



The power behind competitiveness

Grid-tie Transformerless Solar Inverter

M70A_260 / M50A_260

Operation and Installation Manual

www.deltaww.com

 **DELTA**
Smarter. Greener. Together.

Contents

- 1 Safety 8**
 - 1.1 Information of the Inverter 8
 - 1.1.1 Legal Provisions 8
 - 1.1.2 Target Group 8
 - 1.2 General Safety 9
 - 1.2.1 Condition of Use 9
 - 1.2.2 Symbols 10
- 2 Introduction 12**
 - 2.1 Valid Model 12
 - 2.2 Product Overview 13
- 3 Installation 18**
 - 3.1 Unboxing & Review 19
 - 3.2 Mechanical Installation 21
 - 3.2.1 Vertical wall mount 21
 - 3.2.2 Ground Mount (Option) 26
 - 3.3 Door 28
 - 3.4 Electrical Installation for AC Wiring 28
 - 3.4.1 AC Grid Types and Connections 29
 - 3.4.2 Required Protective Devices 29
 - 3.4.3 AC Wiring Preparation 29
 - 3.4.4 AC Side –Prewire Set-Up 31
 - 3.4.5 AC Wiring 32
 - 3.5 Electrical Installation for DC Wiring 33
 - 3.5.1 DC Wiring Installation 34
 - 3.5.2 Equipment Grounding 37
 - 3.6 Antenna 38
 - 3.7 Communication Module Connections 40
 - 3.7.1 RS-485 Connection 43
 - 3.7.2 EPO Function & Digital Input 45
 - 3.7.3 Dry Contact Connection 46
 - 3.8 On-Site Insulation Test 47

- 4 Commissioning 48**
 - 4.1 Display Operation Introduction 48
 - 4.2 Auto ID Commission Tool 49
 - 4.2.1 Auto ID Setting 49
 - 4.2.2 Set ID 51
 - 4.2.3 Set Country 52
 - 4.2.4 Synchronize time 53
 - 4.3 Delta Function Setting 54
- 5 Maintenance 55**
 - 5.1 Open and Close the Door 55
 - 5.1.1 Open Door 55
 - 5.1.2 Close Door 55
 - 5.2 Replacement of Surge Protection Devices (SPD) 58
 - 5.3 External String Fuse 63
 - 5.4 Smart Fans Replacement and Filter Cleaning 63
 - 5.4.1 Location of failure fan for M50A_260 64
 - 5.4.2 Power Module (PM) Fan Tray 65
 - 5.4.3 Internal Fan 1 67
 - 5.4.4 Internal Fan 2 69
 - 5.5 De-Commissioning 71
- 6 Error Message and Trouble Shooting 73**
 - 6.1 Error Codes (Field Fault) 73
 - 6.2 Fault Codes (Inverter Fault) 74
 - 6.3 Warning Codes (Field Warning) 76
 - 6.4 Warning Codes (Inverter Warning) 76
- 7 Technical Information 77**
- Appendix: Assembly Note 83**

Figure

- Figure 2-1: Components 13
- Figure 2-2: Overview 14
- Figure 2-3: Rating label 15
- Figure 2-4: External/ internal view 16
- Figure 2-5: layout 17
- Figure 3-1: The step to unpacking the inverter 19
- Figure 3-2: Handle position for handling 20
- Figure 3-3: Inverter dimensions 22
- Figure 3-4: Mounting bracket dimensions 22
- Figure 3-5: Positions of mounting screws 23
- Figure 3-6: Permitted mounting positions 23
- Figure 3-7: Prohibited mounting positions 24
- Figure 3-8: Required mounting clearances 24
- Figure 3-9: Separation distance of plural inverters 25
- Figure 3-10: Lock the grounded brackets to feet 26
- Figure 3-11: To secure inverter grounded brackets to ground-mounting base 27
- Figure 3-12: Remove the door 28
- Figure 3-13: Size of AC conductors 29
- Figure 3-14: AC Gland with multiple inlet 30
- Figure 3-15: Location for AC terminal 32
- Figure 3-16: DC Wiring illustration 34
- Figure 3-17: location of H4 connectors to connect array wiring (DC) 35
- Figure 3-18: Installation methods for protective frame 36
- Figure 3-19: Mount the equipment grounding 37
- Figure 3-20: Installation of antenna 38
- Figure 3-21: Attention of installing antenna 39
- Figure 3-22: Install antenna bracket 40
- Figure 3-23: Communication Module Layout 41
- Figure 3-24: Location and access to Communication Module 42
- Figure 3-25: Multiinverter connection illustration 44
- Figure 3-26: EPO function terminal block 45
- Figure 3-27: Dry Contact connection 46
- Figure 3-28: Precautions for on-site insulation test 47
- Figure 4-1: Front Panel Display 48
- Figure 4-2: Steps of auto ID setting by tool 49
- Figure 4-3: False of auto ID setting by tool 50
- Figure 4-4: Steps of set ID 51
- Figure 4-5: False of set ID 51

Figure 4-6: Steps of set country 52

Figure 4-7: False of set country 52

Figure 4-8: Steps of synchronize time 53

Figure 4-9: False of synchronize time 53

Figure 5-1: Open and close the door 56

Figure 5-2: To secure door by hexagon driver 57

Figure 5-3: AC and DC SPD modules 58

Figure 5-4: Display Indicating AC and DC SPD failure 59

Figure 5-5: Steps of changing SPDs 61

Figure 5-6: Remove wirings as connectors of AC SPD 62

Figure 5-7: Remove wirings as connectors of DC SPD 62

Figure 5-8: External String Fuse 63

Figure 5-9: The corresponding fan location to the fan fail code on DSS 64

Figure 5-10: Disassembling fan tray from PM chassis 66

Figure 5-11: Internal fan 1 location & remove the shield cover 67

Figure 5-12: Take off the internal fan 1 68

Figure 5-13: Replace with a new fan 68

Figure 5-14: Internal fan 2 location & remove the shield cover 69

Figure 5-15: Take off the internal Fan 2 70

Figure 5-16: Replace with a new fan 70

Figure 7-1: Efficiency Curve 79

Figure 7-2: Power Derating Curve with Ambient Temperature (PF=1) 80

Figure 7-3: Power Derating Curve with Ambient Temperature (PF=0.9) 81

Figure 7-4: Apparent Power Derating Curve with Ambient Temperature (PF=0.9) 82

Table

Table 2-1: Packing list	13
Table 2-2: Overview description	14
Table 2-3: Rating label explanation	15
Table 2-4: Layout description	17
Table 3-1: Cable size comparison table	31
Table 3-2: RS-485 Terminal block wiring	43
Table 3-3: Bus Termination switch settings	44
Table 3-4: Definition of digital input & EPO function	45
Table 4-1: LED indicator	48
Table 4-2: LED COMM indicator	48
Table 6-1A: Error Codes (Field Fault) and Messages	73
Table 6-2A: Fault Codes (inverter fault) & Messages	74
Table 6-2B: Fault Codes (inverter fault) & Messages	75
Table 6-3A: Warning Codes (Field warning) & Messages	76
Table 6-4A: Warning Codes (inverter warning) & Messages	76
Table 7-1A: Specifications	77
Table 7-1B: Specifications	78
Appendix-1: Assembly Note-1	83
Appendix-2: Assembly Note-2	84
Appendix-3: Assembly Note-3	85

1 Safety

1.1 Information of the Inverter

1.1.1 Legal Provisions

Copyright – DELTA ELECTRONICS, INC. - All rights reserved.

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

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

1.1.2 Target Group

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

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

1.2 General Safety

IMPORTANT SAFETY INSTRUCTIONS : SAVE THESE INSTRUCTIONS !



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

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

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

This product is suitable for both indoor and outdoor use.

ATTENTION : NO GALVANIC ISOLATION



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

1.2.1 Condition of Use

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

1.2.2 Symbols

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

DANGER!



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

WARNING !



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

CAUTION !



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

ATTENTION



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

INFORMATION

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

DANGER : ELECTRICAL HAZARD!!

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

CAUTION : HOT SURFACES, DO NOT TOUCH!

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



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



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

2 Introduction

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

ATTENTION : NO GALVANIC ISOLATION



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

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

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

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

2.1 Valid Model

The user manual is valid for the following device types:

- M70A_260
- M50A_260

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

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

2.2 Product Overview

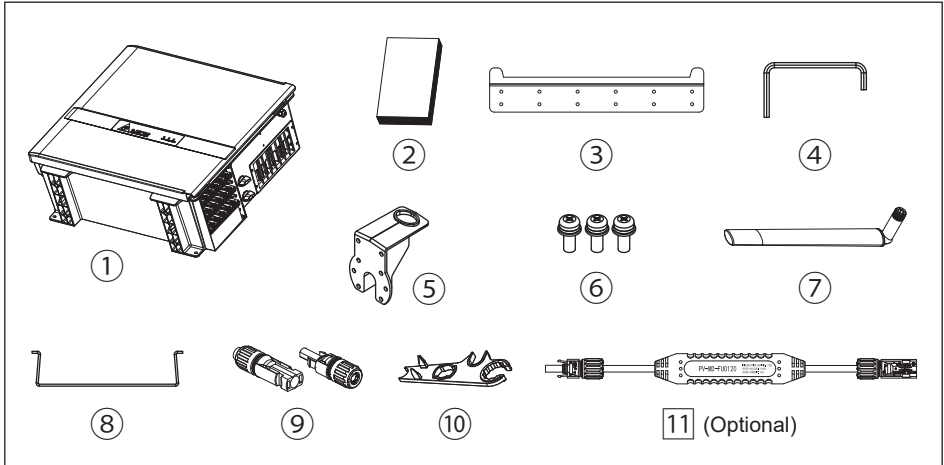


Figure 2-1: Components

Table 2-1: Packing list

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

* M70A_260: 18 pairs / M50A_260: 12 pairs

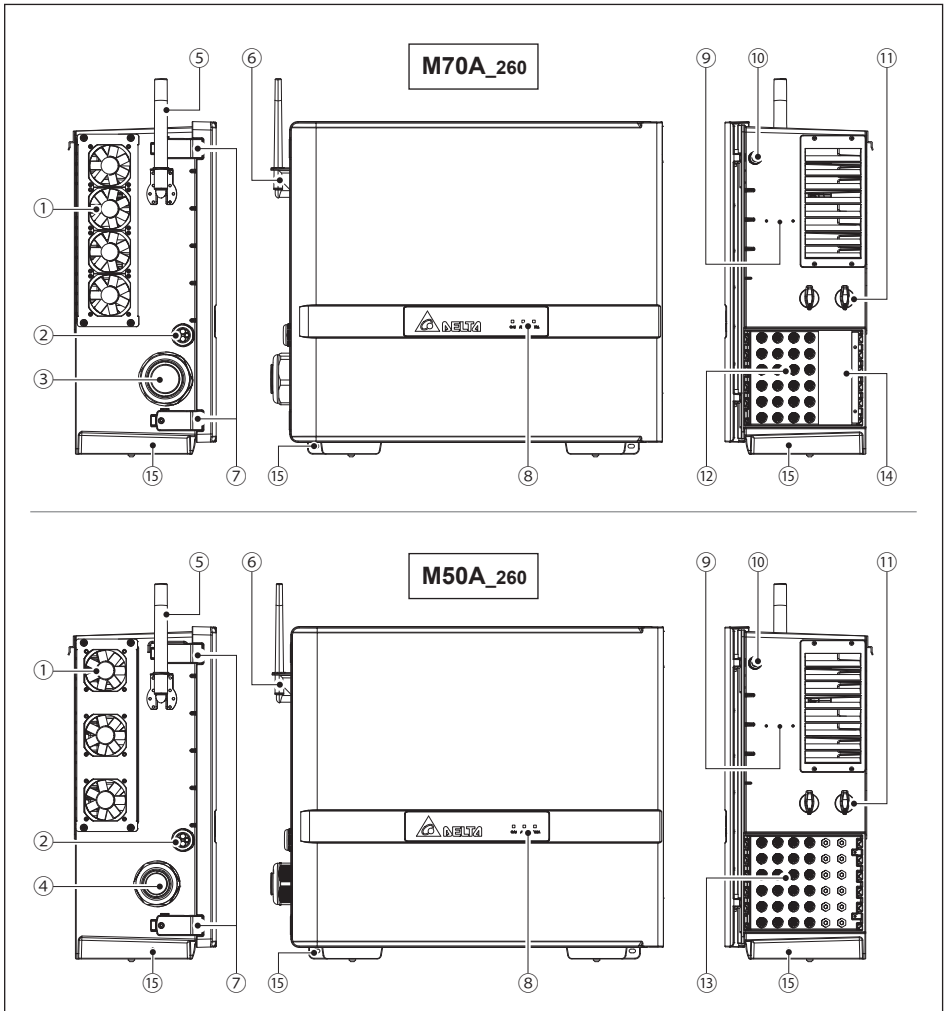


Figure 2-2: Overview

Table 2-2: Overview description

NO.	Component	NO.	Component	NO.	Component
1	External fans	6	Antenna Bracket	11	DC Switch
2	RS-485	7	Toggle Latches	12	DC Input (H4)x 18 strings (M70A_260)
3	2.8" AC Output (M70A_260)	8	LED Indicator	13	DC Input (H4)x 12 strings (M50A_260)
4	2.5" AC Output (M50A_260)	9	Wi-Fi Antenna port (optional)	14	Protective Cover *
5	SUB_1G Antenna	10	Wi-Fi module wiring port (optional)	15	External grounding (M6 threaded stud)

* If MPPT 3 is need to be connected, please remove the protective cover to expand DC inputs.

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

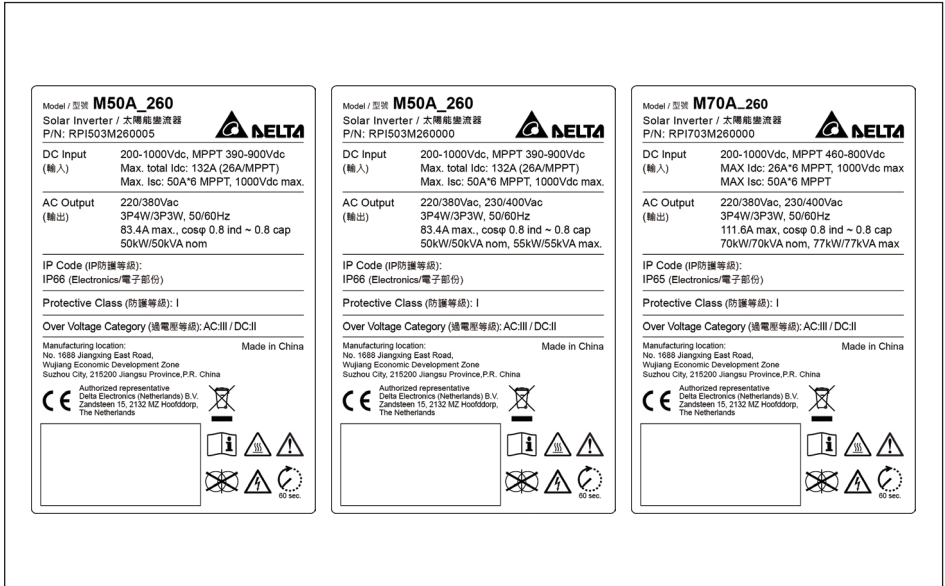







Figure 2-3: Rating label

Table 2-3: Rating label explanation

Symbol	Definition
	Danger to life through electric shock Potentially fatal voltage is applied to the inverter during operation. This voltage persists even 60 seconds after disconnection of the power supply. Never open the inverter. The inverter contains no components that must be maintained or repaired by the operator/installer. Opening the housing will void the warranty.
	Beware of hot surface. This inverter can get hot during operation.
	This inverter is not separated from the grid with a transformer.
	The housing of the inverter must be grounded if this is required by local regulations.
	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.

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

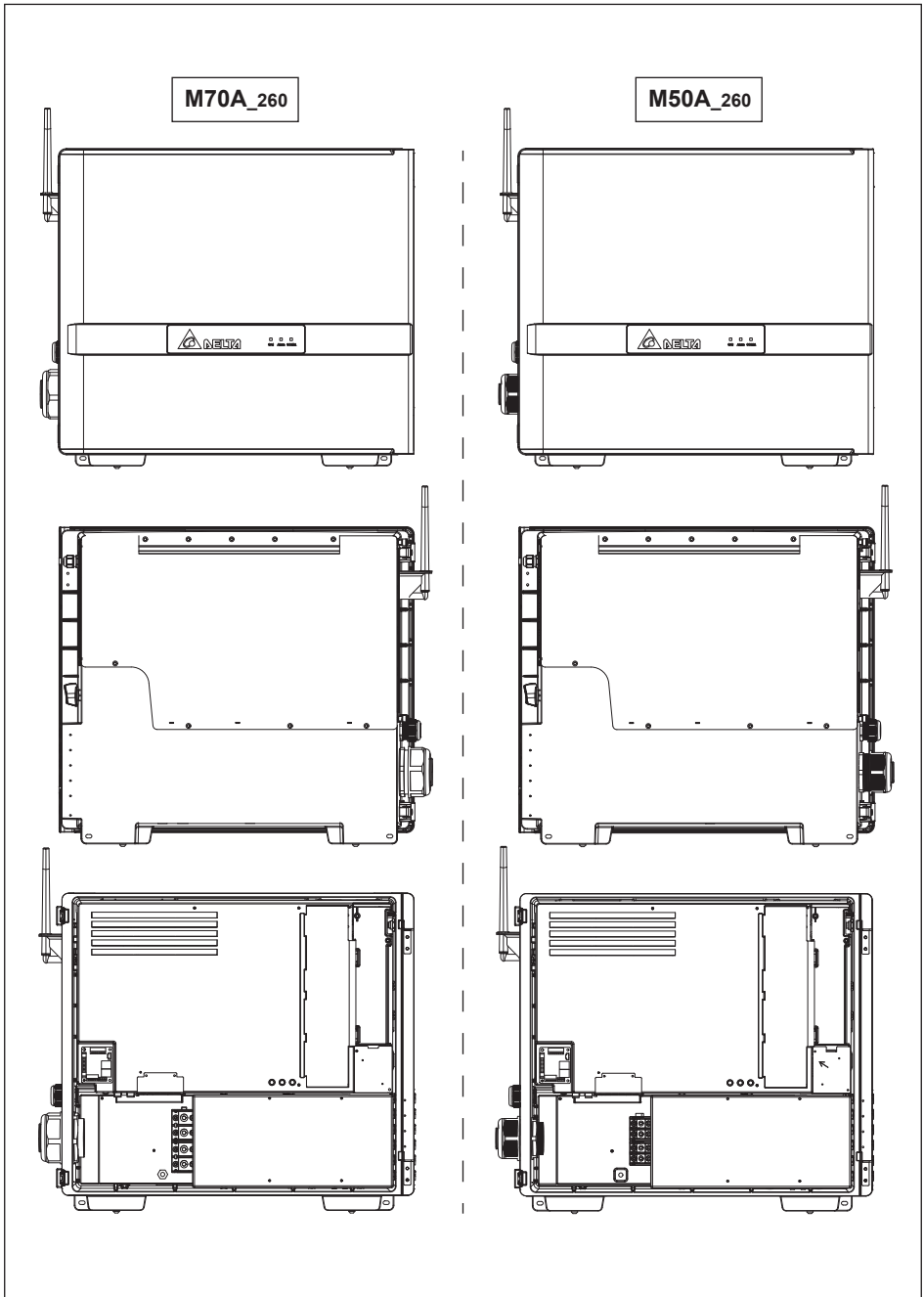


Figure 2-4: External/ internal view

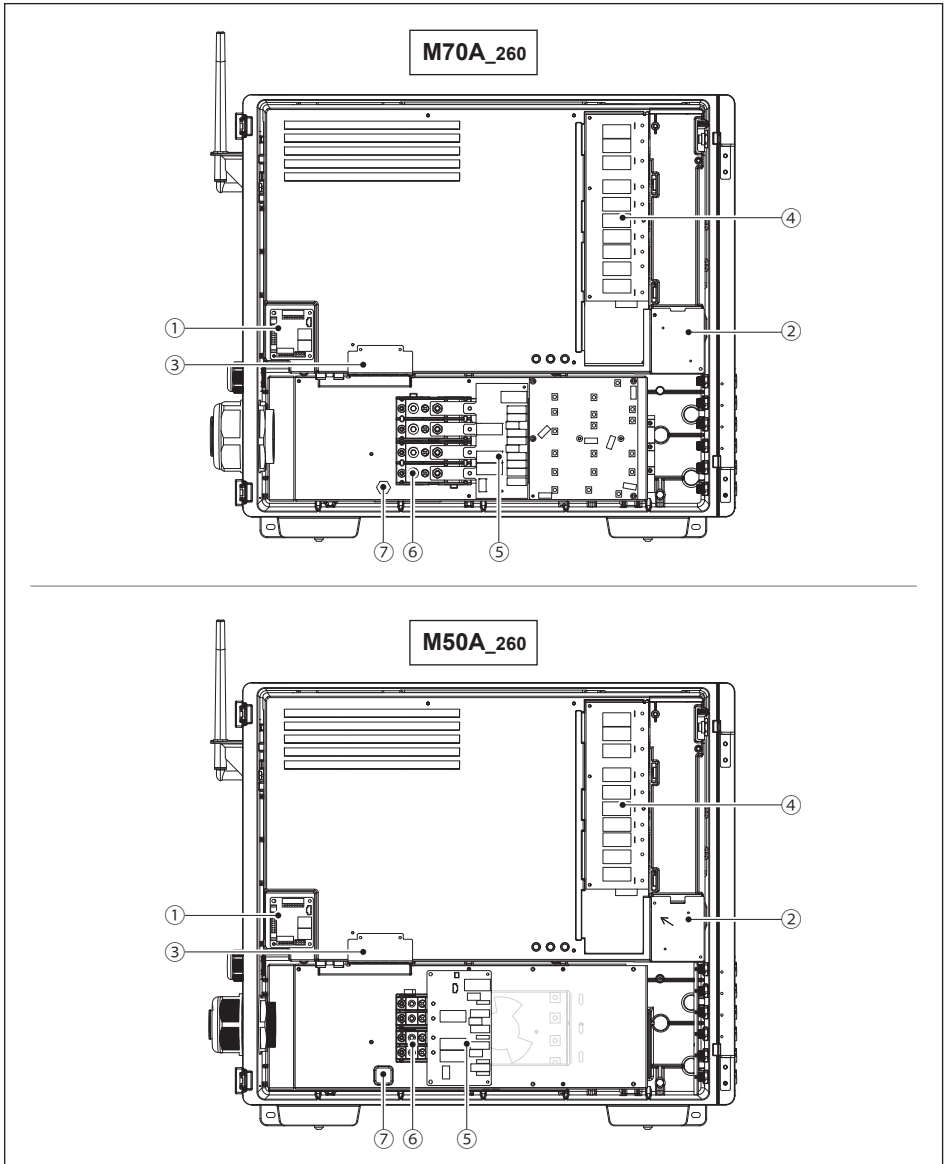


Figure 2-5: layout

Table 2-4: layout description

NO.	Component	NO.	Component	NO.	Component
1	Communication module	4	Type II DC SPD	7	Internal grounding
2	Internal fan 1	5	Type II AC SPD		
3	Internal fan 2	6	AC terminal		

3 Installation

CAUTION !



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

WARNING !



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

The chapter contains instructions for

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

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

3.1 Unboxing & Review

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

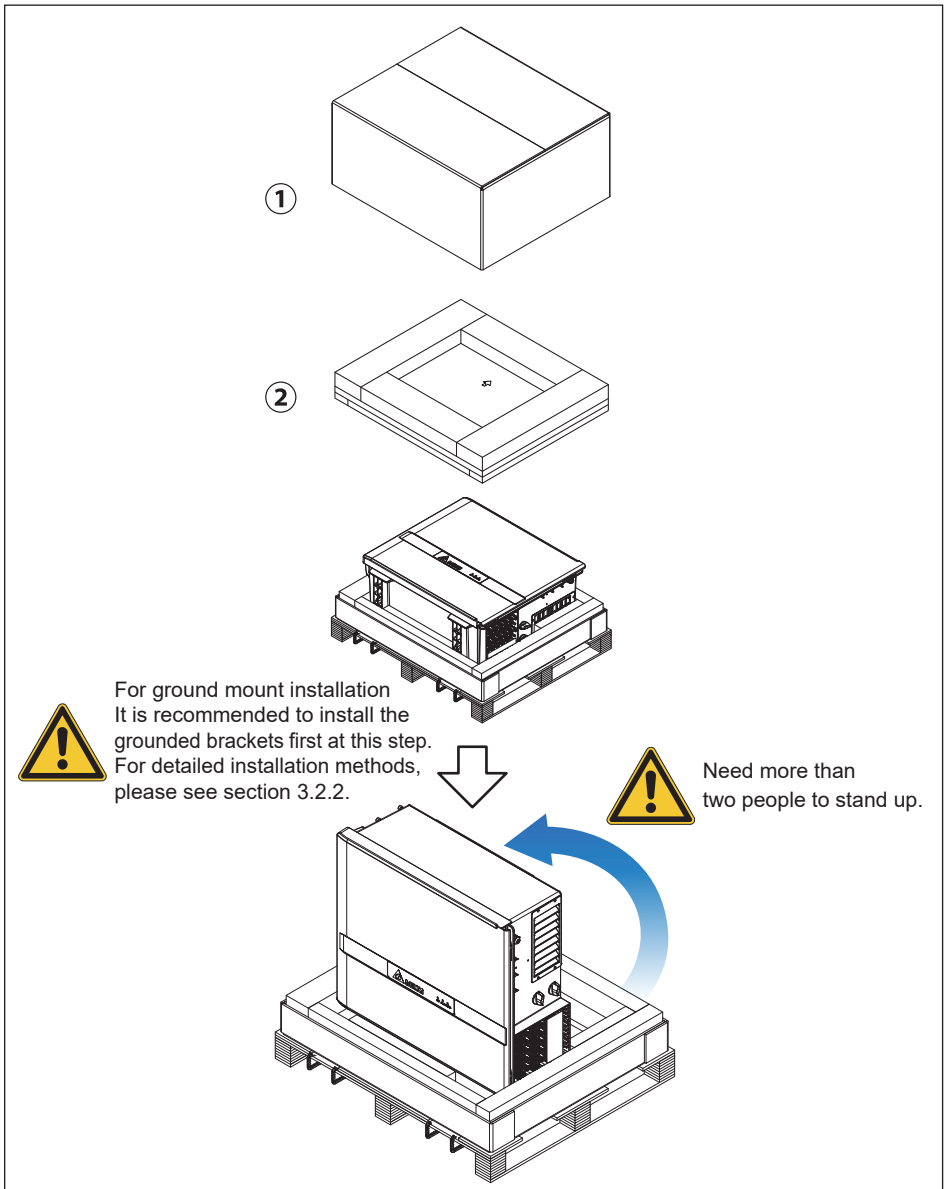


Figure 3-1: The step to unpacking the inverter

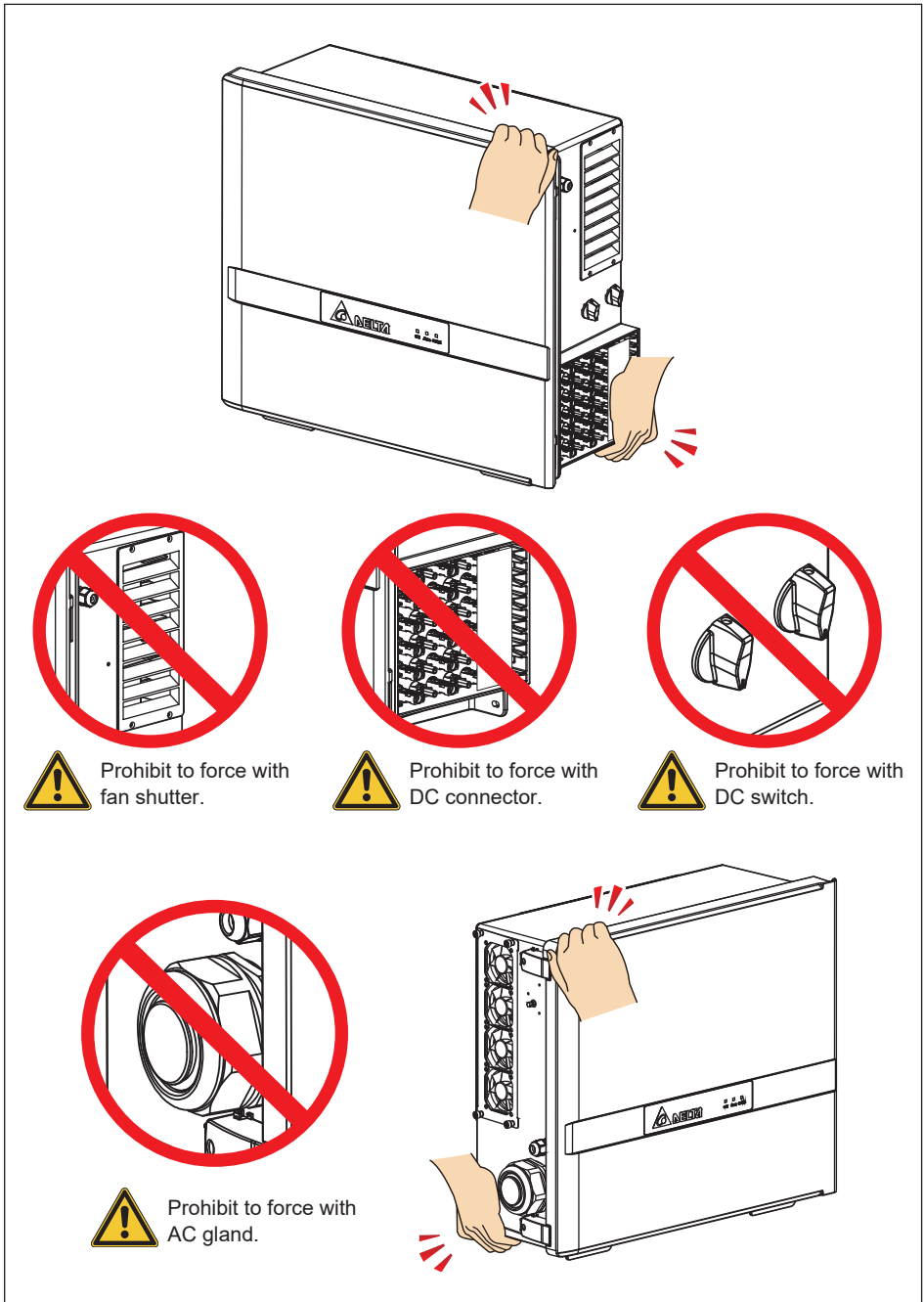


Figure 3-2: Handle position for handling

3.2 Mechanical Installation

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

3.2.1 Vertical Wall Mount

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

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

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

CAUTION !



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

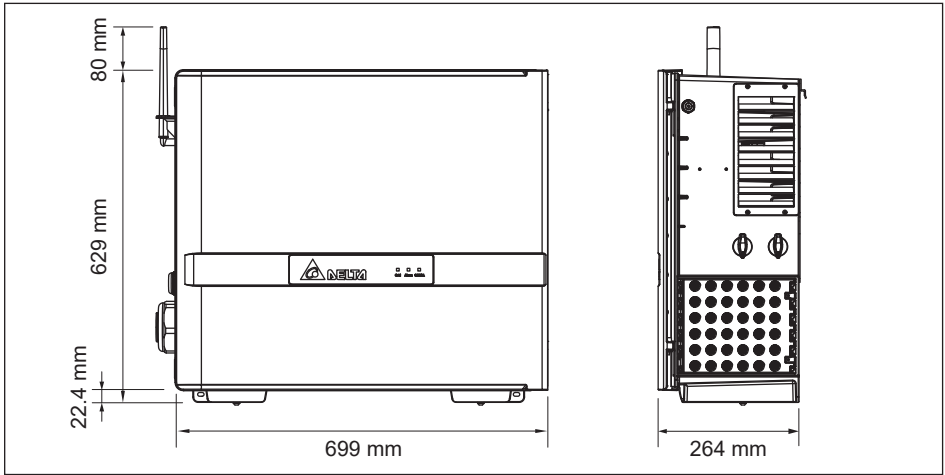


Figure 3-3: Inverter dimensions

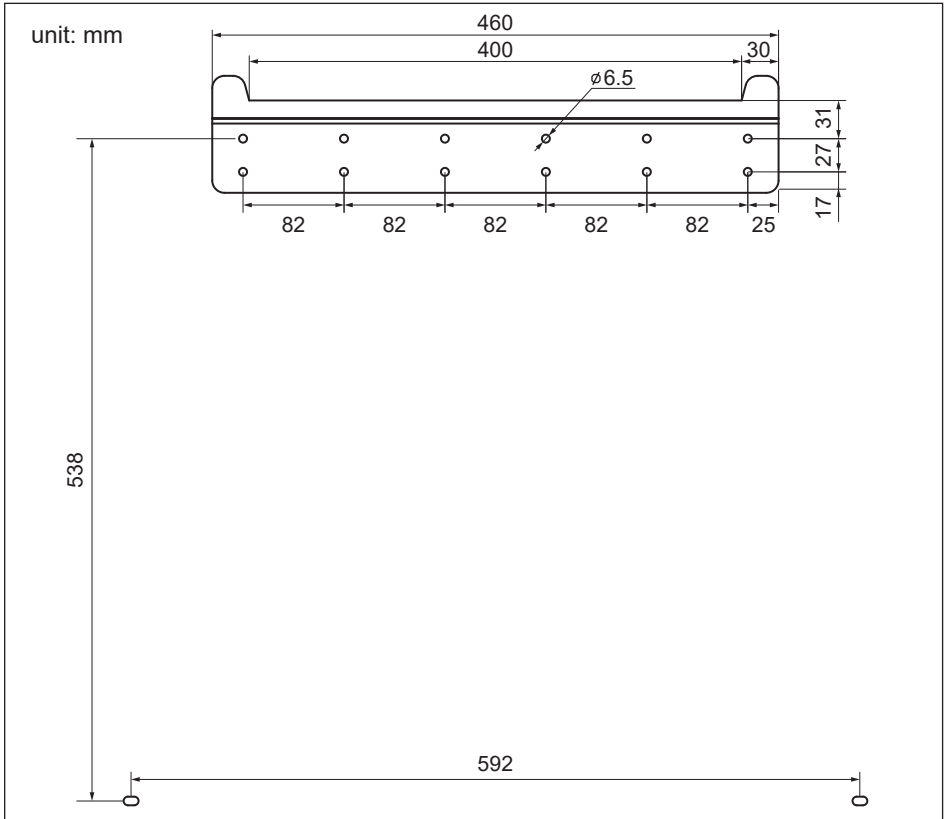
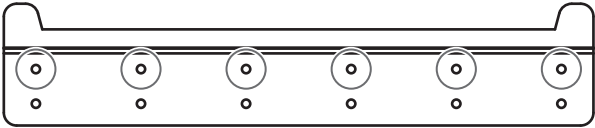


Figure 3-4: Mounting bracket dimensions

Positions for least amount of mounting bracket screws



or

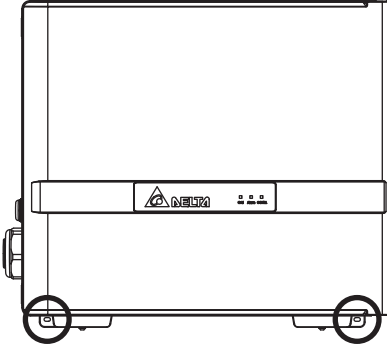
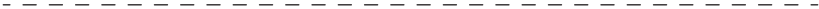
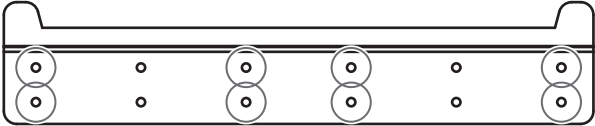


Figure 3-5: Positions of mounting screws

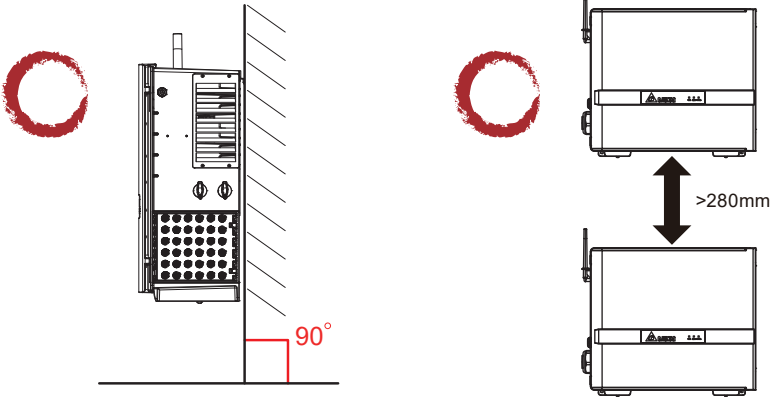


Figure 3-6: Permitted mounting positions

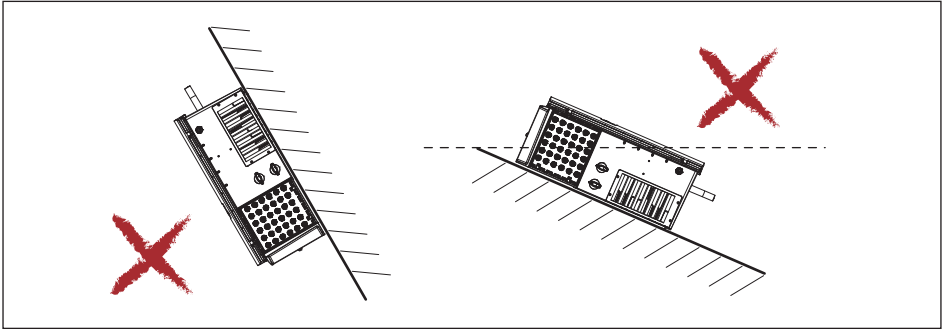


Figure 3-7: Prohibited mounting positions

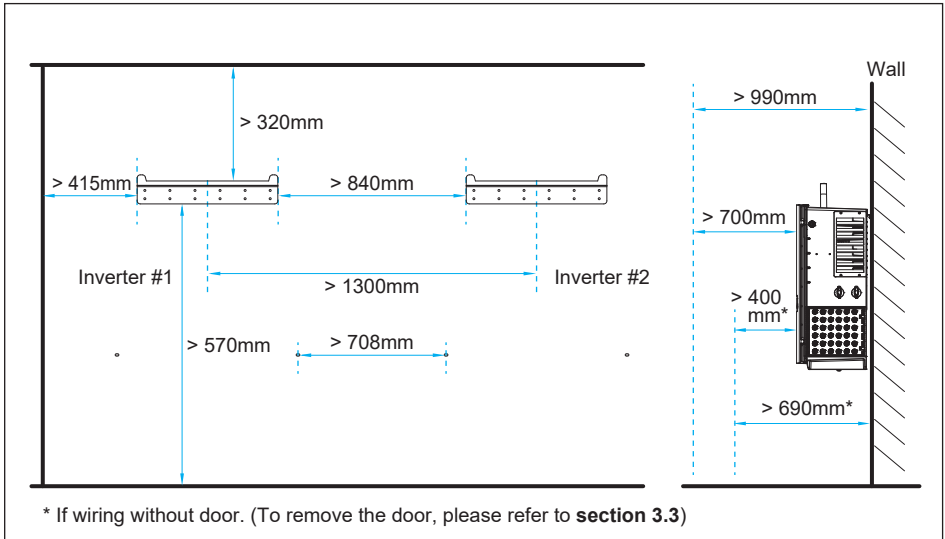
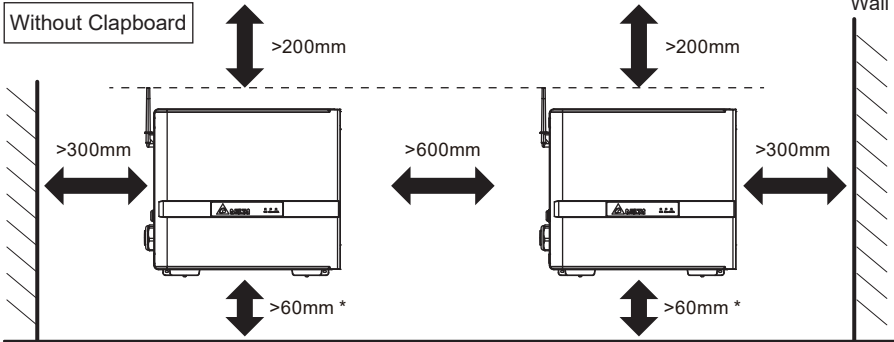


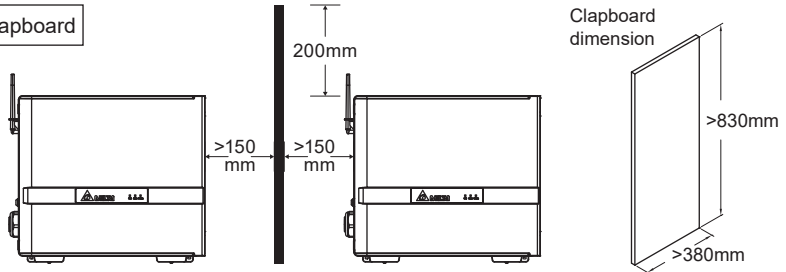
Figure 3-8: Required mounting clearances

Without Clapboard



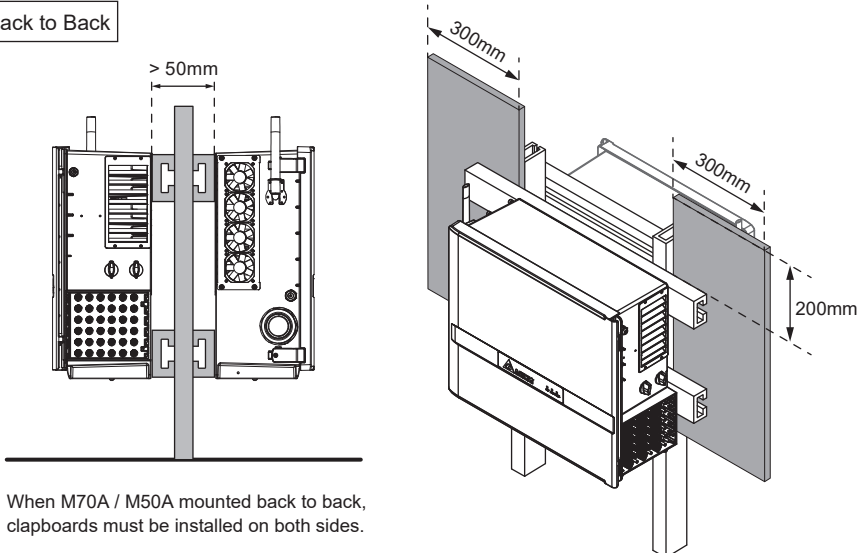
* If the installation location has a risk of flooding or accumulated snow, please raise the appropriate height of the inverter.

Install Clapboard



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

Back to Back



When M70A / M50A mounted back to back, clapboards must be installed on both sides.

Figure 3-9: Separation distance of plural inverters

3.2.2 Ground Mount (Optional)

ATTENTION



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

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

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

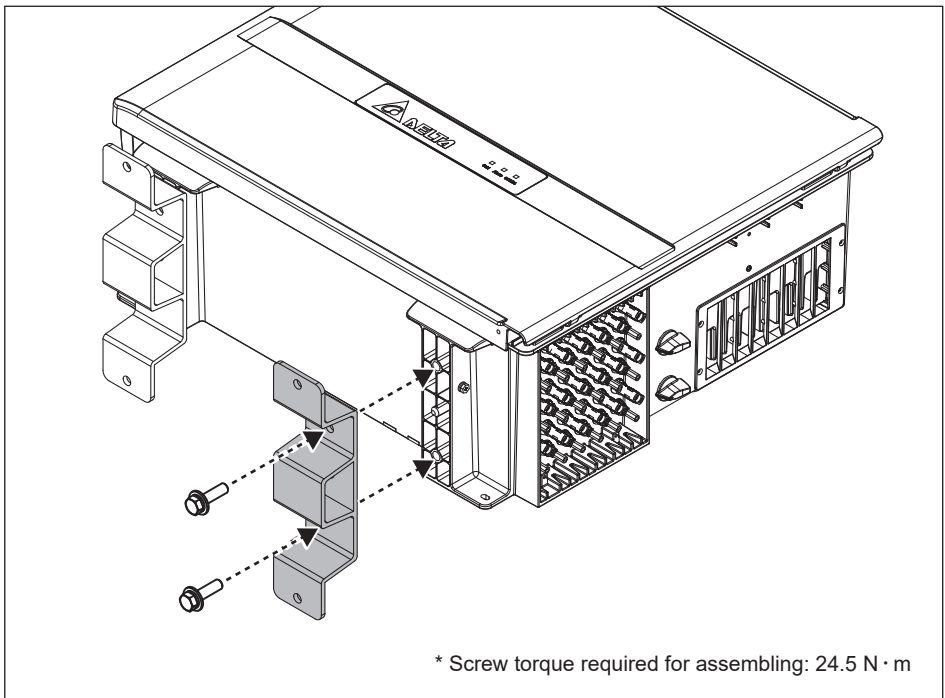
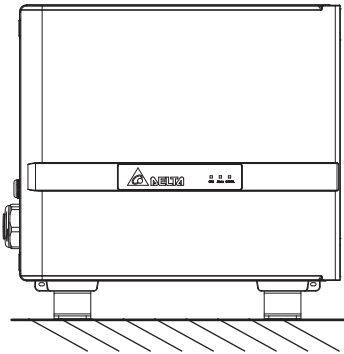
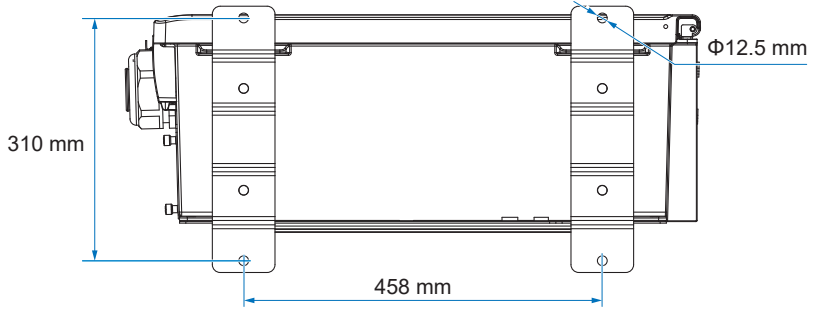
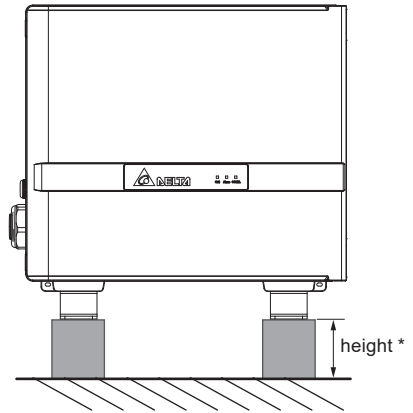


Figure 3-10 : Lock the grounded brackets to feet



or



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

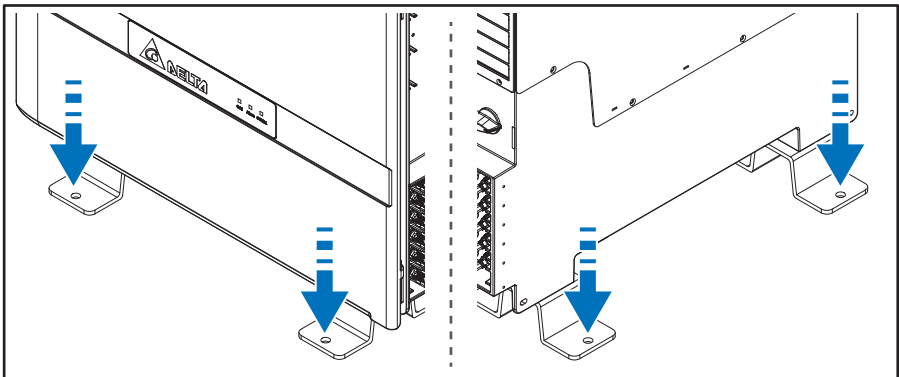


Figure 3-11: To secure inverter grounded brackets to ground-mounting base

3.3 Door

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

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

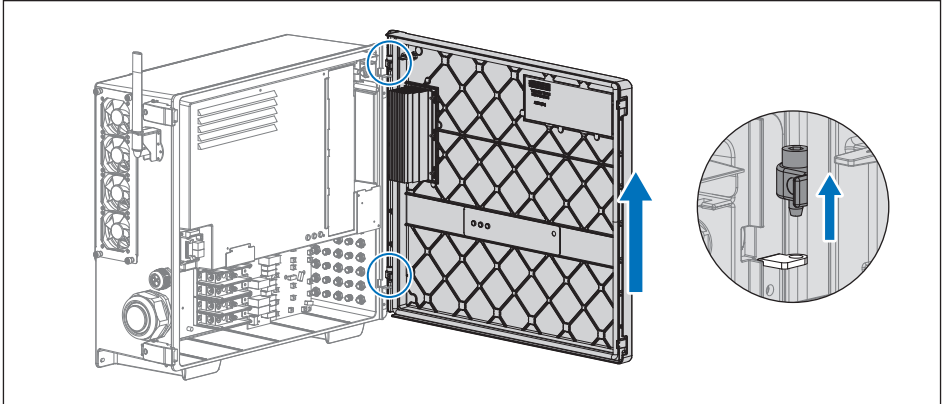


Figure 3-12: Remove the door

3.4 Electrical Installation for AC Wiring

DANGER : ELECTRICAL HAZARD!!



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

WARNING !



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

CAUTION : INVERTER AND EQUIPMENT DAMAGE MAY OCCUR !



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

CAUTION: WRONG AC WIRING !



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

3.4.1 AC Grid Types and Connections

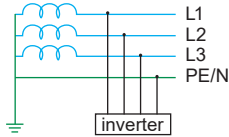
ATTENTION



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

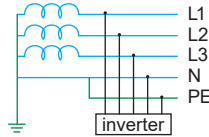
TNC system

230/400V



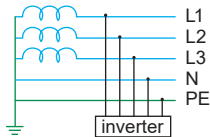
TNC-S system

230/400V



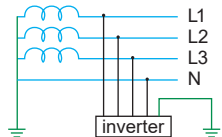
TNS system

230/400V



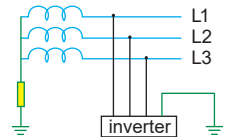
TT system

230/400V



IT system

230/400V



3.4.2 Required Protective Devices

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

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

3.4.3 AC Wiring Preparation

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

Conductor cross-section:

M70A_260 -

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

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

M50A_260 -

Cu: 25 mm² (2 AWG) ~ 60 mm² (2/0 AWG)

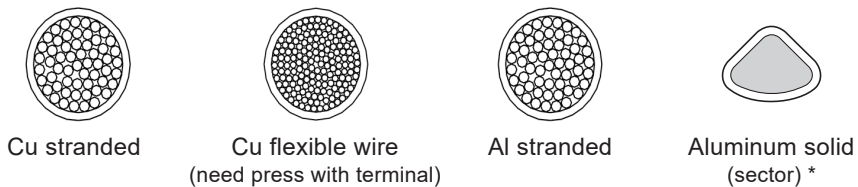
Al: 35 mm² (1 AWG) ~ 60 mm² (2/0 AWG)

Stripping length: 20mm

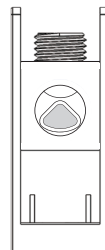


Figure 3-13: Size of AC conductors

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



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



WARNING !



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

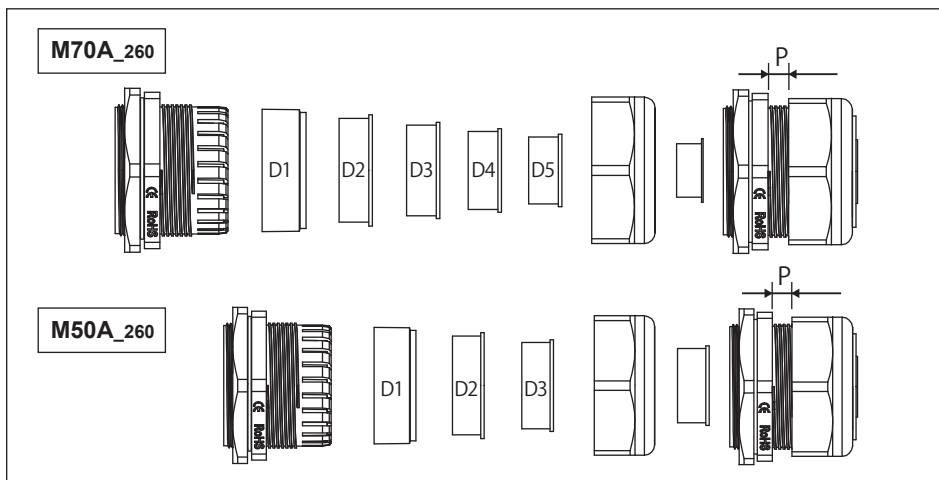


Figure 3-14: AC Gland with multiple inlet

Table 3-1: Cable size comparison table

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

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

3.4.4 AC Side –Prewire Set-Up

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

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

Tighten or Lose nuts with 8 mm (M70A_260) / 5mm (M50A_260) hex wrench.

If an electric tool is used, insure the torque setting is low enough to NOT over-torque the screw.

NOTICE

Extreme temperature rise at the clamping point

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



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

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

3.4.5 AC Wiring

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

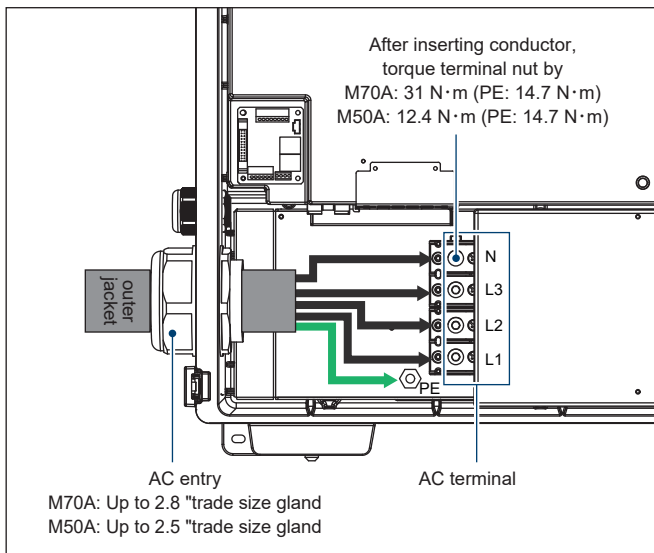


Figure 3-15: Location for AC terminal

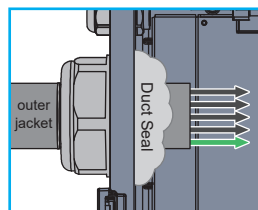
Figure 3-15 illustrates the location of the AC conduit entry and connections to the AC terminal block:

- Unscrew all AC terminal nits as noted in **Section 3.4.4**.
- Ensure the correct conductor is connected to the appropriate terminal.
- After conductor is inserted, use 8 mm (M70A_260) / 5mm (M50A_260) hex wrench to tighten L1, L2, L3, N terminal with the torque shown as **Figure 3-15**.

ATTENTION



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



3.5 Electrical Installation for DC Wiring

DANGER : ELECTRICAL HAZARD!!



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

WARNING !



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

CAUTION: DC SWICH ON/OFF !



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

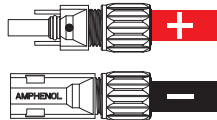
ATTENTION



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

DANGER : ELECTRICAL HAZARD!!

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



ATTENTION



- Do not remove the waterproof plug for unused DC strings.
- Do not remove the protective cover for unused MPPT 3 DC strings.

3.5.1 DC Wiring Installation

Please read the following instructions for connecting DC connector :

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

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

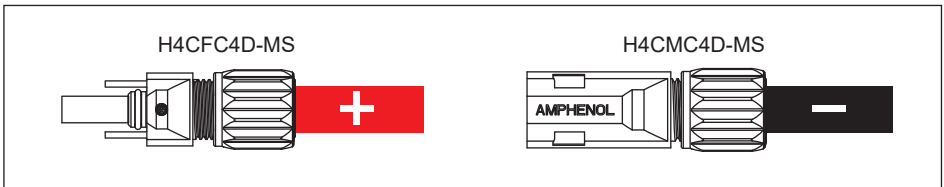



Figure 3-16: DC Wiring illustration

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

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

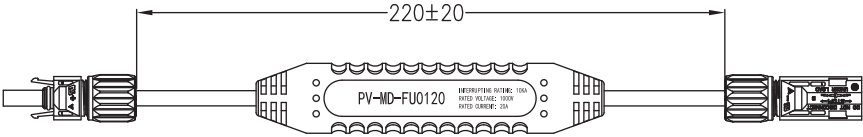
- After DC Wiring installing, insert the protective frame for DC connector and the method is shown in **Figure 3-18**.

ATTENTION



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

MDFU-10-66-20-H4



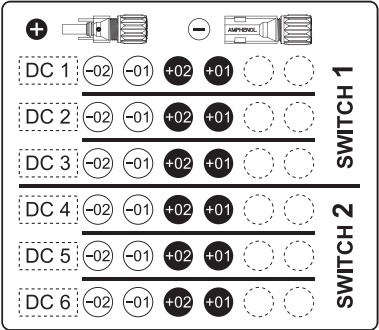
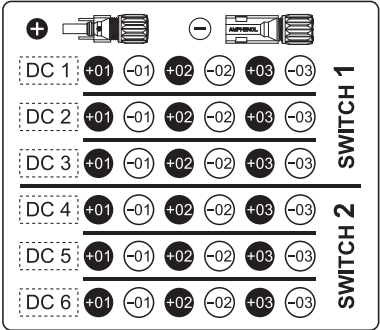
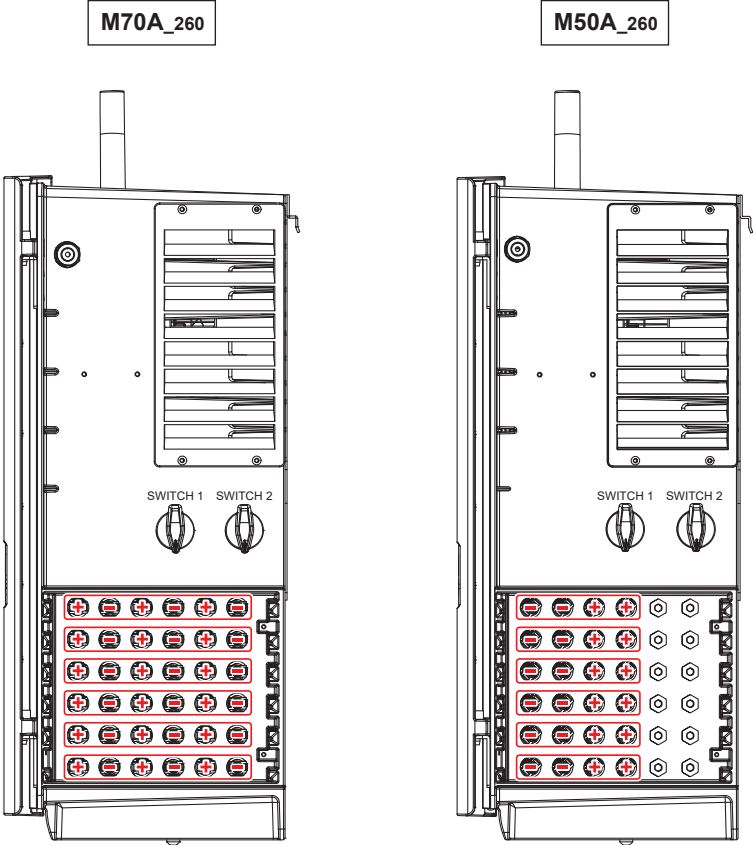


Figure 3-17: location of H4 connectors to connect array wiring (DC)

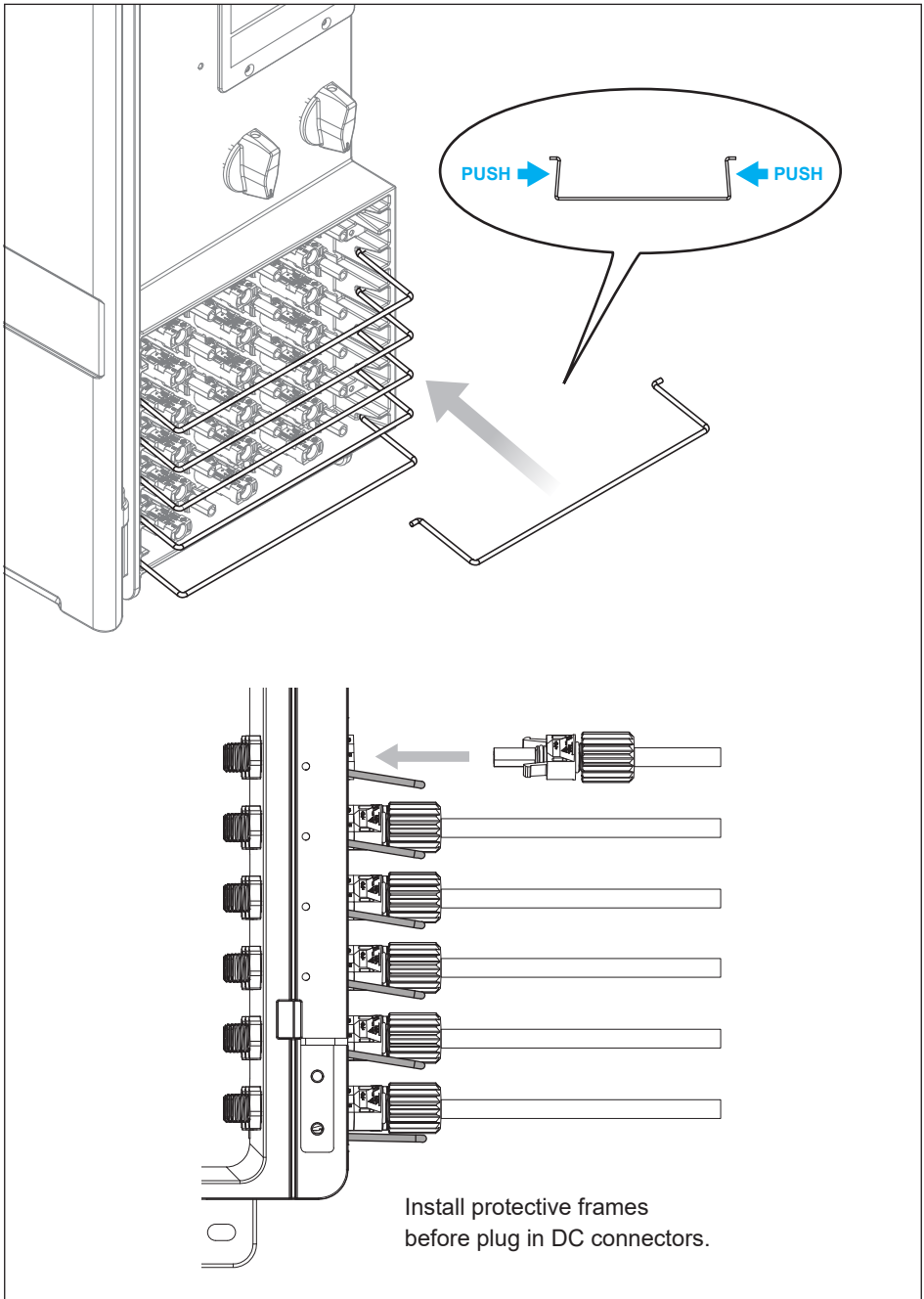


Figure 3-18: Installation methods for protective frame

3.5.2 Equipment Grounding

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

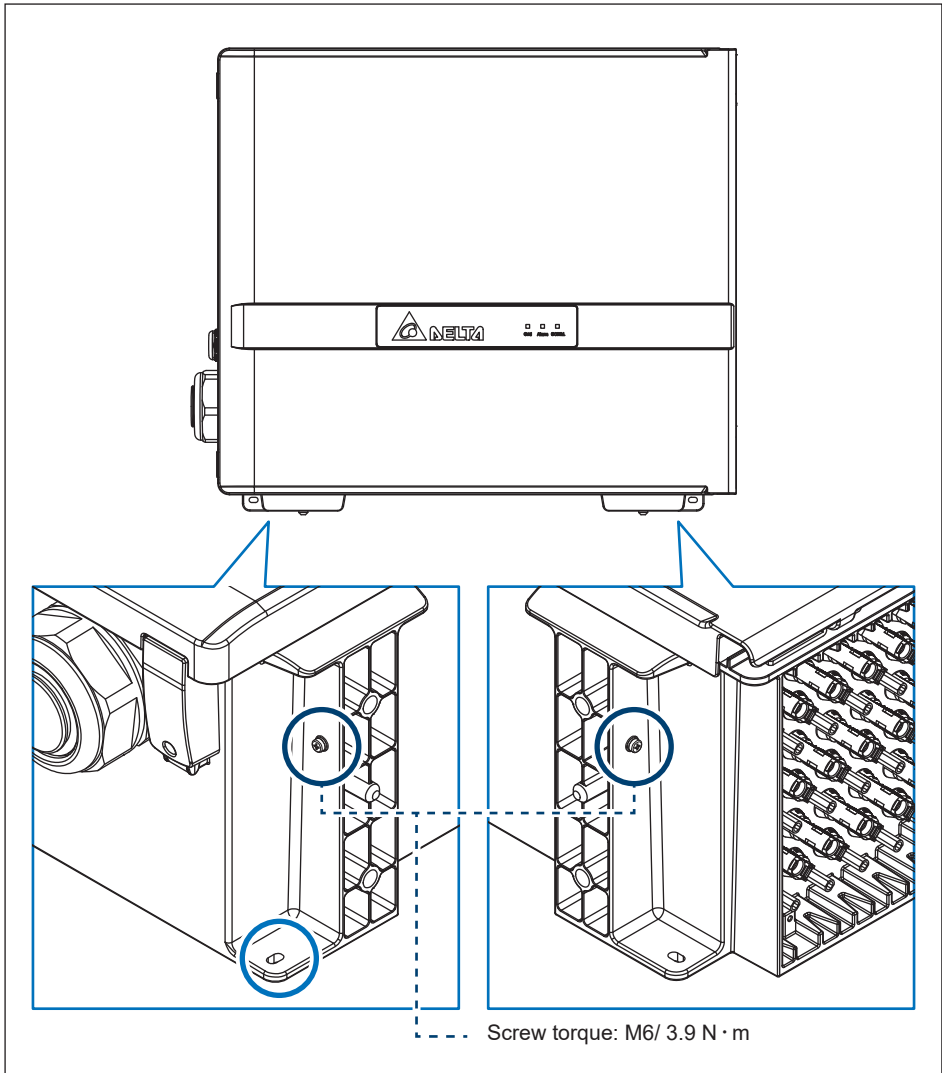


Figure 3-19: Mount the equipment grounding

3.6 Antenna

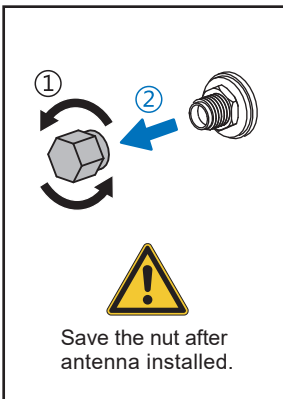
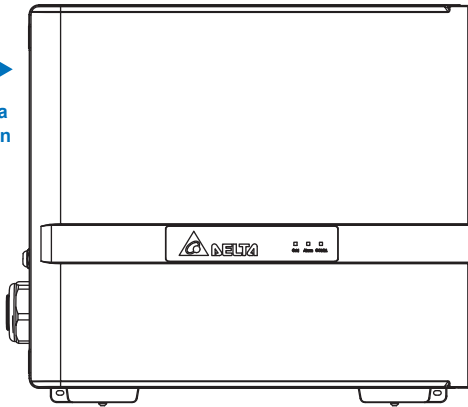
There is an antenna for SUB_1G, it must be installed with 1.2 N·m and some installation notice included antenna and bracket are shown in **Figure 3-20 ~ 3-22**.

ATTENTION

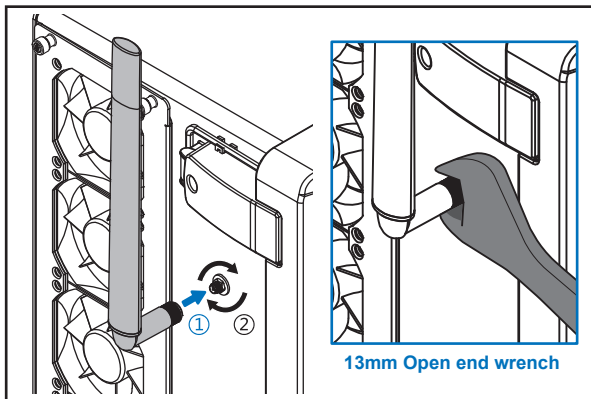


- Always keep nut and screws properly tightened on the case.
- Water leakage may cause serious damage.
- Contact DELTA service when lack for nut and screws.
- Store the nut for spare usage.


Antenna
Location



Remove the nut.

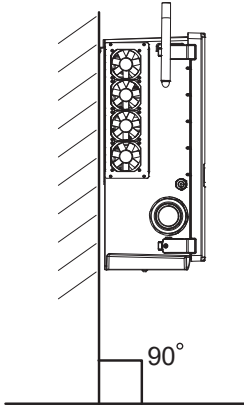
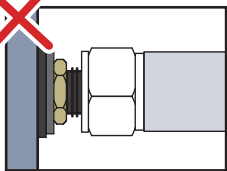
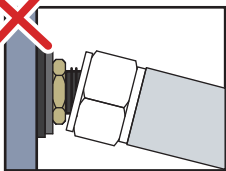
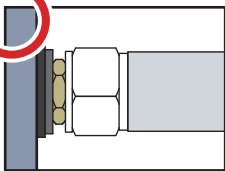
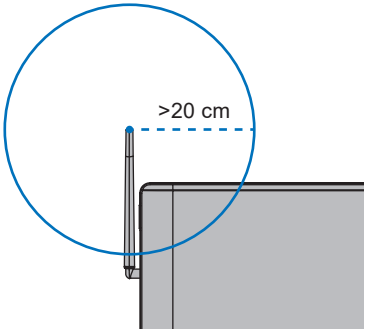


Use the wrench to lock antenna with 1.2 N·m torque.

Figure 3-20: Installation of antenna



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



Keep antenna pointing upright.

Figure 3-21: Attentions of installing antenna

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

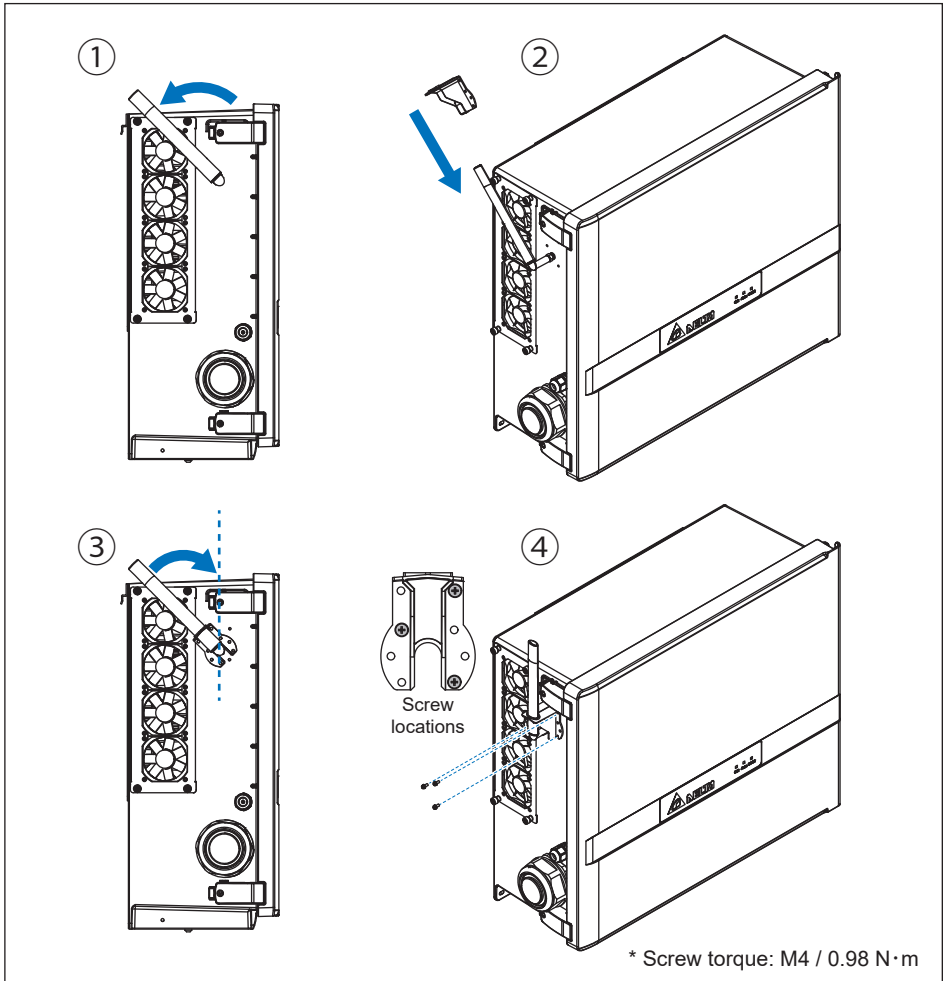


Figure 3-22: Install antenna bracket

ATTENTION



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



3.7 Communication Module Connections

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

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

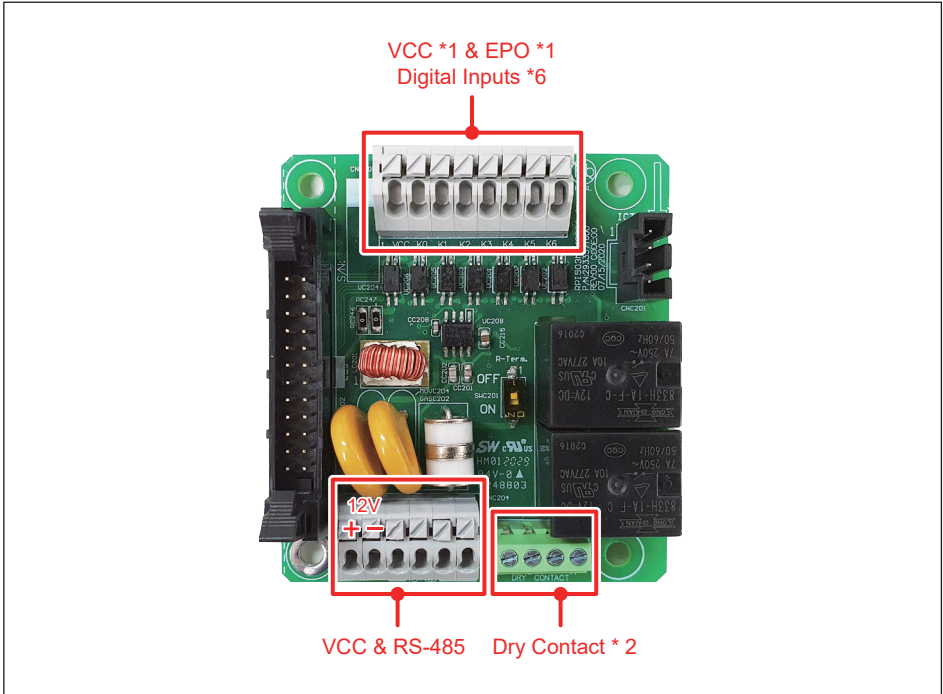


Figure 3-23: Communication Module Layout

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

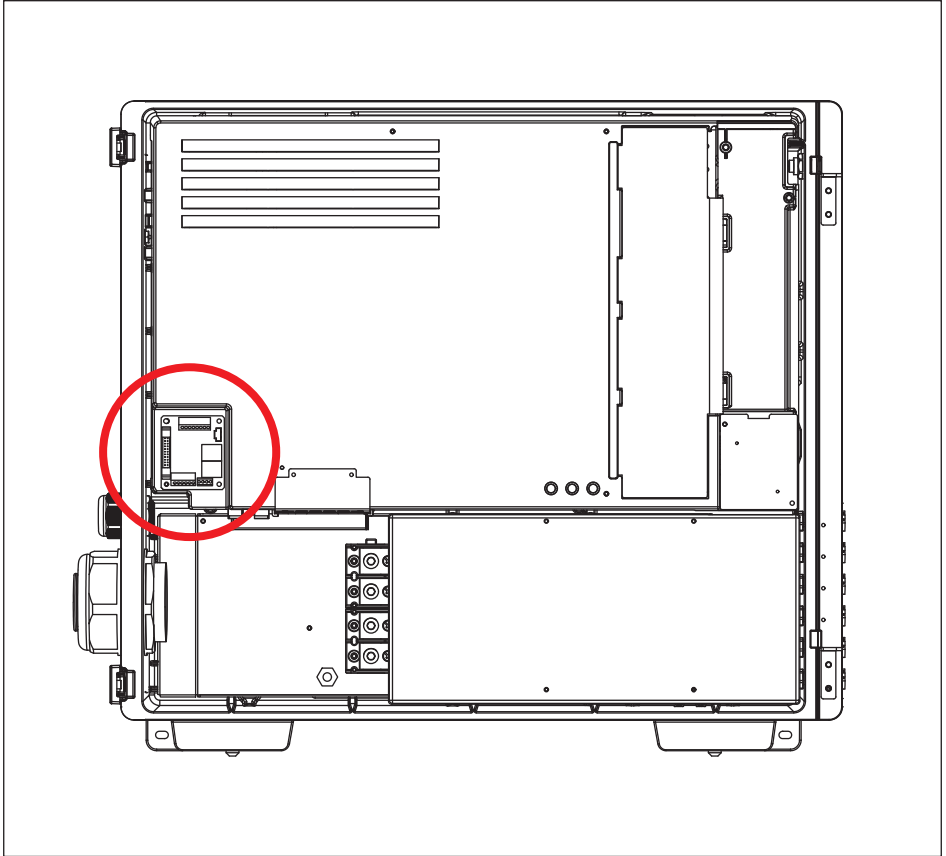


Figure 3-24: Location and access to Communication Module

3.7.1 RS-485 Connection

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

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

These connections allow easy daisy-chaining of multiple inverters.

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

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

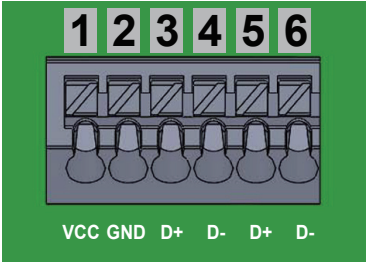
ATTENTION



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

Table 3-2: RS-485 Terminal block wiring

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

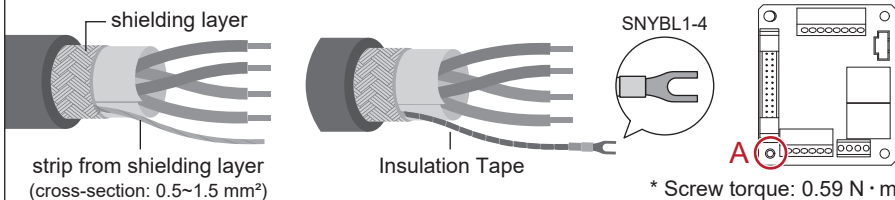


INFORMATION



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

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



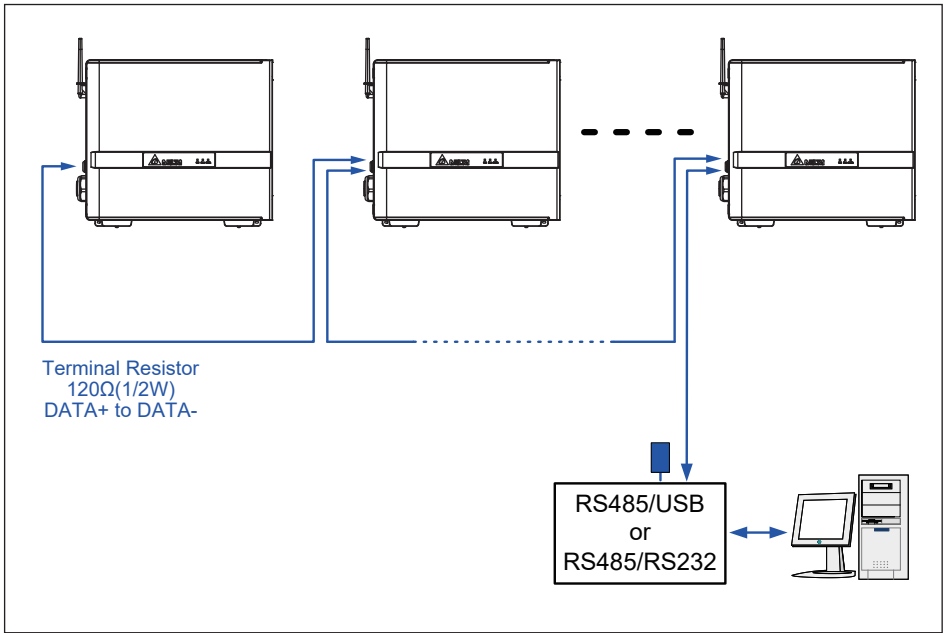


Figure 3-25: Multiinverter connection illustration

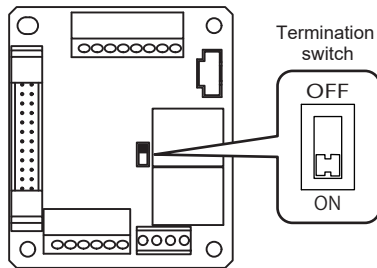


Table 3-3: Bus Termination switch settings

	Switch 1
ON	Terminal Resistor ON
OFF	Terminal Resistor OFF

3.7.2 EPO Function & Digital Input

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

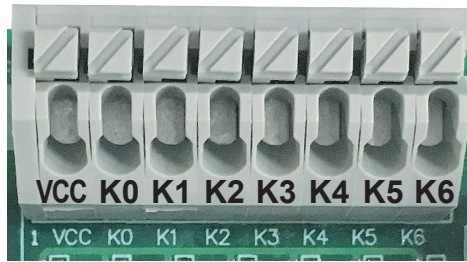


Figure 3-26: EPO function terminal block

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

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

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

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

3.7.3 Dry Contact Connection

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

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

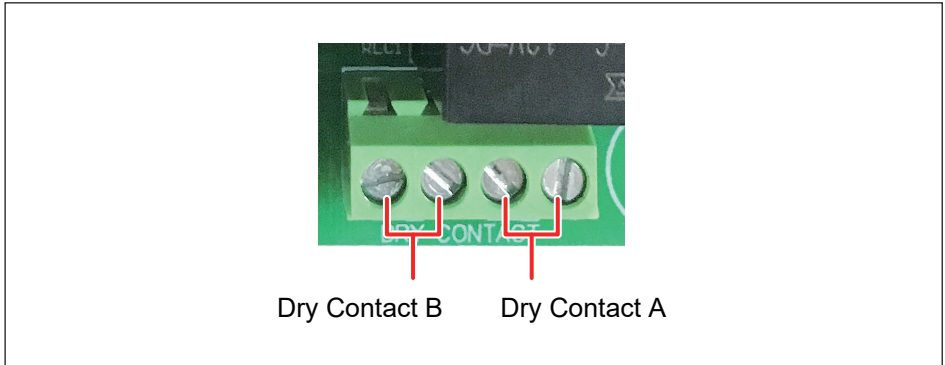


Figure 3-27: Dry Contact connection

3.8 On-Site Insulation Test

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

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

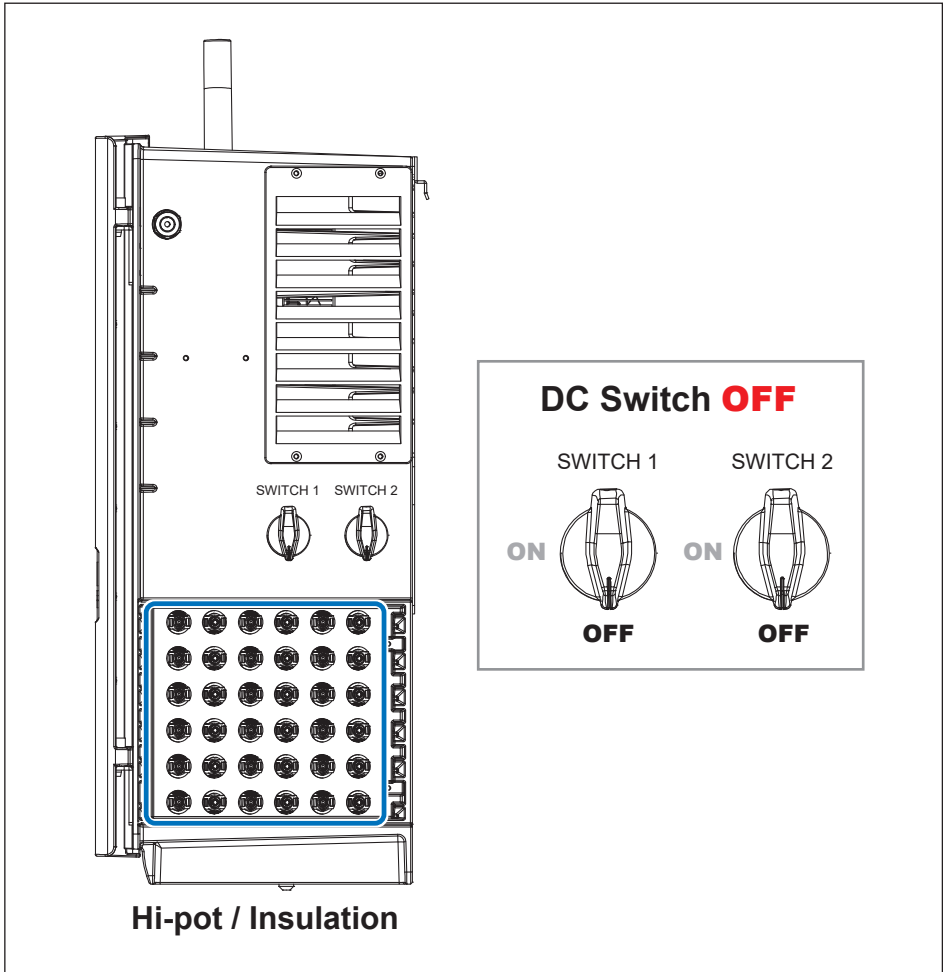


Figure 3-28: Precautions for on-site insulation test

4 Commissioning

CAUTION : HOT SURFACES, DO NOT TOUCH!



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

4.1 Display Operation Introduction

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

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

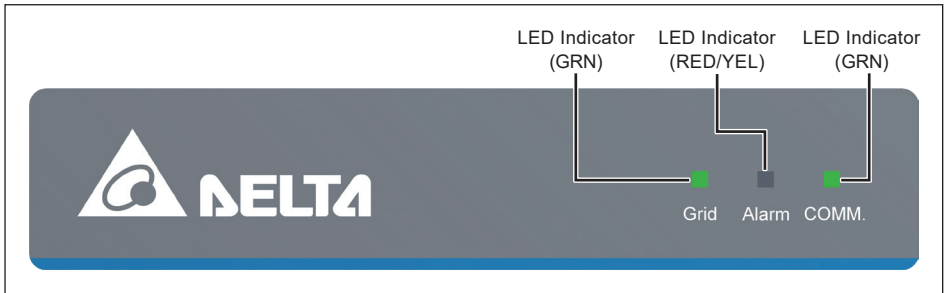


Figure 4-1: Front Panel Display

Table 4-1: LED indicator

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

*FLASH: ON 1s / OFF 1s

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

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

Table 4-2: LED COMM. indicator

SUB_1G Condition	COMM. (Green)
Work	FLASH
Fault	OFF

* FLASH: ON 3s / OFF 2s

4.2 Auto ID Commission Tool

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

ATTENTION



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



4.2.1 Auto ID Setting

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

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

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

Serial Number	ID	Status
0751850003M0	1	OK
07518500023M0	2	OK
07518500002M0	3	OK
07518500014M0	4	OK
07518500012M0	5	OK
07518500019M0	6	OK
07518500016M0	7	OK
07518500020M0	8	OK

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



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

The screenshot shows the Delta Auto ID Tool interface. On the left, the 'COM Port' is set to 'COM5' and 'Port Status' is 'Port COM5 open succeeded'. The 'Auto ID Setting' shows 'Inv num: 31'. A dialog box is displayed in the foreground with the message: 'Found more than expected inverters, please check your inverter quantity'. The background table lists inverter data:

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



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

The screenshot shows the Delta Auto ID Tool interface. On the left, the 'COM Port' is set to 'COM5' and 'Port Status' is 'Port COM5 open succeeded'. The 'Auto ID Setting' shows 'Inv num: 32'. A dialog box is displayed in the foreground with the message: 'Only 31 inverters found! Please check your 485 connection!'. The background table lists inverter data:

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

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

4.2.2 Set ID

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

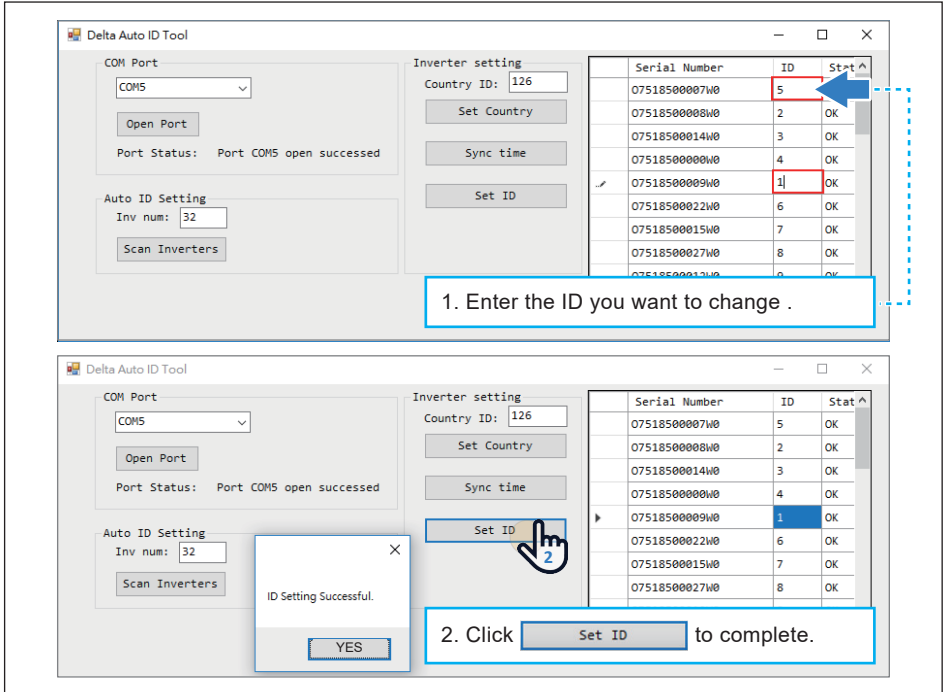


Figure 4-4: Steps of set ID



The wrong ID setting of overlapping.

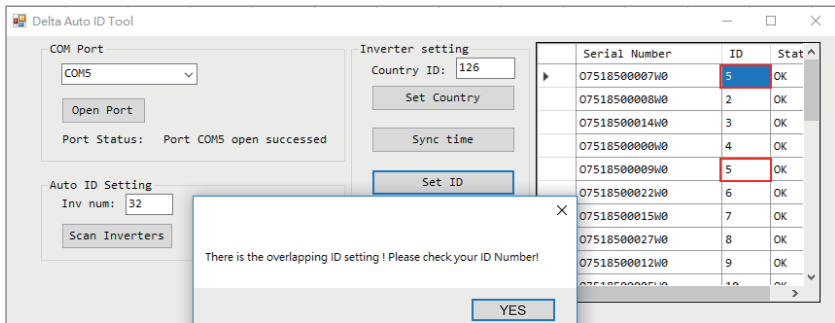


Figure 4-5: False of set ID

4.2.3 Set Country

Set country by the AUTO ID.

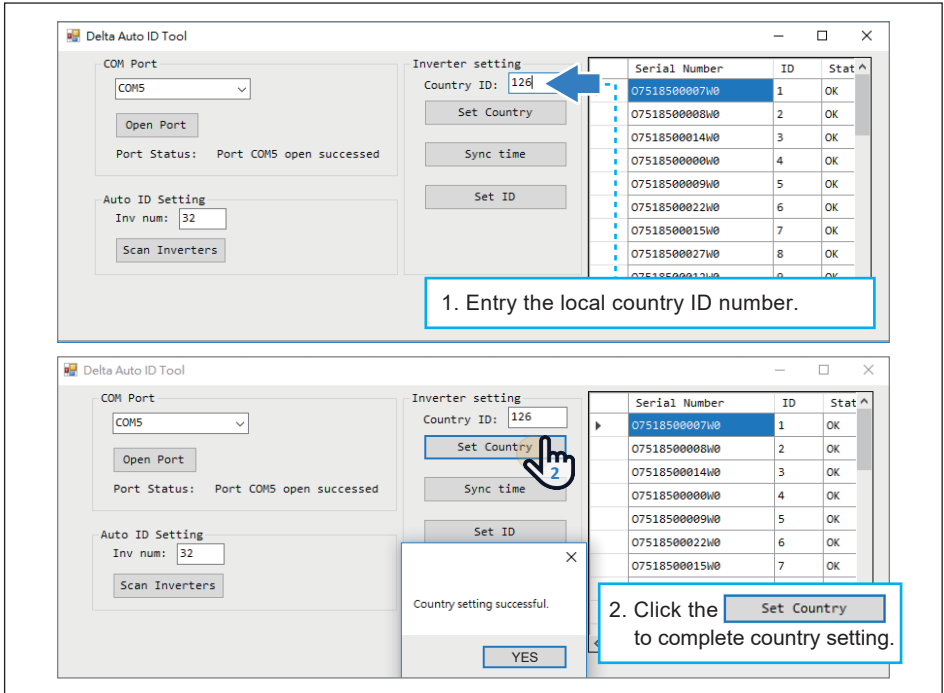


Figure 4-6: Steps of set country

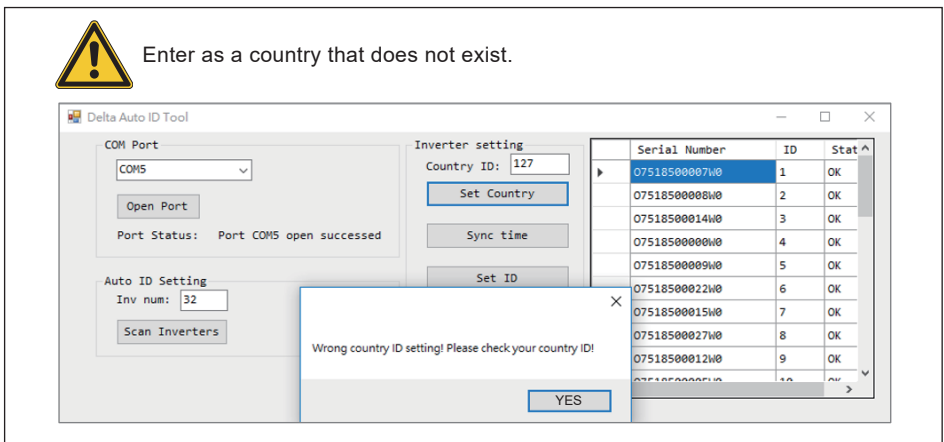


Figure 4-7: False of set country

4.2.4 Synchronize time

Synchronize time by Auto ID tool.

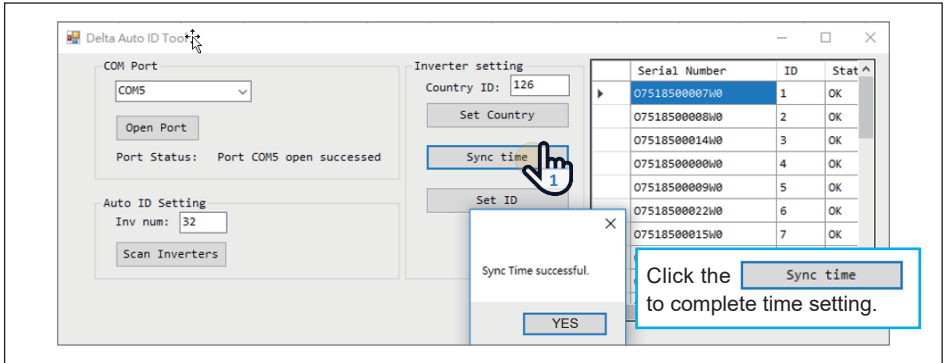


Figure 4-8: Steps of synchronize time

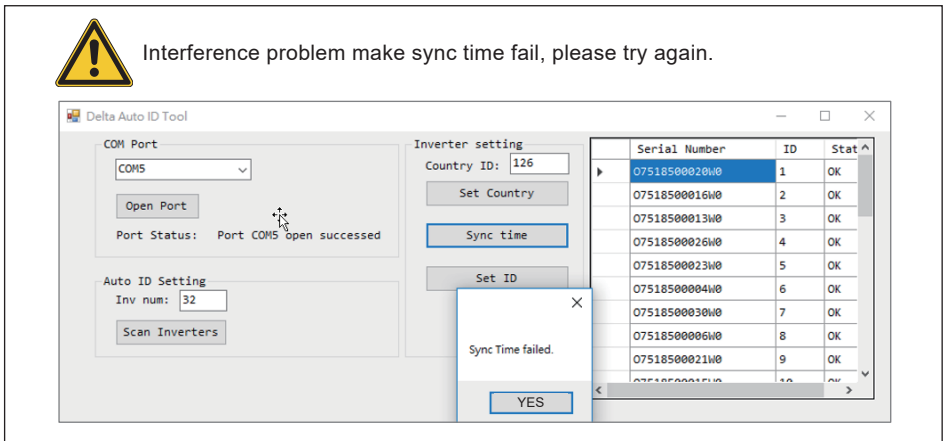


Figure 4-9: False of synchronize time

4.3 Delta Function Setting

Delta offers two setting tools:

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

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	Wi-Fi

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

DSS Operation Manual:

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



APP (MyDeltaSolar) Operation and Installation Manual:

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

- Data Collector > PPM DC1_100 Operation and Installation Manual



5 Maintenance

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

WARNING !



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

5.1 Open and Close the Door

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

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

5.1.1 Open Door

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

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

5.1.2 Close Door

Before closing the door:

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

When closing the door:

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

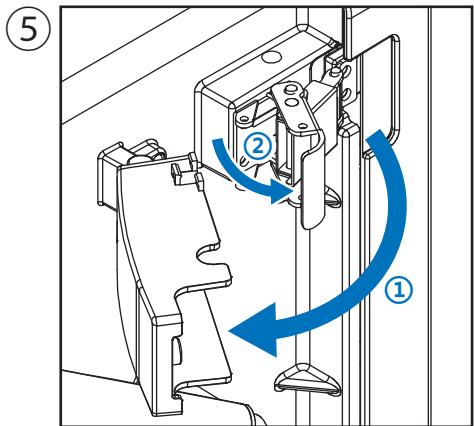
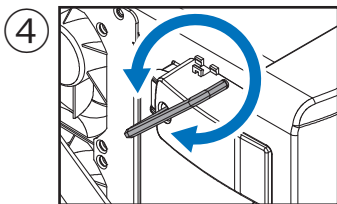
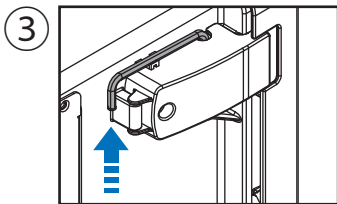
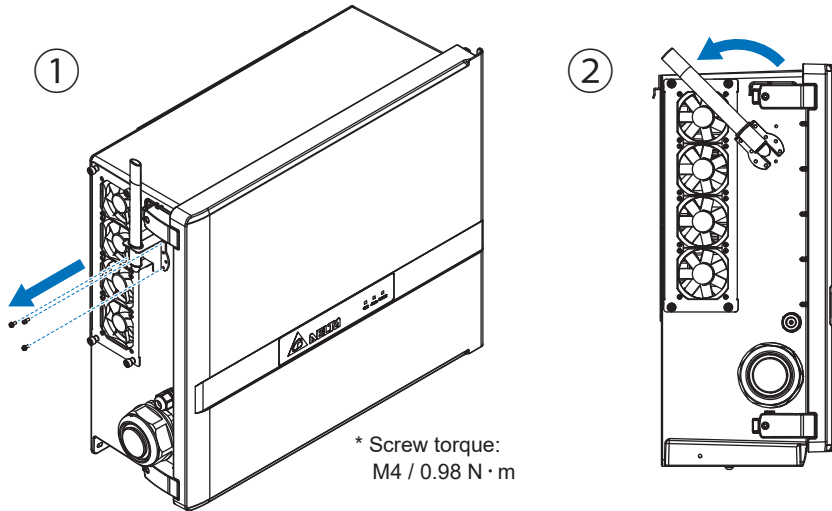
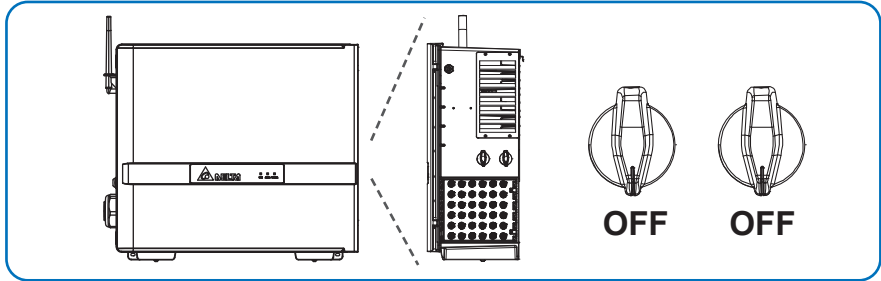
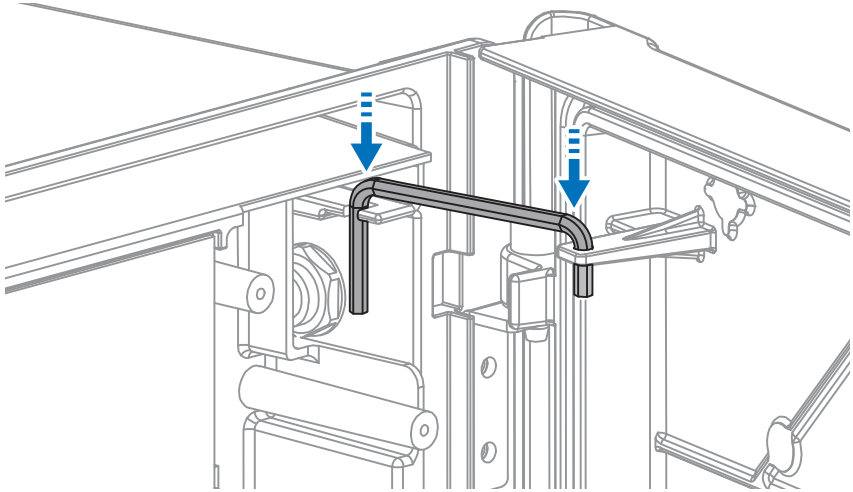
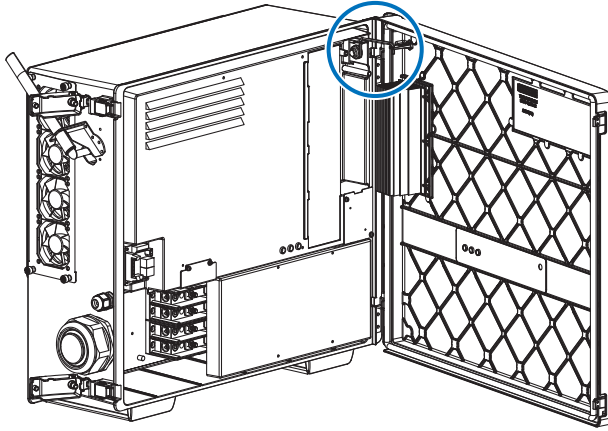


Figure 5-1: Open and close the door



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

5.2 Replacement of Surge Protection Devices (SPD)

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

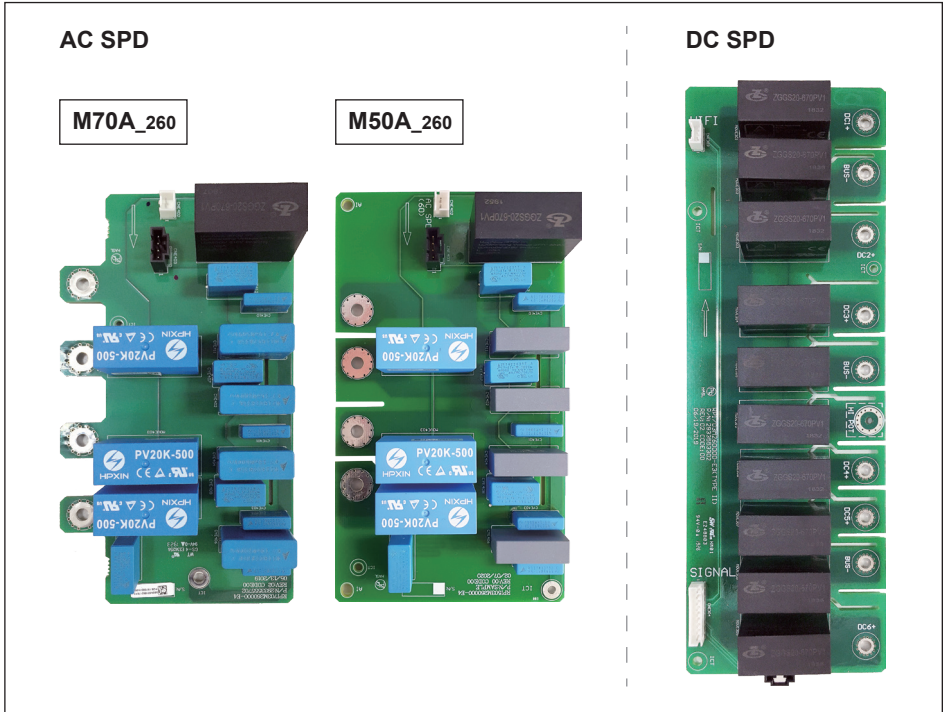


Figure 5-3: AC and DC SPD modules

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

The SPDs are located in the inverter.

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

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

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



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

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

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

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

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

ATTENTION



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

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

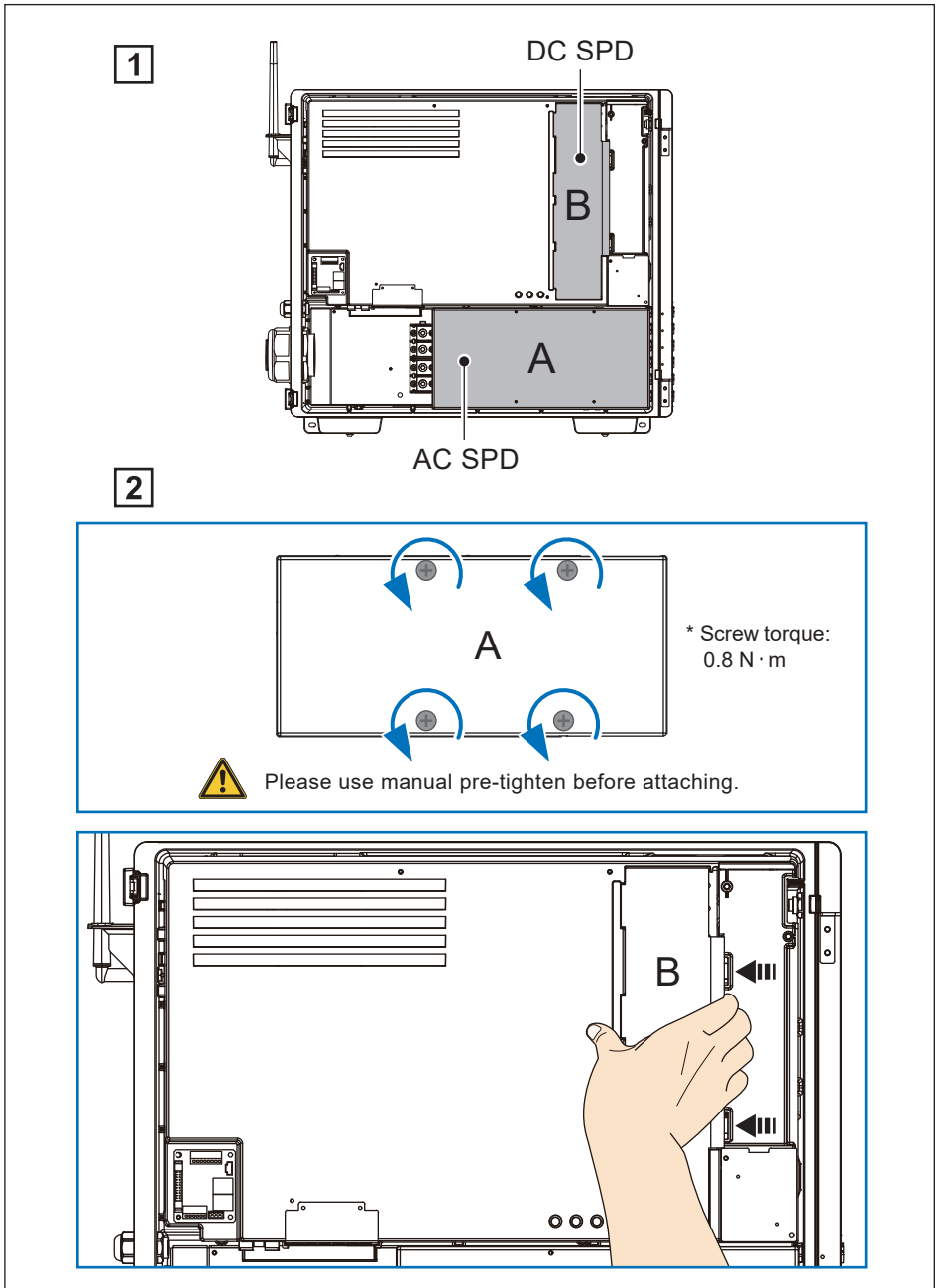


Figure 5-5: Steps of changing SPDs

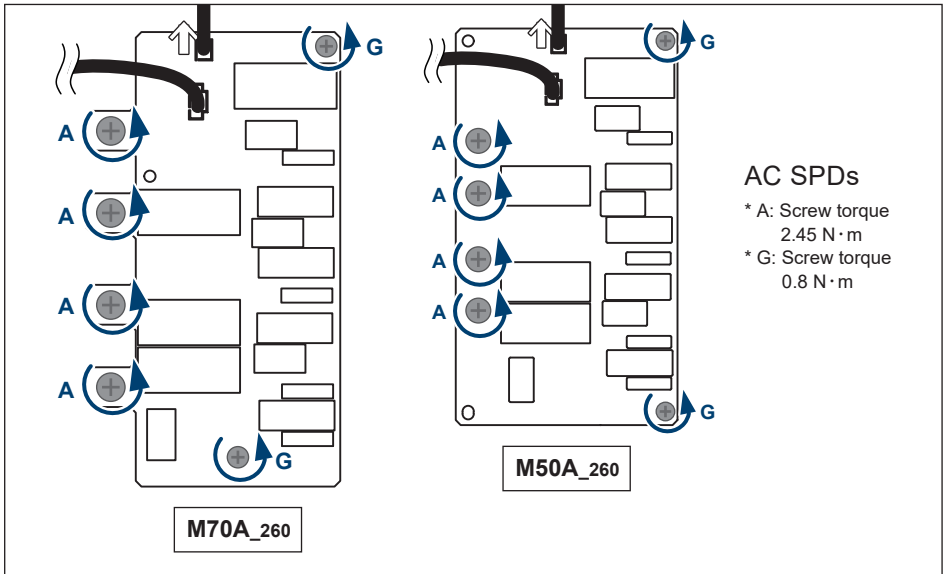


Figure 5-6: Remove wirings as connectors of AC SPD

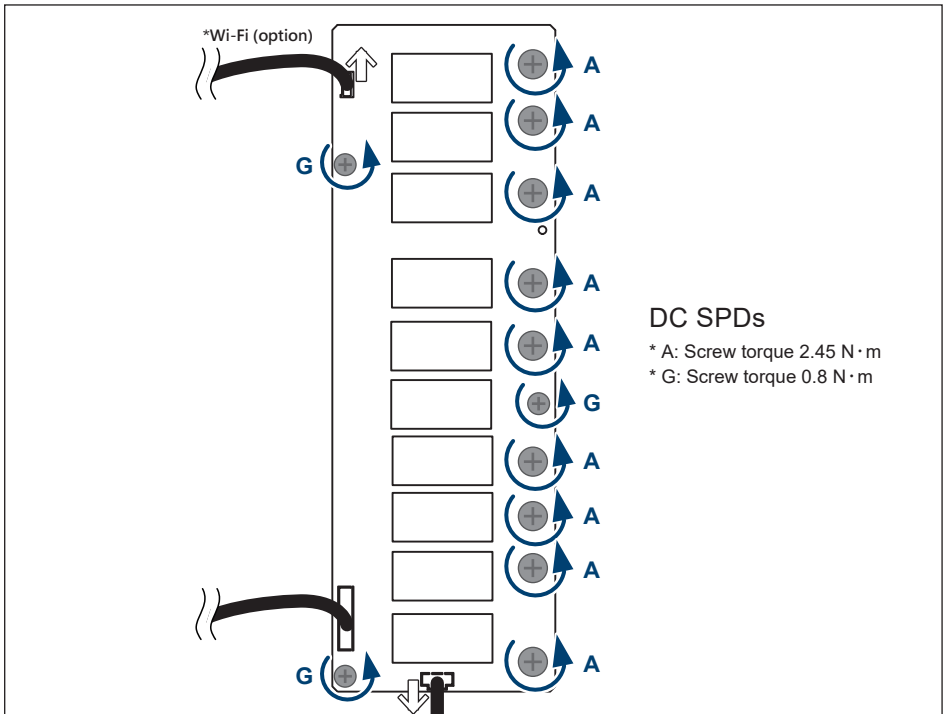


Figure 5-7: Remove wirings as connectors of DC SPD

5.3 External String Fuse

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

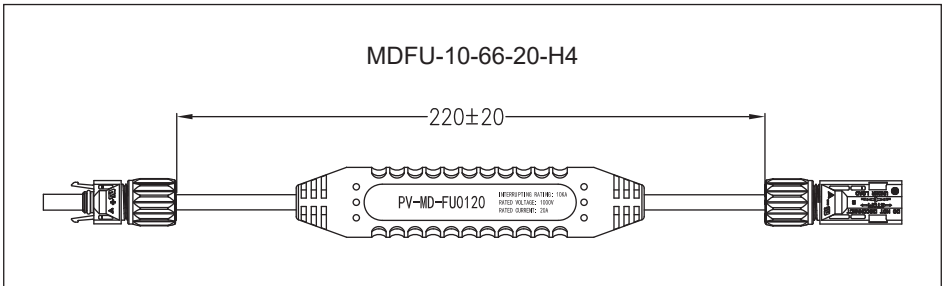


Figure 5-8: External String Fuse

5.4 Smart Fans Replacement and Filter Cleaning

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

The system features 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.

M70A_260 and M50A_260 has one fan tray for power module cooling and two internal fans for inside air circulation.

Figures 5-10 illustrates the PM fan locations.

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

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

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.

5.4.1 Location of failure fan for M50A_260

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

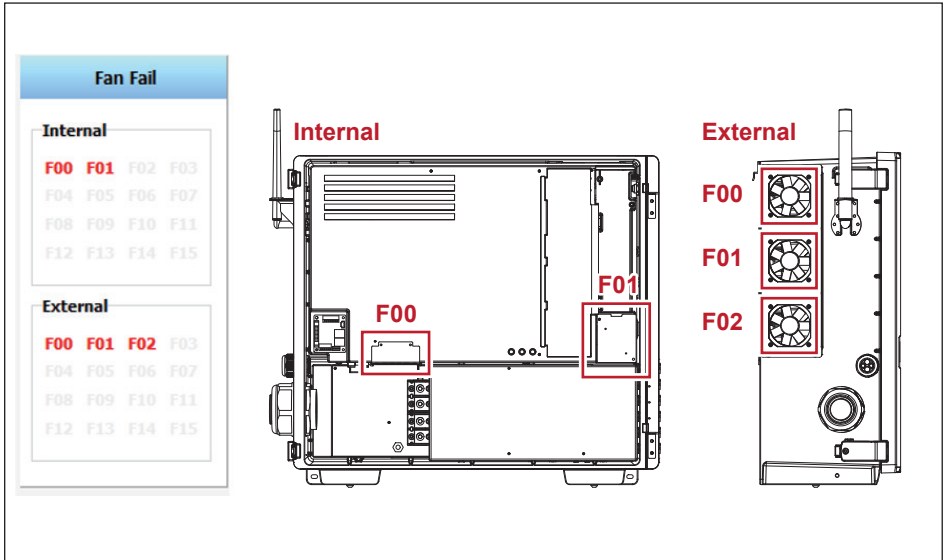


Figure 5-9: The corresponding fan location to the fan fail code on DSS

DANGER : ELECTRICAL HAZARD!!



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

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.

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

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

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

For fan maintenance, continue to do following steps.

2. Unplug fan power connectors for each fan.

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

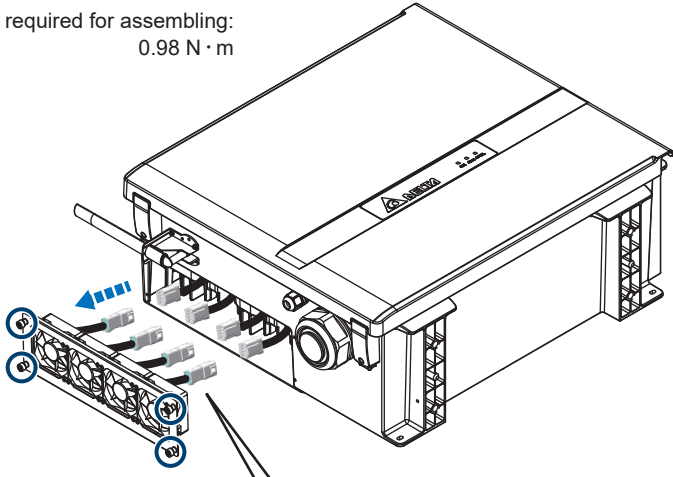
3. Pull fan tray out from PM chassis.

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

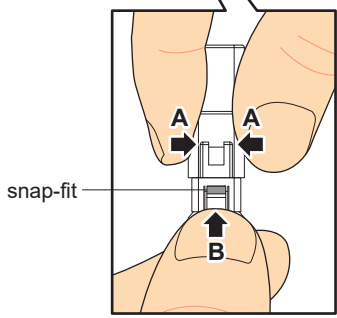
To reassemble reverse the order of the above procedure and tighten screws to torque values indicated in **Figure 5-10**.

* Screw torque required for assembling:
0.98 N · m

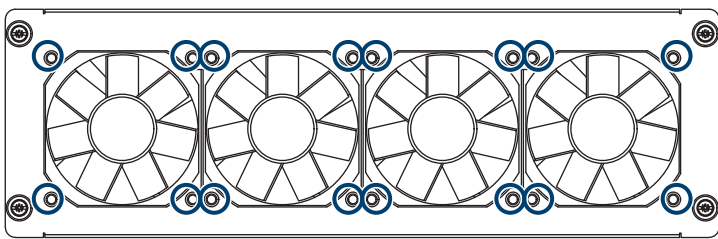
①



②



③



* Screw torque required for assembling: 0.6 N · m

Figure 5-10: Disassembling fan tray from PM chassis

5.4.3 Internal Fan 1

If the warning "**Fan Fail- Internal F01**" show on the DSS / APP, please follow the procedure below to remove Internal Fan 1.

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

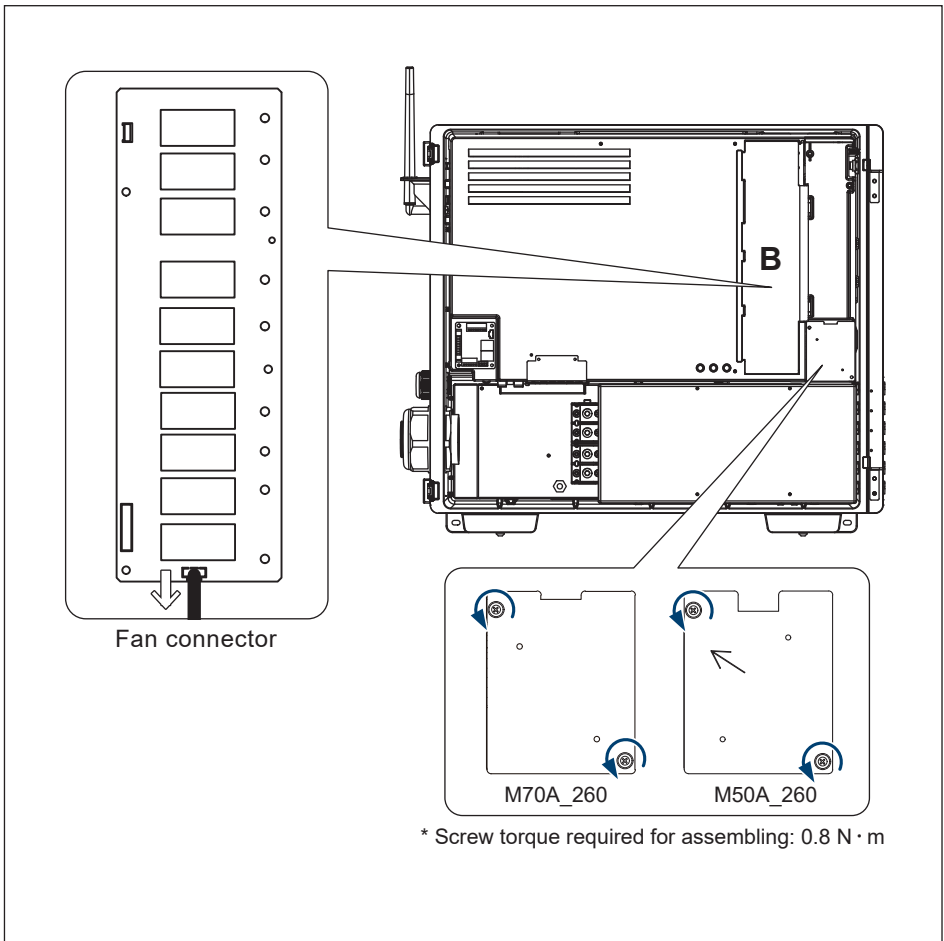


Figure 5-11: Internal fan 1 location & remove the shield cover

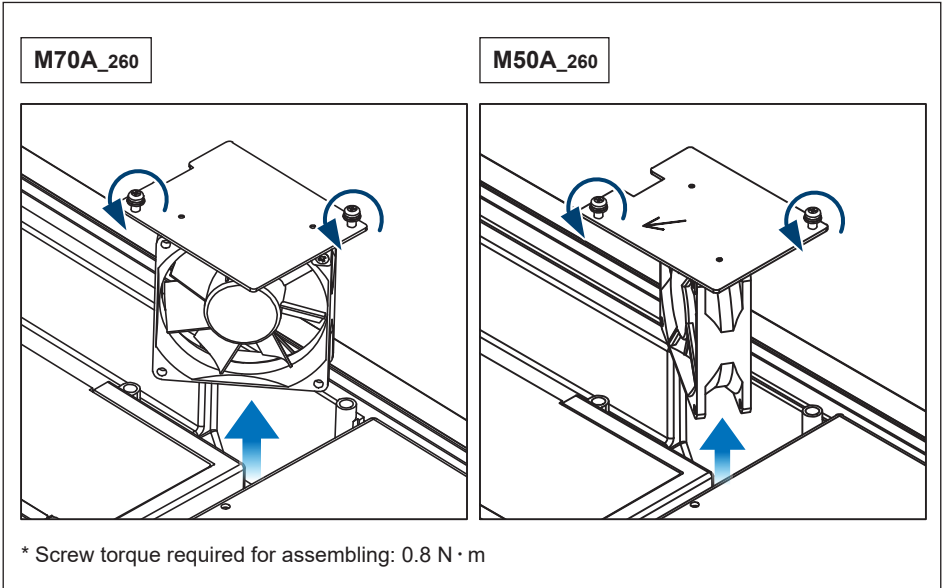


Figure 5-12: Take off the internal fan 1

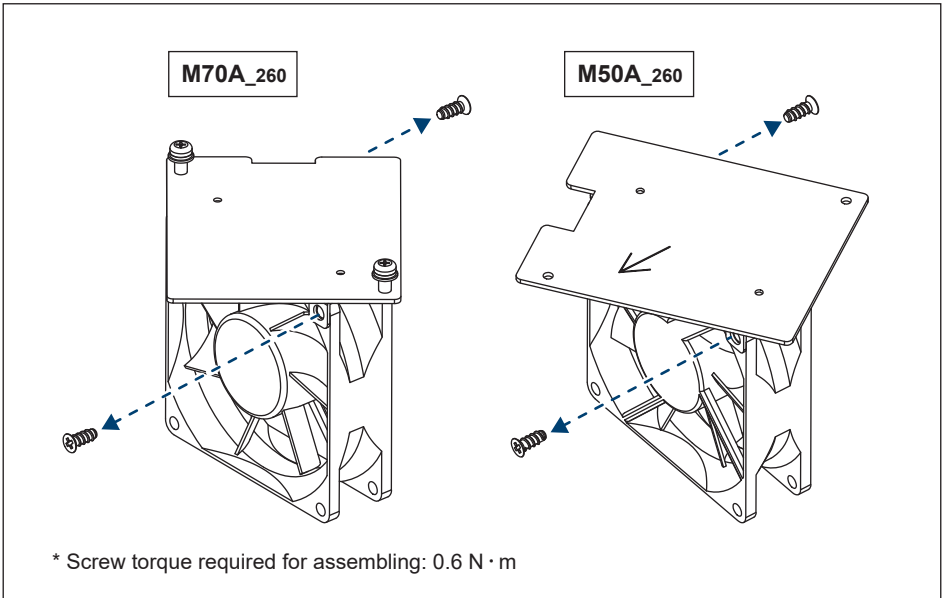


Figure 5-13: Replace with a new fan

5.4.4 Internal Fan 2

If the warning "**Fan Fail- Internal F00**" show on the DSS / APP, please follow the procedure below to remove Internal Fan 2.

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

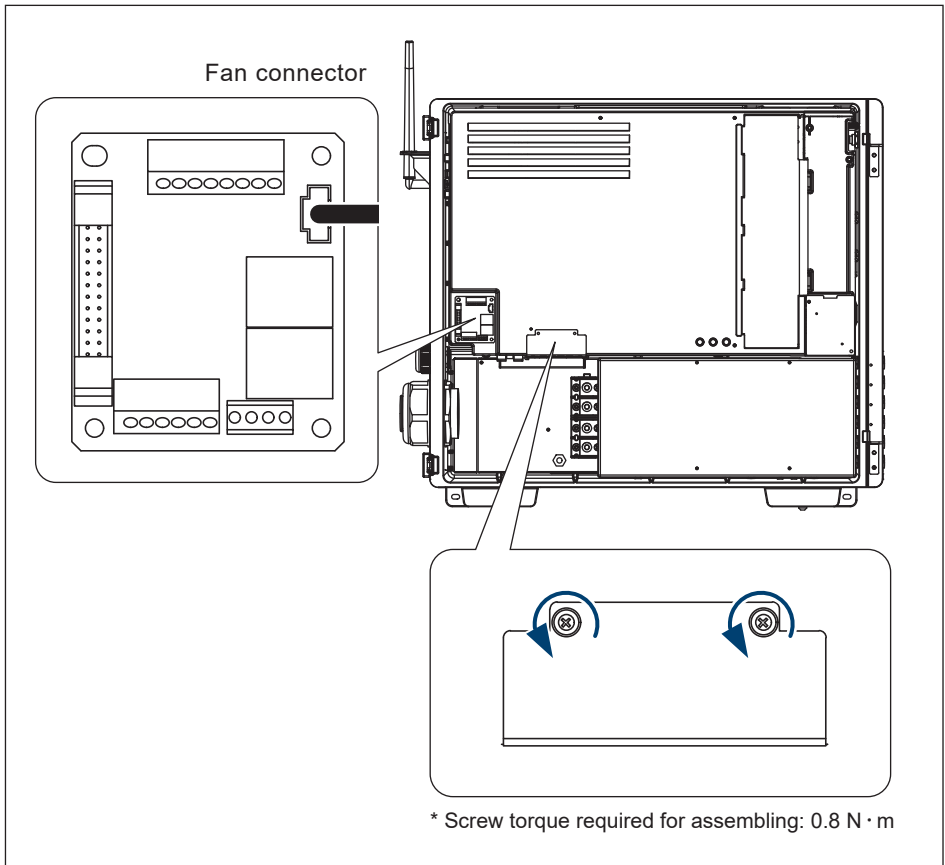


Figure 5-14: Internal fan 2 location & remove the shield cover

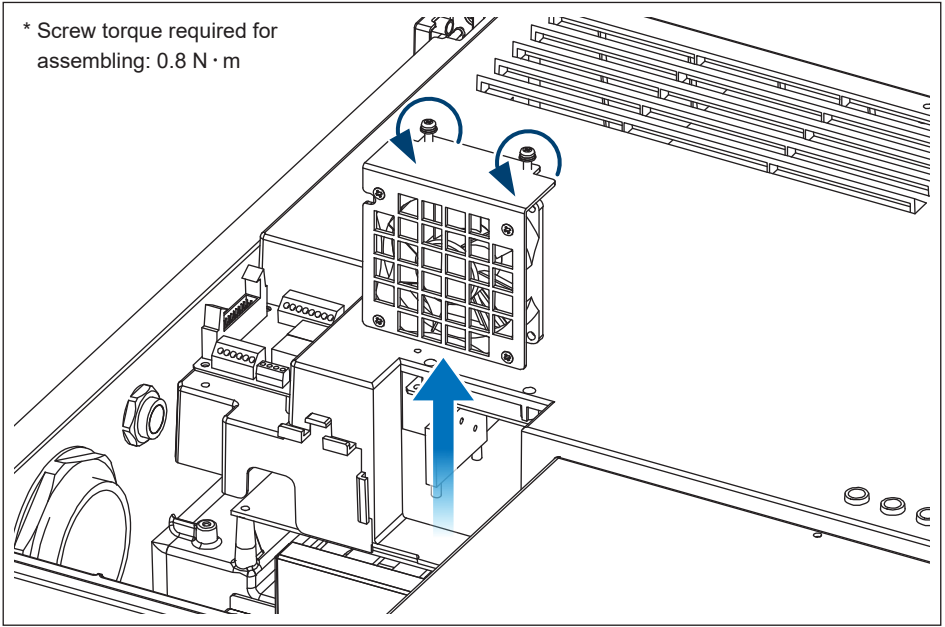


Figure 5-15: Take off the internal fan 2

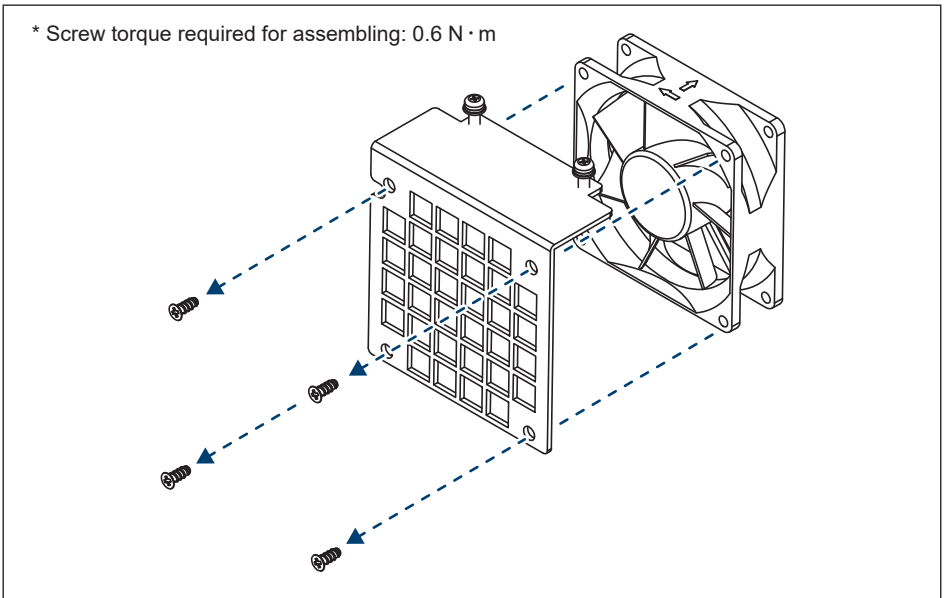


Figure 5-16: Replace with a new fan

5.5 De-Commissioning

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

DANGER : ELECTRICAL HAZARD!!



To avoid serious injury, please follow the procedure below.

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

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

■ RS-485 Communication module

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

CAUTION : HOT SURFACES, DO NOT TOUCH !



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

CAUTION : POSSIBLE INJURY !



M70A weighs more than 69 kg / M50A weighs more than 64 kg.
There is risk of injury if the inverter is carried incorrectly or dropped during transport or when attaching or removing it from the wall mounting bracket. Personnel should wear suitable gloves to protect against injury and maintain firm control of the inverter chassis

ATTENTION



Do not leave loosen screws and nuts inside the case.

6 Error Message and Trouble Shooting

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

6.1 Error Codes (Field Fault)

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

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

6.2 Fault Codes (Inverter Fault)

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

Message	Description	Action
DC Injection (F01,F02,F03)	Utility waveform is abnormal	Contact customer service for technical support
Temperature High (F05)	One of inner ambient NTC and inverter module NTCs is over high temperature limit	Check the installation ambient and environment
Temperature Low (F07)	One of inner ambient NTC and inverter module NTCs is under low temperature limit.	Check the installation ambient and environment
Amb Temp Fault (F06)	The ambient NTC temperature >90 °C or <-30 °C	Contact customer service for technical support
Inverter Temp Fault (F10)	The inverter NTC temperature >98 °C or <-30 °C	Contact customer service for technical support
AC Sensor Fault (F15)	DSP Iac or Vac sensor circuit defective	1. Check the polarity of PV connection (if the error code comes along with W08) 2. Contact customer service for technical support
Vdc Sensor Fault (F16)	DSP Vdc sensor circuit defective	Contact customer service for technical support
Idc Sensor Fault (F17)	DSP Idc sensor circuit defective	1. Check the polarity of PV connection (if the error code comes along with W08) 2. Contact customer service for technical support
AC Sensor Fault (F18)	Red Iac or Vac sensor circuit defective	1. Check the polarity of PV connection (if the error code comes along with W08) 2. Contact customer service for technical support
Idc Sensor Fault (F19)	Red Idc or Vdc sensor circuit defective	Contact customer service for technical support
Red COMM Fault (F22)	The internal communication connection is disconnected	Contact customer service for technical support
DSP COMM Fault (F23)	The communication connection is disconnected	Contact customer service for technical support

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

Message	Description	Action
Ground Cur. High (F24)	Insulation problem of PV array to ground	1. Check the insulation of Solar inputs 2. Contact customer service for technical support
Iac Unbalance (F26)	1. Power line is disconnected inside the inverter 2. Current feedback circuit is defective	Check the connection in AC terminal
RCMU Fault (F27)	RCMU circuit is disconnected	Contact customer service for technical support
AC RLY Short (F28)	Grid relay short	Contact customer service for technical support
AC RLY Open (F29)	Grid relay open	Contact customer service for technical support
Bus Unbalance (F30)	Voltage unbalance of DC link	Restart inverter by DC switches
Bus Voltage High (F31,F33,F35)	Voc of PV array is over 1000Vdc	Restart inverter by DC switches
AC Current High (F36,F37,F38 F39,F40,F41)	Surge occurs during operation	Contact customer service for technical support
AC CT Fault (F42)	Phase R CT is defective	Contact customer service for technical support
AC CT Fault (F43)	Phase S CT is defective	Contact customer service for technical support
AC CT Fault (F44)	Phase T CT is defective	Contact customer service for technical support
AC Current High (F45)	AC current over range	Restart the inverter by DC switches
Arc Circuit Fail (F58)	1. AFCI is not installed 2. AFCI self-test is fail	Check the AFCI detection circuit board for making sure it is connected correctly
Arc Detection (F59)	The inverter detects Arcing occurs	1. Check if there are any cable damaged at DC side. 2. Replace DC cable and unlock the ARC fault from DSS 3. Contact customer service for technical support

6.3 Warning Codes (Field Warning)

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

6.4 Warning Codes (Inverter Warning)

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

7 Technical Information

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

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

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

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

*4 Model for Korea: Idc max. /string =13A

*5 Ambient < 40°C

*6 Ambient < 40°C / Model for Korea is 50kVA (50kW when PF=1).

*7 Night time consumption with standby communication.

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

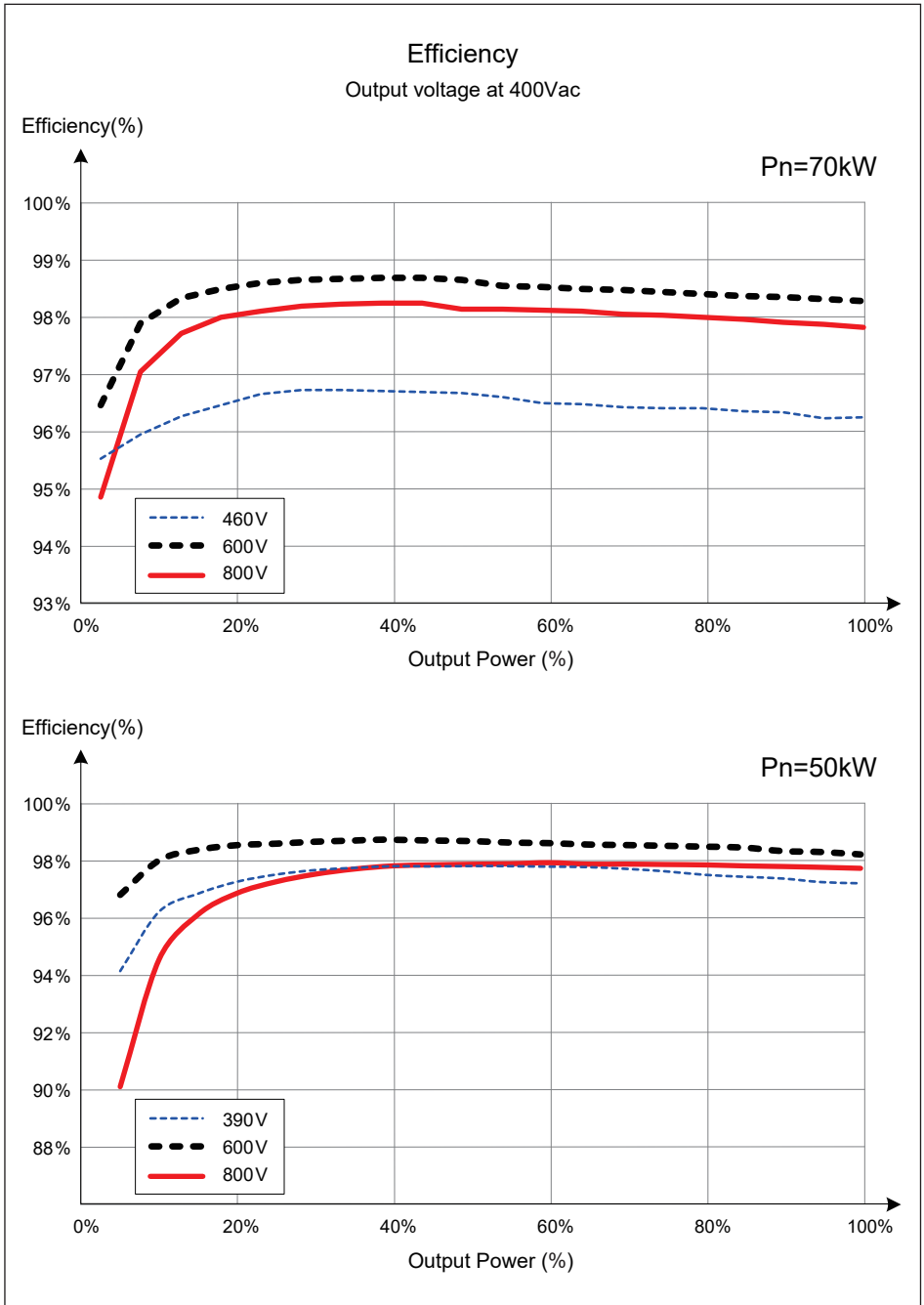


Figure 7-1: Efficiency Curve

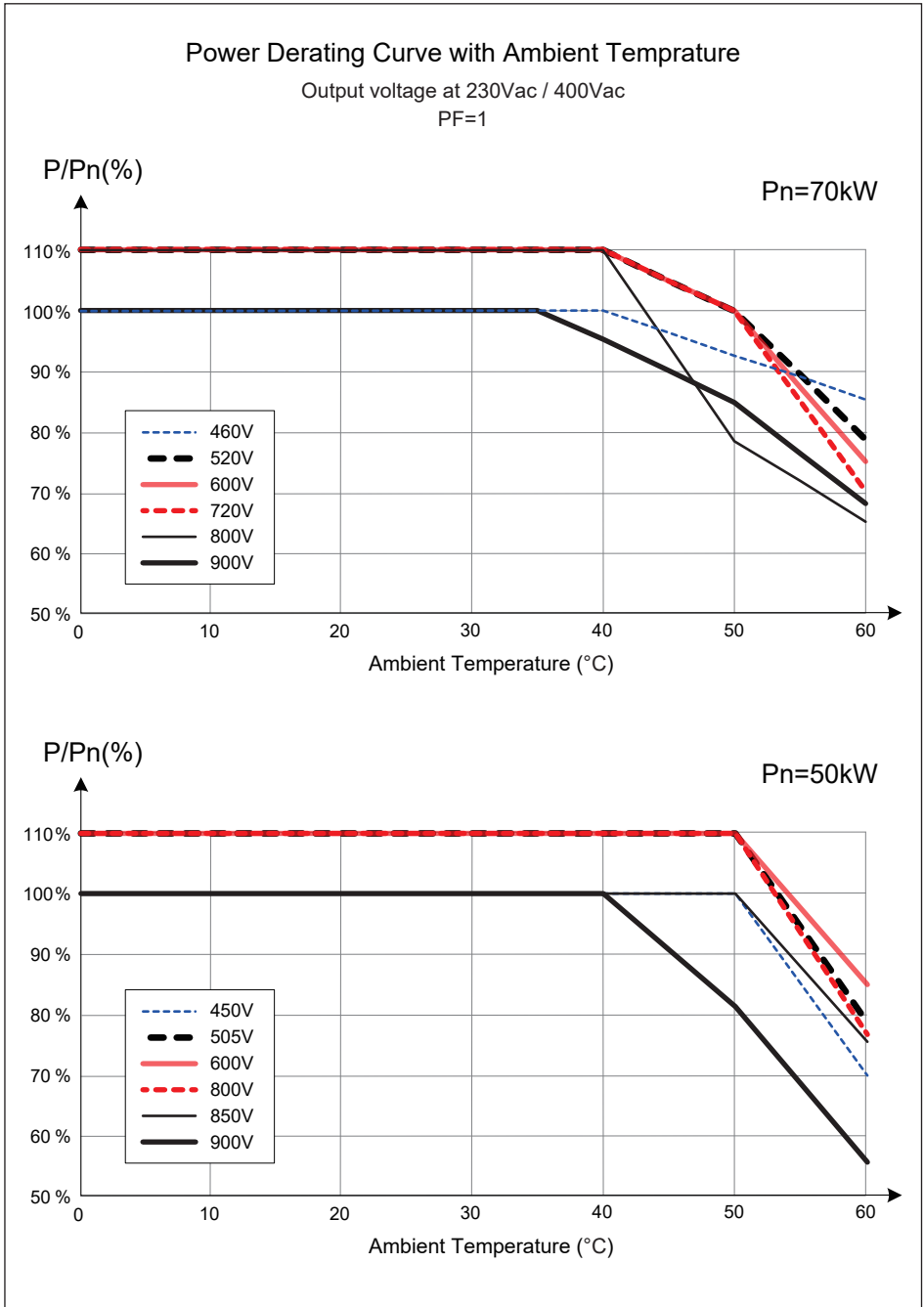
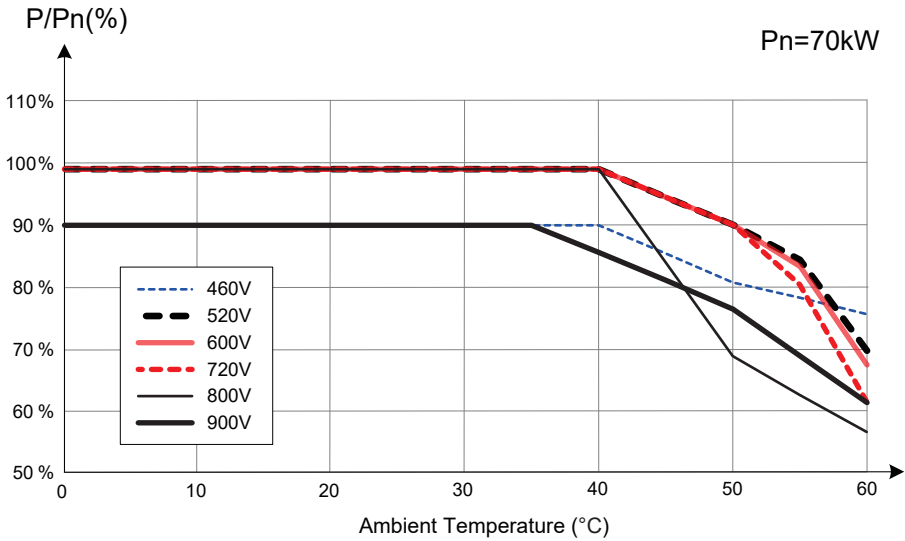


Figure 7-2: Power Derating Curve with Ambient Temperature (PF=1)

Power Derating Curve with Ambient Temperature

Output voltage at 230Vac / 400Vac
PF=0.9

Pn=70kW



Pn=50kW

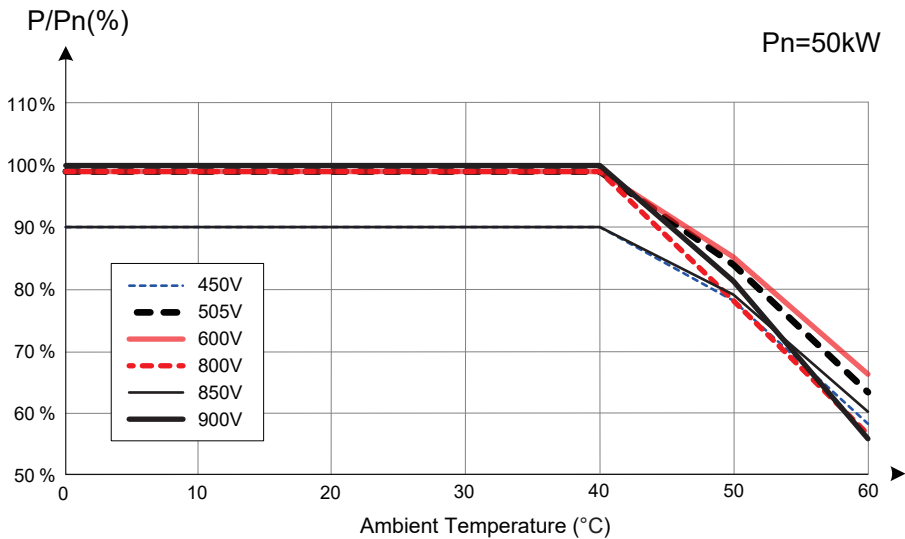


Figure 7-3: Power Derating Curve with Ambient Temperature (PF=0.9)

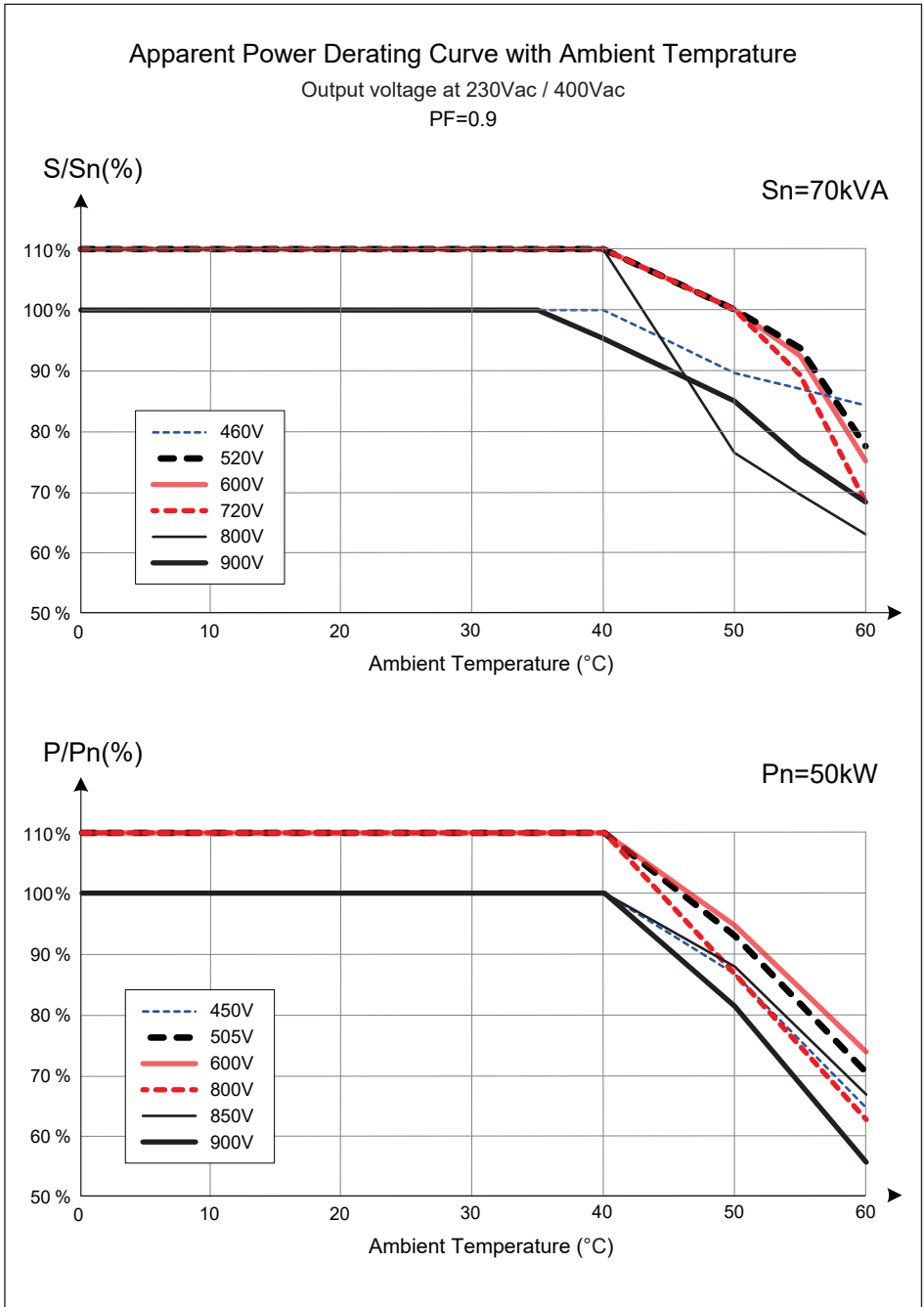
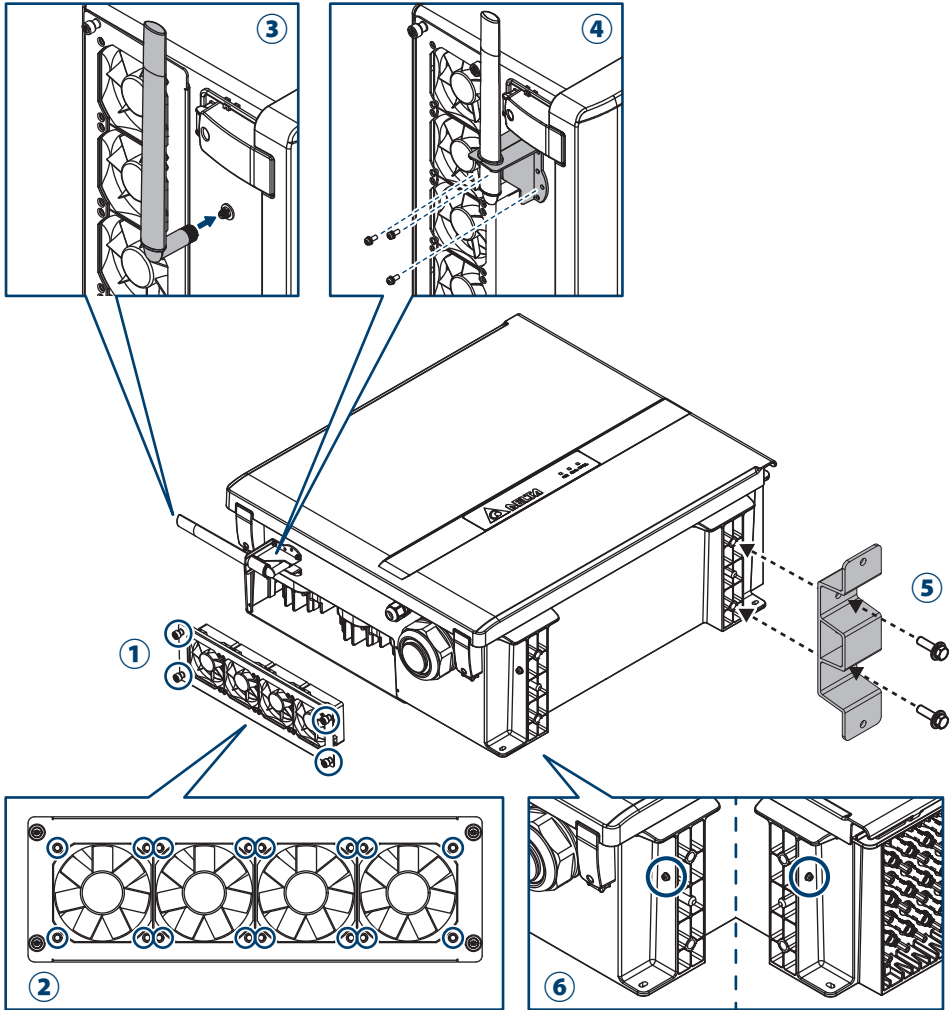


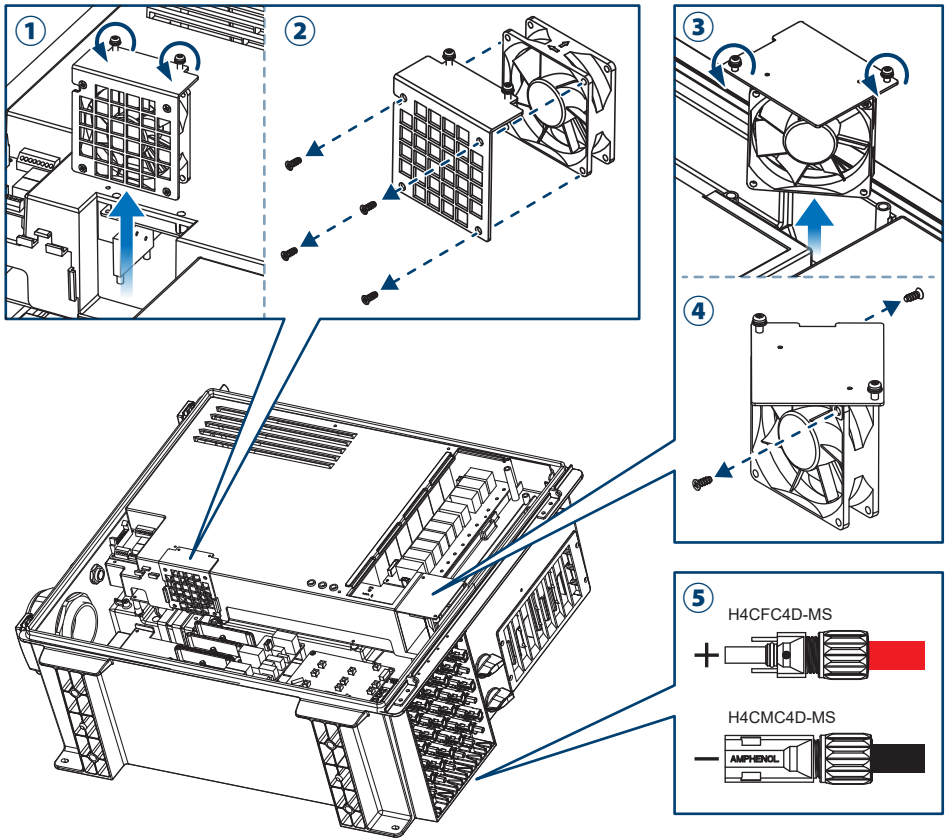
Figure 7-4: Apparent Power Derating Curve with Ambient Temperature (PF=0.9)

Appendix: Assembly Note



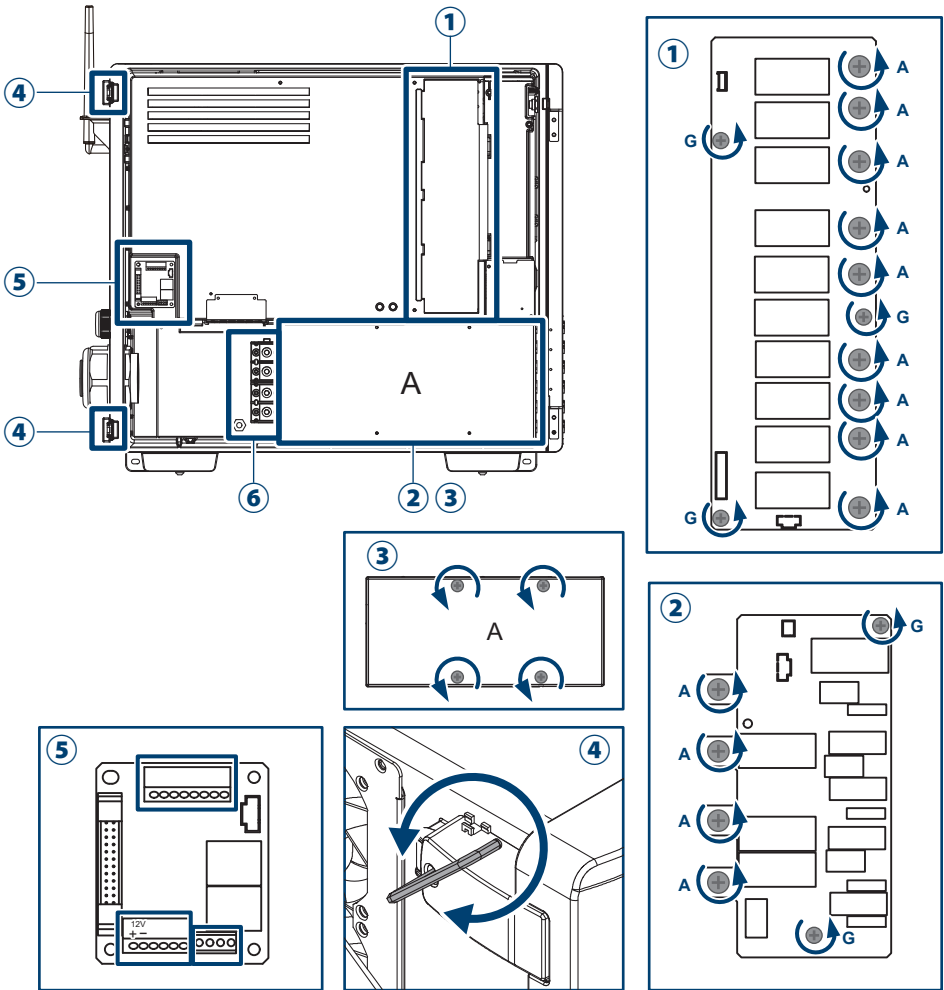
Appendix-1: Assembly Note-1

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



Appendix-2: Assembly Note-2

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



Appendix-3: Assembly Note-3

NO	Location	Screw torque	Conductor cross-section
1	DC SPD board	A: 25 kgf-cm (2.45N · m)	-
2	AC SPD board	G: 8.0 kgf-cm (0.8N · m)	-
3	AC Cover	8.0 kgf-cm (0.8N · m)	-
4	Toggle Latch	25 kgf-cm (2.45N · m)	-
5	Communication port	-	20 AWG (0.5mm ²)
6	AC terminal	L1, L2, L3, N	M70A: 317 kgf-cm (31N · m) M50A: 126 kgf-cm (12.4N · m)
		PE	150 kgf-cm (14.7N · m)
			M70A_260 Cu: 35 mm ² (1 AWG) ~ 120 mm ² (250 kcmil) Al: 60 mm ² (2/0 AWG) ~ 120 mm ² (250 kcmil) M50A_260 Cu: 25 mm ² (2 AWG) ~ 60 mm ² (2/0 AWG) Al: 35 mm ² (1 AWG) ~ 60 mm ² (2/0 AWG)



5013289600

Version 01210108