Operation and Installation Manual

Soleaf

DASSTECH Photovoltaic Grid-Connected Inverter

(Grid connected type Photovoltaic Inverter)

DSP-3334E-OD

Version 2.0

DASS Tech

Table of contents

1. Precautions for safety

1.1. Basics

- **Precautions for safety aim for safe and correct operation of the product by preventing accidents or hazards in advance.**
  Therefore, you must be kept at all times during operation.

- **The meanings of the figure symbols in the product operation and installation manuals are described as follows:**

refers to a symbol of precaution due to some risk occurred at a specific condition.

refers to a symbol of precaution due to some possibility of electric shock occurred at a specific condition.

- **Precaution is divided into two: Warning and Caution. The meaning of them are as follows:**

Warning : When an warning is violated, serious injuries or even death can occur.

Caution : When a caution is violated, minor injuries or product damage can occur.

- **Please after reading the operation and installation manual, store the manual in a place where all users can easily find and read.**

- **Please read the manual thoroughly to use the functions of the DSP series inverter fully and safely.**

1.2 Precautions while operating

⚠ Warning

- **Do not operate the product when the front cover is opened.**
  It can cause electric shock as the high-voltage terminals or live parts can be exposed.

- **Do not operate the switch with wet hands.**
  It can cause electric shock.

- **Do not open the cover when power is already on or during operation.**
  It can cause electric shock.

- **Even if power is not on, do not open the front cover except for regular inspection time.**
  Even under off-power, voltage can be charged in the internal capacitor of the inverter, which can cause electric shock.

- **Please check whether the direct current (DC) voltage of the inverter is discharged using a measurement tool such as volt-ohm-milliampere (VOM) after 20 min or longer from power off when wiring work or regular inspection is performed.**
  Since high voltage can be charged in the internal capacitor of the inverter, it can cause electric shock.

- **Do not use the product if the sheath of the cable is damaged.**
  It can cause electric shock.

- **Do not place a heavy object that gives excessive stress on the cable while using.**
  It can cause electric shock due to the damage on the sheath of the cable.

- **Do not supply power even if the installation is complete when part of the inverter is damaged.**
  It can cause electric shock.

⚠ Caution

- **Do not install the product near the flammable materials.**
  If the product is installed with flammable materials or attached near flammable substance, it can cause a fire.

- **Disconnect the input power (solar cells) and output power (AC system power) in the inverter during inverter failure**.
  If the power is not disconnected, it can cause a fire due to the secondary accident.

- **Do not touch the upper surface of the inverter enclosure during inverter operation.**
  The upper surface of the enclosure can be hot, which can cause a burn.

- **Do not touch the inverter while power is connected or within 30 min after power is disconnected.**
  Since the product is on a high-temperature, it can cause a burn when the product is contacted with human body.

- **Do not supply power even if the installation is complete when the inverter is damaged.**
  It can cause electric shock and additional part damage.

- **Do not have foreign substances such as screws, metal parts, water and oil get into the inside of the inverter.**
  It can cause a fire.

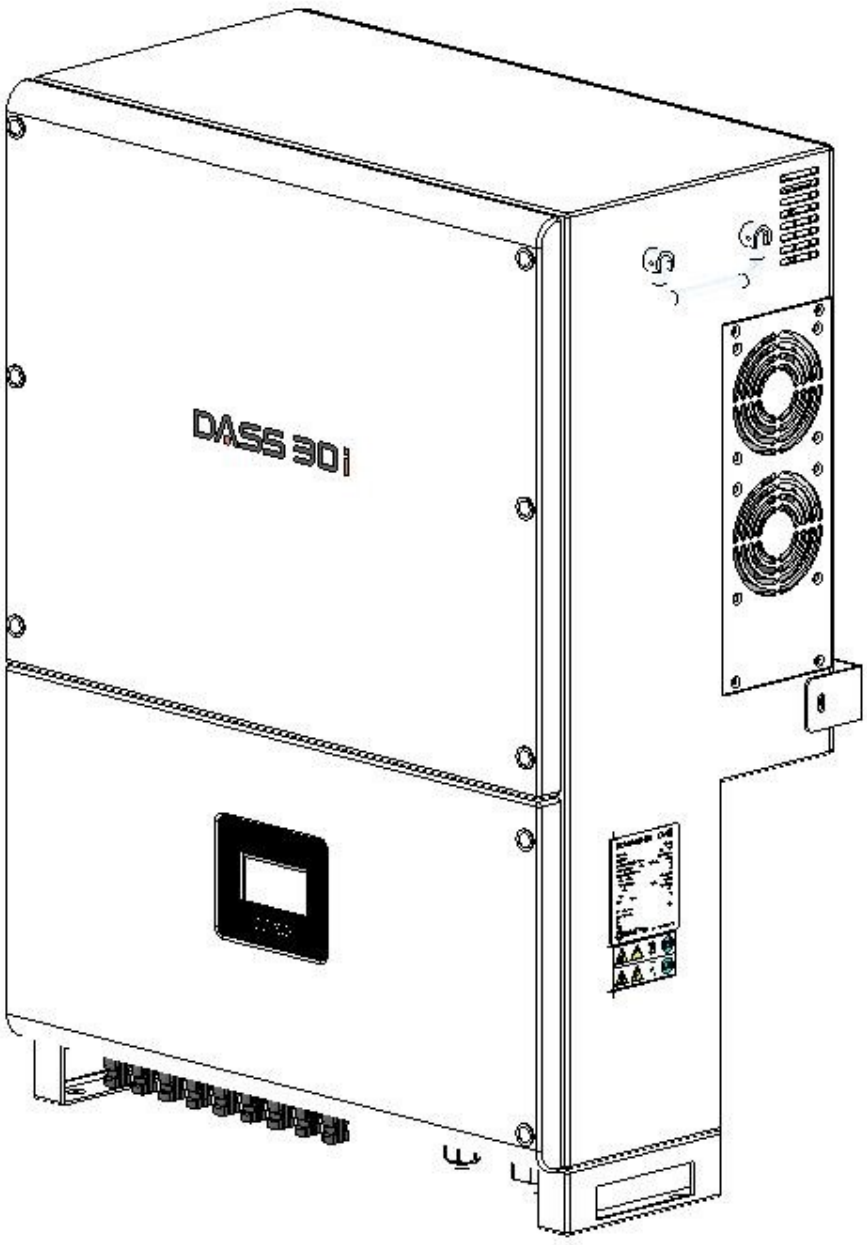
- **Keep the distance of at least 30 cm from the inverter.**
  It can risk health due to the emission effect.

2. Product Overview

2.1. Basics

If the inverter is operated incorrectly, it can prevent normal operation or reduce a lifespan of the product. In the worst case, the inverter can be broken or incur fatal damage to human bodies. Thus, please read carefully and understand thoroughly the operation and installation manual prior to the use.

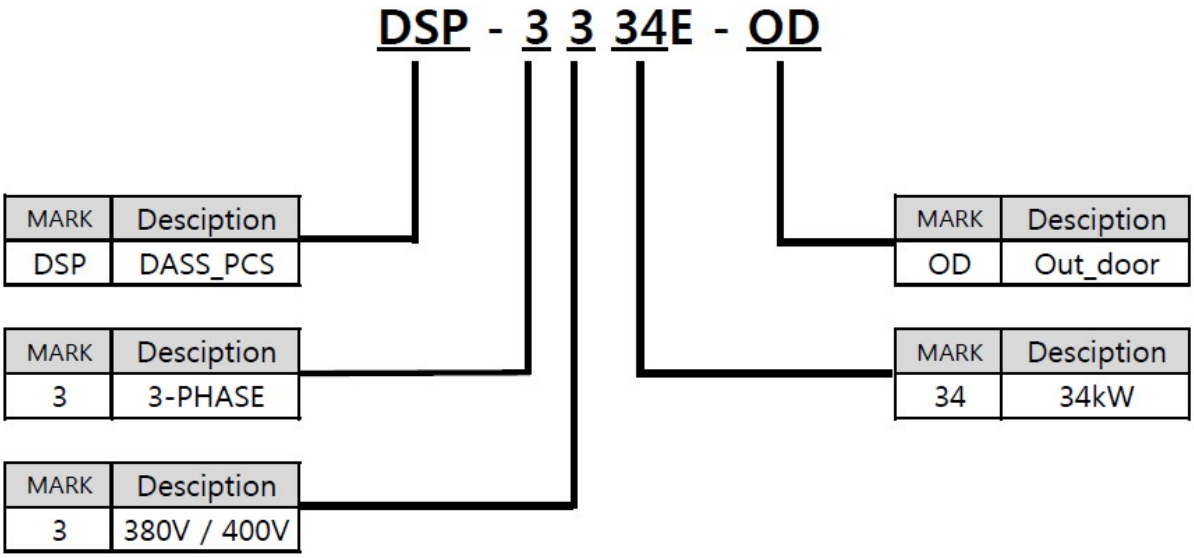
2.2 Appearance of the Product



2.3 Verification of the Product

Please check the name plate at the side of the main product body whether inverter type and rated output are matched with the ordered product details once the inverter is taken out of the packaging box. In addition, check whether there is any damage during transportation.

- Inverter Type
-

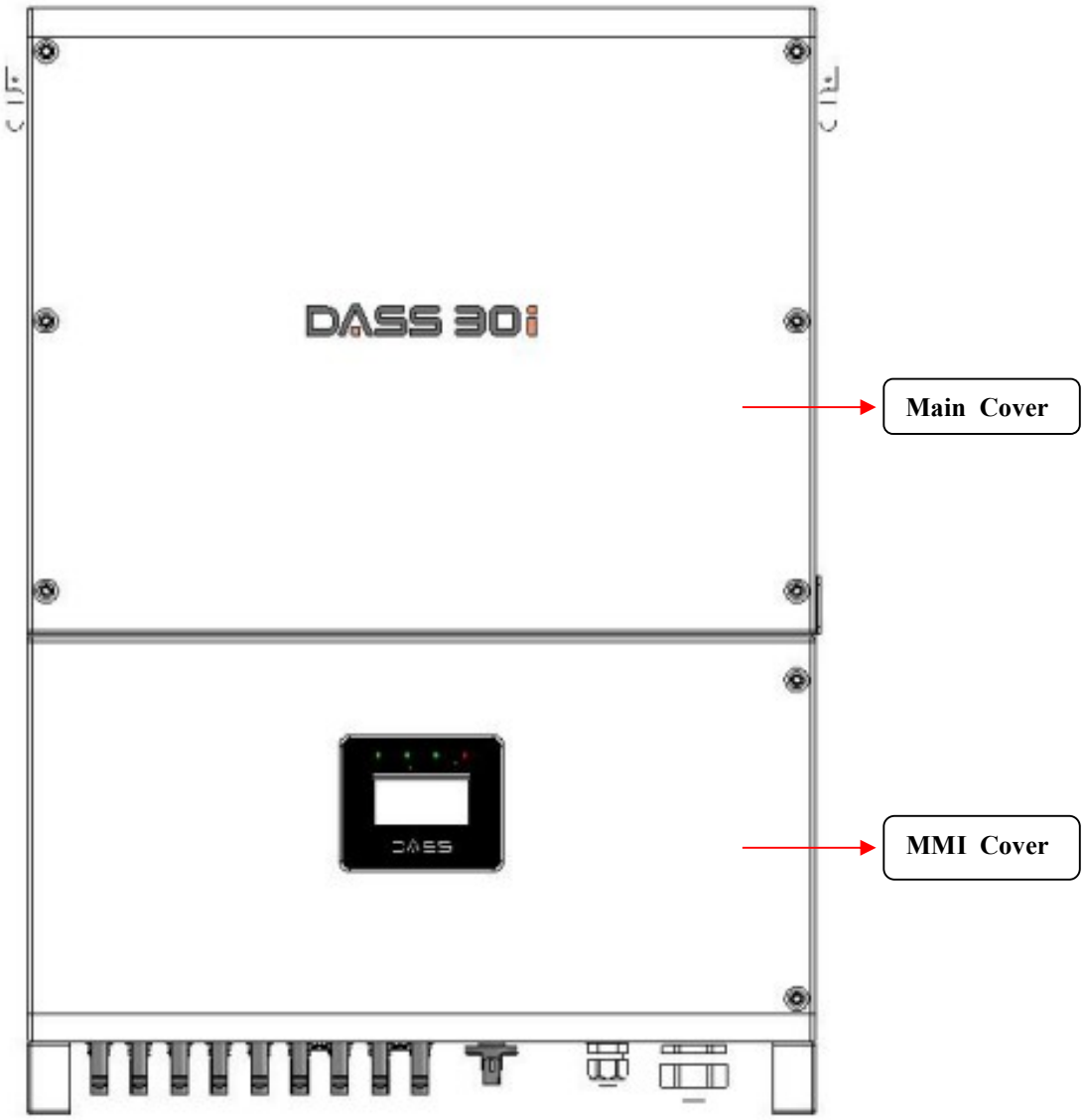


- Accessories/tools
  - Please contact the office if there are some missing accessories such as the operation and installation manual, input (DC) connector, fixed bracket, and bracket fixing bolt or the product is damaged.

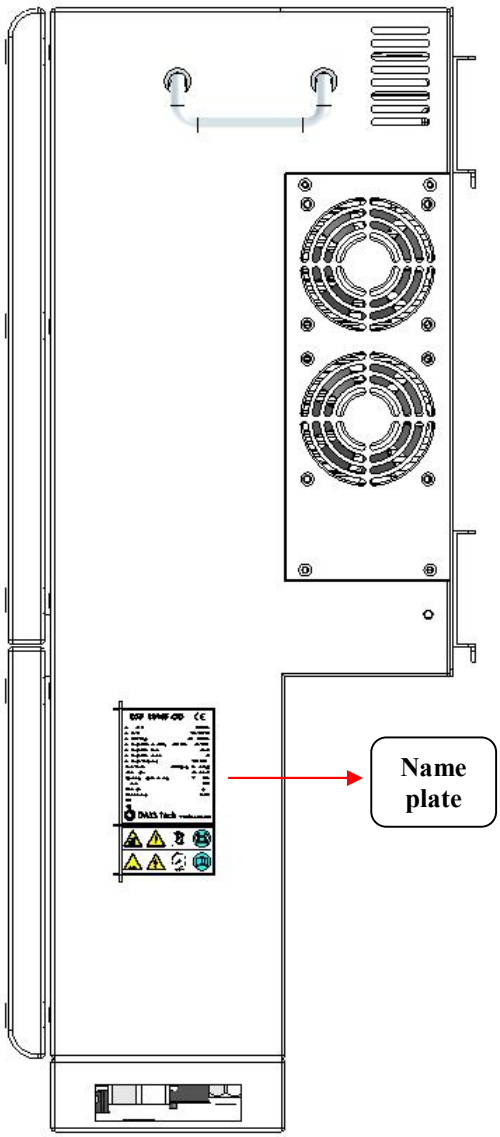
  - Depending on the operation field, necessary tools can be different and shall be prepared well. (e.g.: Multi-tester to check voltage and wiring, electric tools to install brackets etc.)

2.4 Configuration of the Product

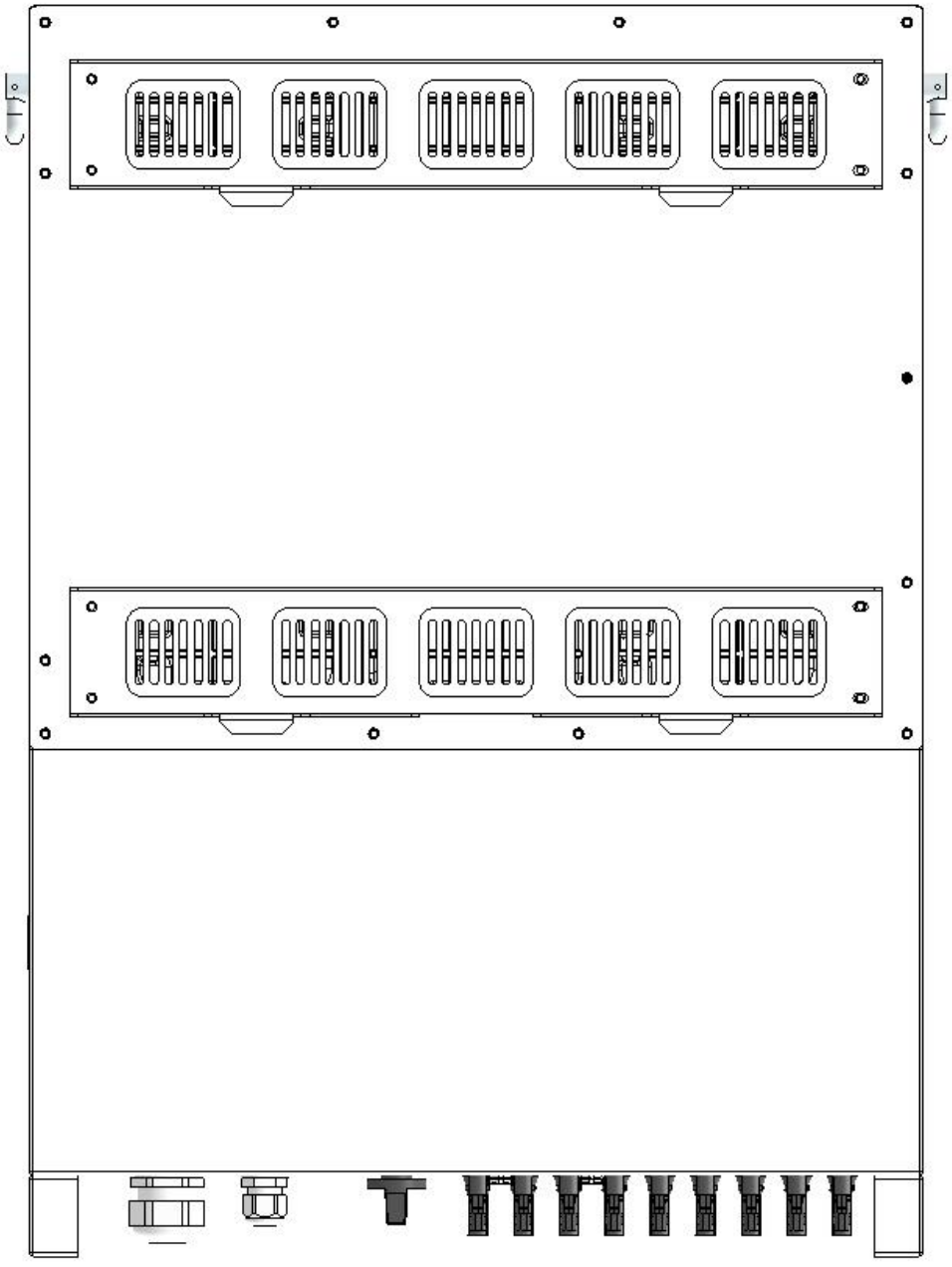
- Front view



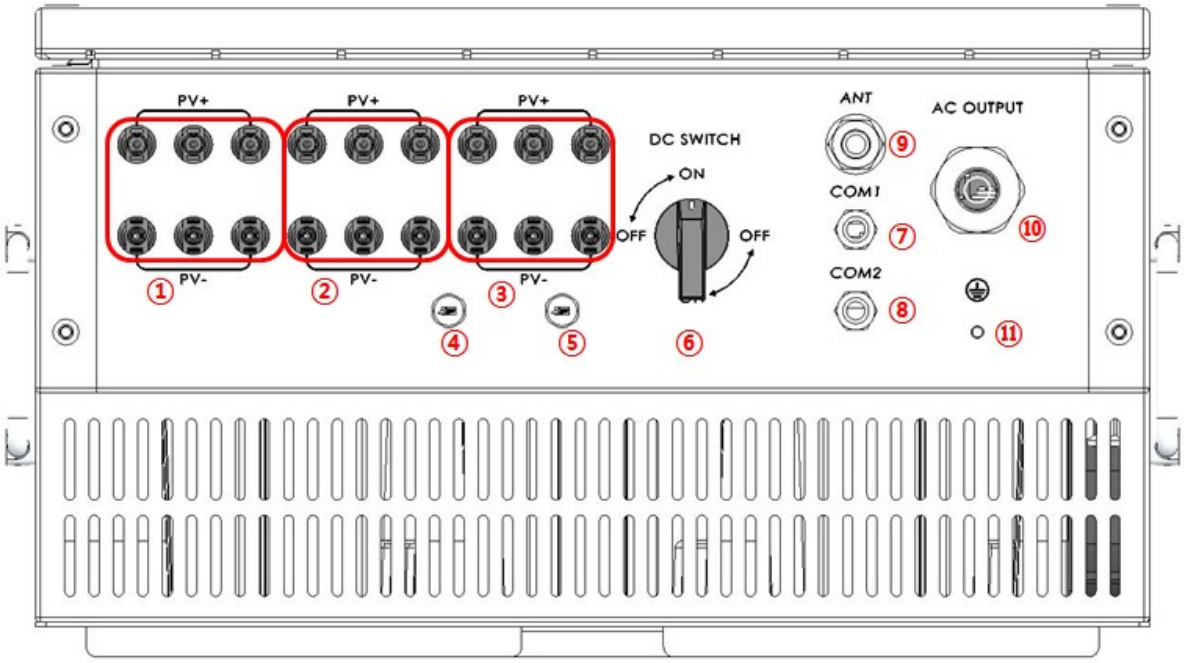
- Side view



- Rear view

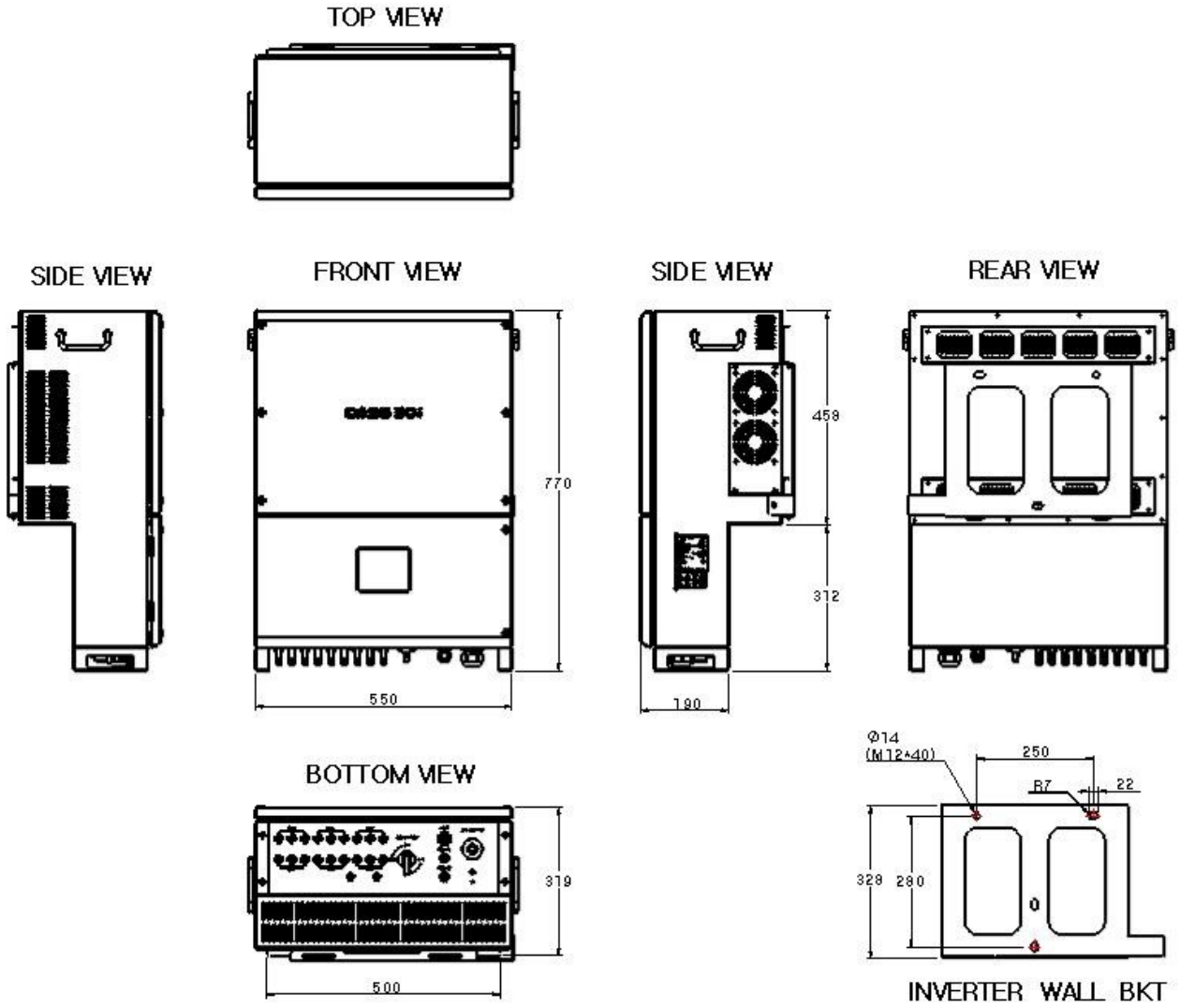


- Bottom view



Item	Name	Description
①	PV1 input port	PV1 connection terminal (3 terminals of + and -, respectively)
②	PV2 input port	PV2 connection terminal (3 terminals of + and -, respectively)
③	PV3 input port	PV3 connection terminal (3 terminals of + and -, respectively)
④	Protective vent	Pressure balance vent
⑤	Protective vent	Pressure balance vent
⑥	DC switch	DC on/off switch
⑦	RS-485 input	Communication RS-485 input part
⑧	RS-485 output	Communication RS-485 output part
⑨	Option port	Used when option is applied.
⑩	AC output port	Output AC cable grand
⑪	FG Terminal	Grounding terminal

2.5 Dimensions of the Product



2.6 Configuration of the Photovoltaic System

With arranging necessary equipment correctly, the inverter shall be connected well.
With the wrong system configuration and connection, it can cause abnormal operation or reduce a lifespan of the product seriously.
In the worst case, the inverter can be damaged and please use the product well according to the contents and precautions in the manual.

2.7 Features of the Product

- **High-efficiency power conversion(PWM)**
  PWM method with IGBT semi-conductor device is applied and the high-efficiency of 98% or higher can be achieved at the rated power.

- **Digital control**
  The system is controlled efficiently through the high-performance digital control and it can be checked through LCD keypad to monitor and display the operation of the inverter including input/output status, also fault conditions to terminate the operation.
  Also, by detecting a voltage in the solar module, the inverter is operated or terminated automatically.

- **Transformer-less inverter**
  As this outdoor type inverter is a transformer-less type, it is suitable for distributed power systems designed for a commercial scale generation.

- **Distributed power system and economic feasibility**
  The photovoltaic system can be installed anywhere where the sunlight is available. Thus, distributed power can be constructed at a level of building, house, or solar power plant, which can be used economically.

- **Maximum Power Point Tracking (MPPT)**
  Since the output characteristic of the solar cell is to generate, not uniform DC depending on temperature, humidity, climate, environment, and insolation, the inverter controls the solar cell module to maintain the maximum power point through the Maximum Power Point Tracking (MPPT) control.

- **Easy parallel operation**
  Once the capacity of the solar cell module is increased, the inverter can be added without additional equipment via parallel connection easily.

- **Simplicity of installation and operation**
  The solar cell and grid can be connected easily and safely by applying the use of exclusive connectors. The inverter is designed to display the status in real time through the front LCD screen.

3. Installation

3.1 Transportation

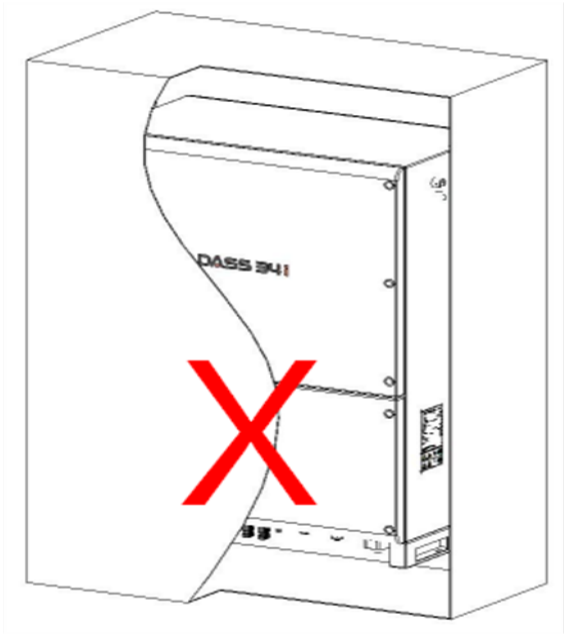
- Please transport the product correctly according to the weight of the product.
- Do not stack the product beyond the restricted limit.
- Always remember the weight of the inverters.
- Move the unit with the lifting device.
- The weights of the inverter and packaging box are 57 kg and 10 kg. Please carry the product with more than two persons.
- Do not open the front cover during transportation of the product.
- Please check the outer appearance of the product whether there are no fault appearances found.
- Do not drag or throw the inverter.
- Since the inverter is a precise apparatus, do not drop the inverter or give any strong impact.

3.2 Installation place

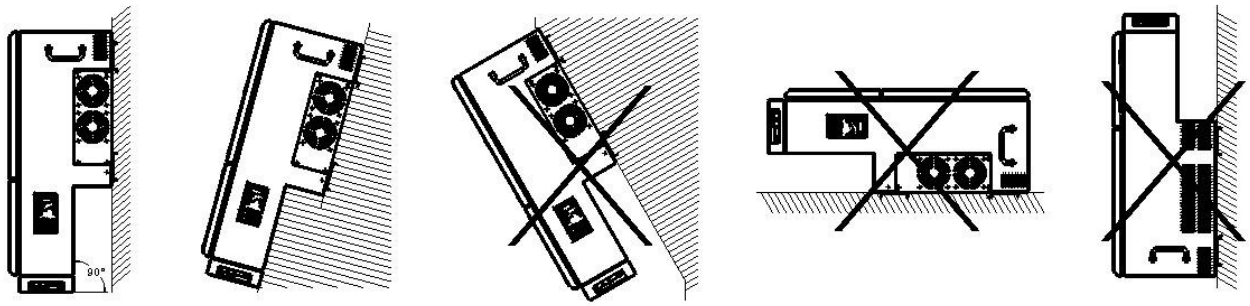
Please install the product at a place where the following conditions are met.

- The inverter should be installed at a place where there is no direct sun light considering installation direction or surrounding space to prevent reduction in lifespan or performance degradation.
- The product can be installed at indoor or outdoor place.
- The inverter should be installed at a well-ventilated place if it is installed indoor.
- Do not install the product at a vibrated place.
- Do not install the product where children can reach.
- Do not install the product in living area. Noise can be produced during running of inverter, which may affect your daily life.
- Do not install the product at the concrete wall as much as possible.
- A lifespan of the inverter can be affected by an ambient temperature. Please make sure the ambient temperature at the installed place does not exceed an allowable temperature (-25 – 50℃).
- Please avoid a place with high temperature and humidity (relative humidity is 90% or less and no dew formation).
- Since the inverter is high-temperature heating element, please install the inverter on the surface of fire retardant material.
- Please make sure facilitating heat dissipation by ensuring a space around the inverter.
- Please avoid the place where there are oil mist, flammable gas, fiber dust, dust, and moisture.
- Please install the product sturdily with the bolts.
- Please install the product at a place without salinity. (In particular, if the product is installed near the coastal area, product corrosion can occur. Thus, contact with salinity should be avoided using additional methods such as installing a additionls enclosure and indoor installation.)

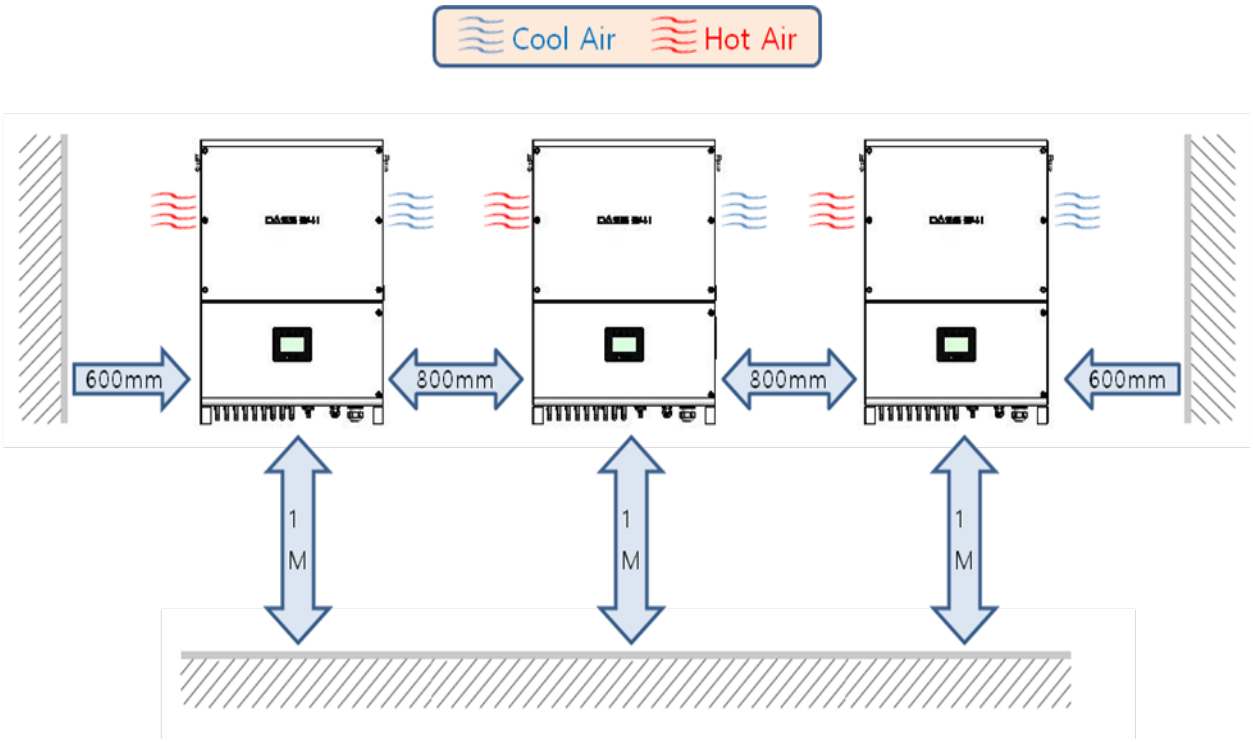
- Do not install the inverter in a closed cabinet. Otherwise, the inverter will not operate normally. It is necessary to make sure that hot air will be discharged by forced ventilation.



3.3 Cautions while installation



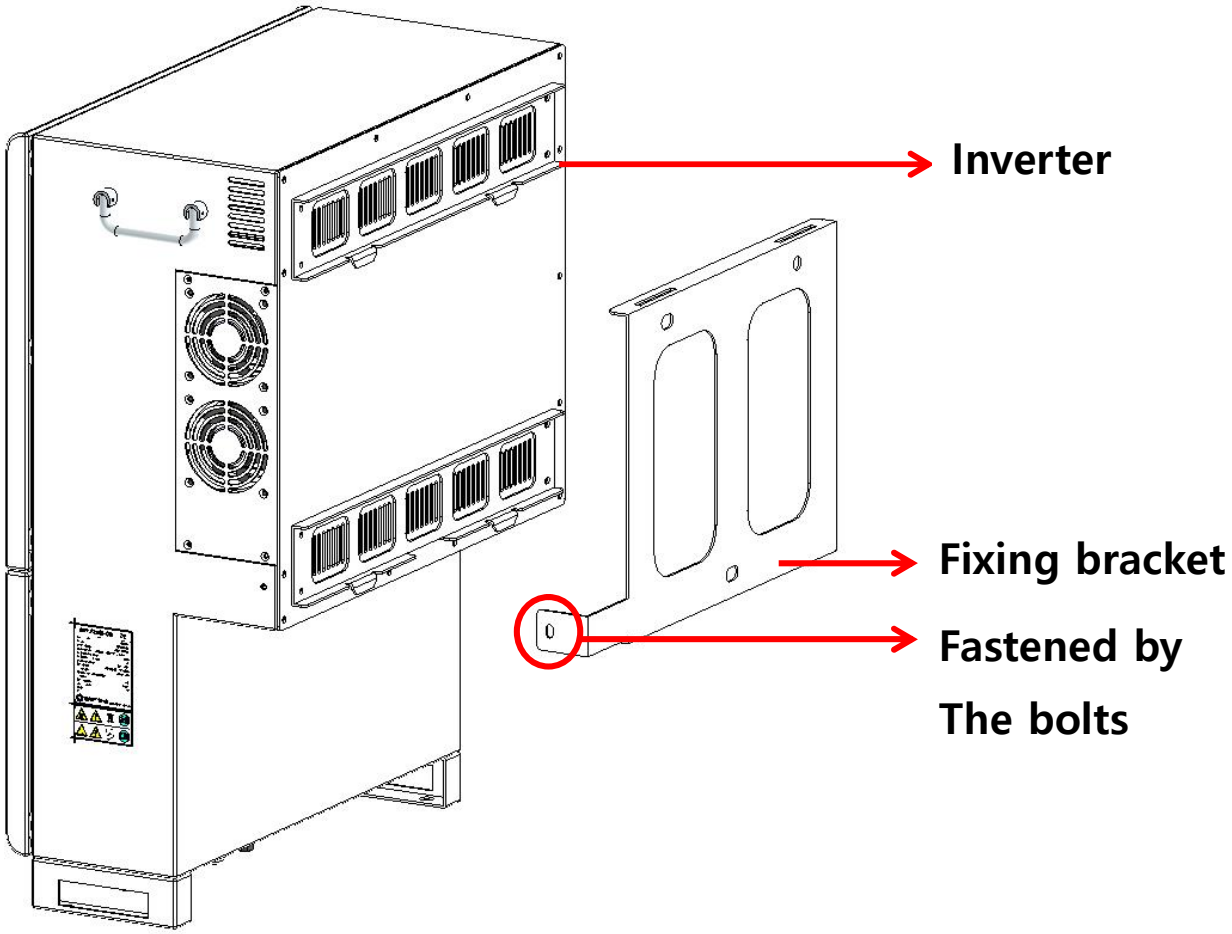
- Please install the product according to the contents in the manual.
- The installation place should be clean at all times and can be accessed safely without using auxiliary means such as lifting platform or foothold. Otherwise, service work may be limited.
- The connecting part (bottom surface of the inverter) should be directed to the below.
- Do not install the product at a tilted condition
- Do not install the product horizontally
- Please install the product at a place without high humidity and dust as well as direct sunlight, and the product should not be close to high-temperature heat-generating part. Generated power can be reduced due to overheating.



- At least 1M of space should be secured from the ground when the product is installed in the indoor or outdoor.
- Take enough space for convection into consideration during installing multiple inverters. It is suggested that position the multiple inverters in a staggered way if necessary.
- The installation work must be done by professional technician.
- Do not place a heavy object on the product.
- Do not spray or place flammable substances near the product.
- The installation direction must be followed in accordance in the information in the operation manual.
- Since the inverter is a precise apparatus, do not drop the inverter or give any strong impact.
- The inverter requires grounding work of 3-type (200 V grade) and special 3-type (400 V grade).
- Do not use other electronic appliances near the product. Failure or noise in the electronic appliances may occur.
- Do use the exclusive bracket only must and install carefully due to the sharp part.
- Prior to installing the inverter, DC switch installed at the lower end of the inverter should be OFF. If it is ON, it can be a cause of a failure during installation. Upon installation completion, the inverter should be ON then, make the inverter operated.

3.4 Installation method

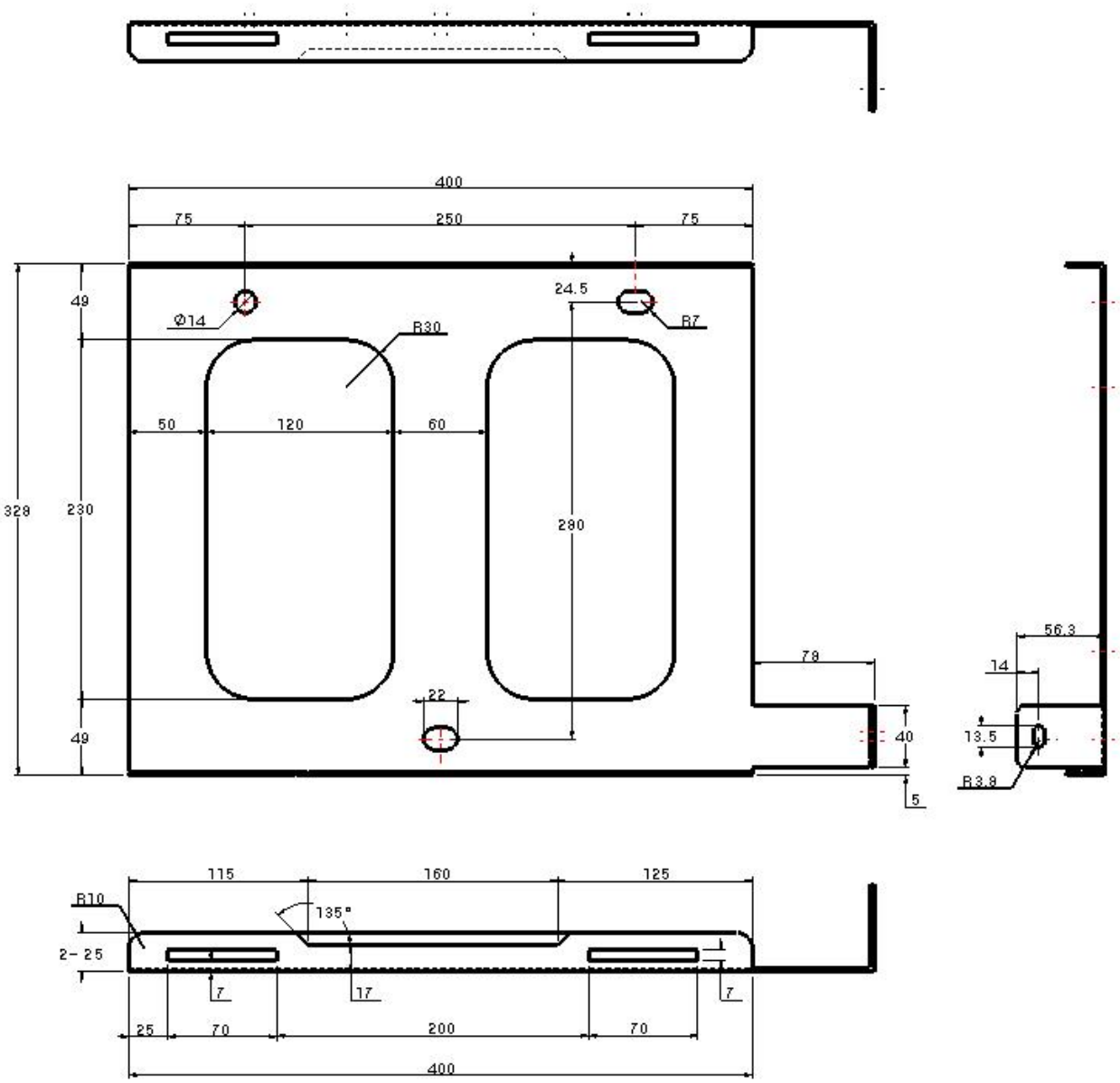
- Please refer to the below photo for the installation method.
- After the fixing bracket is installed, the inverter is placed on the bracket and fastened by the bolts.



- At least two persons must install the inverter during lifting or fixing it to the bracket.
- When two persons lift or fix the inverter to the bracket, two persons should hold the bottom part and heat sink panel simultaneously.
- Since a weight of the inverter is 56 kg, deal with it carefully, not to drop the inverter.

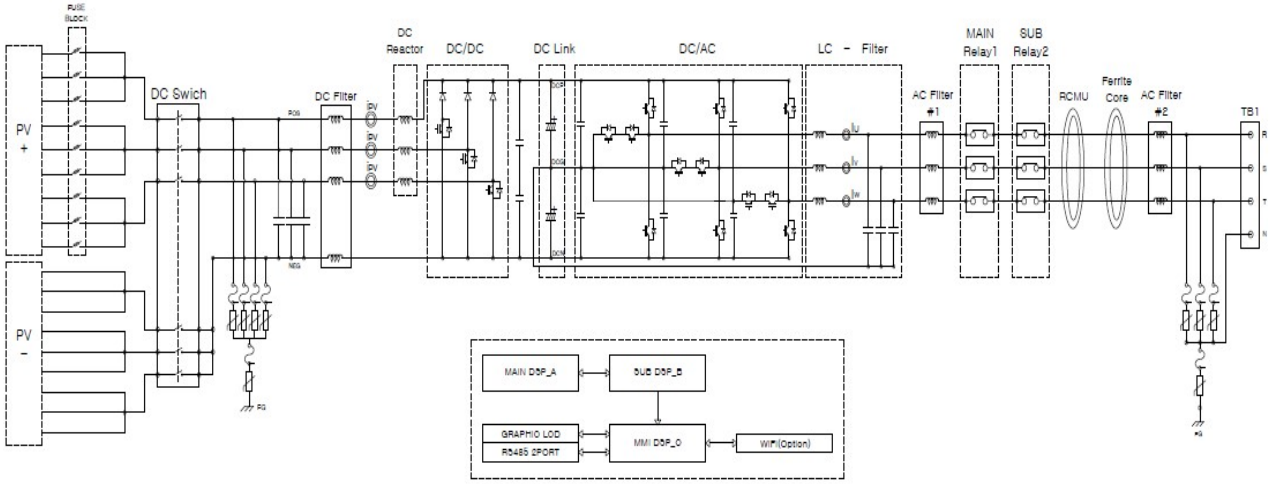
- Mark the locations of drill holes by using a fixing bracket (inner wall bracket) and bracket drawings provided along with the inverter.

- Please refer to the drawing as below to make holes (3 points) on the location for fixing a bracket.



- Fix the bracket by using bolts and nuts.
- After lifting the inverter, hang the inverter to the back of the bracket accurately.
- Grasp the equipment handles by both hands by means of handles.
- Fix the inverter and bracket (1 point).

3.5 Block diagram



34E Main Block Diagram

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3.6 Precautions during Wiring

- PV wiring is connected by using connectors. If connection isn't done accurately, the inverter and surrounding equipment can be damaged and do wiring carefully by considering this condition.
- There are 9 strings in DSP-3334E-OD maximally.
- Incorrect terminal connection can cause damage to the inverter.
- Please be careful for polarity (+/-) during DC connector connection.
- Distinguish carefully groundinng and power lines during connecting AC connectors.
- The wiring work or inspection should be done by professional technician.
- Wiring (connector connection) work should be done after installing the main body of the inverter.
- For input power, connect the **external [+] connector in the inverter to the bottom surface [+] connector** and external [-] connector in the inverter [-] to the bottom surface [-] connector in the inverter prior to power input. Be careful of damage due to incorrect wiring in the inverter.
- The external (+/-) inverter in the inverter is provided but cables are not provided separately.
- Do not disconnect the connectors during operation.
- If wiring is changed as a result of inappropriate events, check whether the LCD display of the keypad is turned off prior to wiring work. It is dangerous immediately after power is disconnected since high voltage is charged in the internal capacitor of the inverter.
- The inverter must be grounded with special 3-type (grounding resistance is 10 Ω or less) to prevent electric shock.

- For grounding wires, dedicated grounding wires should be used. The grounding points should be connected to the inverter as close as possible. A thickness of the wire should be more than the dimension in the below and wiring should be short as much as possible.

- Use copper wire for grounding cable.

Capacity	Grounding wire dimension (mm²)
1.5 – 3 kW	4.0
5 kW or higher	6.0
34 kW or higher	10.0

- Please check the maximum input voltage of the inverter and output voltage of the solar cell array. If the output voltage of the solar cell array exceeds the maximum input voltage of the inverter, critical damage can occur in the inverter.

- The output voltage must be set in consideration of temperature coefficient during wiring of the solar cell module. If the output voltage of the solar cell array is set without consideration of temperature coefficient, input over-voltage or low-voltage in the inverter can occur according to an ambient temperature.

3.7 PV Array Connection

- Before connecting PV array to inverter, the following electrical parameters must be met.

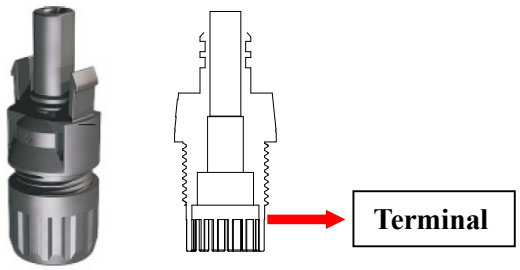
Total DC power limit	Max.open-circuit voltage limit for each input	Short-circuit cunnent limit
38000W	1000V	87A

- Considering the negative voltage temperature coefficient of PV cells, more attention should be paid to the open-circuit voltage of PV strings when the ambient temperature is the lowest.

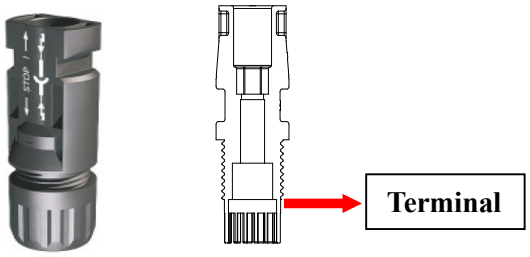
3.8 Configuration and installation of DC Connector

- Item

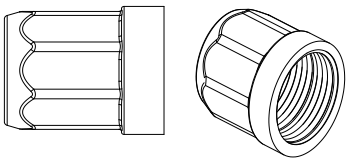
Inverter Outside connector



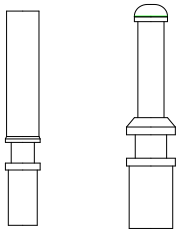
① (+) connector/internal configuration diagram



① (-) connector/internal configuration diagram



③ CAP: How to fasten during cable and terminal connection



④ Terminal used during the connection of cable and connector

Please note that + connector and - connector terminals are different.

- Installation

Process 1. How to connect dedicated terminals of [+] connector, [+] connector and PV cable

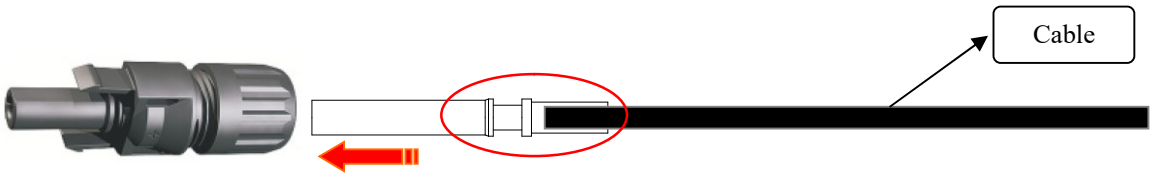
① 4SQ – 6SQ PV dedicated cable or CV cable is prepared.

② The sheath of the end in the cable is peeled off by 5 – 7mm.

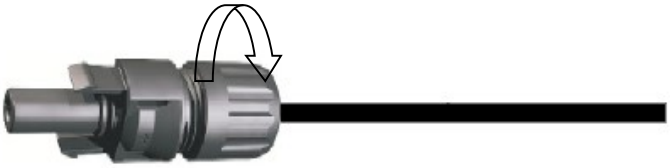
③ [+] connector dedicated terminal is prepared. [+] connector dedicated terminal is one whose **inner diameter (4mm) is large** out of two terminals [+] and [-] included in the inside of the packaging box.

④ The cable and [+] connector dedicated terminal are pressed against each other.

⑤ As shown in the figure, a terminal connected with the cable is pushed to the [+] connector to connect until the “click” sound.



⑥ The cable is tightened by rotating the waterproof plug at the end of the connector where the cable is connected at the clockwise direction.



Without rotating the waterproof plug, rain water may be introduced.

⑦ There are three input areas: "A", "B, and "C" in the inverter. Each of the areas can be connected up to three strings. Since up to nine [+] connectors can be connected, the number of strings needed as many as the required strings is prepared in the above ① – ⑥ process.

Process 2. How to connect dedicated terminals of [-] connector, [-] connector and PV cable

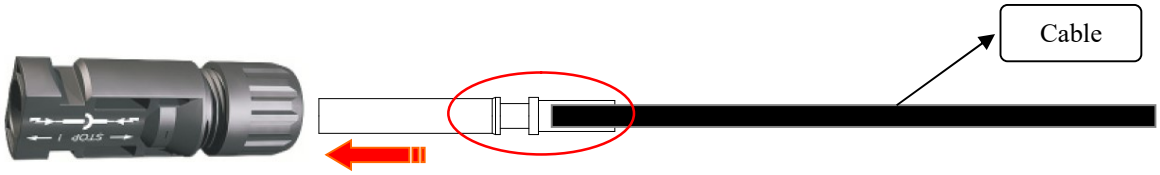
① 4SQ – 6SQ PV dedicated cable or CV cable is prepared.

② The sheath of the end in the cable is peeled off by 5 – 7mm.

③ [-] connector dedicated terminal is prepared. [-] connector dedicated terminal is one whose **inner diameter (2mm) is large** out of two terminals [+] and [-] included in the inside of the packaging box.

④ The cable and [-] connector dedicated terminal are pressed against each other.

⑤ As shown in the figure, a terminal connected with the cable is pushed to the [-] connector to connect until the “click” sound.



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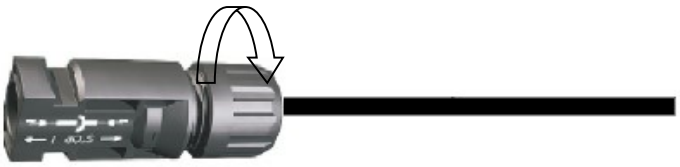
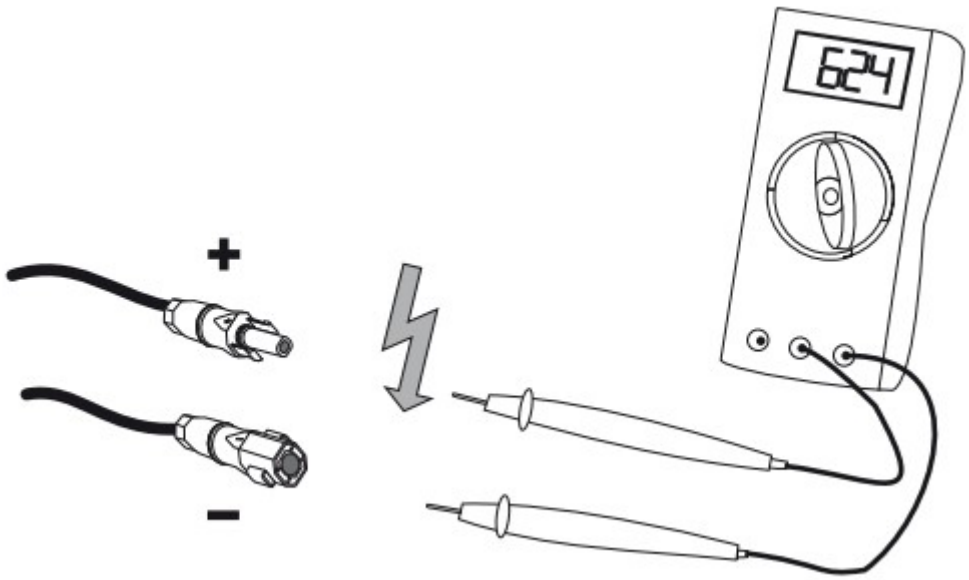


Without rotating the waterproof plug, rain water may be introduced.

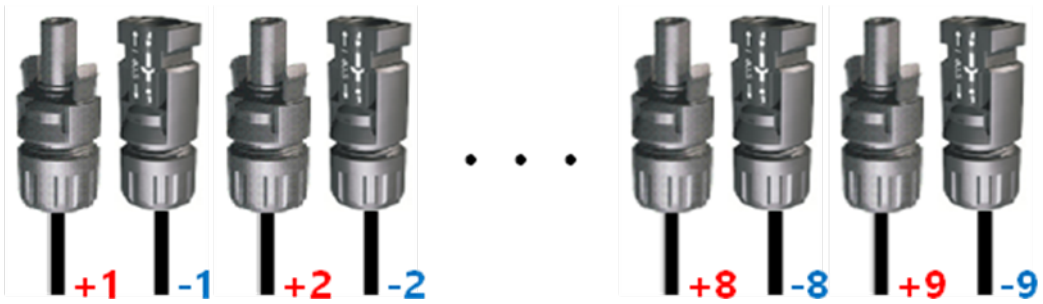
⑦ There are three input areas: "A", "B, and "C" in the inverter. Each of the areas can be connected up to three strings. Since up to nine [-] connectors can be connected, the number of strings needed as many as the required strings is prepared in the above ① – ⑥ process.

Process 3. Checking the polarity of the PV cable

① The polarity of the cable prepared through the above process 1 – 2 is checked.

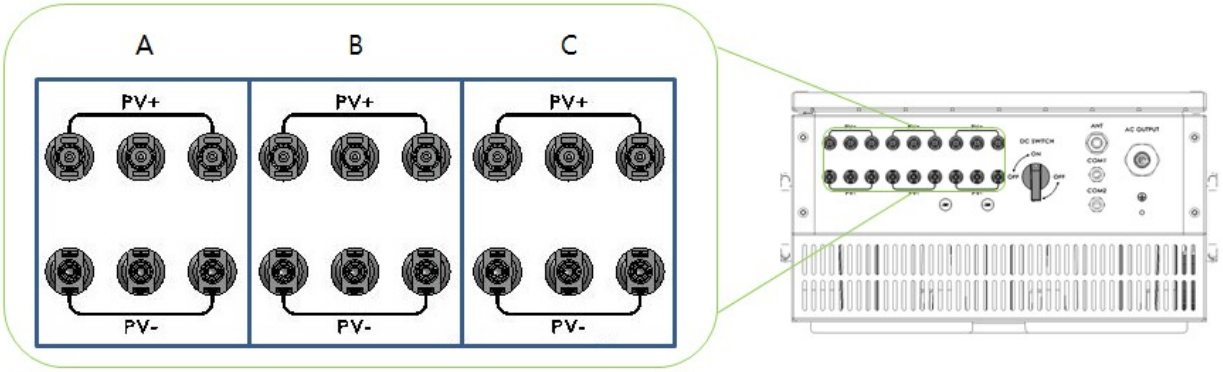


② While checking [+] and [-] polarity, number is marked in cable or connector for each string.



Please check whether polarity of the connection cable in the PV module is correct and the maximum input voltage of the inverter is not exceeded.
The open voltage should not exceed 90% of the maximum input voltage of the inverter at an external temperature of 10℃ or higher.
In such case, please check the system design and PV module circuit. Otherwise, the maximum input voltage can be exceeded at an external temperature of 10℃ or lower.

Process 4. How to connect the inverter and connector



<lower part of the inverter>

① There are three input areas: "A", "B", and "C" in the inverter. Each of the input areas has its own MPP tracker.

② Up to three strings can be connected to input area "A".

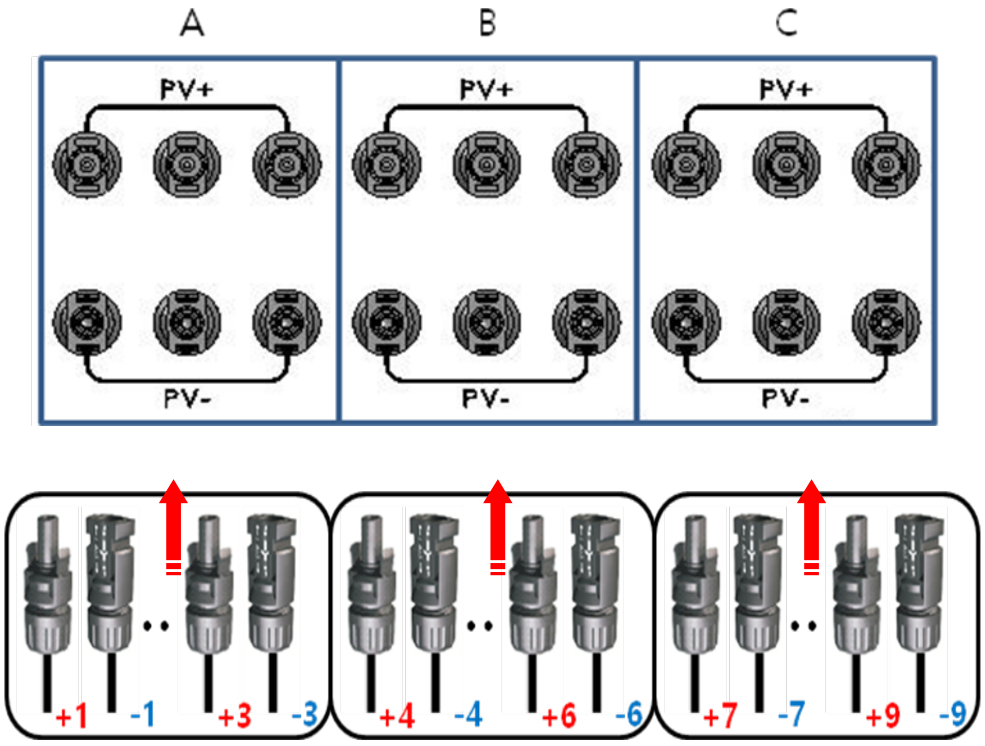
③ Up to three strings can be connected to input area "B".

④ Up to three strings can be connected to input area "C".

⑤ The PV module should satisfy the following requirements for each input area.
- Same type.
- Same quantity of PV module is connected in series.
- Same layout.
- Same tilt.

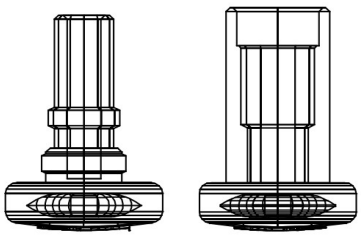
⑥ Please check the DC switch is off prior to the connector connection.

⑦ PV cables prepared in Process 3 are connected to each of the input areas.



⑧ During the connection to the connector, a connection should be made by pushing the cable until **"click" sound is made taking the polarity into consideration**.

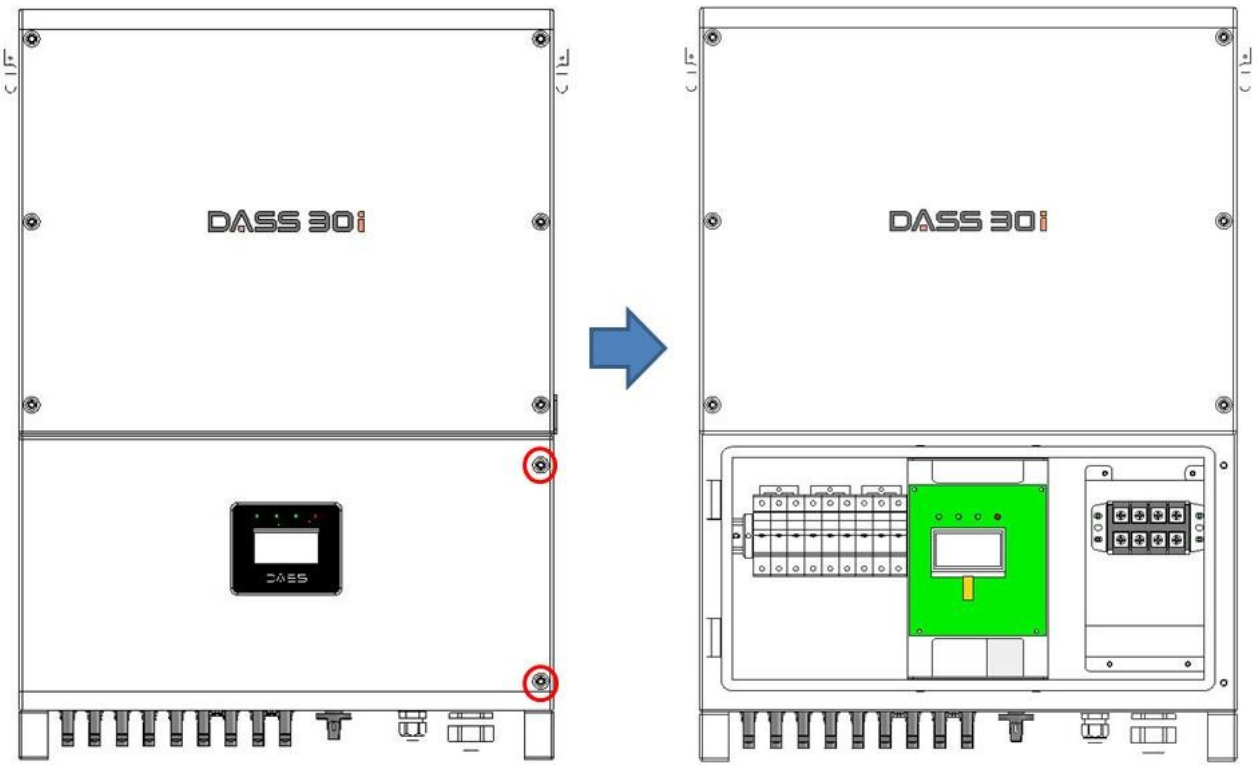
Please re-check the connection if the "click" sound is not made during the connector connection.
If the connection is not completely made, there may be arcing and fire risk.



⑨ If there are remaining connectors after a connector is connected to each of the input areas, cover the connector with the waterproof plug (included in the packaging box) as shown in the figure.

3.9 AC Connection and grounding connection

- **AC connection condition**
  - Residual current protection device: There is an integrated residual current monitoring device of electrode sensing mounted in the inverter. Therefore, the inverter can distinguish a residual current and normal line leakage current automatically.



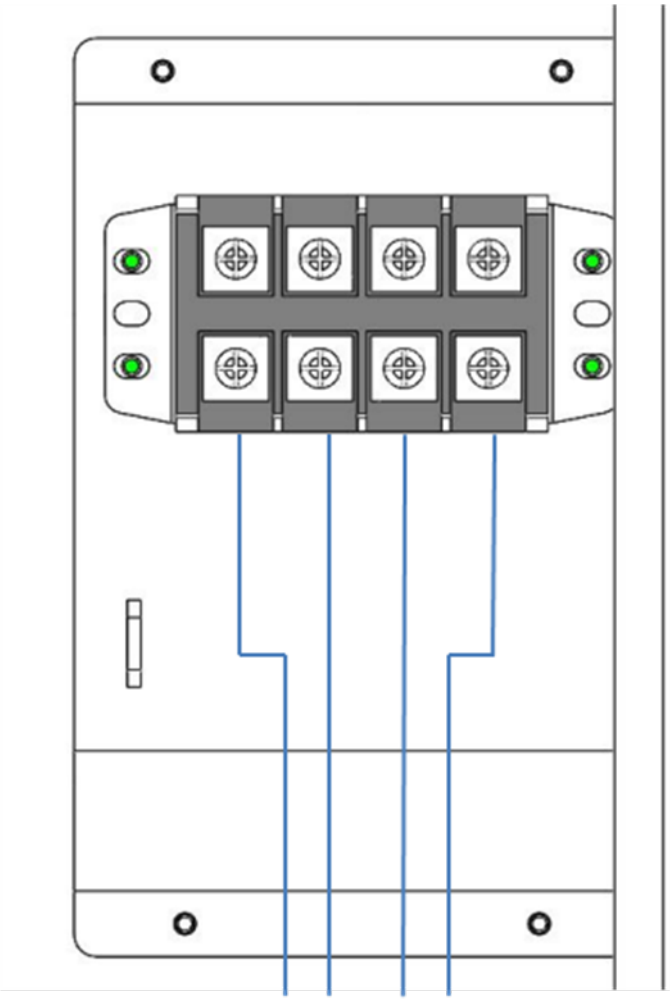
- **AC connection**

① The lower cover can be opened by loosening two bolts marked in the left figure.
② A terminal block is found at the right side if the lower cover in the inverter is opened.
③ Please use a wire of 16SQ – 25SQ when AC wiring is conducted. (Please change a wire thickness according to the length of wire.)

- **AC Circuit Breaker**

Inverter	Recommended AC circuit breaker
DSP-3334E-OD	75A

It is not allowed for several inverters to use one circuit breaker.
It is not allowed to connect loads between inverter and circuit breaker.



④ An order of the terminal block is R, S, T, and N from the left side.

⑤ The rated dimension of the terminal connected to the terminal block is 6 pi.

⑥ When the cable is connected to the terminal block, care should be taken that the cable and terminal do not have a phase-to-phase short-circuit among R, S, T, and N.

⑦ Please fasten the plug of the cable grand after all wiring is done.

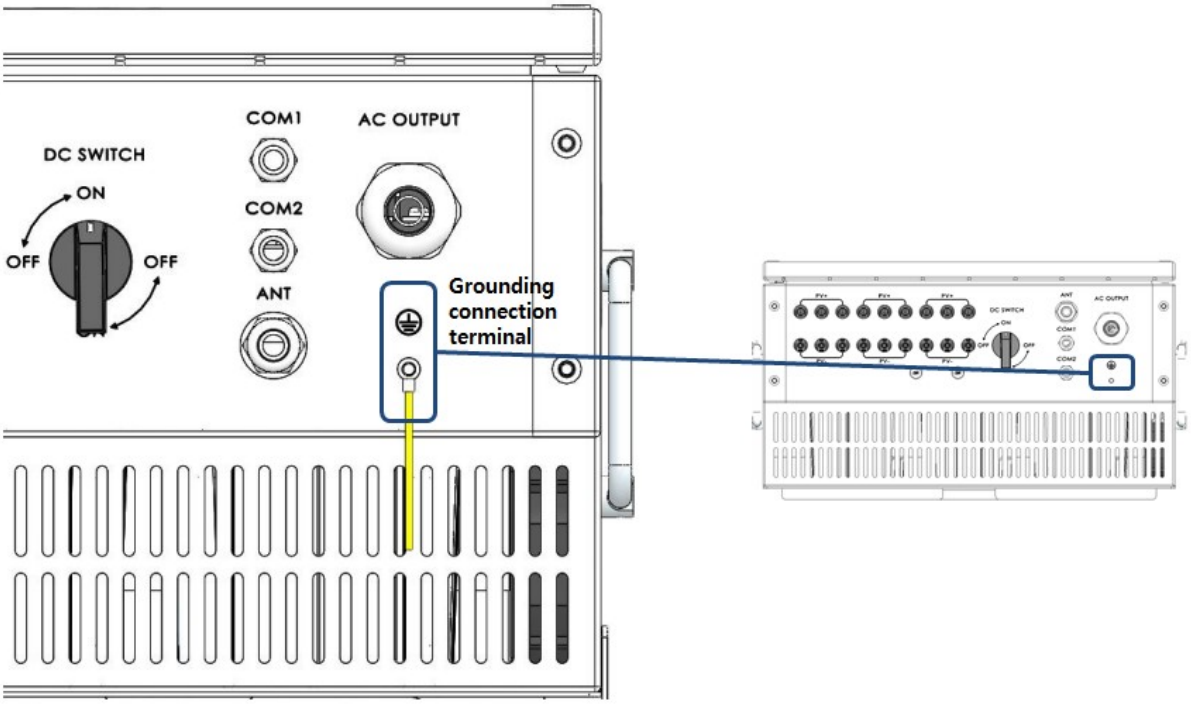
In case of negative phase, a letter of phase reverse appear at the right upper end of the LCD in the keypad when PV power and AC power are applied and it is not counted.
For safety reasons, all power is disconnected and AC cables are re-wired.

- **Residual Current Device**

With an integrated comprehensive residual current monitoring unit inside, the inverter is able to distinguish the fault current from normal capacitive leakage current. Inverter will disconnect from the grid as soon as a fault current of more than limit value is detected.

If an external RCD or residual current breaker is installed, the switch should be Triggered when the fault current is 300mA or higher.

- **Grounding connection**



① Please use dedicated grounding wires when grounding wire is done.

② Use copper wire for grounding cable.

③ A thickness of grounding wire should be 10 mm or thicker.

④ Please press a terminal against the grounding wire and then connected to the grounding connection terminal at the right side of the inverter.

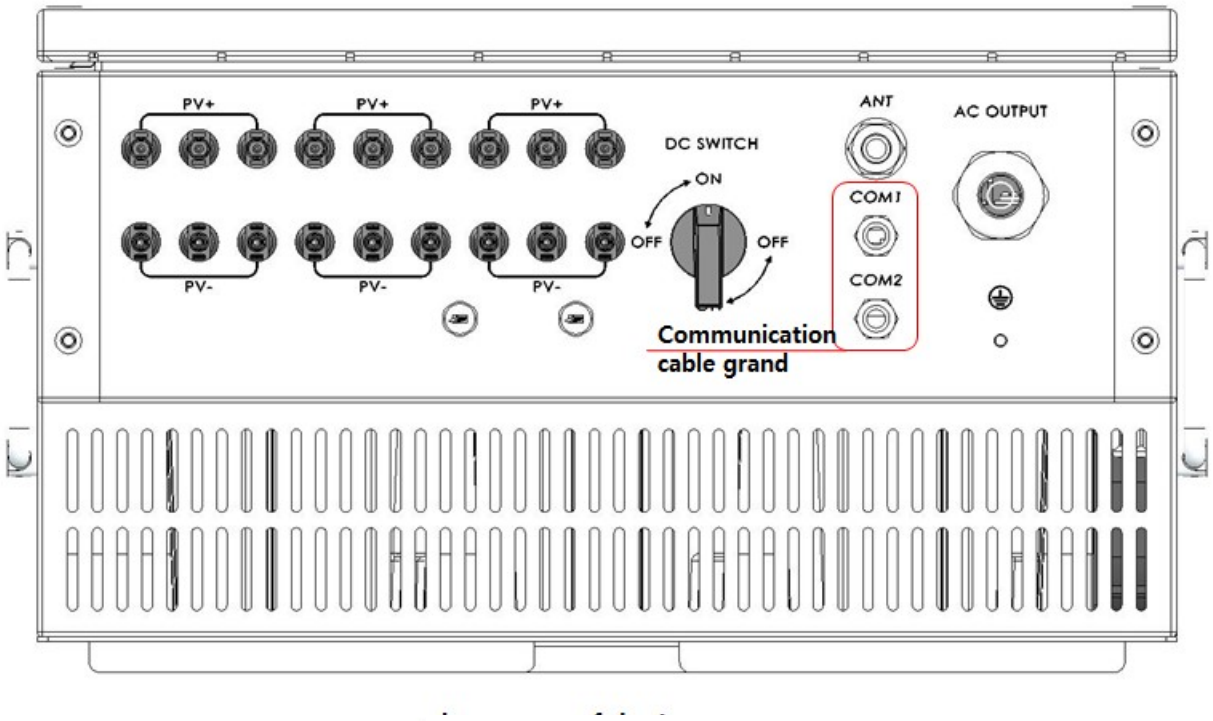
⑤ A rated dimension of the terminal is five pi.

⑥ The grounding points should be connected to the inverter as close as possible.

⑦ The inverter must be grounded with special 3-type (grounding resistance is 10 Ω or less) to prevent electric shock.

Use copper wire for grounding cable.
Calbe with minimum cross dimension 10 mm²

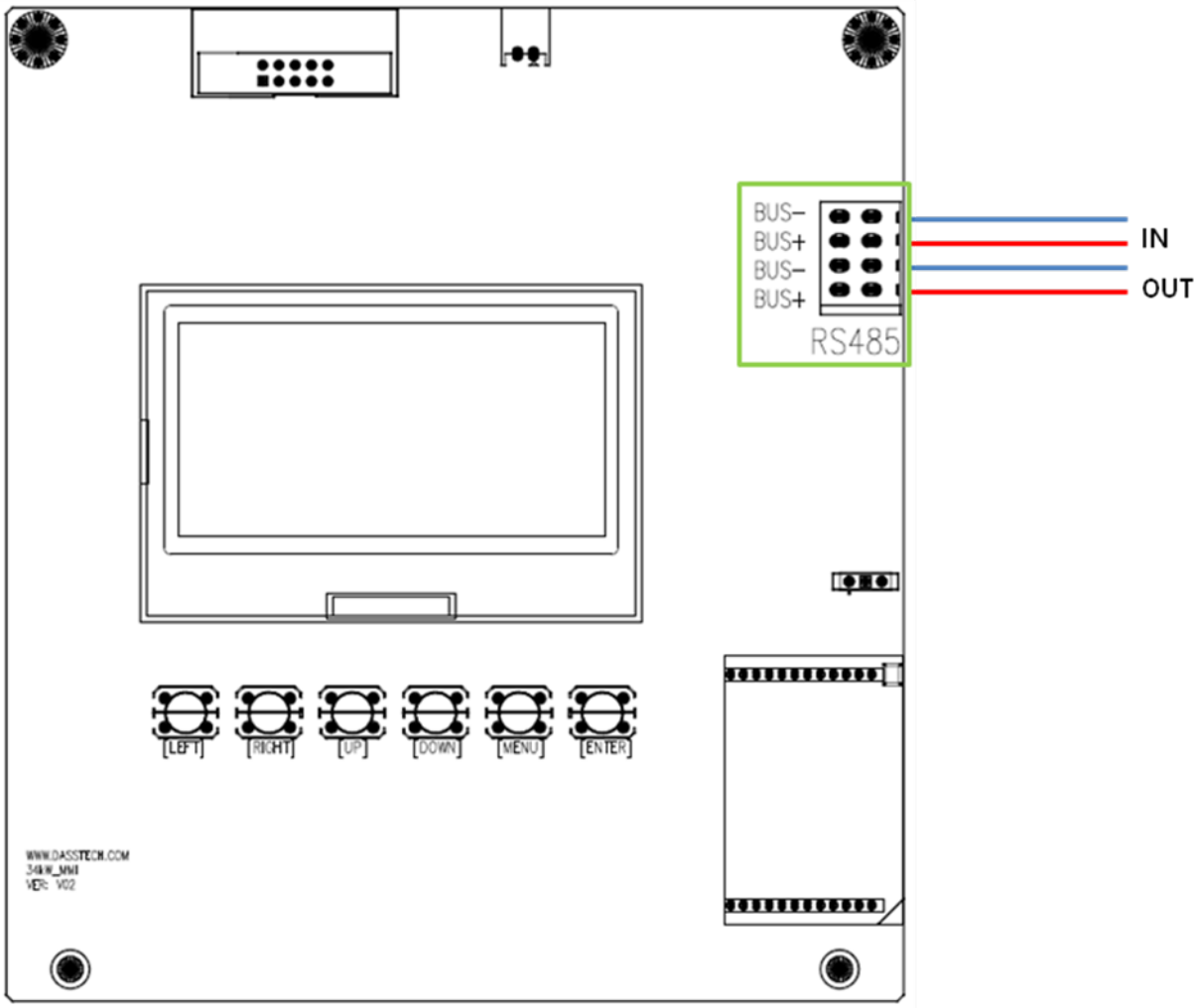
3.10 485 communication connection



<lower part of the inverter>

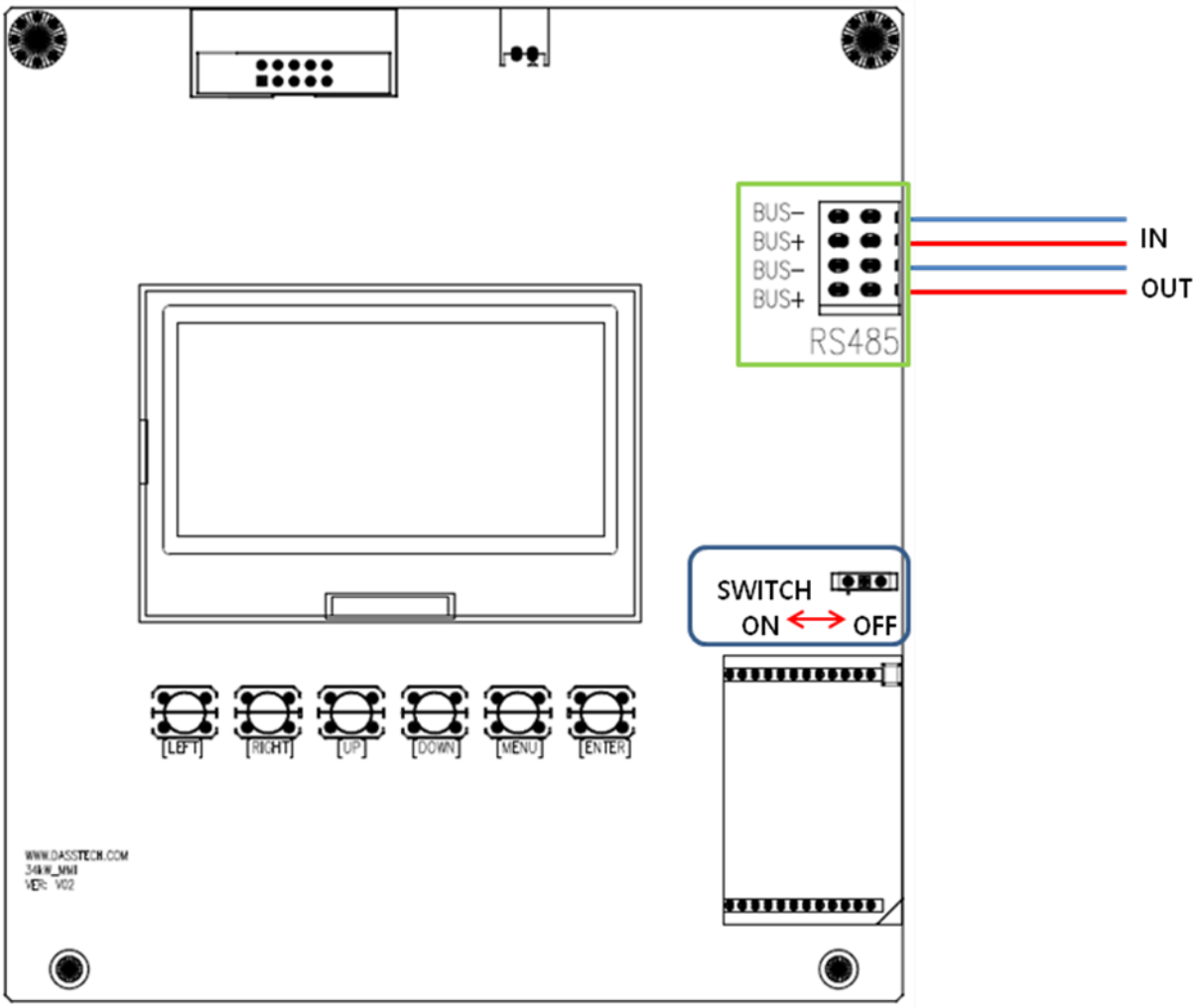
① When the inverters are connected in parallel, please use two communication cable grands.

② Open the lower cover in the inverter.



③ After the communication power line (3–6.5mm) is passed through the cable grand, communication lines [+] and [-] are connected to the BUS+ and BUS- of the RS485 connector at the right upper end of the keypad.

④ During parallel connection of the inverter, 485 communication is connected in parallel using 485 IN and OUT.



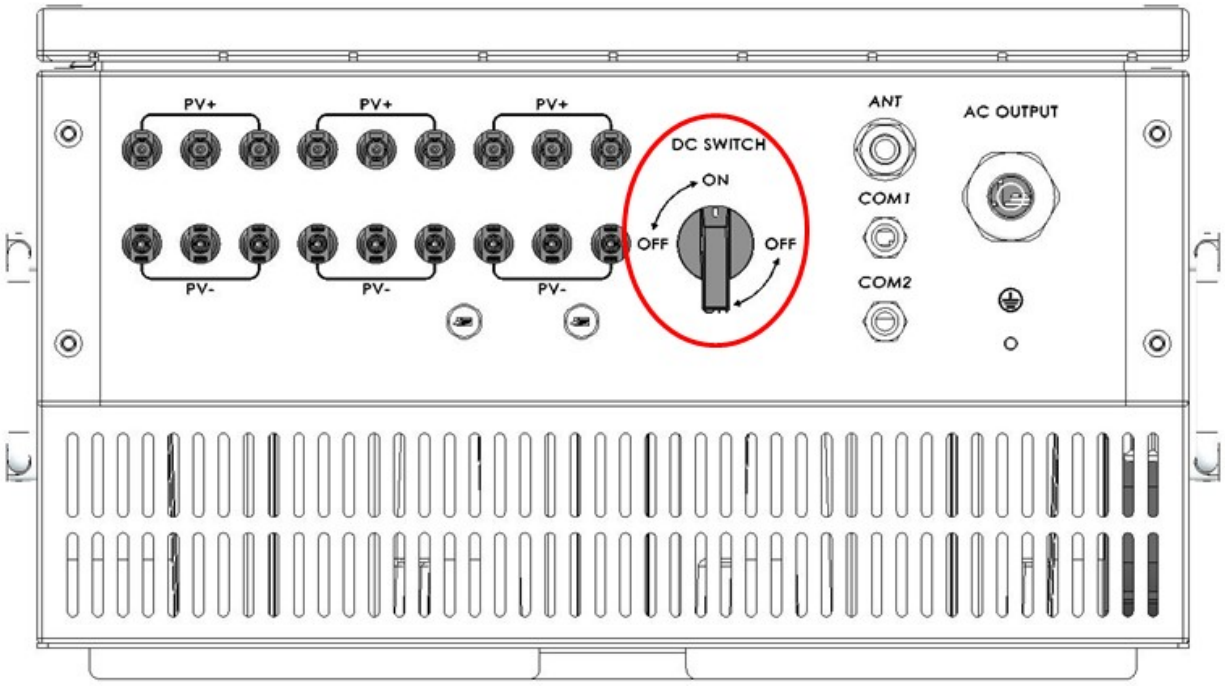
⑤ Please turn on the switch (SW10) only in the inverter at the far end of 485 communication when parallel operation of the inverter and monitoring on the inverter are connected.

⑥ System ID Number should be set according to the below method during the communication use. When ID is not assigned, a default value is set to 0. (Menu button – ETC Set – System ID Number – assigning the preferred ID Number to be used)

⑦ Once the communication setup is complete, a plug of the communication cable grand is fastened.

4. Operation

4.1 Checklist prior to operation



<lower part of the inverter>

① Once the connection is complete between PV cable and AC cable, the inverter is ready for startup.

② Turn the DC switch in the lower part of the inverter to the ON direction at 90°. The factory setup of the product is OFF.

③ Upon the AC turned ON, the inverter counts 300 sec for automatic startup. The count time can be checked at the right upper end of the external LCD.

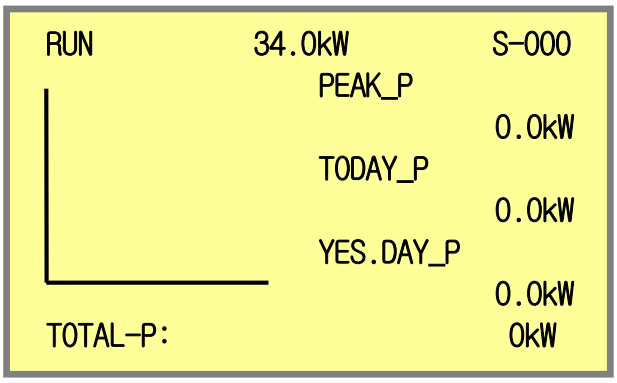
④ Once 300 sec is passed, the inverter is started up automatically and runs below the operation voltage, it is stopped automatically.

4.2 Appearance of the display window and functions

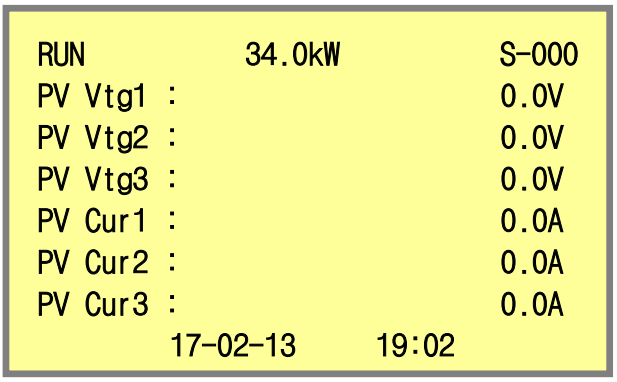
State LED	Description
PV	**Display the input state from the solar cell module.**
GRID	**Displayed if the grid is run normally.**
RUN	**Displayed if the inverter is run normally.**
FAULT	**Displayed if an error is generated in the inverter.**

- The LCD specification in the display window is 128x64 GRAPHIC LCD.
- When power is on in the inverter, the display window is converted in every 10 sec automatically.

4.3 Display Window Screen

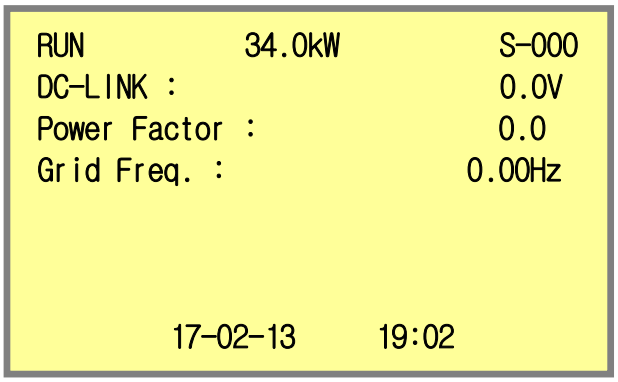


- RUN/STOP : Operation status, 34kW : Current power, S-000 : Display when an error or warning occurs
- Graph : Hourly power generation graph
- PEAK_P : Today peak power
- TODAY_P : Today power
- YES.DAY_P : Yesterday power
- Total-P : Total power



- RUN/STOP : Operation status, 34kW : Current power, S-000 : Display when an error or warning occurs
- PV Vtg1 : Voltage of PV string 1
- PV Vtg2 : Voltage of PV string 2
- PV Vtg3 : Voltage of PV string 3
- PV Cur1 : Current of PV string 1
- PV Cur2 : Current of PV string 2
- PV Cur3 : Current of PV string 1
- XX-XX-XX XX : XX : Year-Month-Day, Hour:Minute

- RUN/STOP : Operation status, 34kW : Current power, S-000 : Display when an error or warning occurs
- Line R Vtg : R Phase voltage
- Line S Vtg : S Phase voltage
- Line T Vtg : T Phase voltage
- Line R Cur : R Phase Current
- Line S Cur : S Phase Current
- Line T Cur : T Phase Current
- XX-XX-XX XX : XX : Year-Month-Day, Hour:Minute



- RUN/STOP : Operation status, 34kW : Current power, S-000 : Display when an error or warning occurs
- DC-LINK : Voltage of DC_Link
- Power Factor
- Grid Freq. : Frequency of line
- XX-XX-XX XX : XX : Year-Month-Day, Hour:Minute

4.4 Operation Method

- Checklist prior to operation

Please check the wiring and installation states of the inverter.
In particular, check whether the solar cell input polarity and power system line are correctly connected.
Solar cell DC power is supplied to the inverter. Once DC power is supplied, the inverter checks whether the AC power is normal or not automatically and operates automatically through operation count-down of 300 sec.
Please check the state of ON/OFF in the DC switch at the lower end of the inverter. (Here, power of the solar cell is supplied to the inverter as a result of the input of DC circuit breaker.)

- Automatic operation

The factory default value is set to automatic operation mode.
If a voltage in the solar cell module is increased to the setup value due to the sunrise, the inverter operates automatically.
A voltage in the solar cell module is decreased at sunset. Once the voltage is below the setup voltage, it is stopped automatically. The grid power is always monitored and operation is stopped automatically once fault state is found.

- Stop during operation

If the inverter needs to be stopped during operation, the DC switch is turned OFF or the grid is blocked to stop the operation.

Note that the figure displayed in the operation and installation manual is explained without the front cover or circuit breaker for the purpose of detailed explanation. However, the front cover and circuit breaker must be installed according to the regulation when the product is operated before the product is operated according to the operation and installation manual.

5. Function

5.1 Description of Functions

- Grid monitoring

Normal or fault state in the grid voltage is determined by a difference in voltage (Fault high voltage and Fault low voltage) compared to a normal voltage. If the value is larger or smaller than the preset value, the inverter is stopped. If the frequency in the grid voltage is deviated from the preset value (line frequency) by more than fault high frequency and fault low frequency, the inverter is not operated and stopped.

In order to start power generation at the normal grid state, the grid is operated after the operation count-down (Line tran. time) is elapsed. The frequency of the grid voltage can be set according to the grid frequency.

- MPPT control and total power generation

Since the output of the solar cell module varies depending on ambient temperature, humidity, and sunlight, the MPPT algorithm should be run smoothly. The method applied to the product is that the inverter is stopped when there is little current pulsation and solar cell is reached up to PV stop voltage thereby unable to run the inverter anymore.
The total power is accumulated and memorized so that total power can be checked.

- Occurrence of fault state

When fault states that stop the inverter occur, related messages are displayed. After the cause of fault state is removed, the system is re-run after some waiting time. If the same symptom occurs again or the system is not re-run, please contact the main office.

- Verification of fault state detail

The fault scan stores 50 faults from No. 0 to No. 49. The latest fault becomes No. 0.
The variables or fault state details in the past can be displayed using an up and down key in the internal keypad of the inverter.

- Modification of set values

Parameter values can be modified using the internal keypad during inverter stop.

Please contact the main office if you need to modify parameter values.

- Initialization

There are two initializations: parameter and fault initializations. Parameter initialization sets all parameters and optional functions to factory default values while fault initialization removes all fault records in the past and make the system to ready-state.

If the internal keypad is manipulated arbitrarily, it can cause malfunction of the inverter. Please contact the main office.

5.2 Symptoms of warning and fault

- If a warning occurs in the product, this is displayed in the screen.
- The product displays a system fault and stops the operation.
- The product displays a grid fault and stops the operation.
- When a fault occurs, red color is displayed at the display window Fault LED.
- When a fault occurs, fault detail is displayed in the keypad window of the display window LCD.
- If the inverter is damaged and becomes out of control, the machine may be neglected as a dangerous state. In order to prevent such circumstance, safety devices such as over-current breaker should be installed additionally.

5.3 Types of Main Faults

- **Input over-voltage protection**

If a solar cell voltage exceeds the regulated voltage, the system is stopped to protect the inverter.

- **Input under-voltage protection**

If a solar cell voltage is below the regulated voltage, the system is stopped to protect the inverter.

- **Output over-voltage protection**

If over-current occurs due to the fault condition of the output current in the inverter, the system is stopped to protect the inverter.

- **Inverter overheat protection**

If an internal temperature in the inverter exceeds 85℃, the system operation is stopped to prevent overheating. If an internal temperature in the inverter is returned to a normal temperature, the system is operated normally after reset.

- **Negative phase**

In case of negative phase, the inverter does not count for running.

- **Grounding fault protection**

If a leakage current occurs due to grounding fault, the system is stopped.

- **Grid fault protection**

Upon the fault occurrence in the grid power, the system is stopped.

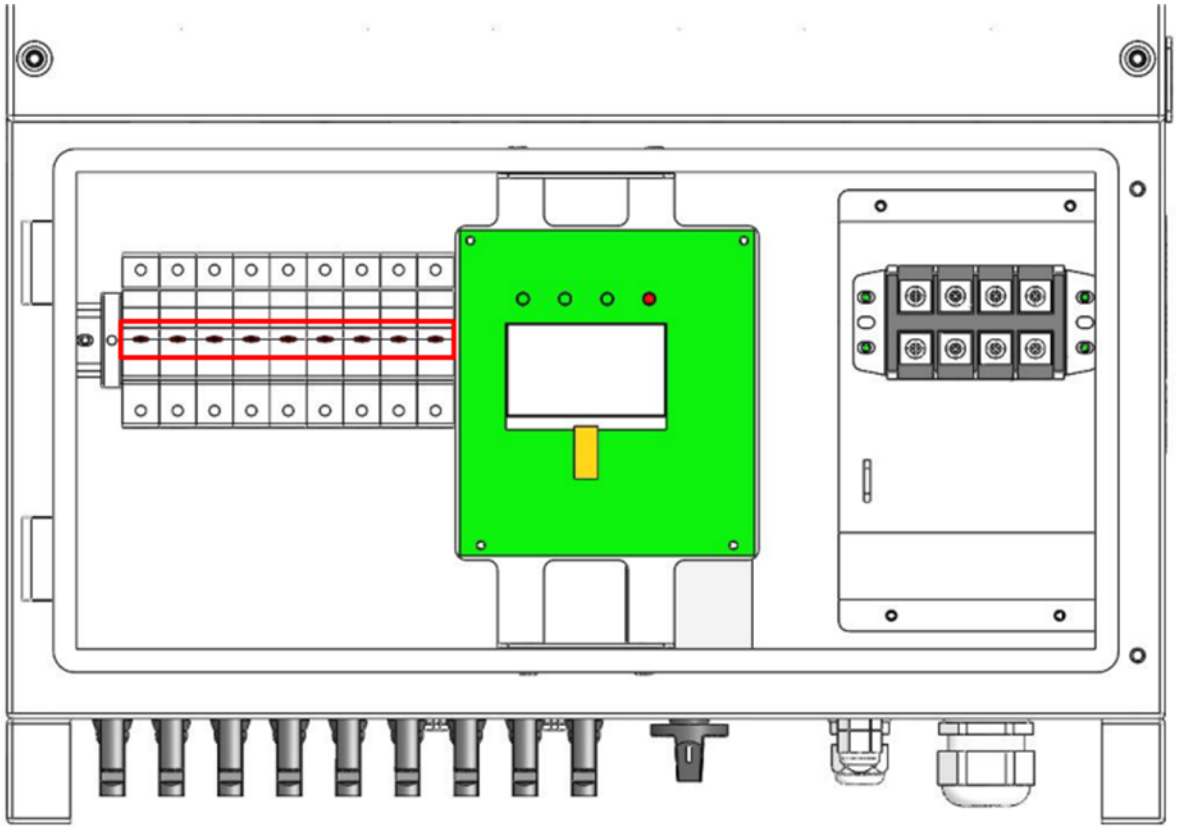
(Grid over-voltage protection, grid under-voltage protection, grid over-frequency protection, and grid under-frequency protection)

- **PWM control fault**

If PWM control fault occurs in the inside of the inverter, the system is stopped.

- **Fuse disconnection**

If a fuse is disconnected, a warning with red lamp is displayed in the fuse holder LED display window.



5.4 Types of Faults and Corrective Actions

Order	Cause of the Fault	Display	Cause of occurrence	Corrective actions
1	DC_LINK overvoltage	InsDC-Link OV, AvgDC-Link OV	DCP, DCN, DC_LINK In case of overvoltage	Contact the service center.
2	DC_LINK Undervoltage	AvgDC-Link UV	DCP, DCN, DC_LINK In case of undervoltage	Contact the service center.
3	Input overvoltage	AvgPV OV	If the solar cell voltage exceeds the set voltage	After inspecting the solar cell module, the inverter is operated. If the system cannot be rerun, please contact the service center.
4	Input undervoltage	AvgPV UV	If the solar cell voltage is below the set voltage	It can occur during sunrise and sunset. If it occurs frequently, the solar cell module is inspected and the inverter is operated.
5	Input over-current	InsPV OC, AvgPV OC	If the solar cell current exceeds the set current	After inspecting the solar cell module, the inverter is operated. If the system cannot be rerun, please contact the service center.
6	Output over-current	InsLine x OC, AvgLine x OC	If output of the inverter is in over-current state,	Contact the service center.
7	PWM FAULT	Bst OC2, Line x OC2, Bst UVLO, x UVLO	Inverter internal fault	Contact the service center.
8	Relay FAULT	RELAY Short, RELAY Open	Relay fuse and failure	Contact the service center.
9	Communication FAULT	Comm. Error	MMI communication fault	Contact the service center.
10	PV SPD FAULT	PV SPD Error	over PV SPD	Contact the service center.
11	Temperature FAULT	Over Heat1	Over-temperature fault	Contact the service center.

12	Output current FAULT	Balance Current	Output current imbalance	Contact the service center.
13	HARDWARE FAULT	Hardware OC	If output of the inverter is in over-current state,	Contact the service center.
14	GRID SPD FAULT	AC SPD Error	Over GRID SPD	Contact the service center.
15	INSULATION FAULT	PV Insulation	Insufficient insulation resistance	Contact the service center.
16	HARDWARE OH	Over Heat2	Hardware overheat	Contact the service center.
17	RCMU FAULT	RMCU Breakdown	Over RCMU	Contact the service center.
18	Overvoltage between grid lines	InsLine xx OV, AvgLine xx OV	If the grid voltage exceeds the set voltage	Contact the installation company and then call the service center.
19	Grid line Undervoltage	AvgLine xx UV	If the grid voltage is below the set voltage	Contact the installation company and then call the service center.
20	Grid frequency fault	Over Frequency, Under Frequency	Grid frequency fault	Contact the installation company and then call the service center.
21	Output DC detection	x DC Current	DC output is introduced to the grid	Contact the service center.
22	Negative phase	PHASE REVERSE	Negative phase	Contact the service center.
23	Leakage current Detection	Residual OC	Leakage current occurrence	Contact the service center.
24	Inverter (phase) overvoltage	InsLine xN OV, AvgLine xN OV	Inverter R, S, and T phase overvoltage	Contact the service center.
25	Grid (phase) Undervoltage	AvgLine xN UV	Inverter R, S, and T phase Undervoltage	Contact the service center.

5.5 Types of Warnings and Corrective Actions

Order	Cause of the failure	Display	Cause of the occurrence	Corrective actions
1	Warning of life limit	LIFE_W	Life warning of main parts	Contact the service center.
2	Output current warning	LIMIT_O	Maximum output current limit notice	Contact the service center.
3	Input current warning	LIMIT_I	Maximum input current limit notice	Contact the service center.
4	Temperature limit warning	LIMIT_H	Output limit notice according to temperature	Contact the service center.
5	FAN warning	FAN_W	FAN failure notice	Contact the service center.
6	PV1 power shortage warning	PV1_UP	Notice of power shortage in input A	Contact the service center.
7	PV2 power shortage warning	PV2_UP	Notice of power shortage in input B	Contact the service center.
8	PV3 power shortage warning	PV3_UP	Notice of power shortage in input C	Contact the service center.

5.6 Failure Repair

- Check whether or not the inverter has a fault.
- Check the date, time, and failure display description when the product is broken.
- The following items are checked and service repair is requested.

1) Model name
2) Part No.
3) Supplier information
4) Purchase year
5) Warranty
6) Failure details

5.7 Disposal

- Please dispose the product as general industrial waste.

6. Product Specifications

Model name		DSP-3334E-OD
DC Input	DC. Vmax. PV	1000Vdc
	Operating voltage range	280 ~ 980V
	MPPT voltage range	480 ~ 800V
	Rated voltage	630V
	Operating start voltage	450V
	Control mode	MPPT
	DC. Isc PV, Input A	29A
	DC. Isc PV, Input B	29A
	DC. Isc PV, Input C	29A
	Maximum input current per string	9.7A
	Independent MPP input count	3
	No. of strings per MPP input, Input A	3
	No. of strings per MPP input, Input B	3
	No. of strings per MPP input, Input C	3

Model name		DSP-3334E-OD
AC Output	Rated power	**34,000W**
	Rated voltage	380 / 400 Vac
	Rated frequency	50Hz / 60Hz
	Rated current	52A
	Constant	Three-phase Four-line (transformer-less type)
	Power factor	0.9(lagging) - 0.9(leading)
	Current distortion (Current THD)	total distortion is 3% or less
		any single is 2% or less
	Control mode	PWM mode
	Prevention of single operation	within 0.5 sec
	Efficiency	More than 98%

Model name		DSP-3334E-OD
Structure	Cooling mode	Foced-air cooling
	protection structure	IP 65 (FAN IP 55)
	Device noise	Less than 70 dB
	Outer dimension (W x H x D)	550*770*320(W*H*D)
	Overall weight	< 60kg
	External interface	RS 485
Protection Function	Inverter	Input overvoltage
		Output short circuit
		DC over-voltage protection
		Insulation monitoring
		Inverter overheat protection
		Relay failure detection
		Non-isolated
	Grid	Anti-islanding (IEEE1547)
		Short circuit current control
		Grid over-voltage, under-voltage protection
		Grid over-frequency, under-frequency protection
		Reactive power control
		Residual current monitoring
	Class	Class1
Environment	Ambient temperature	-20℃ – 50℃
	Holding temperature	-25℃ – 65℃
	Ambient humidity	Relative humidity 90% RH or lower (No dew formation)
	Altitude, vibration	1,000 m or lower, 5.9m/sec²(=0.6g) or lower
	Ambient environment	No corrosive gas, flammable gas, oil mist, and dust

7. Warranty

Letter of warranty

DASS Tech

Product		Grid connected power conditioning system (PCS)
Model		DSP-123K5E
Purchase date		
Warranty period		Three(5) years from the date of installation date (not exceeding 60days from purchase)
Customer	**Name**	
	Address	
	Contacts	
Dealer	**Name**	
	Address	
	Contacts	

• The company manufacturing this product doesn't take any responsibility for safety accident or failure due to the customer's mistake or false use violating specifications.
• The dimension or appearance design of this product can be changed without any notice.

◀ Free A/S ▶

If failure occurred under normal using condition within the warranty period, your product can be tested and repaired for free.

◀ Charged A/S ▶

For following cases, A/S could be provided at a cost

- *The product is out of order due to the customer's intention or carelessness*
- *The product is out of order due to failure in connected devices by error of applied power supply*
- *Any failure occurred by natural calamity*
- *In case the product was repaired or revised at unofficial service center/man, not designated*
- *In case of without the nameplate of DASS Tech*
- *In case any failure occurs after the user dismantled, repaired or replaced our products*
- *Replacement of consumable parts without any notice to a manufacturer in advance*
- *In case warranty period is expired*

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Ver. 2.0

DASS Tech