Operation and Installation Manual

Soleaf

DASS Tech

Photovoltaic Grid-Connected Inverter

DSP-3334K-OD ver1.1

DASS Tech Co., Ltd.

NOTICE

1. Cautions for safety

- Cautions for safety must be kept under any circumstances in order to prevent accident or dangers for safe and right use.
- There are two types of caution in the manual, warning and attention, as below.

Warning **It possibly causes serious injury or death when violated.**

Attention **It possibly causes minor injury or product damages when violated.**

- Symbols in the products and the operation and installation manual indicate as follows.

Indicates that you must be careful for possible danger under certain conditions

Indicates that you must be careful for electric shock under certain conditions.

- After reading this operation and installation manual, keep the manual in place that anyone can read it anytime.
- Read this operation and installation manual carefully in order to use the functions of DSP series sufficiently and safely.

Warning

- **Do not operate when the cover is open.**
  It can cause the electric shock as a high voltage terminal or charging parts is exposed outside.
- **Do not touch switch when your hands are wet.**
  It can a cause of the electric shock.
- **Do not open cover when power is on or in operation.**
  It can be a cause of the electric shock.
- **Do not open cover even when the power is off except for regular check.**
  The inverter is still charged even if the power is off due to the long-time charging, which can cause the electric shock.
- **When doing wiring work or regular check, shut off the power and wait more than 10 minutes then, verify complete discharging of DC voltage from the inverter by using multi tester(VOM).**
  It can be a cause of the electric shock.
- **Do not use this inverter in case the wire is damaged**
  It can be a cause of the electric shock.
- **Do not put any heavy items on the wire.**
  It can make the wire damaged and be a cause of the electric shock.

⚠ Attention

- **Keep away from inflammable materials.**
  If installed on or near the combustible material, it can cause fire. When there is fire or smell, stop operation immediately and contact us right away.

- **Shut off input power (solar module) and output power (AC power) immediately when the inverter malfunctions.**
  Otherwise, it could lead to fire by subsequent accidents accordingly.

- **Do not touch the inverter for about 10 minutes even if the power is off or when the power is on.**
  The inverter is very hot and it can damage your body.

- **When the inverter or a part is damaged, do not input power even if you finish installation.**
  It can cause the electric shock.

- **Be careful not to input any screw, metals, water, oil, etc. to the inverter.**
  It can be a cause of fire.

Directions for Application

(1) Transportation

- Please transport properly according to product weight.
- Please check external conditions.
- Do not pile up over the limited level or height.
- Do not open the cover while transported.
- Do not drop or damage with shock

(2) How to use

- If auto-operation is set up initially, it automatically operates when the voltage goes above the starting voltage.
- You can operate or stop with run/stop key on the key pad.
- Control the reset switch after trouble shooting, because if a trouble issue is reset, the inverter re-operates after some waiting time
- Do not modify the device due to any reasons
- If you need to set parameters, do it prior to operation because if you initialize the device, the device returns to default status.

(3) Precaution measure for trouble-shooting

- In the event of that the inverter gets damaged and becomes uncontrollable, the device can be in dangerous status. In order to prevent this, install the safety device such as a circuit breaker.

(4) Maintenance & repair

- Don’t perform Mega-test (measure insulation resistance) for inverter control circuit.
- For maintenance & repair, pls. refer to the chapter 6

(5) Disposal

- Dispose as a general industrial waste.

(6) Others

- In order to explain efficiently in detail, the description of front cover or circuit breaker is skipped in pictures.
  But, in any case, you should install the front cover and circuit breaker then, operate the device by strictly complying with the guidelines in this manual.

Directions for Installation

(7) Installation

- Follow the instructions in this operation and installation manual.
- This device can be installed on the indoor and outdoor.
- Install the device on no wet and dusty place and away from the direct sun light or high temperature place.
- In case of indoor installation, secure the space at least 20cm from the top, left/right side of the inverter.
- In case of outdoor installation, secure the space 1m at least from the ground surface.
- Installation shall be done by a technical expert.
- Do not place any heavy items on the device.
- Do not spray inflammable material to the device and keep the device away from any inflammable materials.
- Installation shall be done by direction according to the guidelines in this manual.
- Do not drop or add damage to the device.
- 인버터는 3 종 (200V 급) 및 특 3 종(400V 급) 접지 공사를 하십시오.
- Don’t use any home appliance near this device, otherwise, a fault or noise of home appliance may happen.
- Always use the assigned mounting bracket, and be careful from being damaged by a sharp part.
- Prior to installing the inverter, turn off DC switch (in the bottom part of the inverter) then, start to install.
  If DC switch remains turned on when you install, it can be a cause of a fault.
  After finishing installation, turn on DC switch and operate the inverter.

(8) Wiring

- Incorrect terminal connection can damage the device.
- Please be careful for connecting DC connector due to the polarities (+/-).
  Refer to the chapter 3 for installation.
- Please be careful for distinguishing the wire of power and grounding wire when connecting AC connecter.
  Refer to the chapter 3 for installation.
- Wiring and inspection shall be done by a technical expert.
- After installing the inverter, wiring(connection connectors) shall be done.

(9) Adjustment in commissioning

- Verify all setting parameters prior to operation

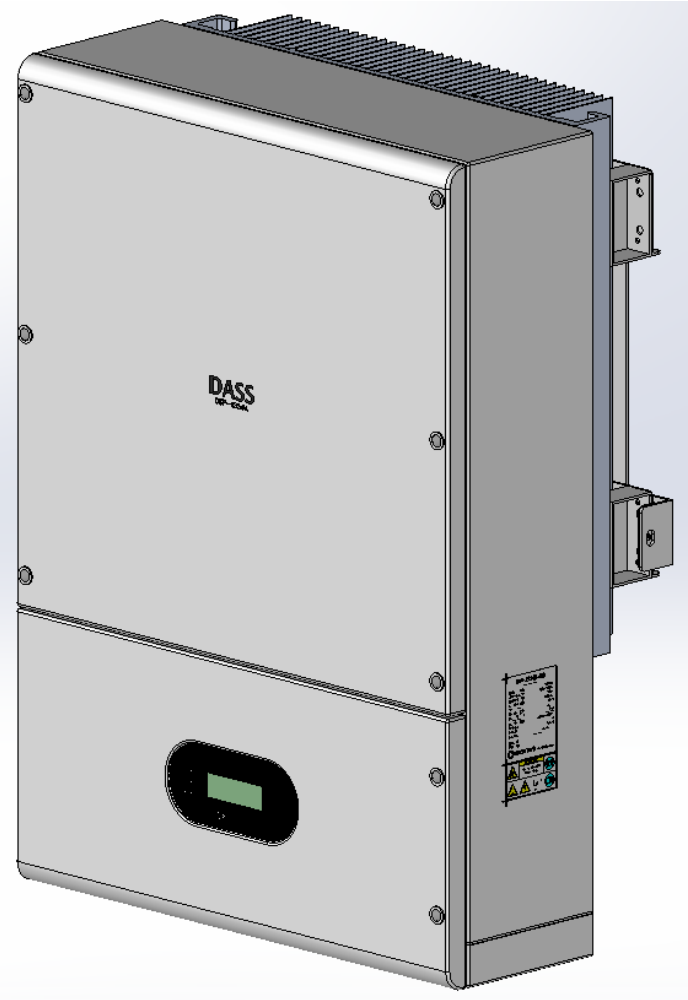
2. Product

2.1 General

2.1.1 Contents to be complied with before using the device

If you misuse the device, it operates abnormally or the lifetime can be short.
Seriously, the inverter can be broken or damage the human body.
So, please use the device after understanding fully the installation manual.

2.1.2 Appearance of the device



2.1.3 Detailed information

Check the nameplate on the side of the device and verify that the type and specification of the device as ordered. Also, please verify whether any broken parts happened during transportation.

(1) Inverter type

DSP - 3 3 34K - OD

Symbol	Name
DSP	DASS Tech.

Symbol	Phase
1	Single phase
2	Three phase

Symbol	AC voltage
2	220V
3	380V

Symbol	Type
OD	Outdoor type

Symbol	AC voltage
34K	34kW

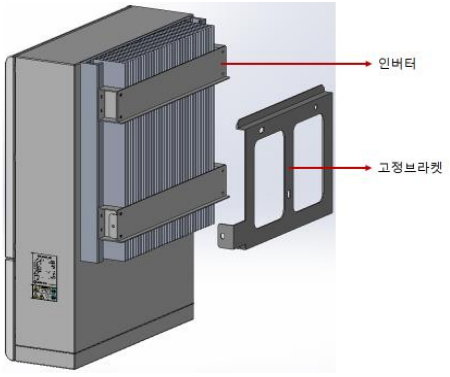
(2) Accessories – Operation & installation manual / input(DC) connector / mounting bracket, bolts

2.1.4 Preparation for devices & components for operation

As the preparation for operation may be changed dependent on the installation environment more or less, prepare necessary materials and parts, i.e. – Multi Tester to check voltage and wiring, gearing tools to install mounting bracket and etc.

2.1.5 Installation

To prevent the lifetime or performance from being depreciated, install the device exactly, considering its installed position or direction, or peripheral space.



After fixing mounting bracket to the wall and install the inverter to the bracket

2.1.6 Wiring

전원, 운전 신호(제어용 신호)를 커넥터를 사용하여 연결합니다. If an incorrect connection is done, there can be problem in the inverter or peripheral devices and pls. wire carefully.

2.1.7 Configuration of the system

The correct connection is needed under right configuration of peripheral devices. Incorrect system configuration and connection may make the normal operation impossible or cause a serious declination in lifetime.
In the worst case, the inverter may be damaged by fire and please use the device in accordance with the guides in the manual.

2.1.8 Specific Features of the Product

(1) High efficiency conversion

The inverter converts the power in a high efficiency using IGBT and has high efficiency more than 98% at the rated power.

(2) Digital Control

It's easier to control the system with the high performance digital control and monitor data by LCD.
It indicates the operation, input/output and abnormal condition of the device and stop the device when problem happens, also it operates or stops automatically by inspecting voltage of the solar module

(3) Transformer-less type

As the transformer-less type, it is suitable for the decentralized power system designed for industrial purpose.

(4) Decentralized Power System and Profitability

Photovoltaic generation system can be installed in the places wherever the sun shines.
Economical use is possible by configuring the decentralized power based on the unit of the building, house.

(5) MPPT (Maximum Power Point Tracking)

As a characteristic in output of the solar module, DC can happen variably depending on temperature, humidity, weather, environment, irradiation.
The inverter control the solar module to keep the maximum power by MPPT.

(6) Easy Parallel Operation

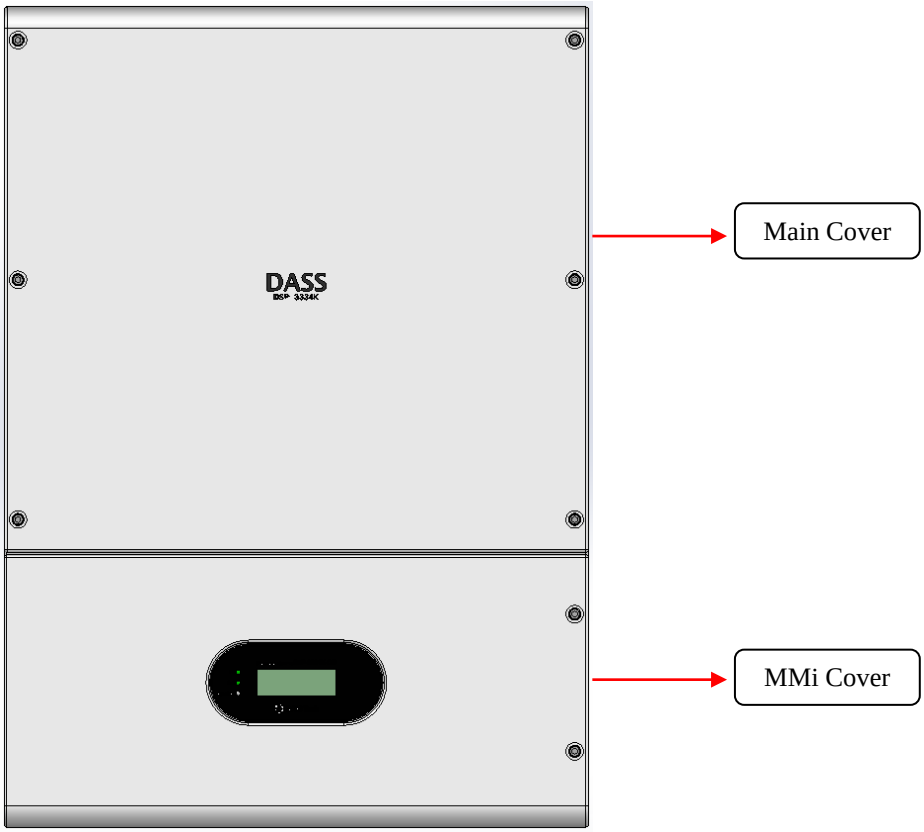
If installation of solar modules increases, only you need to add the inverter in parallel connection without installing the additional other devices.

(7) Convenient Installation and Operation

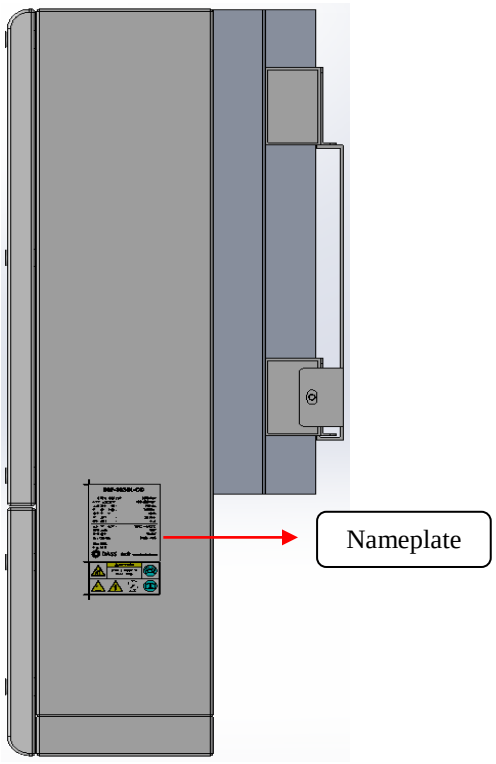
It's easy and safe to connect the solar modules to the grid by using the dedicated connector.
Also, it's designed to display the status of the inverter in real time through LCD screen.

2.2 Appearance

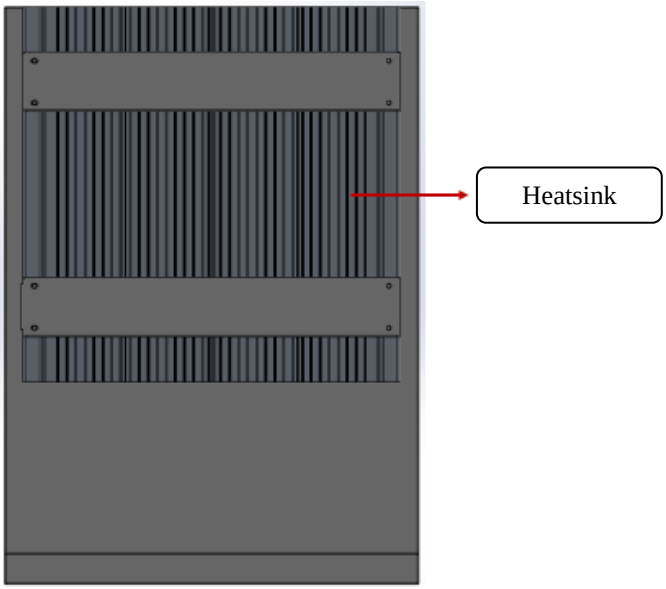
1) Front view



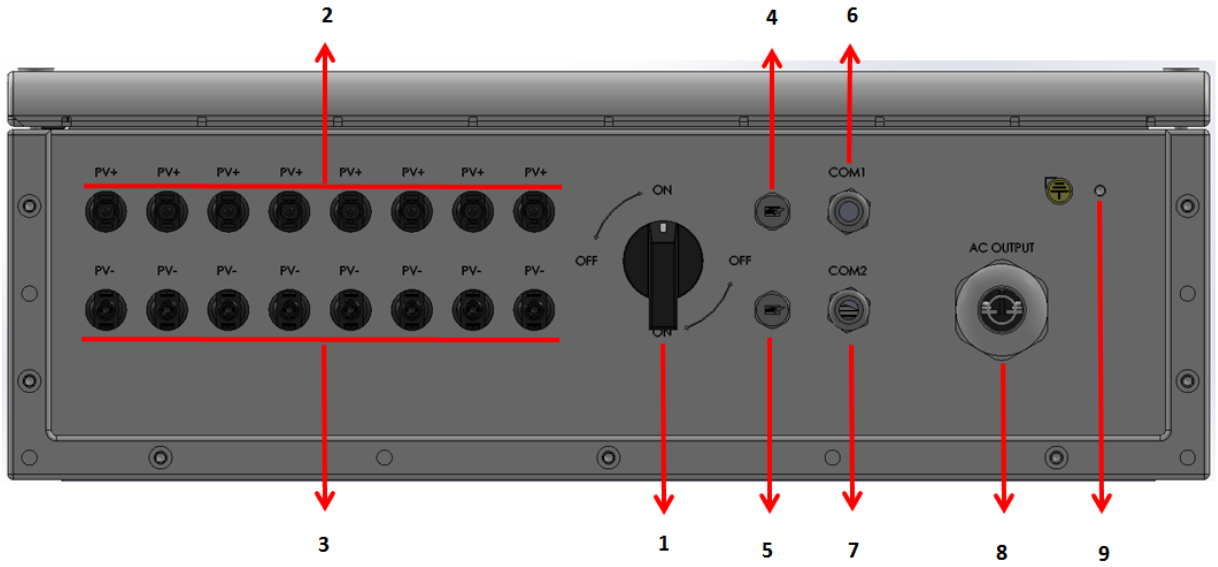
2) Side view



3) Rear view



4) Bottom view



1. DC SWITCH (ON/OFF)

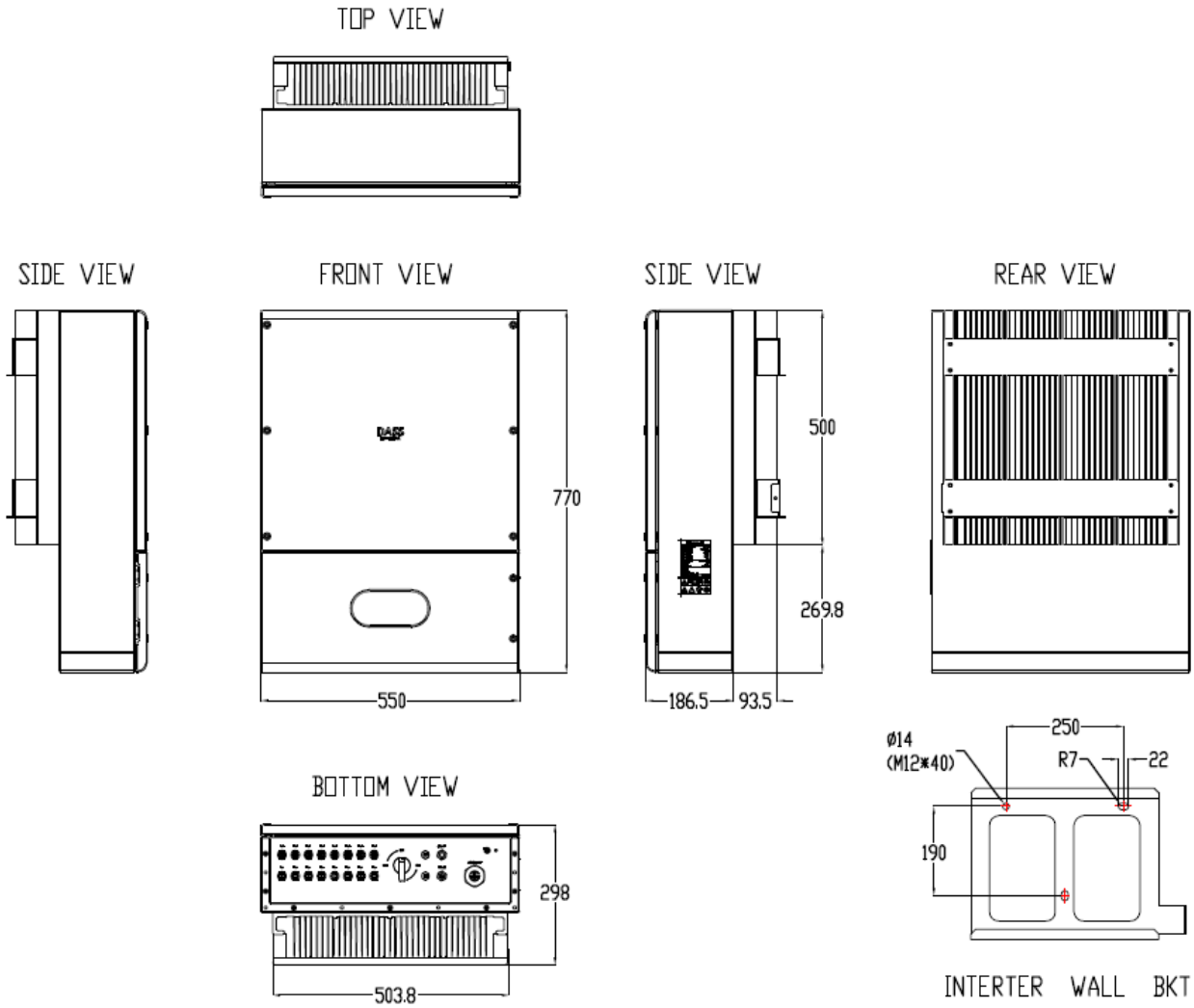
2. DC INPUT 8PORT (POSITIVE +) **3. DC INPUT 8PORT (NEGATIVE -)**

4/5. PROTECTIVE VENT **6. RS-485 INPUT**

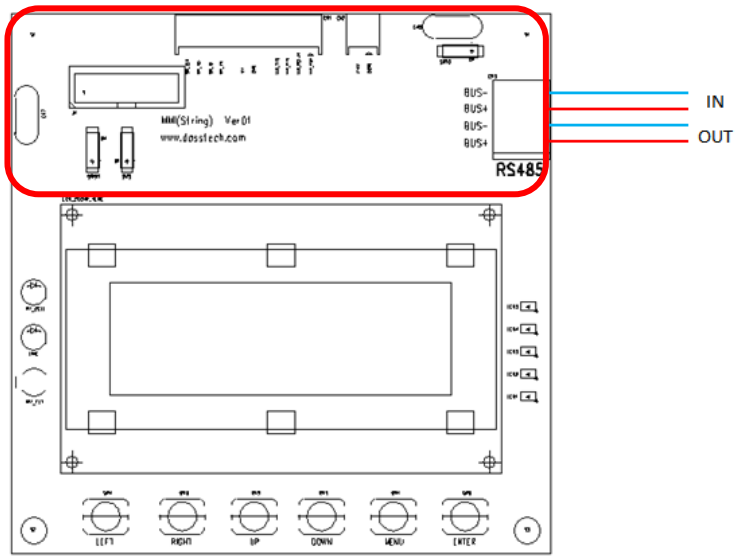
7. RS 485-OUTPUT **8. AC OUTPUT PORT**

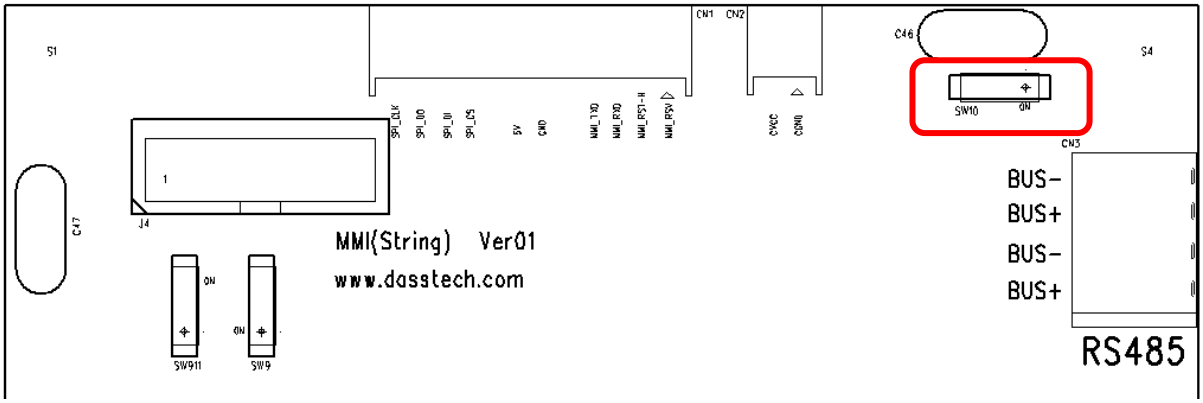
9. Grounding connection

5) Dimensions



2.3 Communication





■ In case of RS 485 interface, connect a communication cable to BUS+, BUS- terminals

■ In case of parallel connection of inverters, configure communication by using RS 485' IN / OUT

■ In case of parallel connection of inverters and monitoring, only turn on the switch (SW10) of the inverter in the end part

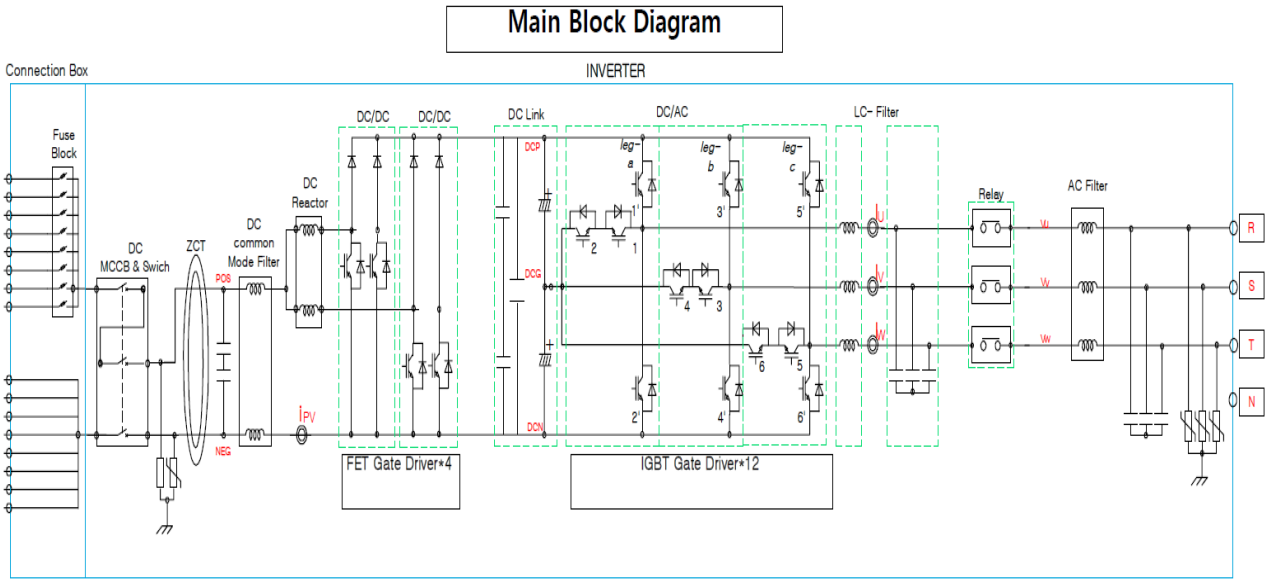
■ Communication connectors are optional and pls. contact us if you need

■ For using communication, set 'System ID No.' as below (if ID isn't set, the default value is set as zero)
[MENU KEY – Etc.set – System ID Number – 'setting ID No.']

3. Installation

3.1 Configuration

1) DSP-3334K-OD Block Diagram



3.2 Installation place

Install the Solar Inverter at the place satisfying following conditions.

1) Do not install the device in the place under the direct sun right.

2) Do not install the device in the place under the direct sun right.

3) As the lifetime of device is affected much by ambient temperature, please make sure that the ambient temperature of the installation place not over the allowed temperature range (-20 ~ 50℃).

4) Avoid the high temperature and humidity place (Below 90% RH and no dewfall).

5) As the inverter is a high temperature unit which generates the heat, it should be installed at the side of non-flammable material.

6) Secure sufficient spaces around the inverter for smooth dissipation of the heat.

7) Avoid the place where oil mist, flammable gas, fabric mote, dust and moisture exists.

8) Install the device by using bolts firmly.

9) Install the inverter at the place where no salt exists. (Especially if it's installed in the coast, please install the additional case or consider installing the device on the indoor installation because the device can be corroded)

3.3 Wiring

3.3.1 Main circuit wiring

1) Cautions for main circuit wiring

- For input power, connect the inverter's inside connector **[+]** to the inverter's outside connector **[+]** and the inverter inside connector's **[-]** to the inverter outside connector **[-],** then supply power. The inverter might be damaged by wrong connection.

- Do not disconnect the connecter during operation.

- In case of changing the wire for trouble shooting, please do this after verifying that the keypad is off. Keep in mind that the internal capacitor of the inverter is charged and it is very dangerous even if the power is off.

- 감전 방지를 위해 반드시 인버터를 특3종 접지(접지 저항 10 Ω 이하)로 하여 주십시오.

- Connect the terminal of the inverter to the grounding connection terminal in the bottom part. (pls. refer to Page 9)

- Use the dedicated wire for grounding and the grounding spot shall be connected close to the inverter as maximally. Use the wire which of its thickness more than the following size and do wiring shortly as much as.

Power	Size of grounding cable(mm^2)
1.5 ~ 3 kW	4.0
More than 5 kW	6.0
More than 34 kW	8.0

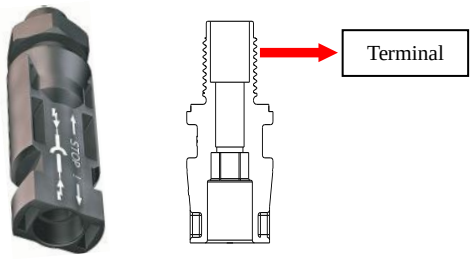
- Verify the maximum input voltage of inverter and output voltage of solar module array. If the output voltage of solar module exceeds the maximum input voltage of inverter, the critical damage can occur to the inverter.

- For wiring of solar module, set the output voltage by considering the temperature coefficient. Otherwise, input overvoltage or undervoltage of the inverter can happen depending on atmosphere temperature.

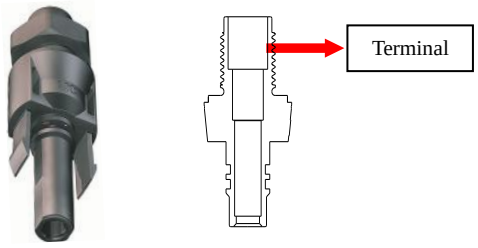
2) Configuration and installation for DC connector

- Configuration

Inverter Inside Connecter

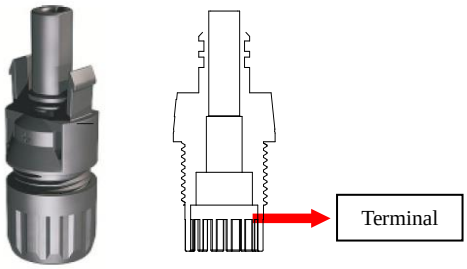


① [+] Pole / Inner diagram

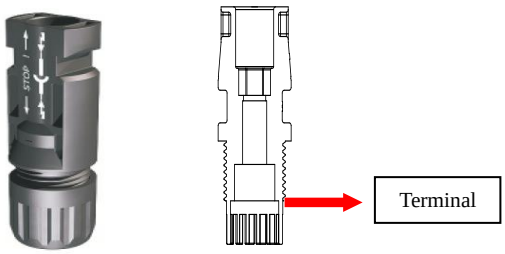


② [-] Pole / Inner diagram

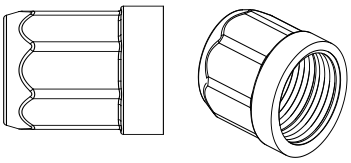
Inverter Outside Connecter



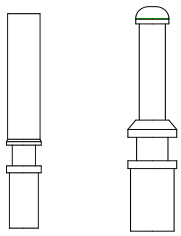
① [+] Pole / Inner diagram



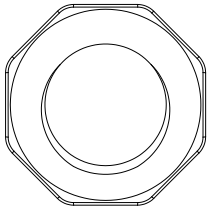
② [-] Pole / Inner diagram



③ CAP : tightening form when connecting cable and terminal



④ Terminal used when connecting cable and connector

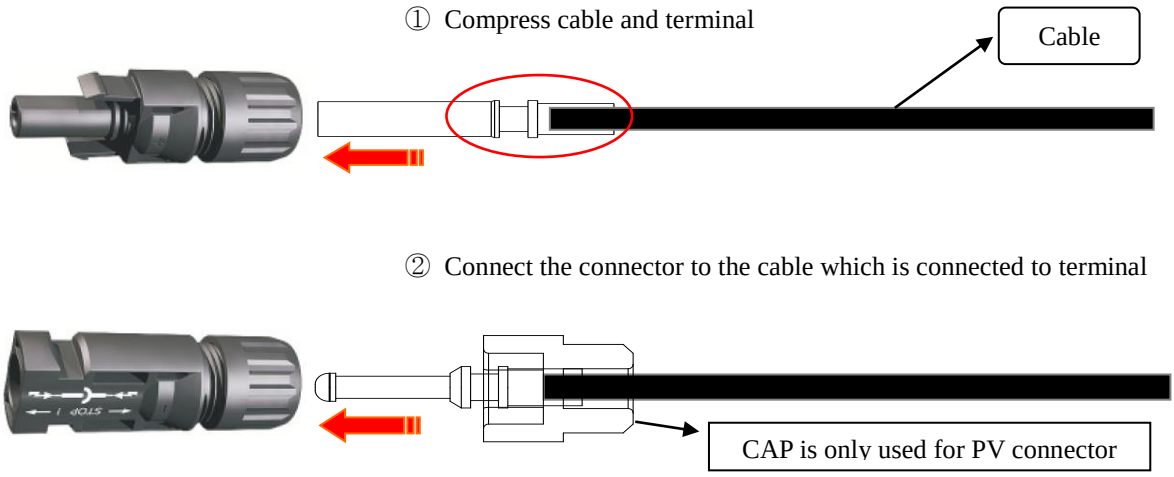


⑤ Nut to fix the connecter inside the inverter

※ To easily classify **Inside Connector and Outside Connector** is to check the difference in connection part of rear cap. When tightening, tighten the same pole shown in the connector.

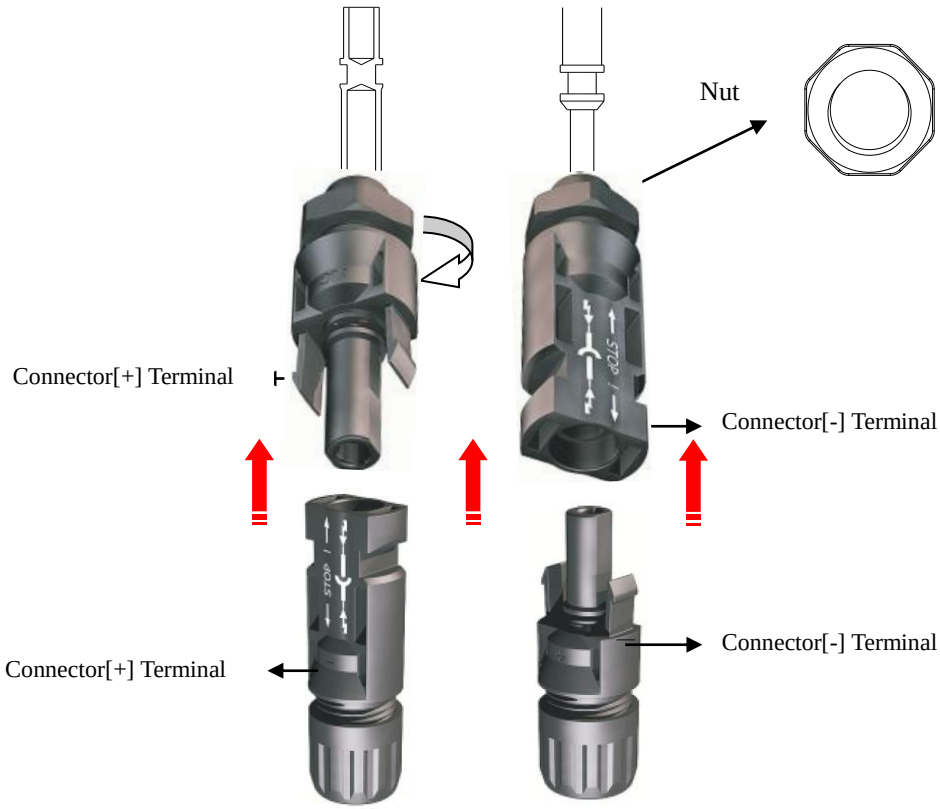
- Installation

Step 1. Coupling method of cable terminal and connector



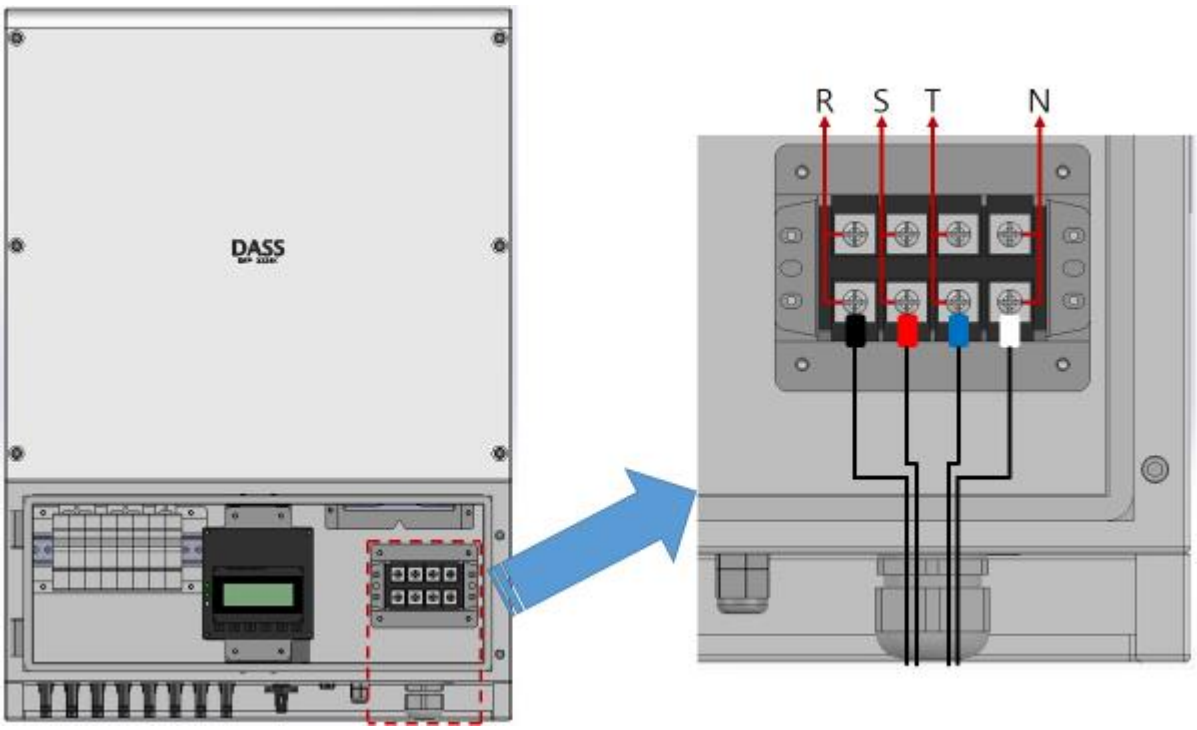
※ Terminal coupling method is only connectable with terminal and connector shown above

Step 2. Connection method of connector and inverter



※ Caution : Connect only the same polarity shown above [[+] ↔ [+] , [-] ↔ [-]]

3) AC CONNECTION installation



Pls. use a cable(more than 16SQ) for wiring (change thickness of a cable depending on wiring length)
In the picture, connect the black tube-wire to R phase and connect the red tube-wire to S phase.
Also, connect the blue tube-wire to T phase and the white tube-wire to N phase.

3.3.2 Communication circuit wiring

1) Cautions for wiring

- Pls. use a communication connector for wiring of control circuit board (pls. refer to the wiring diagram in 2.3)

4. Operation

4.1 Display

4.1.1 Appearance

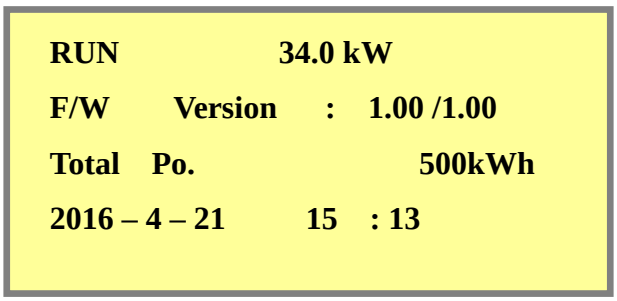
4.1.2Functions of display

LED Status	Description
PV	Indicates the input status from solar modules.
Grid	Indicates the grid power system status.
Operation (Red)	Indicates an error status of operation
Operation (Green)	Indicate the normal status of operation

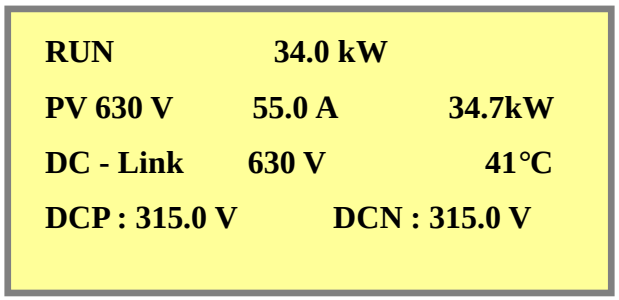
4.2 Basic mode (4 lines 16 characters LCD)

When the inverter power is ON, information on the LCD is updated every 10 seconds.

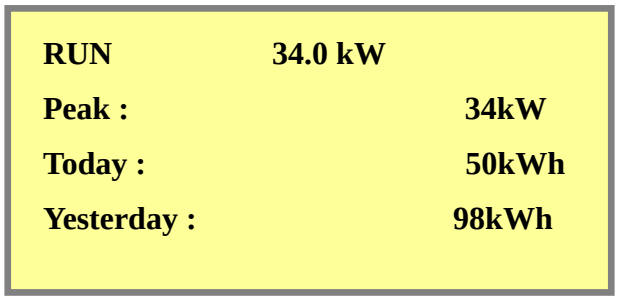
4.2.1 Input power (DC)



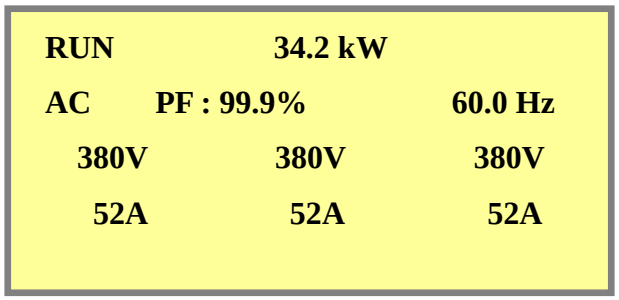
- RUN: Present generation amount
- F/W Version: Final program ver.in MCU and MMI
- Total Po: Total accumulated generation amount
- xxxx-x-xx xx : xx : Date / Hour / Minute



■ RUN: Present generation amount
■ PV voltage, current, input power
■ DC-LINK voltage, IGBT temperature
■ DC-LINK Balance voltage



■ RUN: Present generation amount
■ Peak: Max. generation amount on today
■ Today: Generation amount on today
■ Yesterday: Generation amount on the previous day



■ RUN: Present generation amount
■ PF(Power Factor) and grid frequency
■ Grid voltage
■ Output current

4.3 Operation method

4.3.1 Check points prior to operation

-. Check the wiring and installation status of the inverter.

-. Especially, check that input polarity of solar module is connected correctly and the line is connected to grid correctly.

-. Direct power of solar module is supplied to the inverter and AC power status is checked by itself, then the inverter operates automatically after 300 seconds.

-. Check ON/OFF status of DC switch in the bottom of the inverter
(If necessary, a DC circuit breaker can be installed outside the inverter.
At this time, the power of solar module is supplied to the inverter through a DC circuit breaker.)

4.3.2 Automatic operation

The inverter is set to auto-operation mode as default setting when shipped from the factory.
The inverter operates automatically when the voltage of the solar module is over the setting value after sunrise and the inverter stops automatically when voltage of the solar module is below the setting value after sunset.

The inverter always monitors the grid power and it stops automatically in abnormal status.

4.3.3 Stop during operation

When the inverter shall be stopped during operation, turn off DC switch or shut off the grid

5. Function

5.1 Descriptions

5.1.1 Grid monitoring

Normality of the grid voltage is decided depending on difference from the normal voltage (Fault high voltage, Fault low voltage), if this value is higher or lower than the specified value, it stops the inverter.
If the frequency of the grid voltage is out of the specified value (Line frequency) as amount more than Fault high freq. and Fault low freq, it stop operation of the inverter.

In order to start generation at the normal grid status, it operates with the grid after the operation countdown (Line tran. time) elapses. Used frequency of the grid voltage can be set in accordance with the grid frequency.

5.1.2 MPPT control and total power generation

As the output power of solar module varies on surrounding temperature, humidity and solar ray intensity, MPPT (Maximum Power Point Tracking) algorithm should be carried out reliably. The method applied to the device does not have pulsation in the current, and it stops the inverter when the solar modules reach the PV stop voltage and the inverter cannot be operated anymore.

As the accumulated total power is stored, total generation power can be checked.

5.1.3 Initialization and action for abnormality

In case the inverter stops due to any errors, error indication is shown on the screen. At this time, examine the reason why any error occurs, remove the fault cause and then the system is operated. When the same problem happens or the inverter does not re-run, you should contact DASS tech or Installer.

Fault scan is stored 50 qty' (0~49) in the order of the time when they were happened in the past from 0 to 49 and the latest one is No. 0.
By using the Up/Down key on the keypad inside the inverter, it is able to find out the status of the fault in the past or variables.

When the inverter stops, it is able to change the parametric value by using the inner keypad.
There are two initializations, which is Parameter initialization and Fault initialization. Parameter initialization sets every parameter or selection function to the default value, and Fault initialization deletes the fault records occurred in the past and sets to 'ready' mode.

Controlling the inner keypad randomly shall cause malfunction of the inverter. You should contact DASS Tech.

5.1.4 Fault

1) Fault

■Input-Overvoltage protection (S-009)

In case the voltage of solar module is higher than the specified value, stop the system to protect the inverter.

■Output-Overcurrent protection (S-025 ~ S030)

In case the output current of the inverter is over-current due to abnormal load status, stop the system to protect the inverter.

■Inverter Overheat protection (S-044)

In case the inside temperature of the inverter is over 85℃, stop the system to prevent overheat.
If the inside temperature of the inverter returns to normal, operate the inverter normally after reset.

■Grouding fault protection (G-016)

In case the current leaks due to abnormal grouding, stop the system.

■Grid-Line failure protection (G-001 ~ G-011)

When abnormality occurs in the grid power, stop the system.
(Protection of grid over/underfrequency, protection of grid over/underfrequency)

■Abnormal PWM control (S-031 ~ S-038)

If there is abnormal status found in PWM control inside the inverter, stop the system

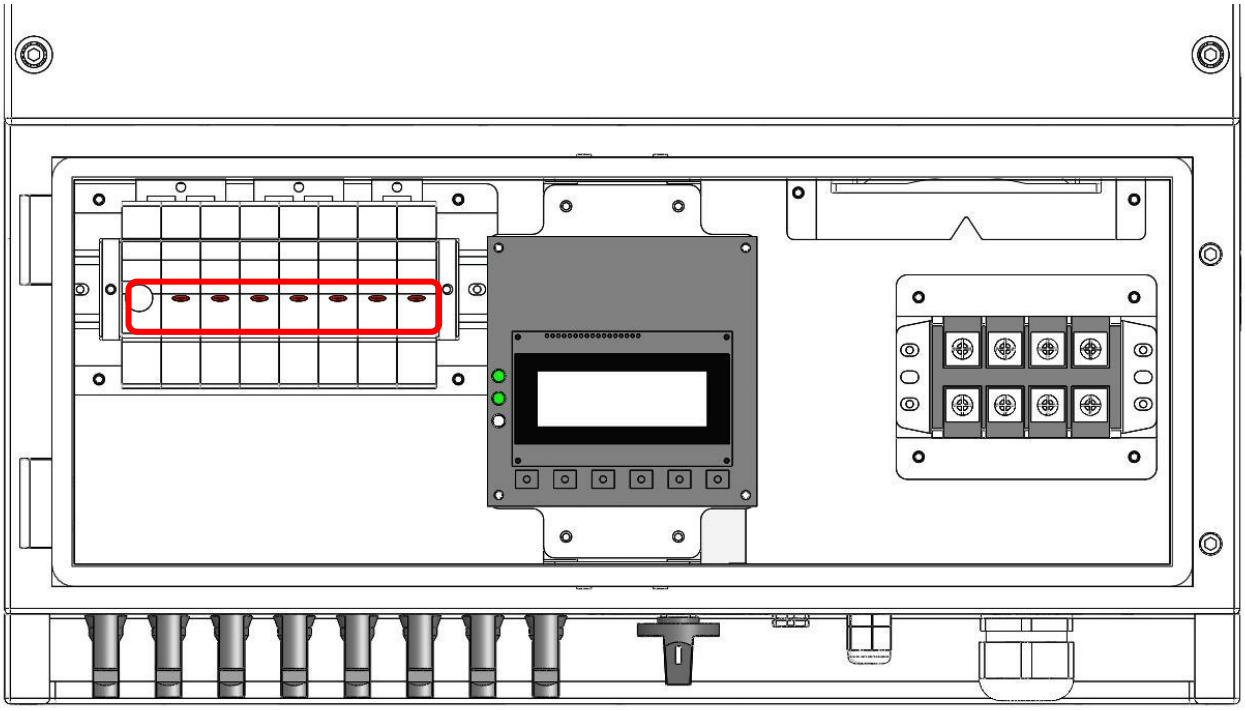
6. Maintenance & repair

6.1 Warning and types of error

If any error occurs, it indicates such error and stops operation.
Also, types of error are displayed on the screen of the keypad.

■Warning and the cause of fault / corrective action

No.	Type	Code	Cause of error	Corrective action
1	Input Undervoltage	S-010	Undervoltage from PV module	It can happen at sunrise and sunset and check PV module when it happens frequently then, operate the inverter.
2	Input Overvoltage	S-009	Overvoltage from PV module	Check PV module then, operate the inverter. If the inverter doesn't operate, contact the service center.
3	Grid Undervoltage	G-007 ~ G009	Grid voltage is below the specified value	Contact the installer and if there is problem, contact the service center.
4	Grid Overvoltage	G-001 ~ G-006	Grid voltage is above the specified value	Contact the installer and if there is problem, contact the service center.
5	Input Overcurrent	S-011 S-012	Overcurrent from PV module	Check PV module then, operate the inverter. If the inverter doesn't operate, contact the service center.
6	Output Overcurrent	S-025 ~ S-030	Output of the inverter is in overcurrent status	Contact the service center.
7	Abnormal grid frequency	G-010 G-011	Abnormal grid frequency	Contact the installer and if there is problem, contact the service center..
8	PWM fault	S-031 ~ S038	Internal fault of the inverter	Contact the service center
9	Output DC detection	G-012 ~ G014	DC output is leaked to the grid	Contact the service center
10	Leakage current detection	G-016	Leakage current is detected	Contact the service center
11	Overtemperature	S-044	Over the standard temperature of IGBT	Contact the service center



FUSE disconnection

The LED red ramp of the fuse holder flickers as warning when the fuse is disconnected.

6.2 Customer Service

Check whether the inverter is normal or not.
When the product breaks down, pls. remember the date, time and indications on the fault.
If the product does not work normally, check the follows for requesting customer service.

1) Name of model
2) Serial number of the product
3) Purchased place
4) Purchase date
5) Certification warranty (You can download from our website)
6) Brief description of fault type

6.3 Specification

Model		DSP-3333K-OD	DSP-3334K-OD
Input	Operation voltage range	280 ~ 980V	
	MPPT voltage range	480 ~ 800V	
	Rated voltage	630V	
	Start voltage	450V	
	Control method	Max. Power Point Tracking control(MPPT)	
Output	Rated power	**33.1kW**	**34kW**
	Rated voltage	380Vac	
	Rated frequency	50Hz / 60Hz (+0.5Hz, -2.5Hz)	
	Grid connection	3 phase-4 wire (Transformer-less type)	
	Power factor	Above 0.98	
	THD	Total below 3%	
		Each below 2%	
	Control method	PWM	
	Anti-islanding	Within 0.5 sec	
	Overload	120%	
	Efficiency	Above 98%	
Structure	Cooling method	Natural air cooling	
	Protection structure	IP 65	
	Noise	Below 70 dB	
	Dimension (WxHxD)	550 x 770 x 280	
	Weight	56.2kg	
External interface		RS485	
Protection	Inverter	Input overvoltage, Short circuit of output, Overheating, Relay fault detection, Leakage current detection	
	Grid	Anti-islanding, Grid over/undervoltage, Grid over/underfrequency, Reactive power control	
Environment	Ambient temperature	-20℃ ~ 50℃	
	Storage temperature	-25℃ ~ 65℃	
	Ambient humidity	Below 90 % RH (No Dewfall)	
	Altitude vibration	Below 1,000 m · 5.9m/sec²(=0.6g) or less	
	Ambient environment	No corrosive/flammable gas, oil mist and dust	

※ Specifications of this product may be changed without prior notice for quality improvement

7. Quality Assurance

7.1 Warranty letter

Warranty Letter

DASS Tech

Product		Grid connected power conditioning system (PCS)
Model		DSP-123K5-OD
Purchase date		
Warranty period		Three(5) years from the date of 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. 1.0

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