開關
Bus Voltage Low (F32, F34)	變流器內部直流電壓單邊電壓過低	**請聯繫客服人員，尋求技術支援**
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 Circut Fault (F50)	相位偵測電路故障	**請聯繫客服人員，尋求技術支援**
Inv Circut Fault (F51)	變流器電路故障	**請聯繫客服人員，尋求技術支援**
Thermal Fuse Fault (F55)	溫度保險絲偵測到溫度異常	**請聯繫客服人員，尋求技術支援**
Arc Circut Fault (F58)	電弧偵測電路故障	**請聯繫客服人員，尋求技術支援**
Arc Fault (F59)	電弧故障	1.請檢查直流端端子與線材是否損壞 2. **請聯繫客服人員，尋求技術支援**
DC Current High (F60, F70)	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 警告訊息(配置端警告)

表 6-3A: 警告訊息 (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. 不正確接線導致組串過電流 2. 組串電流偵測功能異常	1. 請確認直流接線是否正確 2. 若仍顯示異常，**請聯繫客服人員，尋求技術支援**

6.4 警告訊息(變流器警告)

表 6-4A: 警告訊息 (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	**外部風扇** 1. 移除卡在風扇內的對象 2. 檢查風扇的連接 3. 替換無效的風扇 --- **內部風扇** **請聯繫客服人員，尋求技術支援**
DC SPD Fault (W17) AC SPD Fault (W18)	1. 一個或多個SPD有缺陷 2. 一個或多個SPD未連接	1. 更換有缺陷之SPD 2. 檢查SPD的連接
Aux Power Fault (W19)	輔助電源異常	**請聯繫客服人員，尋求技術支援**
String COMM Fault (W22)	組串電流通訊異常	**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**

7 技術資料

7.1 技術資料

表 7-1A: 規格	
Model	**M125HV_111**
直流輸入	
最大輸入電壓	1600V *1
工作電壓範圍	860 – 1500V
MPP 電壓範圍	860 – 1350V *2
額定電壓	1050V
MPP 追蹤	1
最大輸入電流	150A
最大承受短路電流	320A
保險絲	20A/1500V PV 保險絲
接頭種類	20對 H4接頭
雷擊保護	Type II SPD (選配: type I, type I+II)
直流開關	內建
組列電流監控	內建
交流輸出	
額定輸出功率	125kW / 125kVA
最大輸出功率	125kW / 140kVA
最大輸出電流	135A
最大浪湧電流	300A, 100μs
最大輸出故障電流 (rms)	160A
最大輸出過流保護	175A
額定電壓	3P/PE, 600Vac
工作電壓範圍	Vac600V: -36% ~ +15%
工作頻率範圍	50/60Hz ±5Hz
功率因數 (可調)	0.8 ind ~ 0.8 cap (最大功率1~0.9)
雷擊保護	Type II SPD (選配: type I, type I+II)
T.H.D	<3%
接頭種類	O型端子鎖附端子台 (最大可用185mm² 銅線或鋁線)
夜間耗電 *3	< 3.5W

*1 The max withstand voltage is 1600Vdc. (the inverter stops to operate when the PV voltage is over 1500Vdc)

*2 Ambient < 25°C : 860~1350V；Ambient < 40°C : 860~1250V

*3 Night time consumption with standby communication.

表 7-1B: 規格	
Model	**M125HV_111**
效率	
最高效率	>99 %
歐洲效率	98.7 %
資訊	
通訊埠	RS-485 (Delta / Sunspec) / SUB_1G (選配)
指示器	LED (Grid, Alarm, COMM.)
規範認證	
	Enedis-PRO-RES_64E UTE C 15-712-1 VDE AR-N 4110 TRF_EN50549-2_2019a EN 61000-6-2 EN 61000-6-3 IEC 62109-1/-2 IEC 61439-2 IEC 61727 IEC 62116 IEC 62910 IEC 62109
一般數據	
智能變頻功能	Voltage/Frequency Ride through, Volt/Var, Volt/Watt, Power curtailment, Frequency/Watt
最大反饋電流至太陽能模組端	0A
汙染程度	3
過電壓類別	AC output :III, DC Input :II
保護等級	I
工作溫度範圍	-30°~60°C (超過50°C降載)
防水防塵等級	IP65 (Electronics)
溼度範圍	0% – 100% non-condensing.
運行高度限制	<3000m, Outdoor, wet locations
散熱方式	智能風扇控制
噪音	71.5 dBA @1m, Amb25°C
尺寸 (W x H x D, mm)	900 x 663 x 334
重量 (kg)	80

如果輸入電壓高於1350V，變流器會降低輸出功率。輸入電壓與輸出功率降載之間的關係如圖7-1所示。

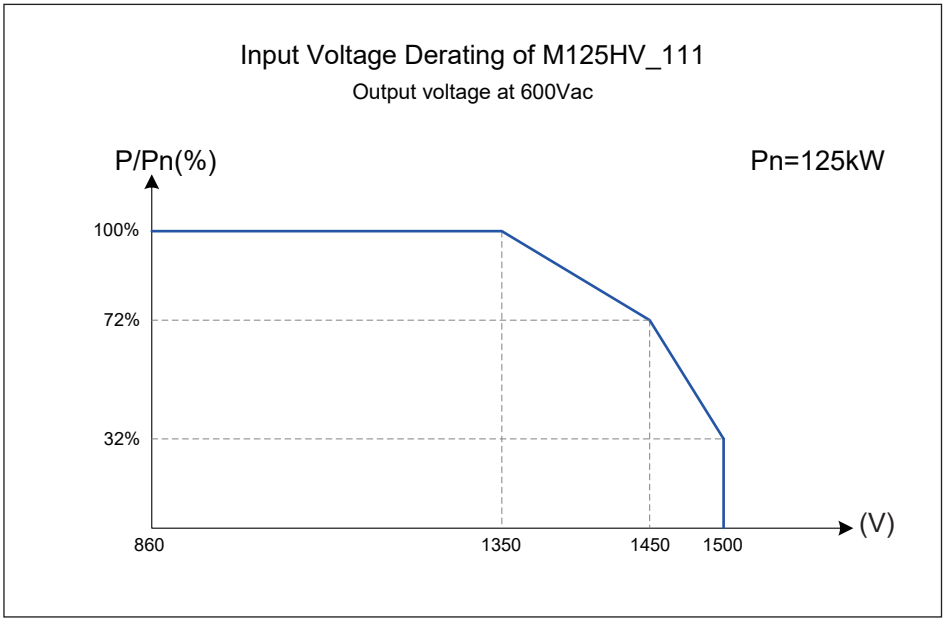


圖 7-1: 輸入電壓降載曲線

當功率元件溫度或變流器內部溫度超過上限，變流器將降低功率，直到溫度降至允許範圍內。

- 當環境溫度超過50°C時，功率將降低。降額曲線如圖7-4所示。
- 當環境溫度低於40°C時，視在功率可能為110%。
  PF=0.9時的降載曲線如圖7-5所示。

滿載的輸入電壓可以滿足高達2倍超配額度，高緯度也能應用自如。在進行太陽能場的面板配置設計時，請參考輸入電壓降載曲線。
PF=1和PF=0.9時的輸入電壓降載曲線如圖7-6和圖7-7所示。

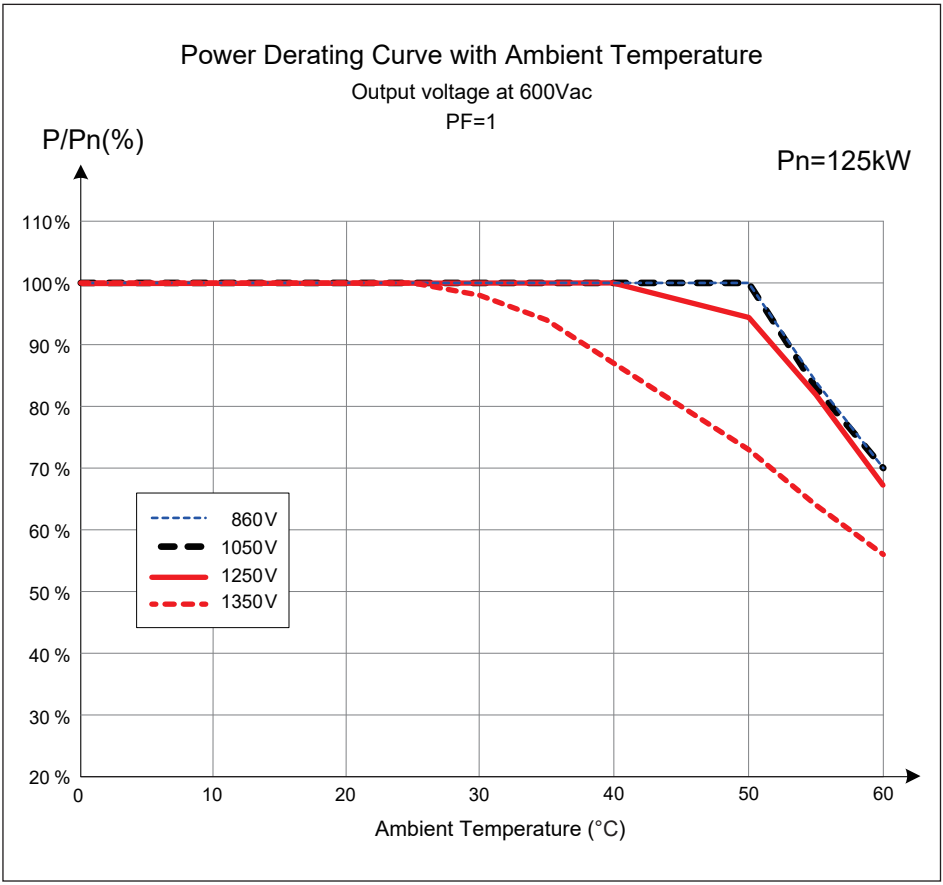


圖 7-2: 環溫對應降額曲線圖(PF=1)

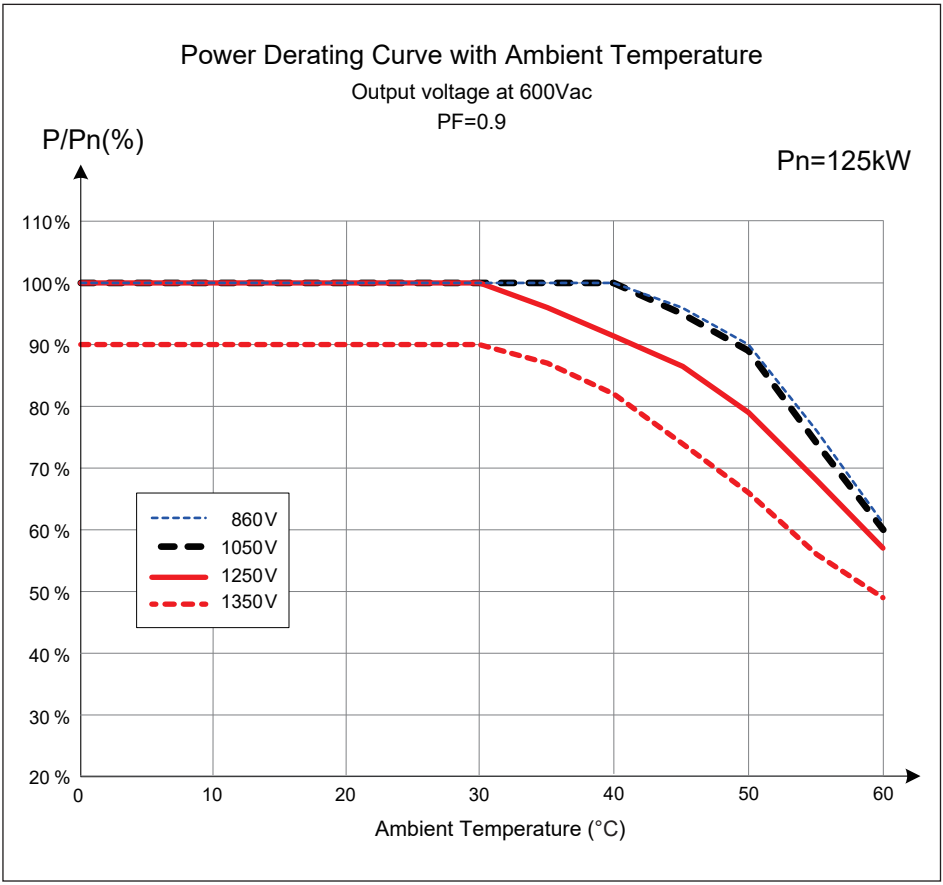


圖 7-3: 環溫對應降額曲線圖(PF=0.9)

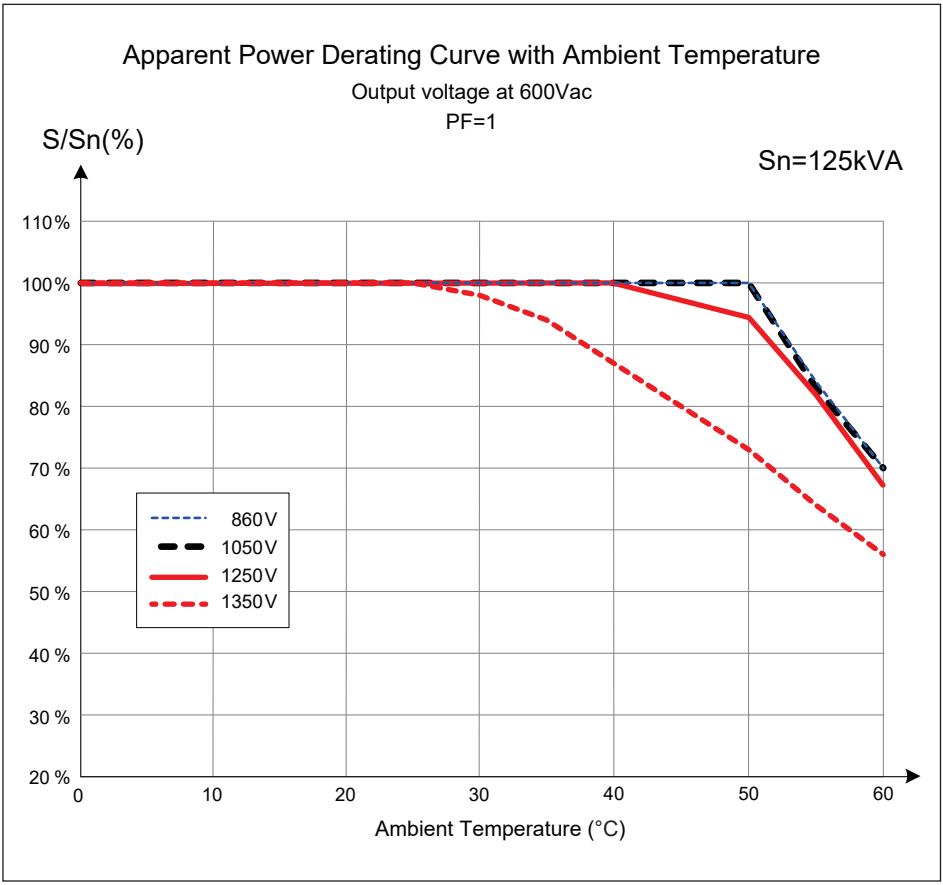


圖 7-4: 環溫對應視在功率降額曲線圖(PF=1)

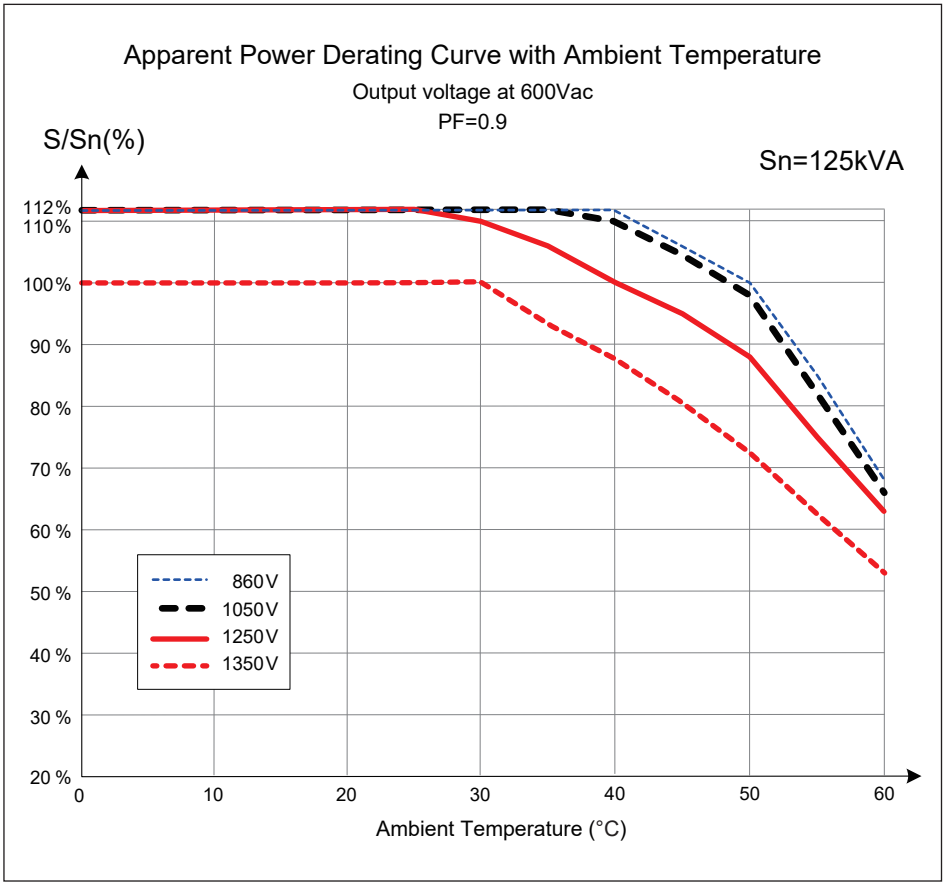


圖 7-5: 環溫對應視在功率降額曲線圖(PF=0.9)

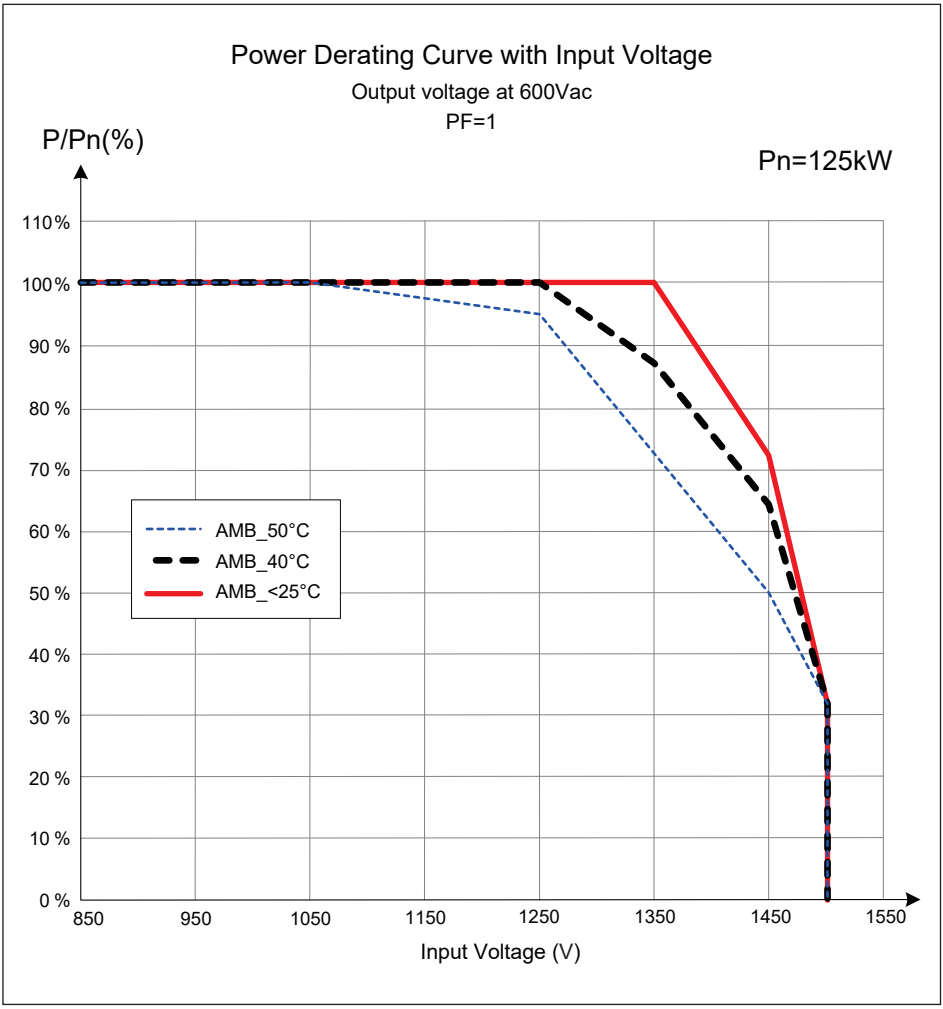


圖 7-6: 輸入電壓對輸出功率降載曲線(PF=1)

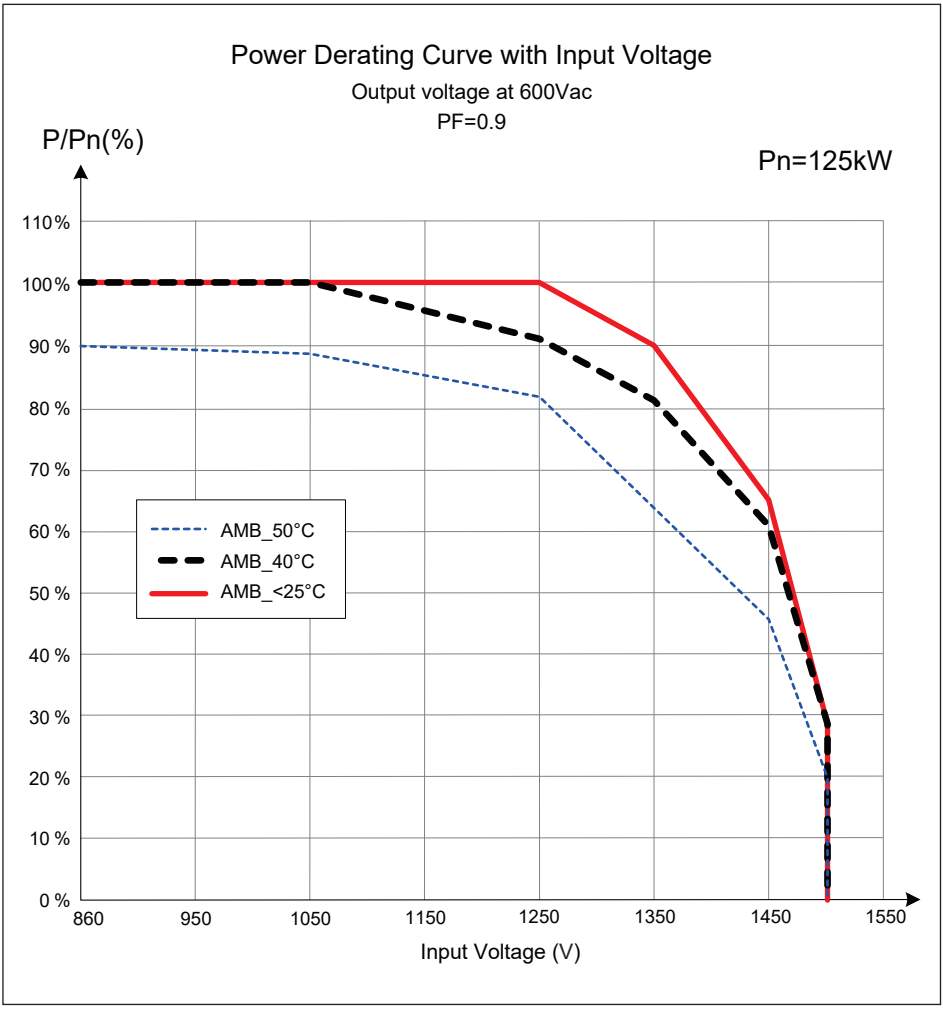


圖 7-7: 輸入電壓對輸出功率降載曲線(PF=0.9)

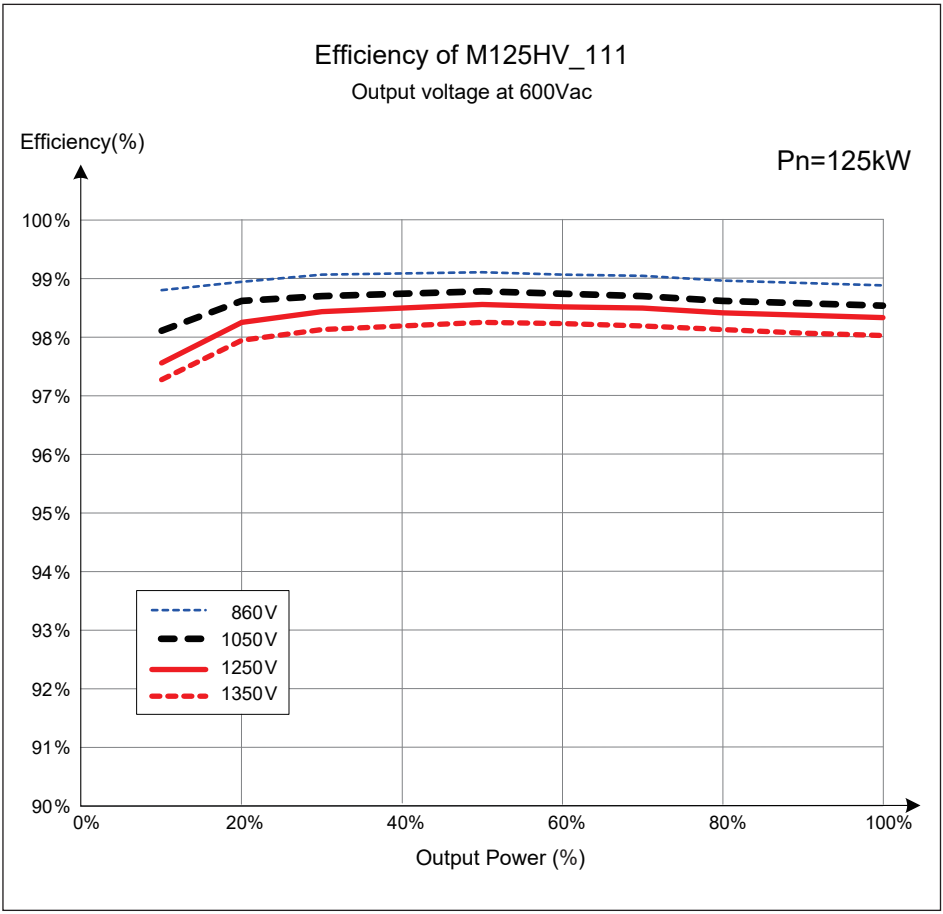

Efficiency of M125HV_111
Output voltage at 600Vac
Efficiency(%)
Pn=125kW
100%
99%
98%
97%
96%
95%
94%
93%
92%
91%
90%
860V
1050V
1250V
1350V
0%
20%
40%
60%
80%
100%
Output Power (%)

圖 7-8: 效率曲線圖

附錄A: 軌道式雷擊保護裝置安裝 (選配)

M125HV_111支援更換 type I 和 type II 的直流軌道式雷擊保護裝置。

- 直流側雷擊保護器配件如PE接線、軌道和螺母用於更換DC SPD，如圖A-2所示。

警告！

- 在進行交流斷路器和直流開關之維護程序時，請避免電擊危險！
- 請先確認更換位置，左側為交流側門，右側為直流側門。禁止同時打開兩側。

DC DIN Rail SPD

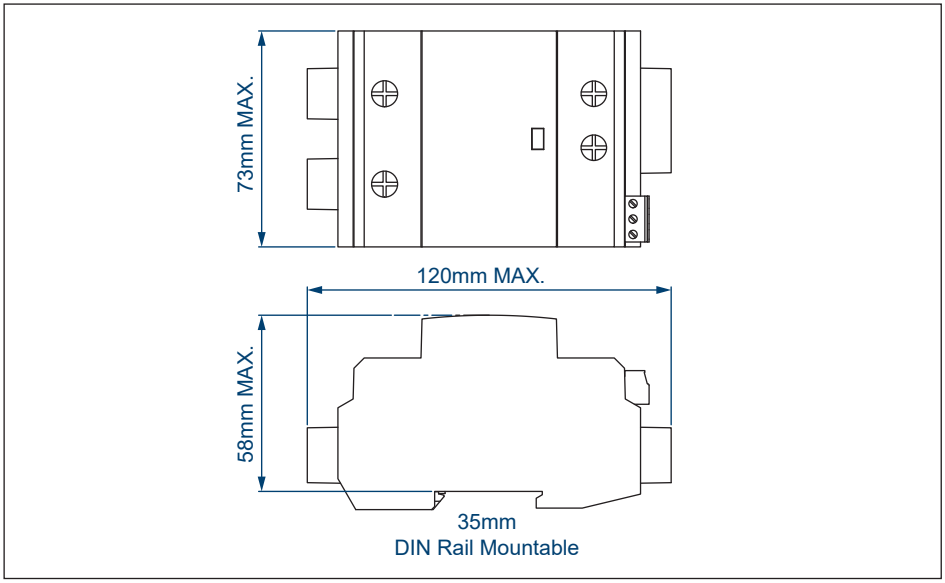


圖 A-1: 直流側雷擊保護器尺寸限制

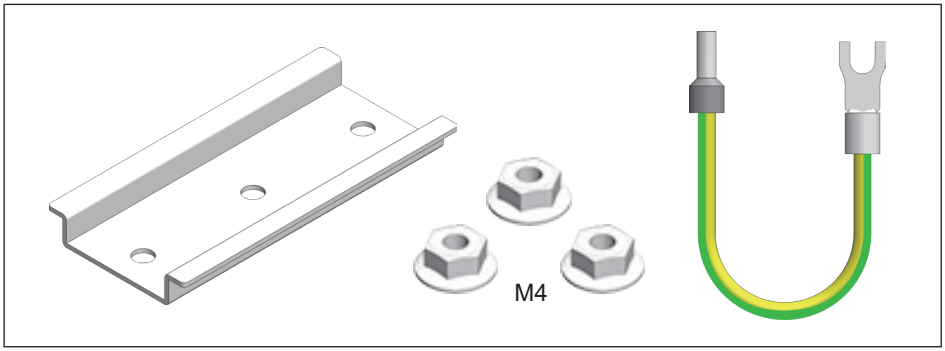


圖 A-2: 直流側雷擊保護器配件

直流側軌道式雷擊保護裝置更換步驟:

1. 掀開保護蓋 (圖 A-3)
2. 移除DC SPD電路板上的兩顆螺絲與雷擊保護裝置如圖A-4
3. 移除六角銅柱 (圖 A-4 ③)
4. 以扭力值2N·m鎖上軌道 (圖 A-5 ①) 接著安裝接地線
5. 在軌道上安裝雷擊保護裝置 (圖 A-5 ②)
6. 雷擊保護裝置的配線請參考其產品說明書
7. 蓋上保護蓋

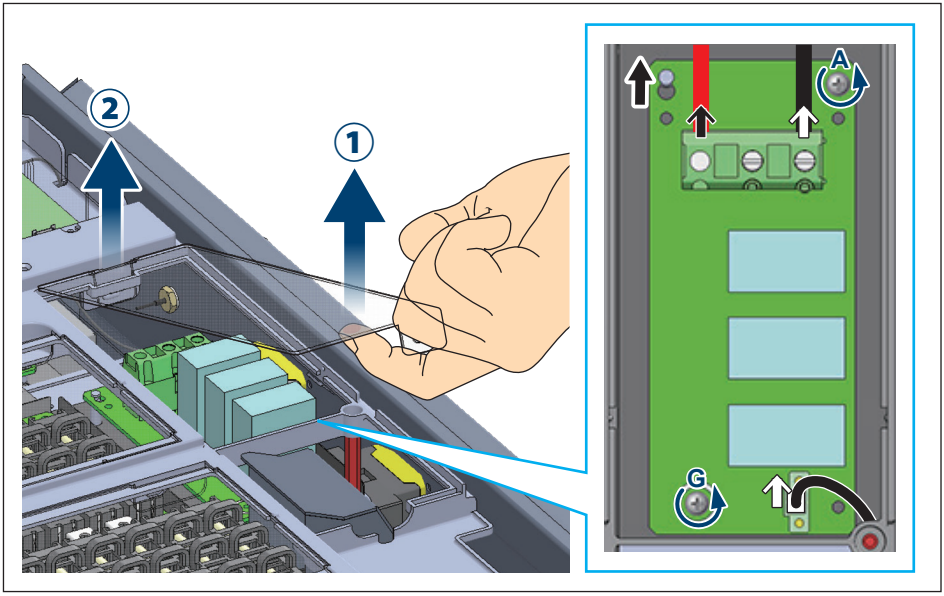


圖 A-3: 掀開直流側雷擊保護器保護蓋

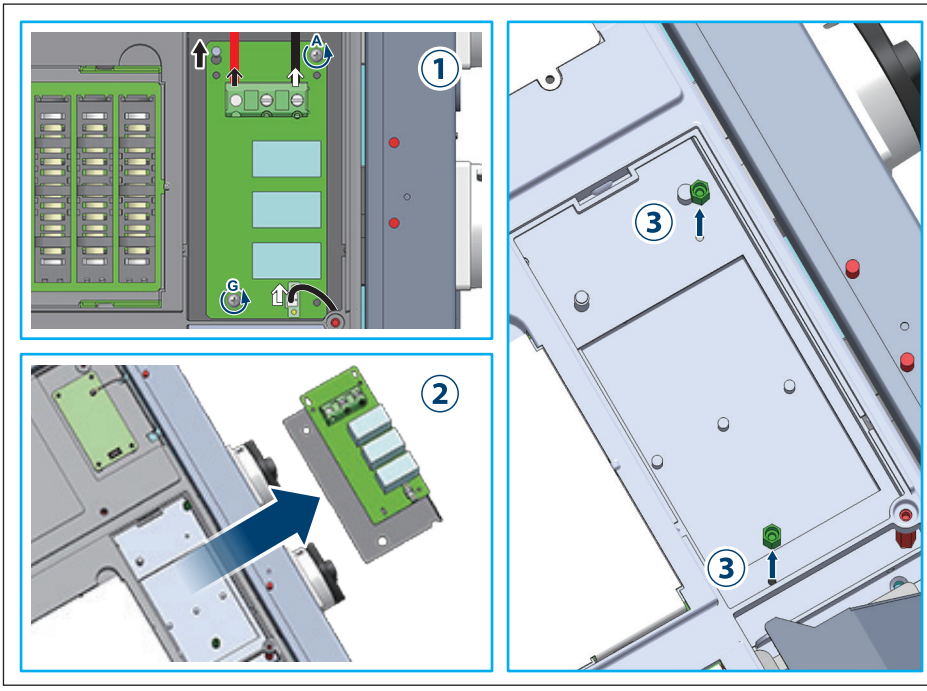


圖 A-4: 移除螺絲並拆卸DC SPD電路板

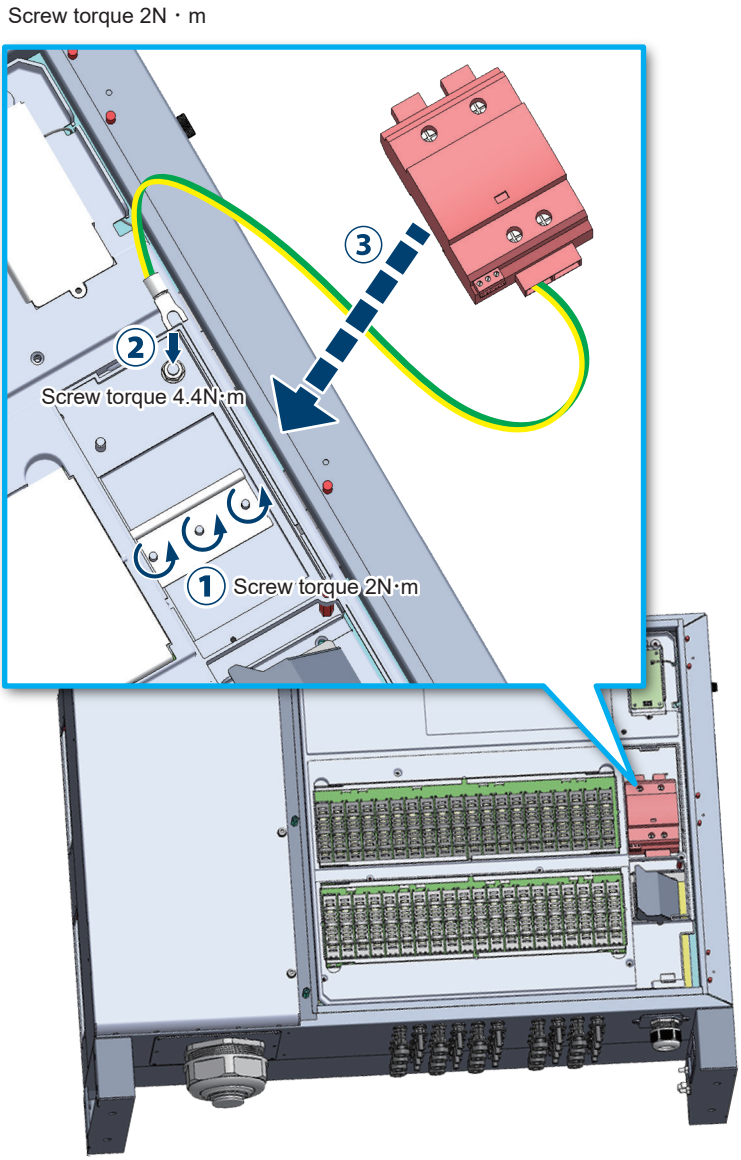
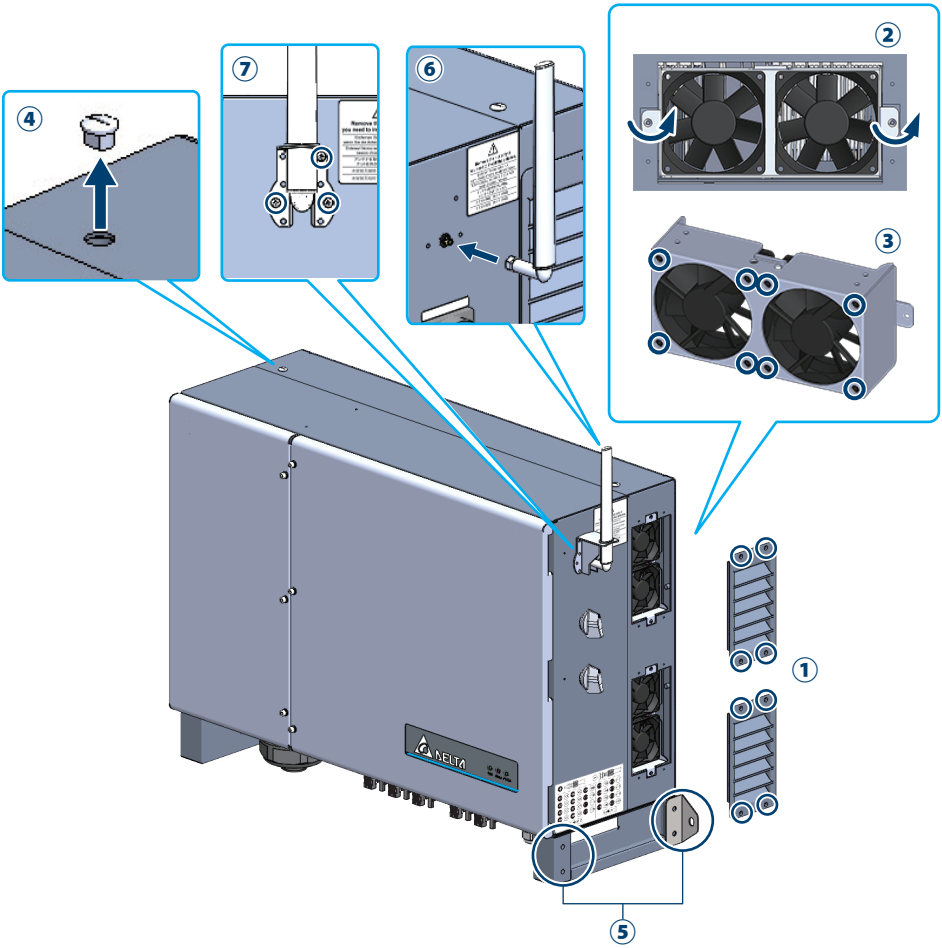


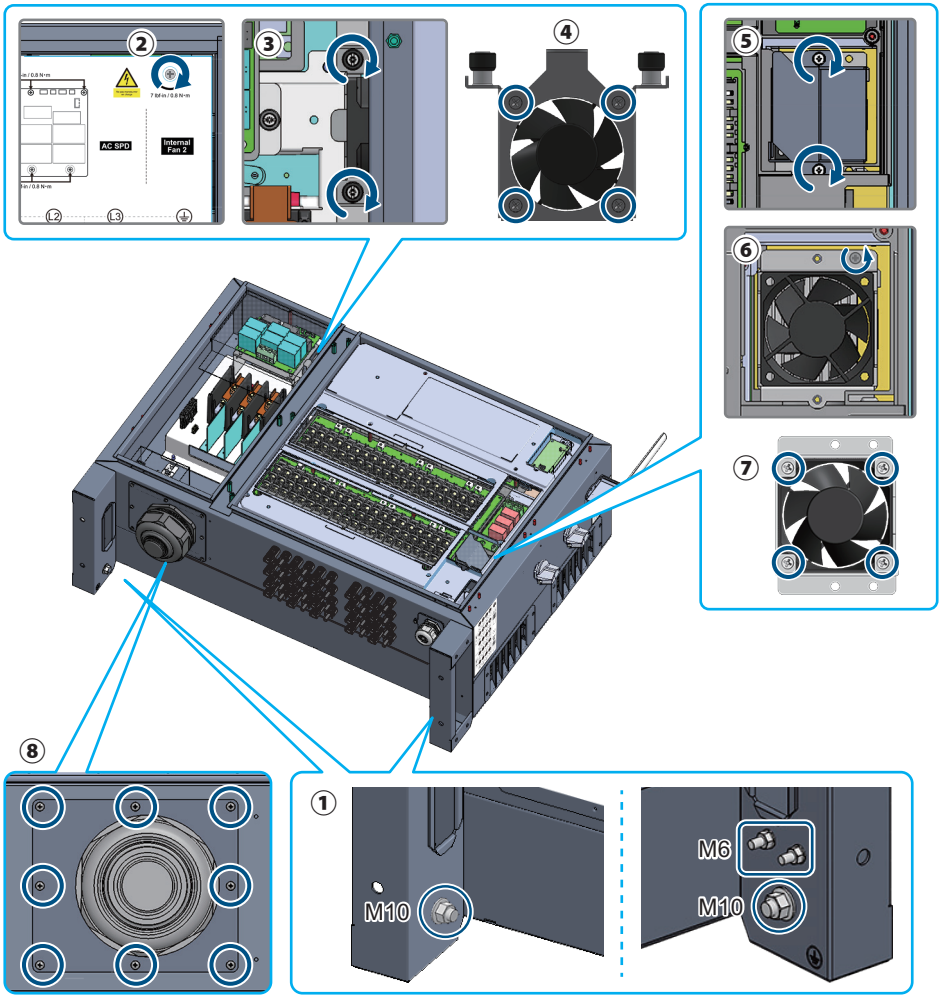
圖 A-5: 安裝軌道與雷擊保護裝置

附錄B: 組裝說明



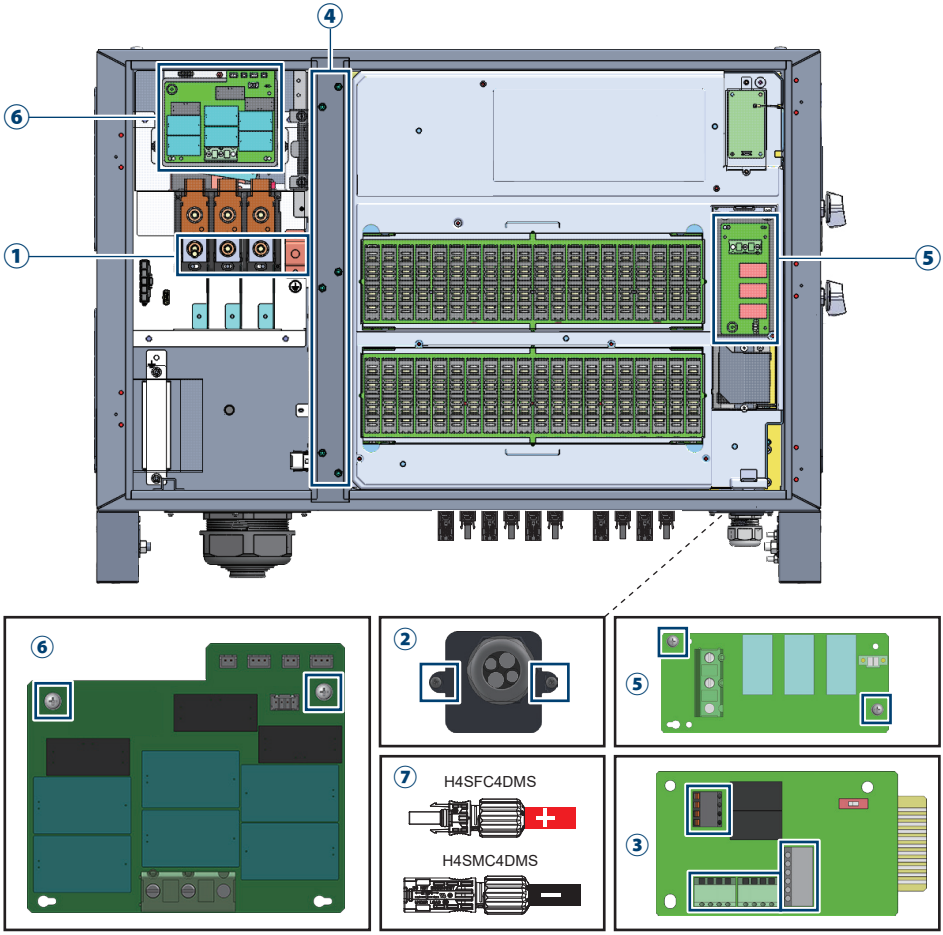
附錄B-1: 組裝說明-1

NO	位置	螺絲扭力
1	濾網外蓋	8.0 kgf-cm (0.8N·m)
2	風扇托盤	8.0 kgf-cm (0.8N·m)
3	風扇	6 kgf-cm (0.6N·m)
4	盲塞	5.0 kgf-cm (0.5N·m)
5	壁掛支架 / 落地支架	150 kgf-cm (15N·m)
6	天線	12 kgf-cm (1.2N·m)
7	天線支架 (M4)	10 kgf-cm (0.98N·m)



附錄B-2: 組裝說明-2

NO	位置		螺絲扭力
1	接地	M6	71 kgf-cm (7.0N·m)
		M10	254 kgf-cm (25N·m)
2	AC Cover		8.0 kgf-cm (0.8N·m)
3	內部風扇 2 外蓋		20 kgf-cm (2.0N·m)
4	內部風扇 2 托盤		6 kgf-cm (0.6N·m)
5	內部風扇 1 外蓋		8.0 kgf-cm (0.8N·m)
6	內部風扇 1 托盤		8.0 kgf-cm (0.8N·m)
7	內部風扇 1 托盤		6 kgf-cm (0.6N·m)
8	壓蓋板		8.0 kgf-cm (0.8N·m)



附錄B-3: 組裝說明-3

NO	位置	螺絲扭力	導體橫截面
1	AC 端子	254 kgf-cm (25N·m)	Cu: 50 ~ 185 mm² Al: 95 ~ 185 mm²
2	通訊蓋	8.0 kgf-cm (0.8N·m)	–
3	通訊孔	–	20 AWG (0.5mm²)
4	中隔板	45 kgf-cm (4.4N·m)	–
5	直流側雷擊保護裝置	8.0 kgf-cm (0.8N·m)	–
6	交流側雷擊保護裝置	8.0 kgf-cm (0.8N·m)	–
7	H4⁺ 端子	–	12/10 AWG (4/6mm²)

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