Operation and Installation Manual

Soleaf

DASSTECH Photovoltaic Grid-Connected Inverter

(Grid connected type Photovoltaic Inverter)

DASS 20i

DSP-3315H-OD

DSP-3320H-OD

DSP-3325H-OD

Version 1.0

DASS Tech

Table of Contents

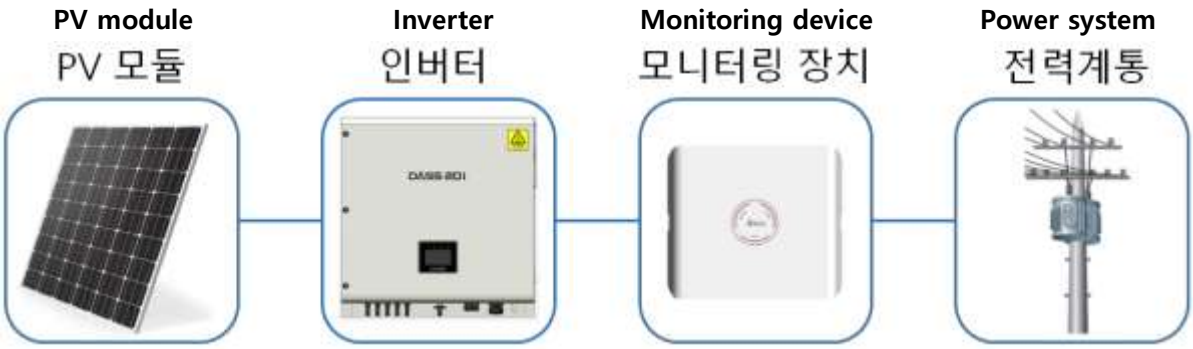
1. Precautions for Safety

- **Precautions for safety aim for safe and correct operation of the products by preventing accidents or hazards in advance, so you must follow them at all times.**

- **In order to properly and safely use the functions of DSP inverter series, read the manual carefully.**

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

- **DSP series inverter is a grid-connected PV inverter that transforms direct current of PV generator into alternate current and connects to the system.**



<Photovoltaic inverter generator system>

※ The DSP series inverter must be operated together with a PV generator of safety class II in accordance with IEC 61730 Class A. Do not connect any other energy source other than PV modules to the DSP series inverter.

위험 **! Danger**

Deadly risk due to the high voltage of the inverter

When the photovoltaic generator array is exposed to the light, dangerous DC voltage on the DC conductor or the conductive parts of the inverter can be generated. If you are contact on the DC conductor or the conductive parts, you may be deadly shocked by electricity.

Use caution not to be contacted on the DC conductor.

Use caution not to be contacted on the live conductive parts of the inverter.

Separate the inverter from all power sources before you carry out any work on the inverter.

1.1 Symbols Used in the Manual

- The meaning of the symbols used in the manual is as follows:

 **! Danger** When the instructions are not kept, serious injuries or even death occur.
 **! Warning** When the instructions are not kept, serious injuries or even death can occur.
 **! Caution** When the instructions are not kept, major or minor injuries can occur.

1.2 Symbols Used in the Inverter

- The meaning of the symbols used in the inverter is as follows:

Symbol	Description
	Do not lift up or move the product alone.
	Keep the connection requirements of secondary protective conductor. Refer to Ground Connection in page 36.
	The product can be heated during the inverter's operation. Do not touch the inverter enclosure during operation. Before carrying out any work, you should wait for the product cooled down completely. Wear safety gloves and personal protective equipment.
	The product is worked on a high pressure. All works related with the inverter must be performed by a professional electric engineer.
	The capacitor of the inverter may charged with very high voltage. Se[arate the inverter from all power sources and wait for 10 minutes or longer before your work in order for the capacitor to be discharged.
	Follow the local electronic waste regulations when disposing the inverter.
	Transport the product by 2 persons or more or use dedicated equipment.
	Follow the instructions in the manual provided with the inverter.
	This product is complied with the corresponding CE requirements.

1.3 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.

- **Check if the DC voltage of the inverter is discharged by using a measurement tool such as volt-ohm-milliampere (VOM) after 10 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 any 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 front or upper surface of the inverter enclosure during inverter operation.**
  The front or 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 or 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. Therefore, please read carefully and understand thoroughly the operation and installation manual prior to the use.

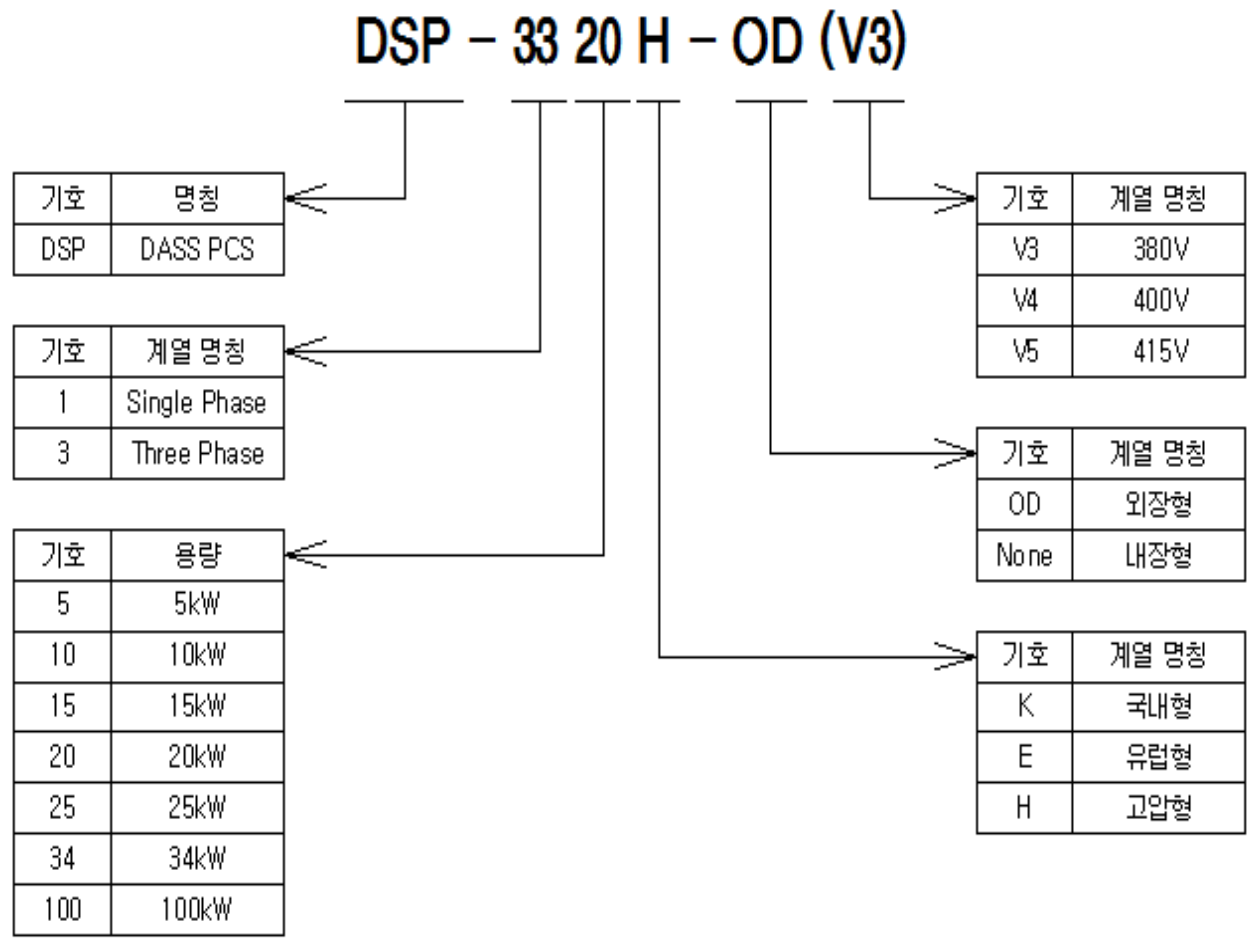
2.2 Appearance of the Product

DASS 20i

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**



Mark Description Capacity Out_door Embedded Korea Europe High-pressure

- **Accessories/tools**

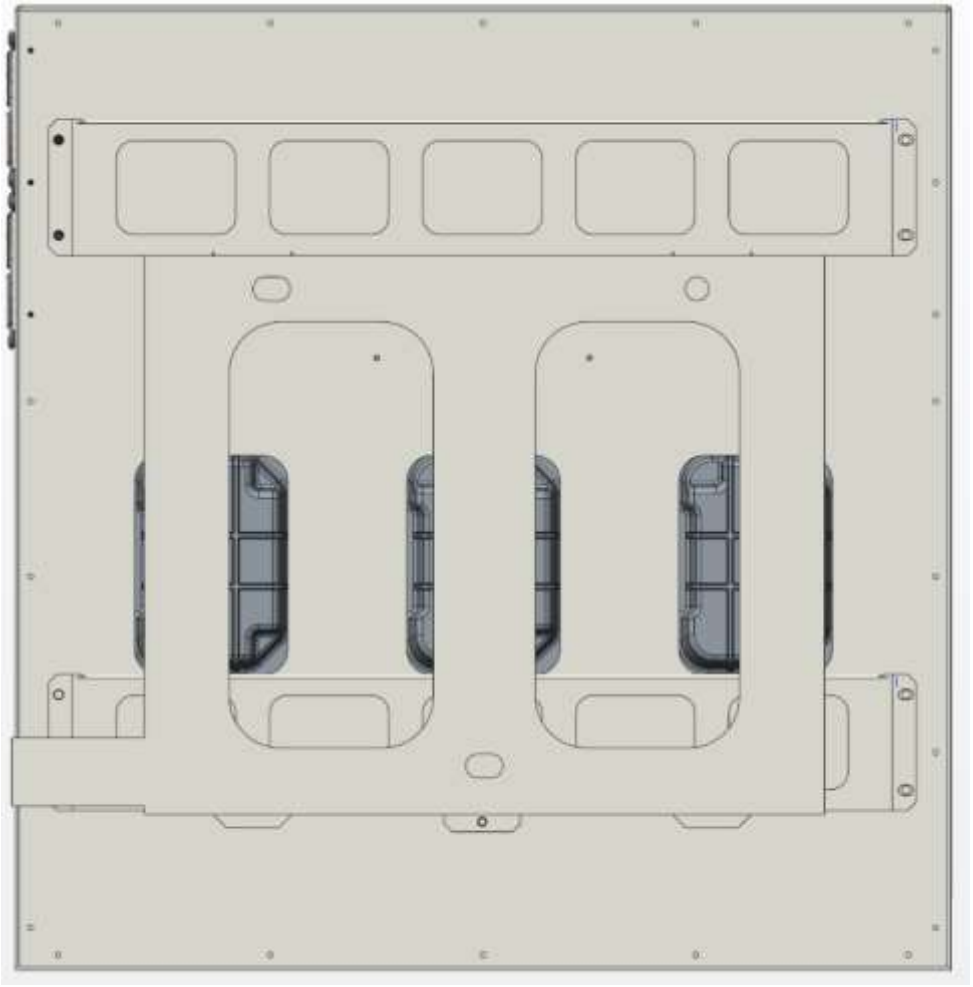
  - Please contact the office if there are some missing accessories such as the operation and installation manual, input (DC) connector, fixed bracket, bracket fixing bolts and hexagon wrench or if the product is damaged.
  - Depending on the operation field, necessary tools can be different and should be prepared well. (e.g: Multi-tester to check voltage and wiring, power tools to install fixed brackets etc.)

2.4 Configuration of the Product

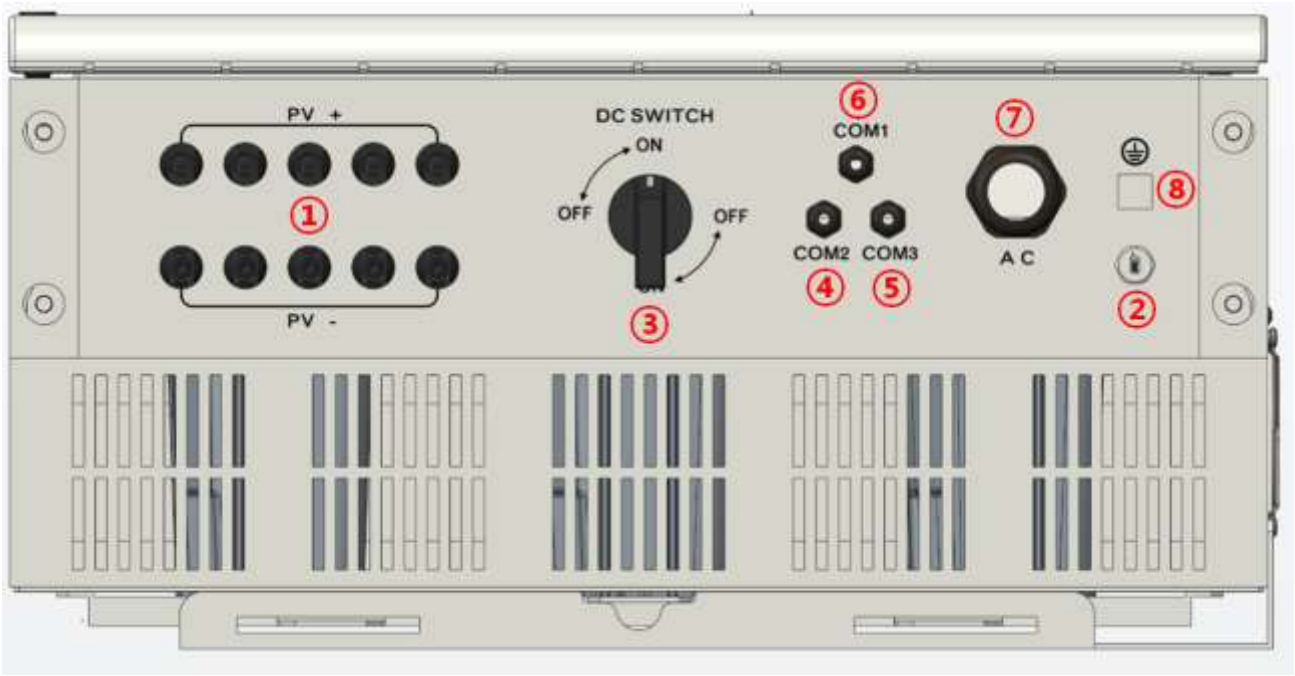
- **Front view**

- **Side view**

- **Rear view**

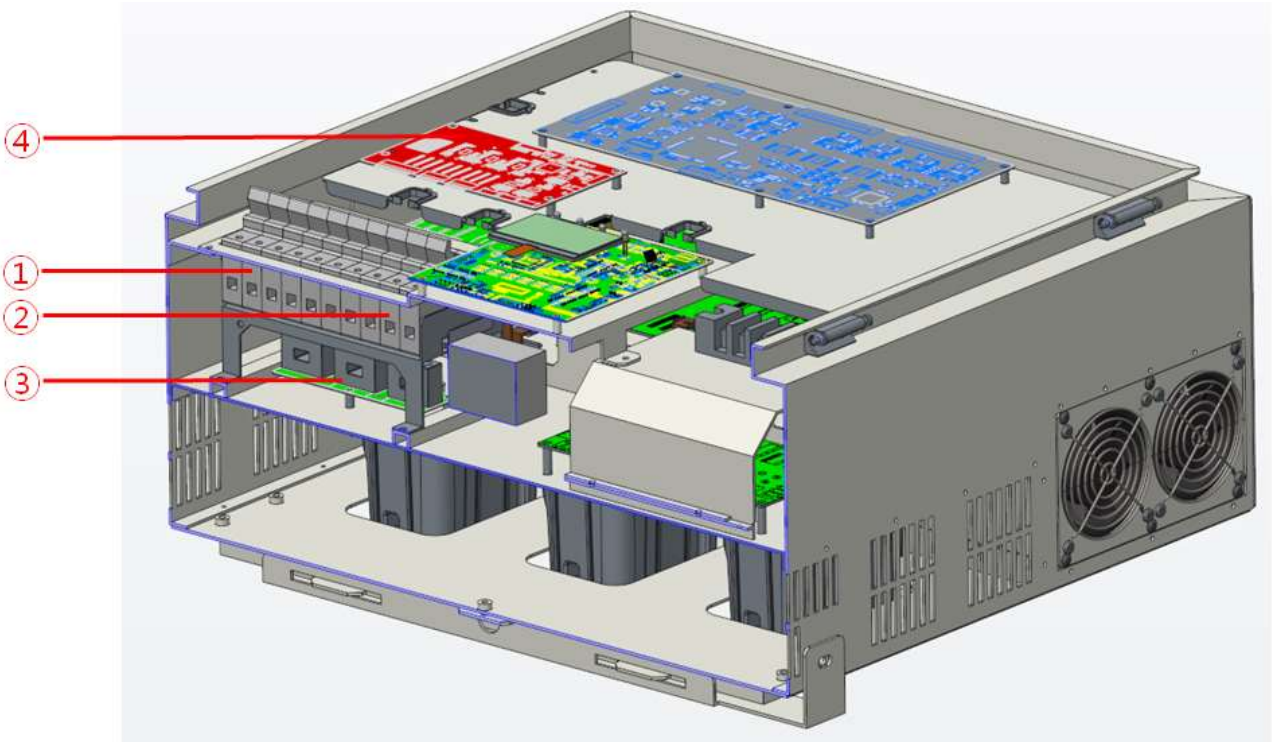


- **Bottom view**



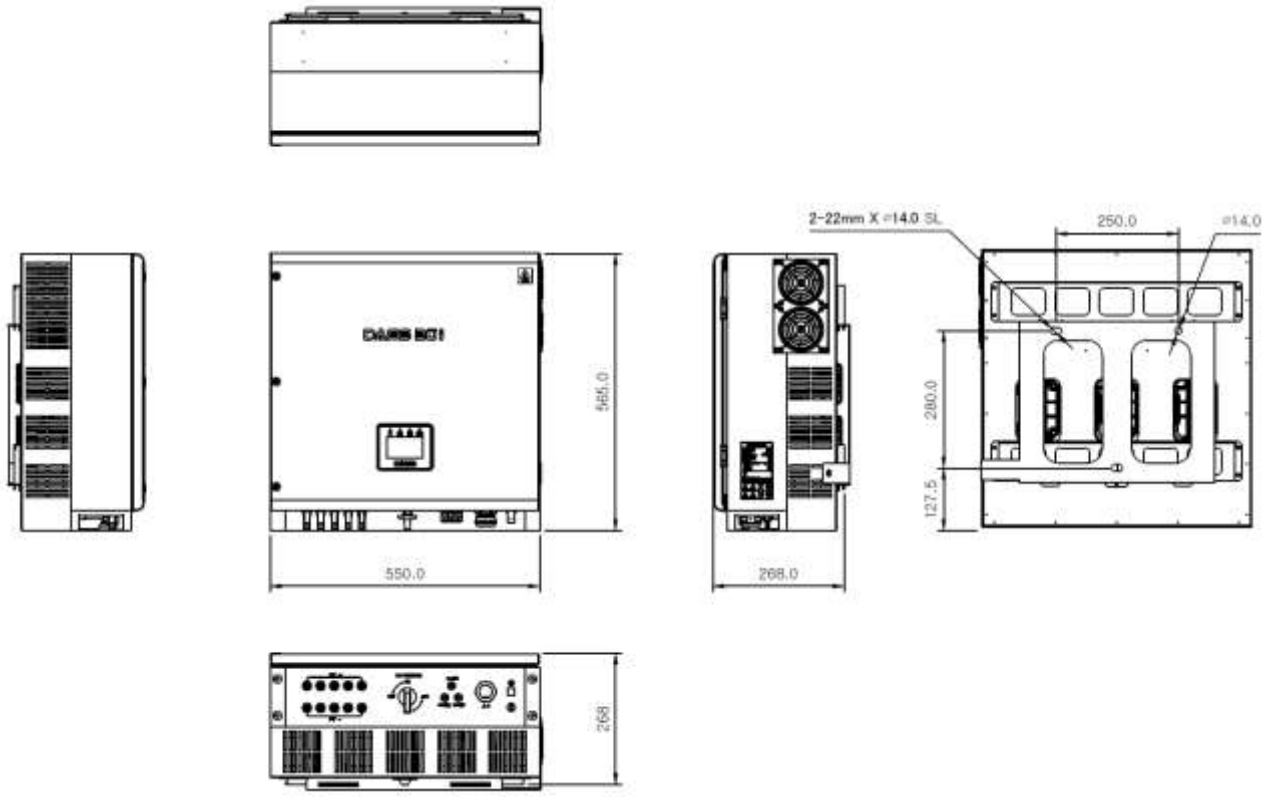
Item	Name	Description
①	PV Input Port	PV connection terminal (5 terminals of + and -, respectively)
②	Protective Vent	Pressure balance Vent
③	DC Switch	DC On/Off Switch
④	RS-485 Input	Communication RS-485 input part
⑤	RS-485 Output	Communication RS-485 output part
⑥	RS-485 Option Port	Used when option is applied
⑦	AC Output Port	Output AC cable gland
⑧	Grounding Connection Terminal	Grounding connection terminal

- **Input channel monitoring (String Monitoring)**



Item	Name	Description
①	[+] PV FUSE & FUSE HOLDER	5 [+] fuses and fuse holders
②	[-] PV FUSE & FUSE HOLDER	5 [-] fuses and fuse holders
③	Monitoring CT	5 string current monitoring CTs
④	Monitoring MCU PBA	String current monitoring PBA

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, so 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 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.

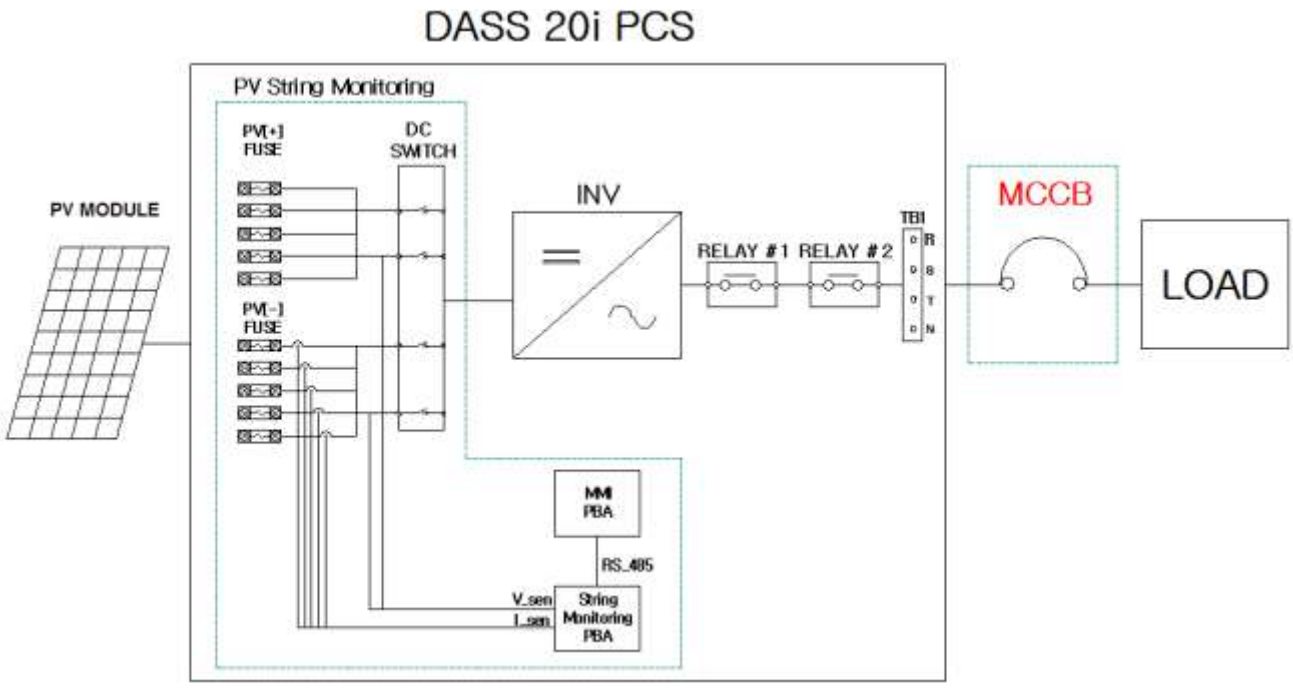
- **Simplicity of installation and operation**

  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.

- **Embedded PV FUSE and string monitoring feature**

  The inverter input terminal includes fuses for [+] and [-] and current monitoring sensor of [-] string.

  The string monitoring PBA monitors PV voltage and current in real time, communicates with MMI PBA by using RS_485, and displays the result on the graphic LCD. If necessary, you can use this feature.



- **Installation and capacity of circuit breaker**

  The inverter is not internally equipped with an **MCCB** breaker. In accordance with

photovoltaic facility guideline and grid-connected system guideline, follow the specification below for installation.

Inverter	MCCB capacity
DSP-3315H-OD	40A
DSP-3320H-OD	50A
DSP-3325H-OD	60A

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 by 2 persons or more or with the lifting device because the weights of the inverter and packaging box are 45kg and 5kg.
- 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.

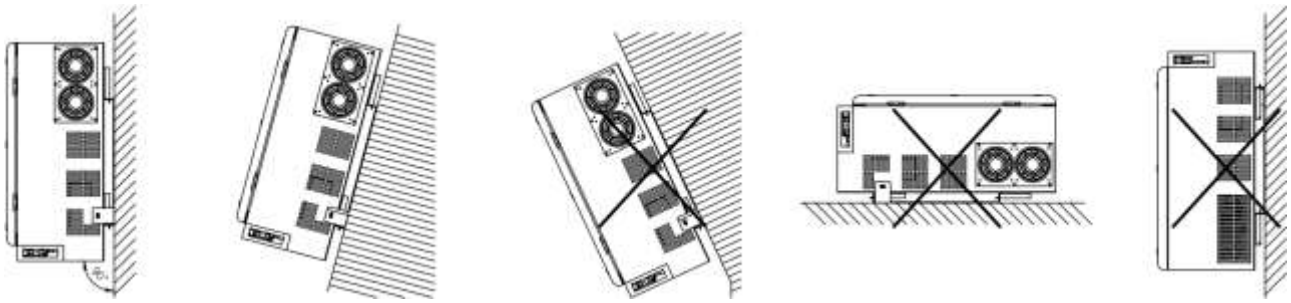
3.2 Installation Place

주의 **! Caution**

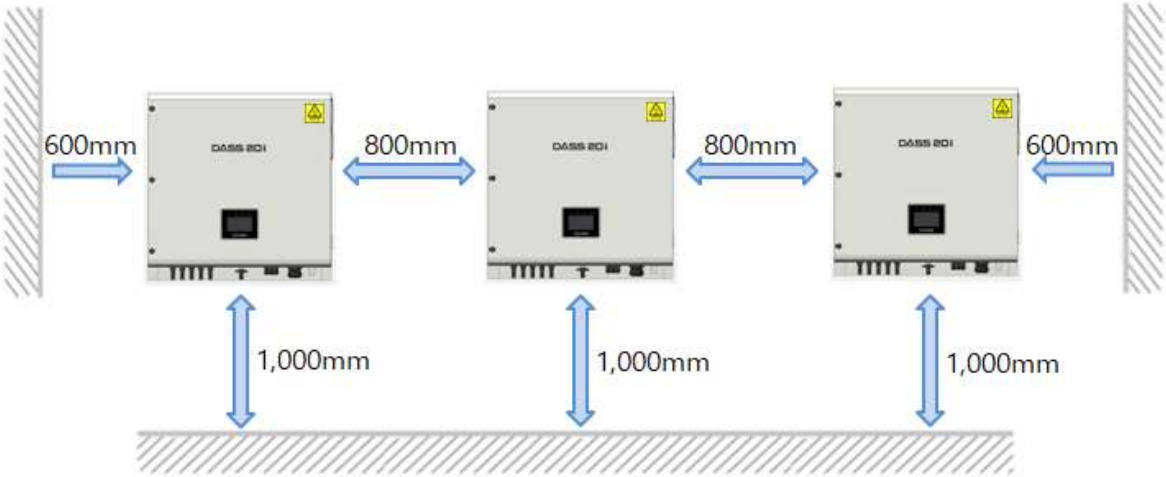
Please install the product at a place where the following conditions are met.

- 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.
- 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 storage temperature (-25 ~ 65℃).
- 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 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 an additional enclosure and indoor installation.)
- Please make sure facilitating heat dissipation by ensuring a space around the inverter.
- Do not install the inverter in a closed cabinet or a cubicle. If hot air is not discharged, the inverter will not operate normally.

3.3 Cautions While Installation



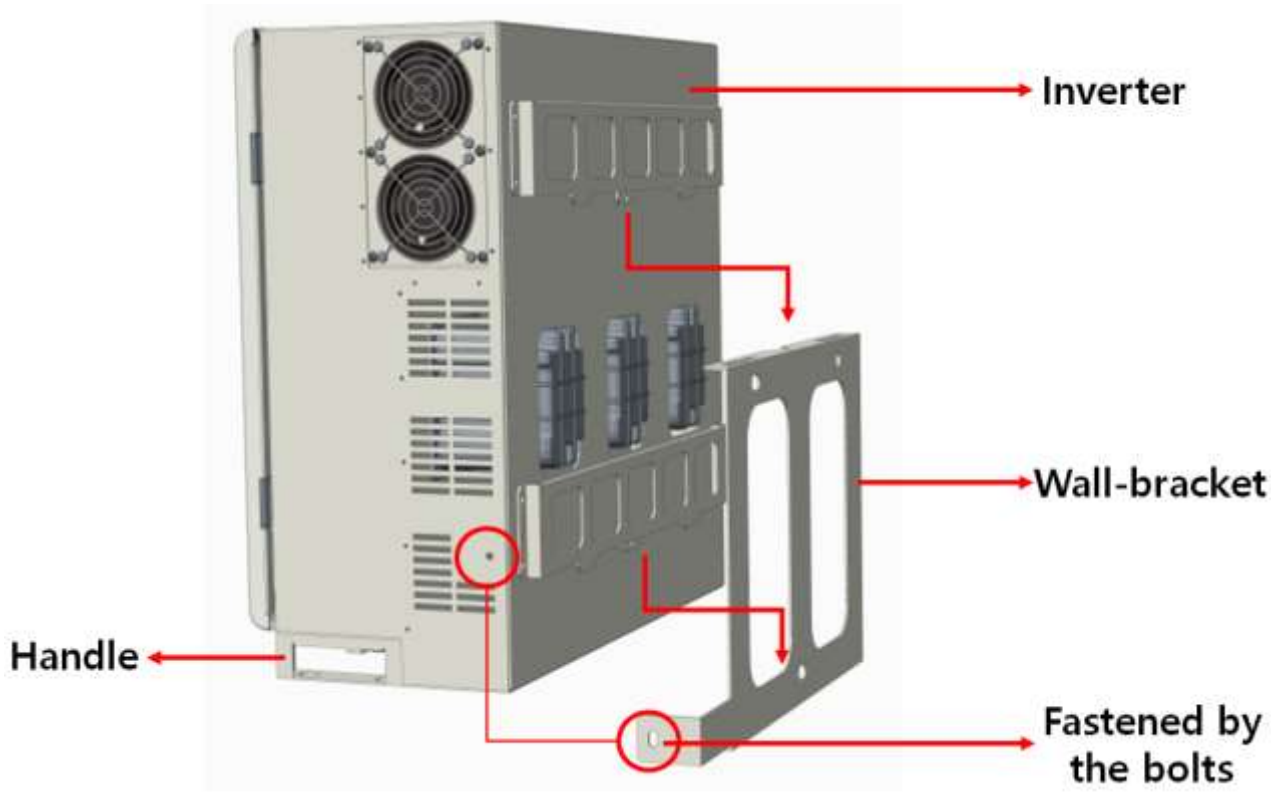
- Please install the product according to the contents in the manual.
- The installation place should be clean at all times and can be accessed safely without using auxiliary means such as lifting platform or foothold. Otherwise, service work may be limited.
- The connecting part (bottom surface of the 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 60 ㎝ of space at the upper part as well as left and right side of the inverter should be secured when the product is installed in the indoor.
- At least 1m of space should be secured from the ground when the product is installed in the indoor or outdoor.
- 80cm or more of space between inverters should be secured when the product is installed in parallel.



- At least 1,000mm or more of space should be secured in the front side of the inverter for later management.
- 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 1-type or special 3-type (400 V grade).
- Do not use other electronic appliances near the product. Failure or noise in the electronic appliances may occur.
- Be sure to use the exclusive bracket, and use caution 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, and then make the inverter operated.

3.4 Installation Method

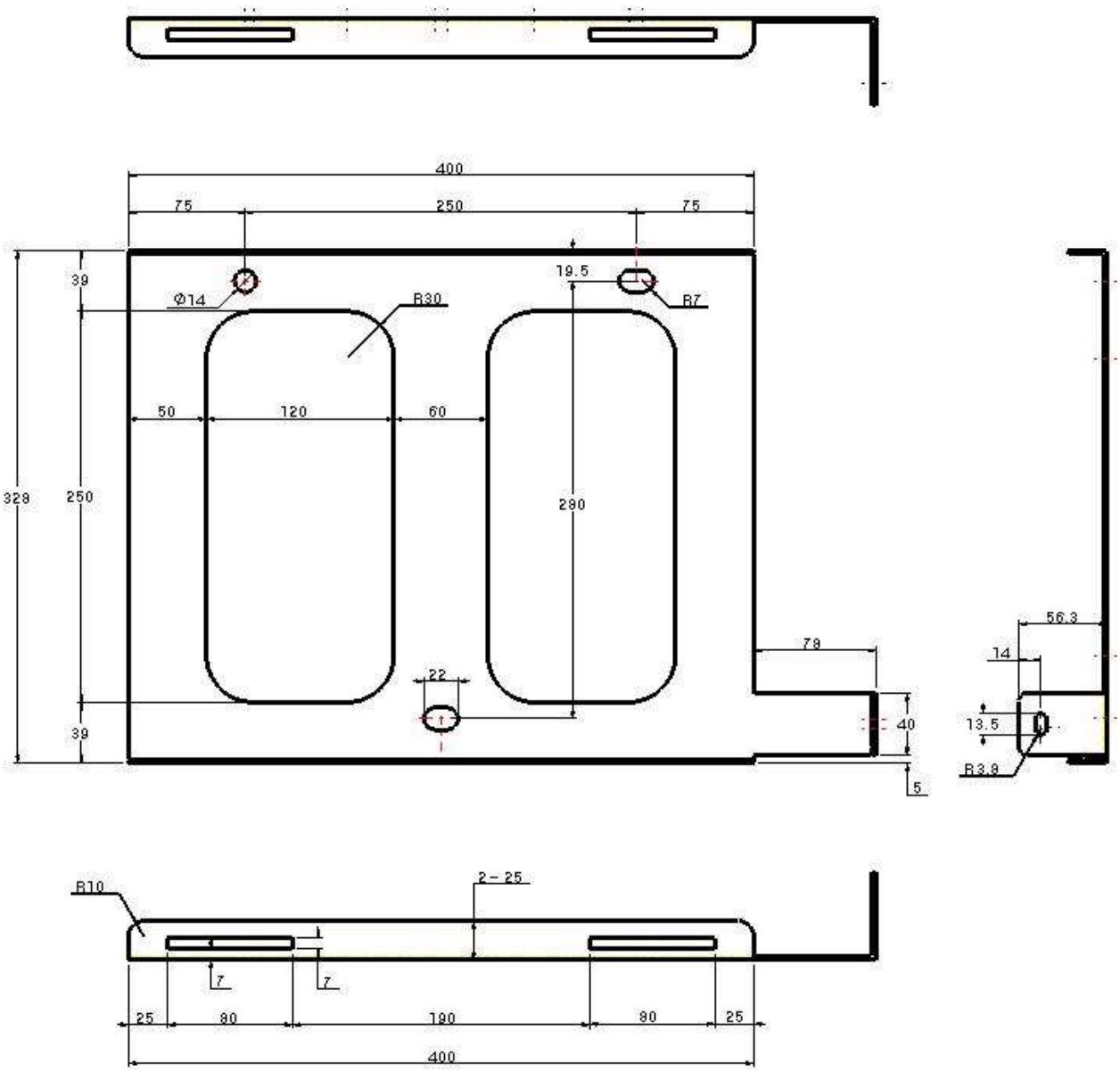
- Please refer to the below photo for the installation method.
- After the fixing bracket is installed, the inverter is placed on the bracket and fastened by the bolts.



주의 **! Caution**

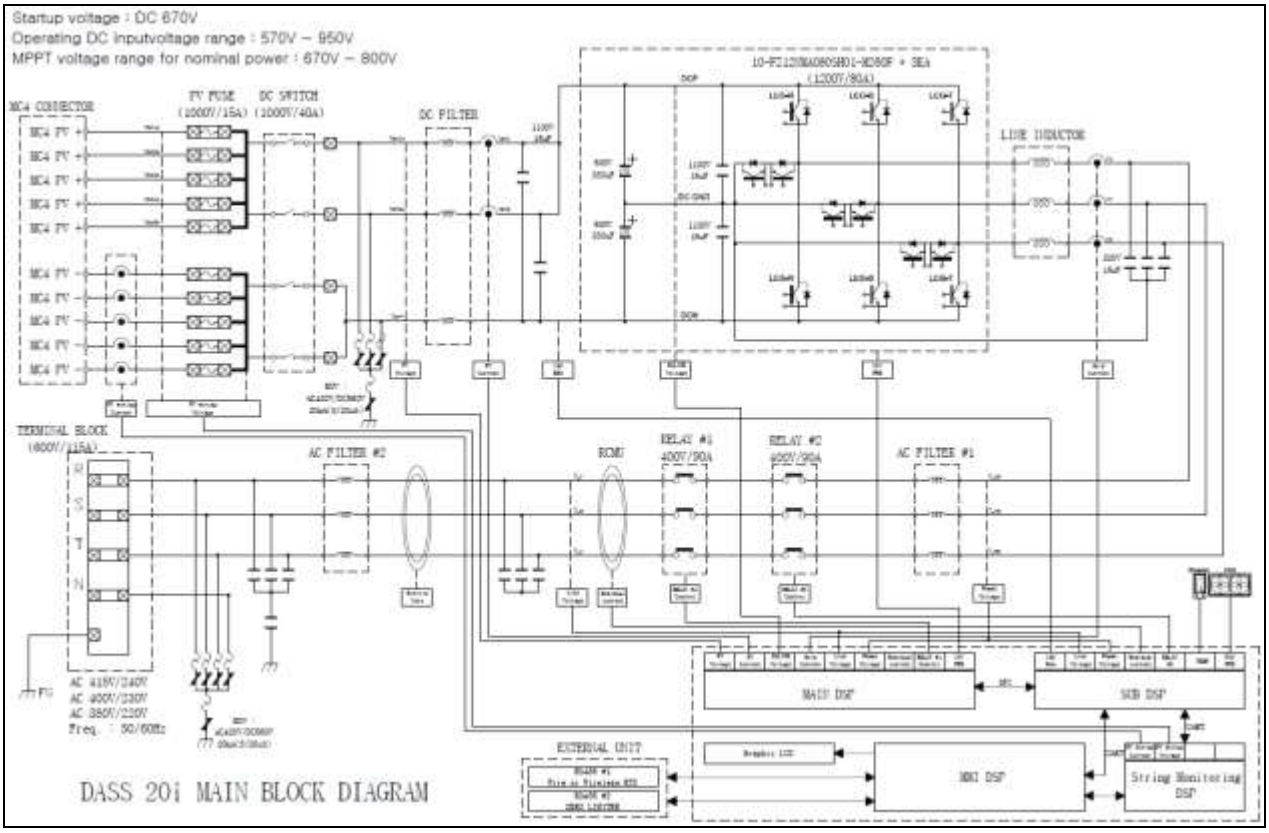
At least two or more persons must install the inverter during lifting or fixing it to the bracket.
When two persons lift or fix the inverter to the bracket, use the handles at the upper and lower part of the inverter.
Since a weight of the inverter is 45kg, deal with it carefully, not to drop the inverter.

- 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.
- When lifting the inverter up, grasp the equipment handles by both hands by means of handles.
- Fix the inverter and bracket (1 point).

3.5 Block Diagram



<DASS 20i Block Diagram>

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 max 5 strings in DASS 20i.

- Incorrect terminal connection can cause damage to the inverter.

- Please be careful for polarity (+/-) during DC connector connection.

- Distinguish carefully grounding 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 in the inverter and external [-] connector in the inverter [-] to the bottom surface [-] connector in the inverter, respectively prior to power input. Be careful of damage due to incorrect wiring in the inverter.

- The external (+/-) connector 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 1-type or special 3-type (grounding resistance is 10 Ω or less) to prevent electric shock.

- Fasten the grounding of the inverter to the grounding connection terminal at the bottom side of the inverter. (Refer to the picture in page 13)

- 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.

Capacity	Grounding wire dimension(mm^2)
1.5 ~ 3 kW	4.0
5 kW or higher	6.0
20 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 Configuration and Installation of DC Connector

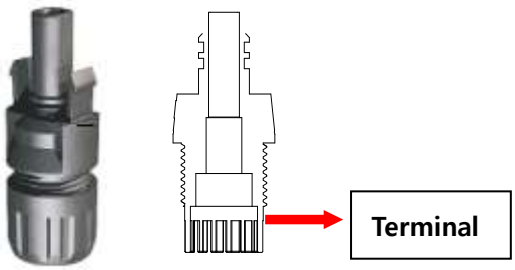
- **Before connecting PV array to inverter, the following electrical parameters must be met.**

Max input power	Max open-circuit voltage limit	Short-circuit current limit
16500W	1000V	41A
22000W	1000V	56A
27500W	1000V	69A

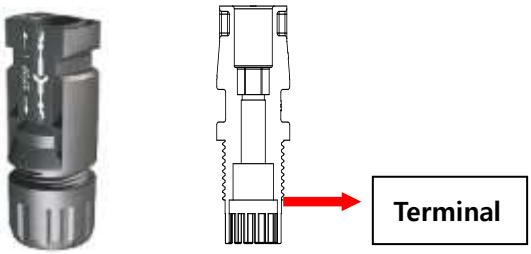
- Considering the negative voltage temperature coefficient of PV cells, more attention should be paid to the open-circuit voltage of PV strings when the ambient temperature is the lowest.

- **Item**

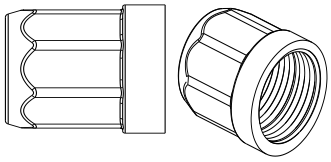
Inverter Outside connector



① (+) connector/internal configuration diagram



② (-)connector/internal configuration diagram



③ CAP : How to fasten during cable and terminal connection

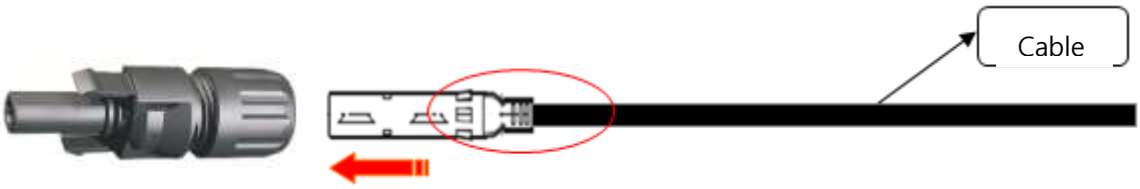
④ PV[+] MC4 CONNECTOR PIN

⑤ PV[-] MC4 CONNECTOR PIN

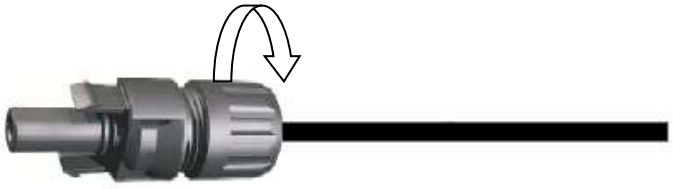
- **Installation**

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.



! Caution

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

⑦ Total 5 strings can be connected to the inverter. Since max 5 [+] 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

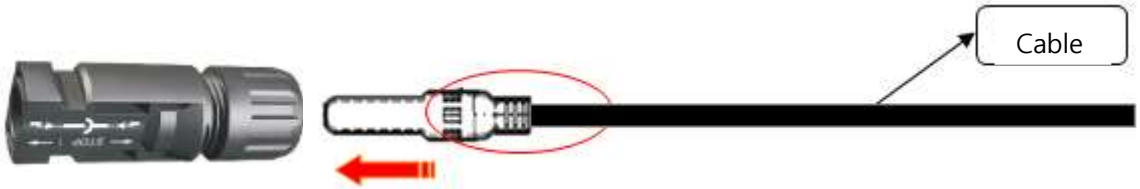
① 4SQ – 6SQ PV dedicated cable or CV cable is prepared.

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 small** 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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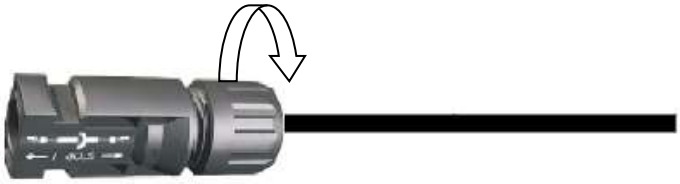


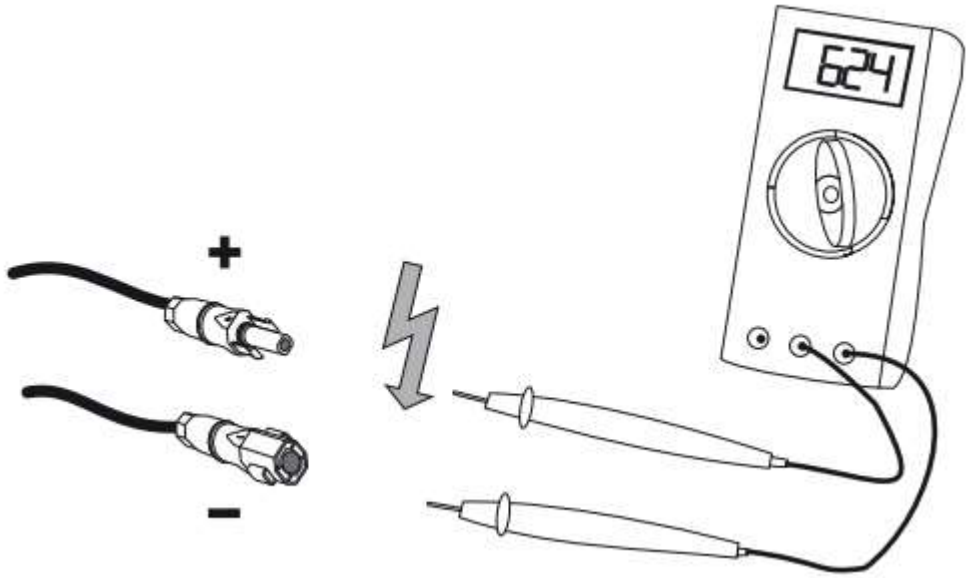
주의 **! Caution**

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

⑦ Total 5 strings can be connected to the inverter. Since max 5 [-] 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.

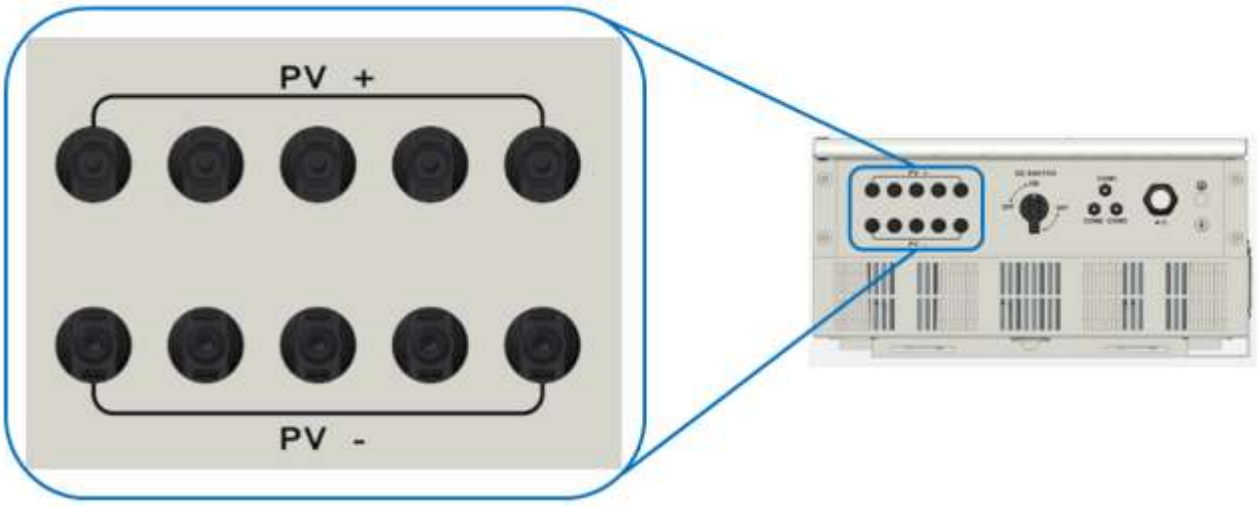
주의 **! Caution**

Please check whether polarity of the connection cable in the PV module is correct and the maximum input voltage of the inverter is not exceed.

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



① There is a single input area in the inverter and there is an MPP tracker.
② Up to 5 strings can be connected to [+] input area.
③ Up to 5 strings can be connected to [-] input area.
④ [+] and [-] input area should satisfy the following requirements.
- Same type
- Same quantity of PV module is connected in series
- Same layout
- Same tilt
⑤ Please check if the DC switch is OFF prior to the connector connection.

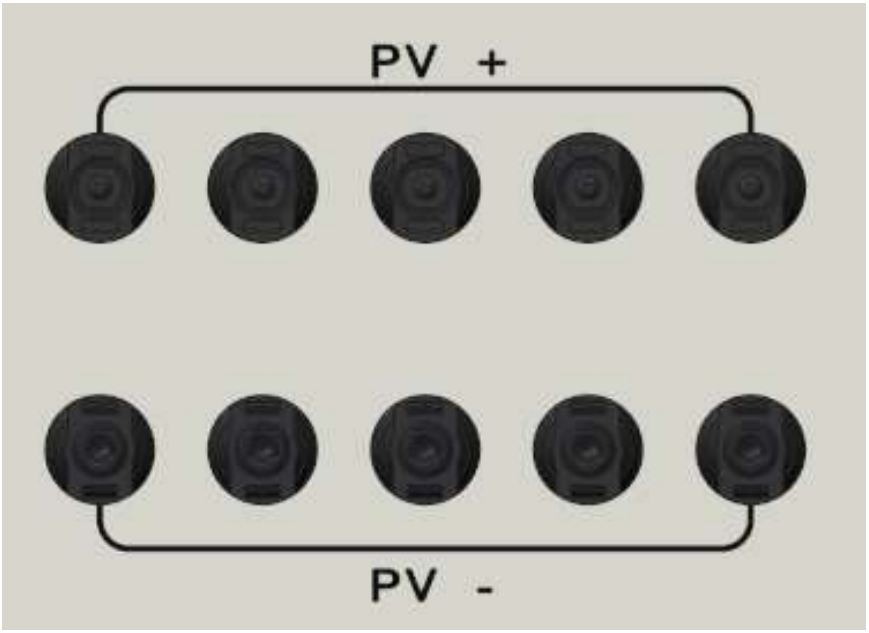
주의 **! Caution**

If two strings with different configuration in series are connected to the same input area, efficiency can be reduced, so be sure to connect strings with the same configuration in series to each input area.

주의 **! Caution**

Use caution not to exceed total max current of [+] and [-] input area or 15A per string. Otherwise, the inverter may be damaged.

⑥ PV cables prepared in Process 3 are connected to each of the input areas.

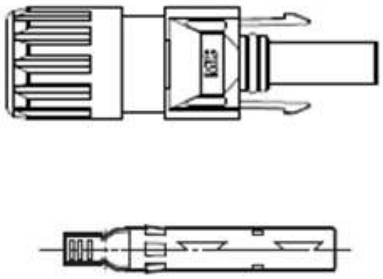
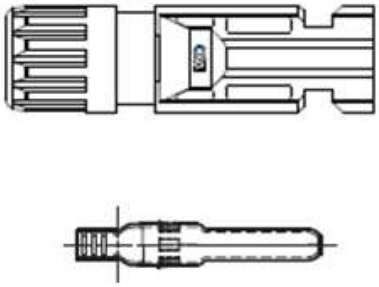


⑦ During the connection to the connector, a connection should be made by pushing the cable until **"click" sound is made taking the polarity into consideration**.

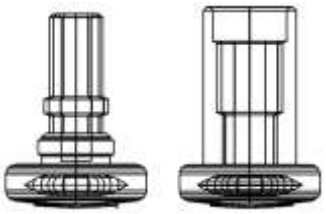
주의 **! Caution**

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.

- **Distinguishing [+] and [-] connector and its pin polarity during PV cable connection work**

	
PV [+] MC4 Connector	PV [-] MC4 Connector

※ Use caution for fastening a pin of each polarity during MC4 connector connection work. Wrong connection can cause damage to the inverter.

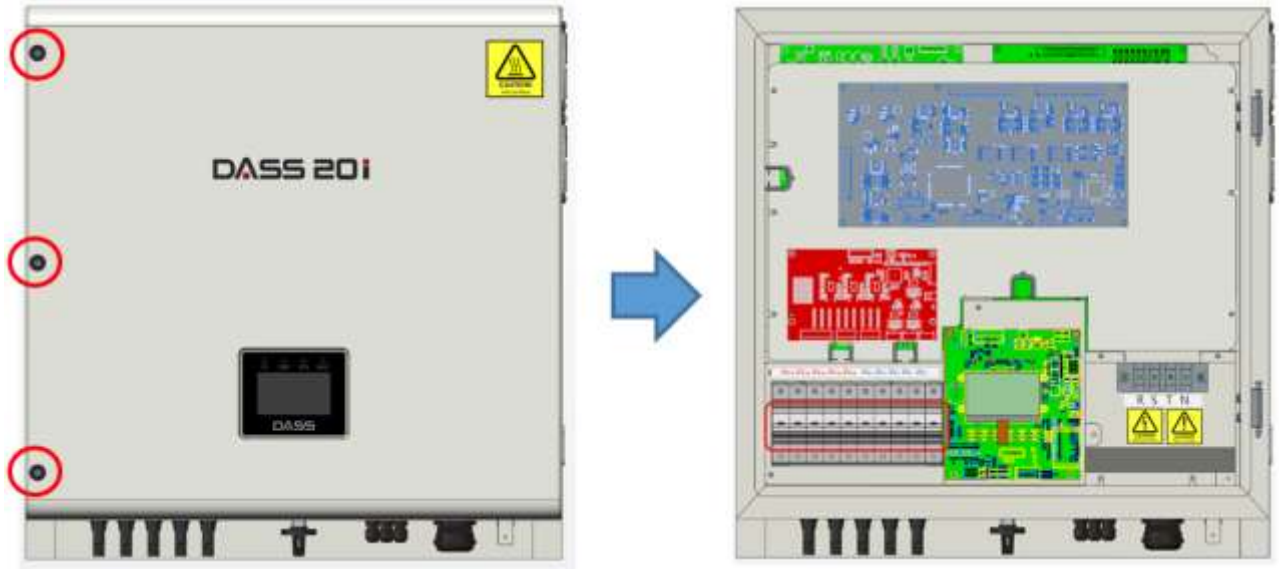


⑧ If any connector is unconnected in the inverter after connecting connectors to each input area, put a waterproof connector gland (included in the package box) shown in the above picture on the connector.

3.8 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.

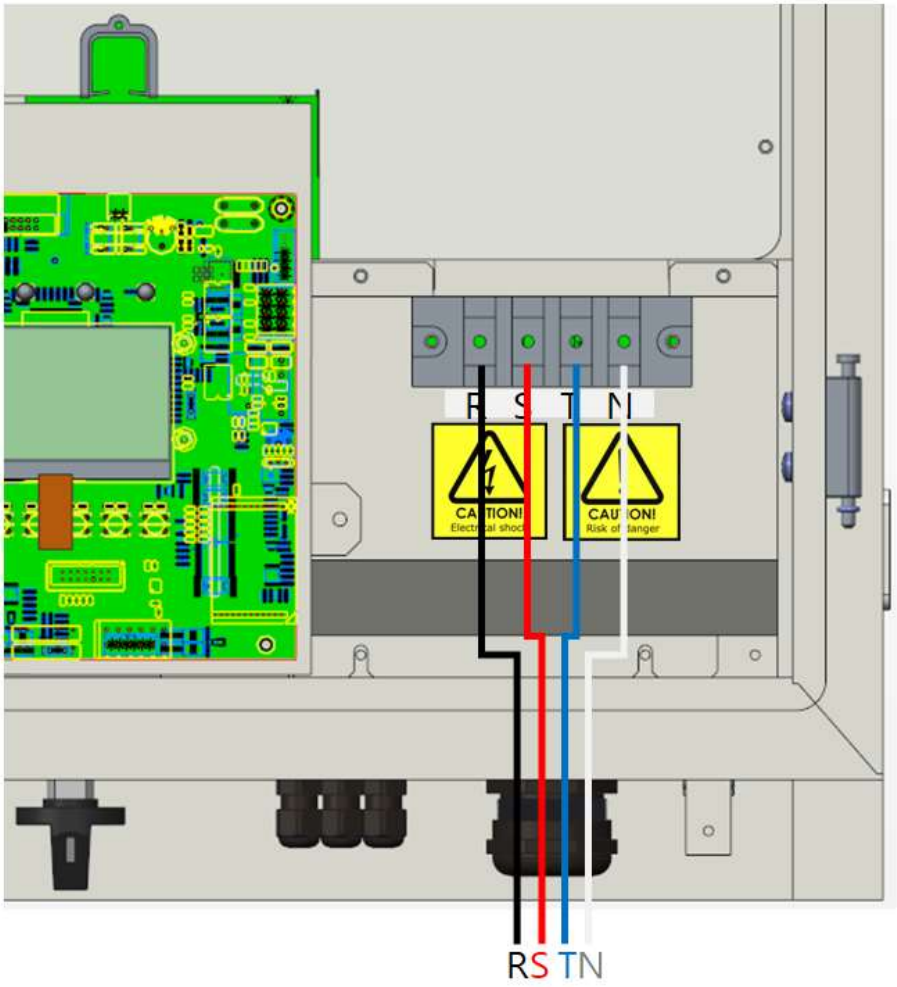


- **AC connection**

① The cover in the inverter can be opend by loosening three hexa bolts marked in the figure below.

② A A terminal block is found at the right side if the cover in the inverter is opened.

③ Please use a wire of 10SQ – 16SQ when AC wiring is conducted. (Please change a wire thickness according to the length of wire.)



① An order of the terminal block is R, S, T, and N from the left side.

② Press the cable and terminal connected to the terminal block. (The rated dimension of the terminal block is 6Ø.)

③ Fasten the cable orderly to the terminal block by using a power driver.
(8.7Nm ≤ recommended torque ≤ 15Nm)

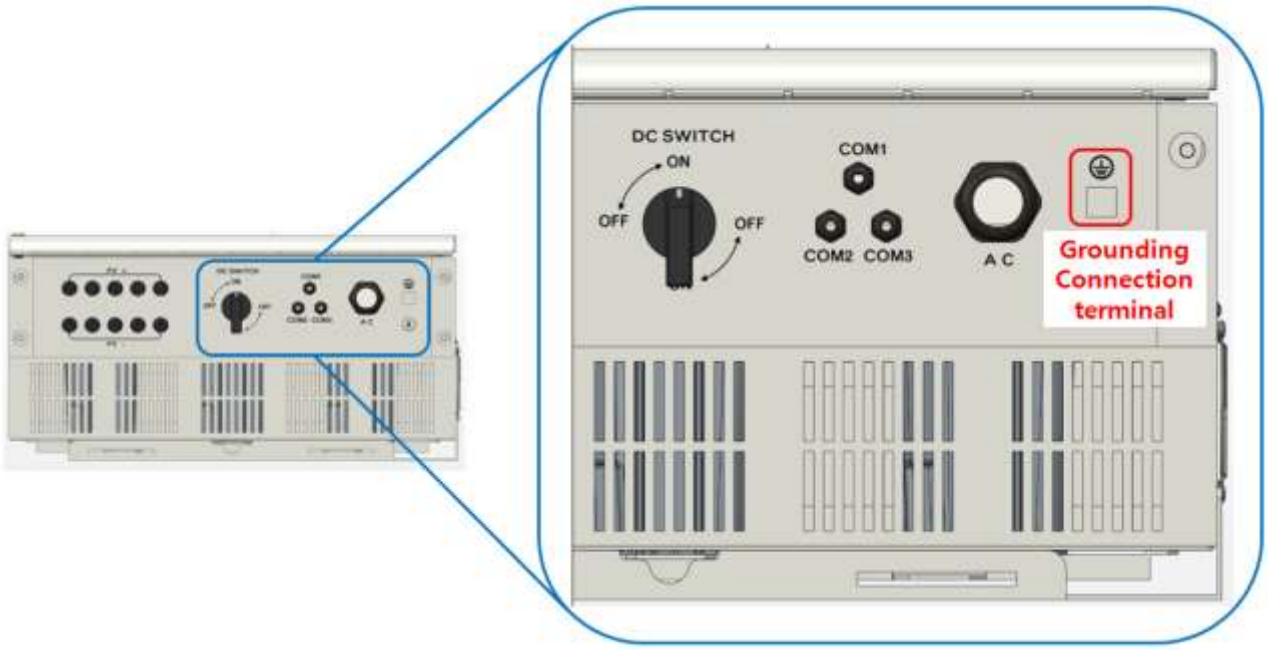
④ When the cable is connected to the terminal block, care should be taken that the cable and terminal do not have a phase-to-phase short-circuit among R, S, T, and N.

⑤ Please fasten the plug of the cable gland after all wiring is done.

경고 **! Warning**

In case of negative phase, a letter of **PHASE REVERSE** appears 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, disconnect all powers and re-wire the AC cables.

- **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 10mm^2 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 5Ø.
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.

주의 **! Caution**

Use copper or aluminum cable only.
Use grounding cable with minimum cross dimension 10mm^2.

3.9 RS485 Communication Connection

! Caution

Check if BUS + and BUS- cables are correctly connected. If the wiring is wrong done, communication will not be enabled.

The specification of BSU+ and BUS- cables may differ depending on manufacturers.

- **RS485 cable**

Max length of RS485 cable	Max allowable length of an RS485 cable is 1200m. This length is allowed only under optimal conditions. Generally speaking, when the length of a cable exceeds 500m, a repeater or hub is required.
Max number of connection	DRTU : 8 sets i-PLUG : 32 sets (inverter, sensor box, system connection panel) External device : use after checking the specification.
Data cable	Recommendations : - Use a twisted and shielded wire. - When installing at the external place or on the ground : Black LI2YCYv (screened wire), - When installing in the dry or humid indoor space : LI2YCY (screened wire) gray

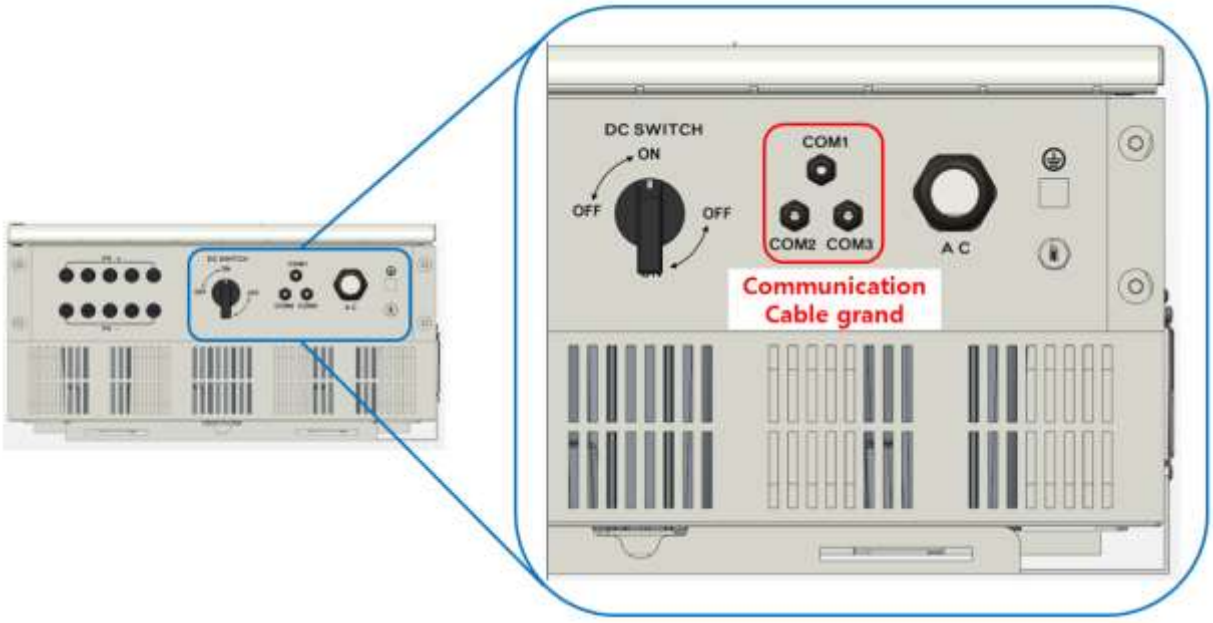
In order to prevent interfereence effect during data transmission, please check the followings:

Check the pairing of the cables when connecting BUS + and BSU – cables.

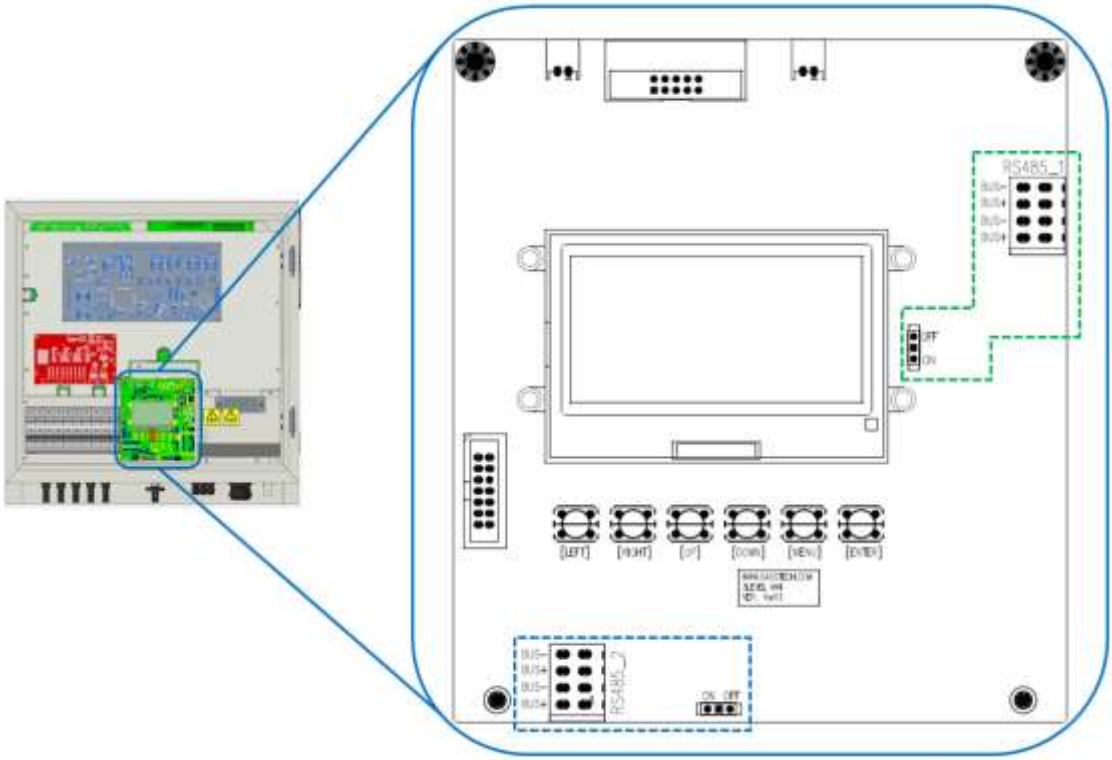
Do not install RS485 cables together with DC or AC power cables.

Connect BUS + and BSU – cables to the corresponding terminal correctly and be sure to fix it tightly.

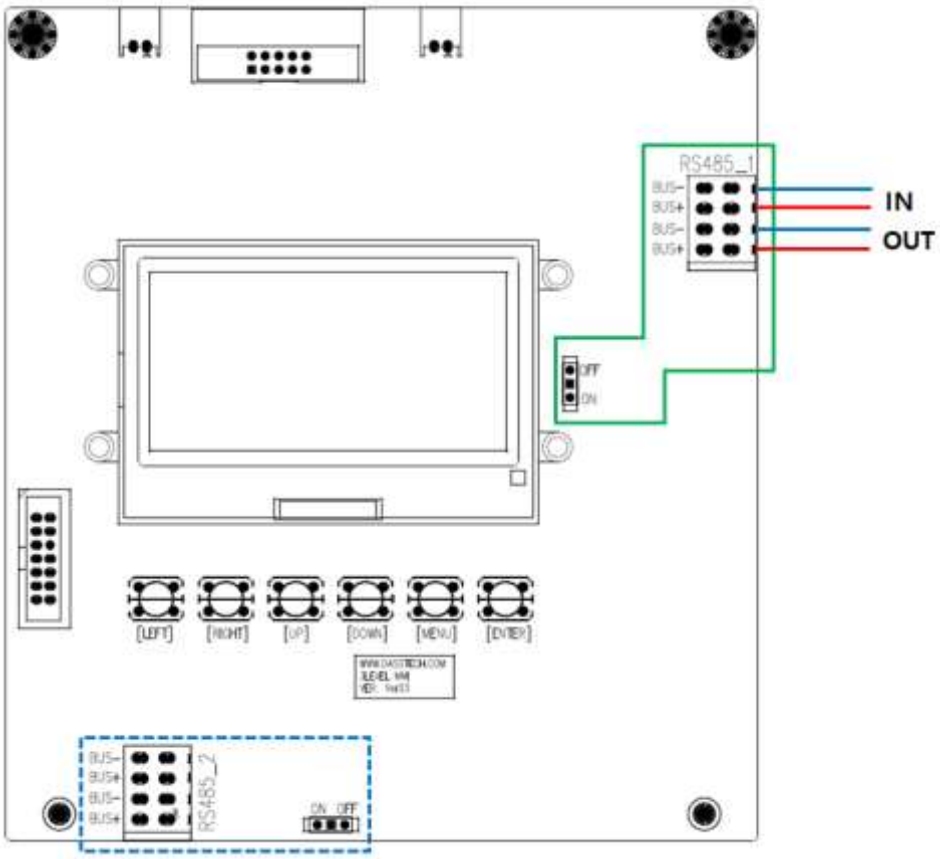
In parallel connection, activate the terminal resistance of the last inverter(Switch).



① When RS485 communication is connected, use the cable gland at the bottom side of the inverter.



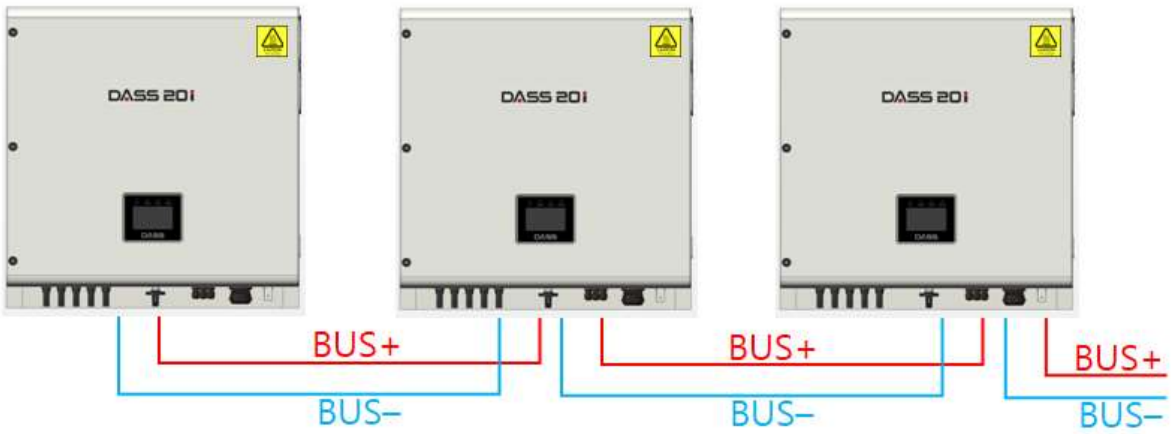
② Open the cover in the inverter and check the position of communication connector located at MMI PBA.



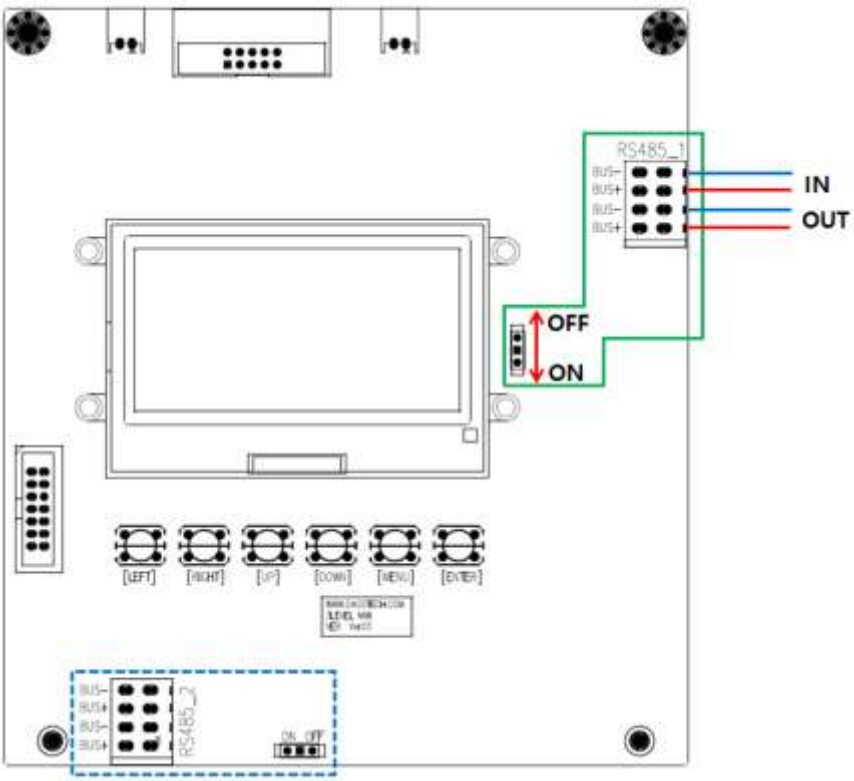
< MMI PBA >

③ Pass the communication power wire (3~6.5mm) through the cable gland and connect the communication line [+] to BUS+ of RS485 connector, the communication line [-] to BUS-, respectively.

④ Connect the RS485 communication connector for RS485 communication in parallel when connecting the inverter in parallel.



⑤ Please turn ON the switch (SW40) only in the inverter at the far end of RS485 communication when parallel operation of the inverter and monitoring on the inverter are connected.



⑥ RS485_2 is an optional part. The communication method is the same as RS485_1.

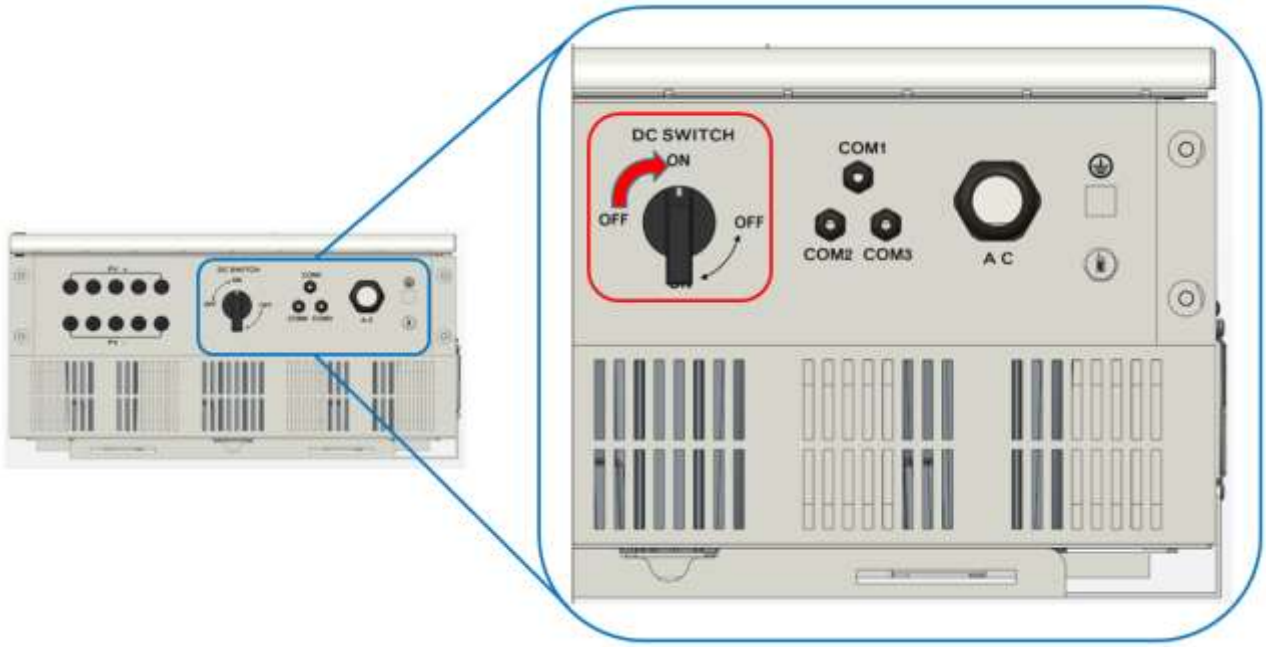
⑦ System ID Number should be set according to the below method during the communication use. When ID is not assigned, the value is set to 0 by default.

(Menu button – ETC Set – System ID Number – assigning the preferred ID Number to be used)

⑧ Once the communication setup is complete, fasten the plug of the communication gland.

4. Operation

4.1 Checklist prior to Operation



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 How to Operate

- **Checklist prior to the operation**

Check the status of wiring in the inverter and its installation.

In particular, check if the input polarity of solar cells is connected accurately or if the connection of the grid line is connected correctly.

Supply the DC power of solar cells to the inverter. Once DC power is supplied, the inverter will check automatically the status of AC power, count down 300sec, and run automatically.

Check the ON/OFF status of the DC switch at the lower part of the inverter.

- **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.

! Warning

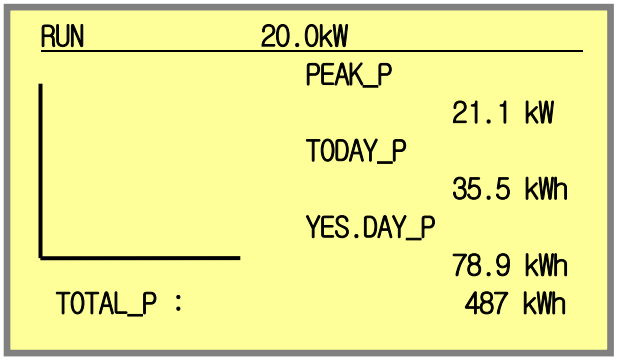
Note that the figure displayed in the operation and installation manual is explained without the front cover for the purpose of detailed explanation. However, the front cover must be installed according to the regulation when the product is operated before the product is operated according to the operation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

4.3 Appearance of the Display Window and Functions

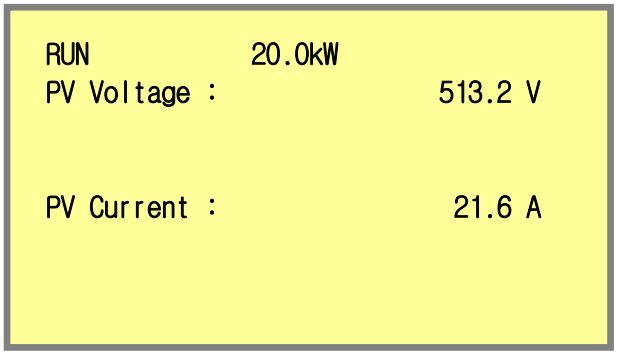
State LED	Description
PV	Its displays the input state from the solar cell module.
GRID	It Displays if the grid is run normally.
RUN	It displays if the inverter is run normally.
FAULT	It displays if an error is generated in the inverter.

- 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.

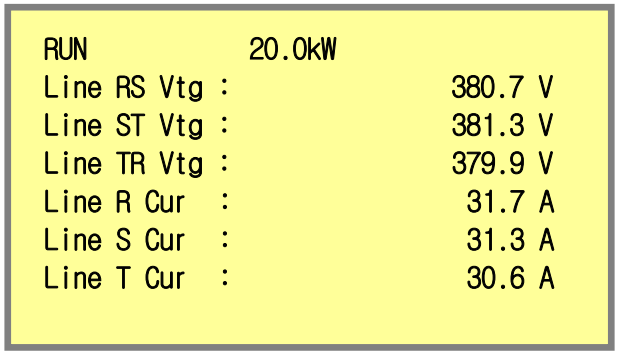
4.4 Display Window Screen



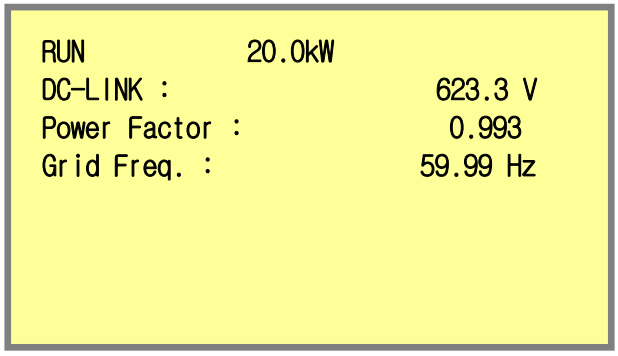
- RUN/STOP : Operation status, 20.0kW : Current power
- Graph : Today hourly power generation graph
- PEAK_P : Today peak power
- TODAY_P: Today power
- YES.DAY_P : Yesterday power
- TOTAL_P : Total power



- RUN/STOP : Operation status, 20.0kW : Current power
- S-000 : Displayed when a Fault or Warning occurs
- PV Vtg1 : Input PV voltage
- PV Cur1 : Input PV current



- RUN/STOP : Operation status, 20.0kW : Current power
- Line RS Vtg : grid R-S interline voltage
- Line ST Vtg : grid S-T interline voltage
- Line TR Vtg : grid T-R interline voltage
- Line R Cur : R phase current
- Line S Cur : S phase current
- Line T Cur : T phase current

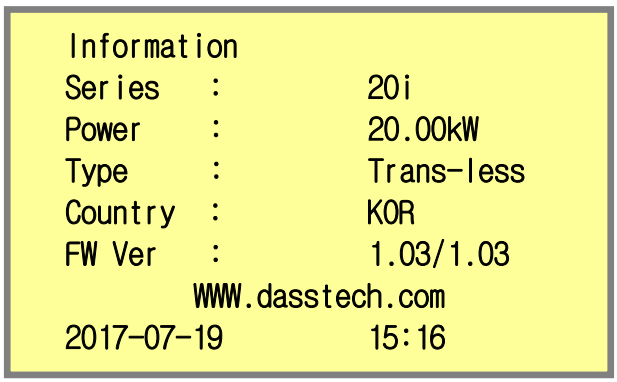


- RUN/STOP : Operation status, 20.0kW : Current power
- DC-LINK : DC-LINK voltage
- Power Factor
- Grid Freq. : frequency of line

The above 4 screens are based on firmware version 1.03/1.03.

Follow the below sequence to check the firmware version.

Open MMI cover -> MENU -> select Information by using UP/DOWN key -> ENTER



- Series : current model series
- Power : current model power capacity
- Type : current model inverter type
- Country : country for current model
- FW Ver : firmware version number
- WWW.dasstech.com : homepage address of Dasstech
- 2017-07-19 15:06 : current date and time (Year-Month-Day, Hour:Minute)

5. Functions

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 pre-set value, the inverter is stopped. If the frequency in the grid voltage is deviated from the pre-set 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 transfer. 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 (Maximum Power Point Tracking) 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.

! Caution

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 makes the system to ready-state.

! Caution

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-current 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.

- **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)

- **Negative phase**

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

- **Grounding fault protection**

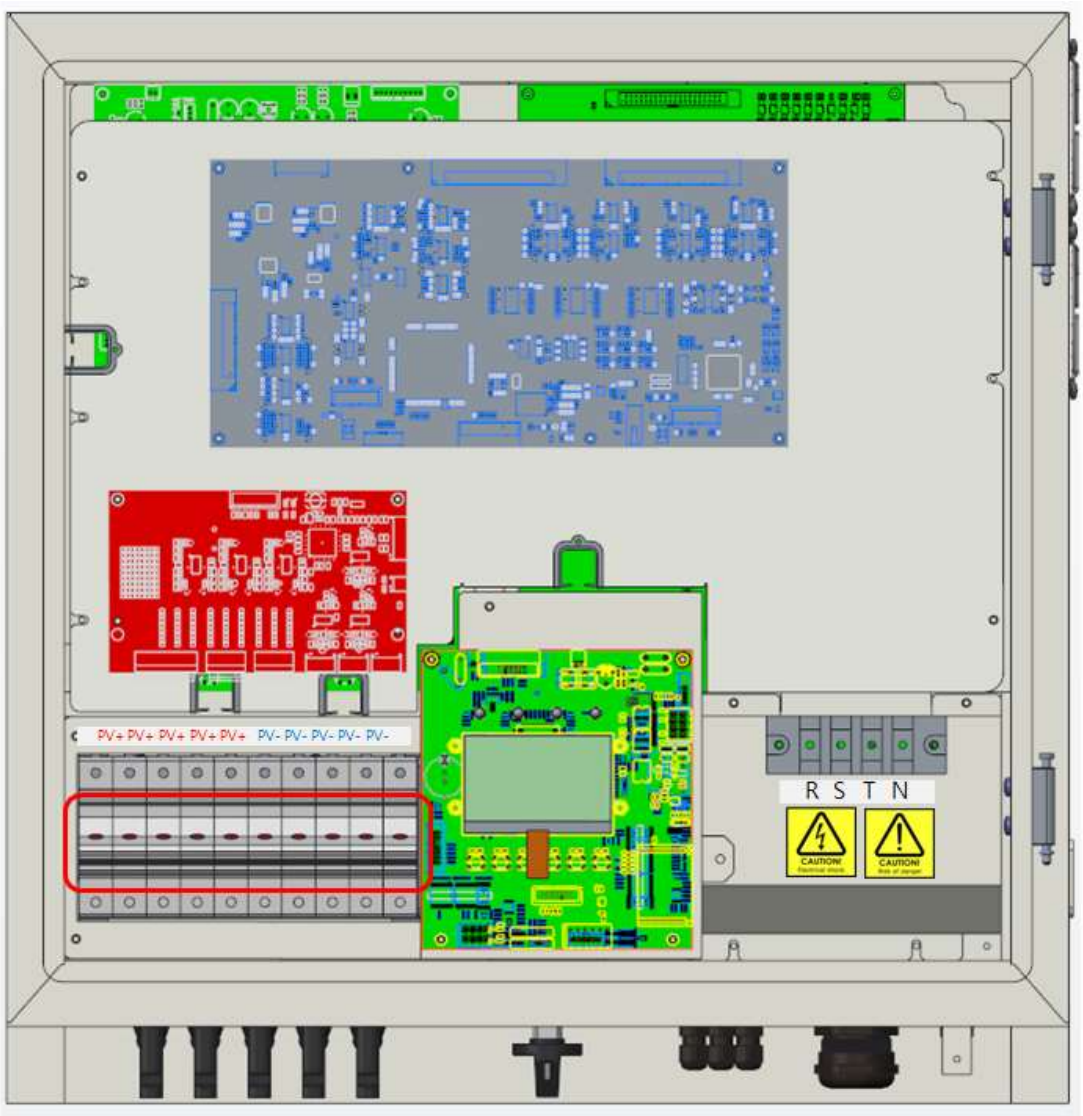
If a leakage current occurs due to grounding fault, the system is stopped.

- **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.


PV+ PV+ PV+ PV+ PV+ PV- PV- PV- PV- PV-
R S T N
CAUTION!
CAUTION!

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	InsDC-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	Operate the inverter after inspecting the solar cell module. 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, Operate the inverter after inspecting the solar cell module.
5	Input overcurrent	InsPV OC, AvgPV OC	If the solar cell current exceeds the set current	Operate the inverter after inspecting the solar cell module.
6	Output overcurrent	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	Temperature FAULT	Over Heat1	Over-temperature failure	Contact the service center.
11	Output current FAULT	Unbalance A	Output current imbalance	Contact the service center.
12	HARDWARE FAULT	Hardware OC	Output over-current	Contact the service center.
13	INSULATION FAULT	PV Insulation	Insufficient insulation resistance	Operate the inverter after checking the solar cell module. If reoperation fails, contact the service center.
14	HARDWARE OH	Over Heat2	Hardware overheat	Contact the service center.
15	RCMU FAULT	RMCU Breakdown	RCMU fault	Contact the service center.
16	Grid Overvoltage	InsLine xx OV, AvgLine xx OV	If the grid voltage exceeds the set voltage	Contact the installation company and then call the service center.
17	Grid Undervoltage	AvgLine xx UV	If the grid voltage is below the set voltage	Contact the installation company and then call the service center.
18	Grid Frequency fault	Over Frequency, Under Frequency	Grid frequency fault	Contact the installation company and then call the service center.
19	Output DC detection	x DC Current	DC output is introduced to the grid	Contact the service center.
20	Negative phase	PHASE REVERSE	Negative phase	Rewire the output cable.
21	Leakage current detection	Residual OC	Leakage current occurrence	Operate the inverter after checking the solar cell module and distribution panel.

				If reoperation fails, contact the service center.
22	Inverter (phase) overvoltage	InsLine xN OV, AvgLine xN OV	Inverter R, S, and T phase overvoltage	Contact the installation company and then call the service center.
23	Grid (phase) Undervoltage	AvgLine xN UV	Inverter R, S, and T phase Undervoltage	Contact the installation company and then call 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.
8	PV SPD FAULT	PV SPD Error	PV SPD failure	Contact the service center.
9	GRID SPD FAULT	AC SPD Error	GRID SPD failure	Contact the service center.
10	Fuse disconnection	Fuse Open	Fuse disconnection notice	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) Manufacture No.
3) Purchase place
4) Purchase year
5) Warranty
6) Failure details

5.7 Disposal

- Please dispose the product as general industrial waste.

6. Maintenance and Cleaning

- Be sure to carry out maintenance of the inverter regularly.

Recommended service period	Service work	Details
6 months	Cleaning	- Remove fan dust at the right side of the inverter - Remove vent dust at the left side of the inverter
12 months	Cleaning	- Remove fan dust at the right side of the inverter - Remove vent dust at the left side of the inverter
	Visual check	- If the inverter enclosure has any rust - The connector at the lower part of the inverter - The cable glad at the lower part of the inverter - DC SWITCH at the lower part of the inverter - Dust and humidity of the front display of the inverter - The cable sheath at the lower part of the inverter

! Caution

Do not carry out dust removal during inverter operation.
Do not touch any part of the product such as inverter enclosure, connectors, cable gland, cables, etc. during visual check.

! Danger

Deadly risk due to electric shock

Do not carry out any service with the inverter cover open except the above service list.
Touching any electrically-live part may cause deadly electric shock.

7. Product Specifications

- DSP-3315H-OD

Model name		DSP-3315H-OD
DC Input	DC. Vmax. PV	1000Vdc
	Operating voltage range	600[2] ~ 950V
	MPPT voltage range	600[2] ~ 800V
	Rated voltage	600V[2]
	Operating start voltage	700V[1]
	Control mode	MPPT
	DC. Imax. PV	27.5A
	DC. Isc PV	41A
	Max. inverter backfeed current	0 A
	Maximum input current per string	15A
	Independent MPP input count	1
	No. of strings per MPP input	5

[1]650V-380/220V, 700V-415/240V, [2]550V-380/220V, 600V-415/240V

Model name		DSP-3315H-OD		
AC Output	Rated power	**15,000W**	**16,000W**	**16,500W**
	Rated voltage	380/220V	400/230V	415/240V
	Rated frequency	50Hz/60Hz(45~55Hz/55~65Hz)		
	Rated current	23A		
	Max. fault current	27.6A		
	Constant	Three-phase Four-line (transformer-less type)		
	Power factor	0.8(lagging) - 0.8(leading)		
	Over current protection			
	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	98% or more		

- DSP-3320H-OD

Model name		DSP-3320H-OD
DC Input	DC. Vmax. PV	1000Vdc
	Operating voltage range	600[2] ~ 950V
	MPPT voltage range	600[2] ~ 800V
	Rated voltage	600V[2]
	Operating start voltage	700V[1]
	Control mode	MPPT
	DC. Imax. PV	37A
	DC. Isc PV	56A
	Max. inverter backfeed current	0 A
	Maximum input current per string	15A
	Independent MPP input count	1
	No. of strings per MPP input	5

[1]650V-380/220V, 700V-415/240V, [2]550V-380/220V, 600V-415/240V

Model name		DSP-3320H-OD		
AC Output	Rated power	**20,000W**	**21,000W**	**22,000W**
	Rated voltage	380/220V	400/230V	415/240V
	Rated frequency	50Hz/60Hz(45~55Hz/55~65Hz)		
	Rated current	30A		
	Max. fault current	36A		
	Constant	Three-phase Four-line (transformer-less type)		
	Power factor	0.8(lagging) - 0.8(leading)		
	Over current protection			
	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	98% or more		

- DSP-3325H-OD

Model name		DSP-3325H-OD
DC Input	DC. Vmax. PV	1000Vdc
	Operating voltage range	600[2] ~ 950V
	MPPT voltage range	600[2] ~ 800V
	Rated voltage	600V[2]
	Operating start voltage	700V[1]
	Control mode	MPPT
	DC. Imax. PV	46A
	DC. Isc PV	69A
	Max. inverter backfeed current	0 A
	Maximum input current per string	15A
	Independent MPP input count	1
	No. of strings per MPP input	5

[1]650V-380/220V, 700V-415/240V, [2]550V-380/220V, 600V-415/240V

Model name		DSP-3325H-OD		
AC Output	Rated power	**25,000W**	**26,500W**	**27,500W**
	Rated voltage	380/220V	400/230V	415/240V
	Rated frequency	50Hz/60Hz(45~55Hz/55~65Hz)		
	Rated current	38A		
	Max. fault current	45.6A		
	Constant	Three-phase Four-line (transformer-less type)		
	Power factor	0.8(lagging) - 0.8(leading)		
	Over current protection			
	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	98% or more		

- General Data

Model name		DSP-3315,20,25H-OD
Structure	Cooling mode	Forced-air cooling
	Protection structure	IP 65 (FAN IP 55)
	Device noise	70 dB or less
	Outer dimension (W x H x D)	550*565*280(W*H*D)
	Overall weight	< 45kg
	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	Prevention of single operation
		Short circuit current control
		Grid over-voltage, under-voltage protection
		Grid over-frequency, under-frequency protection
		Reactive power control
		Residual current monitoring
	Protection class	Class1(IEC 62103)
	Overvoltage category OVCⅢ	PV II, AC III
Use Environment	Installation environment	Outdoor
	Enclosure external pollution grade	3
	Enclosure internal pollution grade	2
	Ambient temperature	-25℃ ~ 60℃
	Holding temperature	-25℃ ~ 65℃
	Ambient humidity	Relative humidity 90% RH or lower (No dew formation)
	Altitude, vibration	2,000 m or lower, 5.9m/sec²(=0.6g) or lower
	Ambient environment	No corrosive gas, flammable gas, oil mist, and dust

8. Warranty

Warranty

Product name		Grid-connected photovoltaic inverter (PCS)
Model name		
Purchase date		
Warranty period		Five years from the purchase date
Customer	Name	
	Address	
	Contact	
Purchase place	Name	
	Address	
	Contact	

- The warranty of the product does not cover safety-related accidents and failures occurred due to the use that violates the specifications and consumer's fault.
- The specifications and outer design of the product may be modified without notice.
- The warranty is only applied to the Republic of Korea.
- The warranty is not re-issued. Please store this at a secured place along with the operation manual.

◀Information about free-of-charge service▶

If failures of the product occur within the warranty period while using the product at normal use conditions, free-of-charge repair service is provided.

◀Information about paid service▶

The following cases should use paid services.

- Failure of the product occurred due to user's fault or carelessness.
- Failure of the product due to the bad connected devices as a result of use power fault.
- Failures due to natural disasters.
- Product is modified or repaired by service centers which are not authorized by us.
- Product without DASSTECH name plate.
- Failures occurred due to disassembly, repair, or replacement by users arbitrarily.
- Consumable parts are replaced due to the end of life.
- In case that personnel who are not authorized service agents modify or repair the product.
- When free-of-charge service period is passed.

Customer service center	1588-7468
Contact number of main office	043-218-5670
(FAX)	043-218-8897
E-mail	webmaster@dassteh.com

The specifications of the product may be changed without notice due to quality improvements. Please contact us if you like to purchase the product.

Main office: 81, Yangcheongsongdae-gil, Ochang-eup, Cheongwon-gu, Cheongju-si, Chungcheongbuk-do, 28118, Korea

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