Operation and Installation Manual

Soleaf

DASSTECH Photovoltaic Grid-Connected Inverter/ Junction Box

DSP-123K6-OD ver1.3
DSP-123JB-OD ver1.1

DASS Tech

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1. Safety precautions

Make sure to adhere to the safety precautions since they are aimed at safe and proper use of the product by preventing accidents or hazards in advance.

- Precautions are classified into 'Warning' and 'Caution' with the following meanings:

Warning: Situations with possibility of occurrence of serious injuries or death if the instructions are violated

Caution: Situations with possibility of occurrence of minor injuries or product damage if the instructions are violated

- Meanings of pictograms use in the product, and User and Installation Manual are as follows:

is a sign to take precaution since there is concern for occurrence of risks under particular conditions.

is a sign to take precaution since there is concern for occurrence of electrocution under particular conditions.

- After having read the User and Installation Manual, keep it at a location that can be accessed by all the users at any time.
- Make sure to sufficiently familiarize with the contents of User and Installation Manual in order to sufficiently and safely use all the functions of DSP series inverter.

Warning

- **Do not operate while the front cover is opened.**
  It becomes a cause of electrocution due to the exposure of high voltage terminal or charging section.
- **Do not manipulate switch with wet hand.**
  It becomes a cause of electrocution.
- **Do not open the cover while power is turned on or during operation.**
  It becomes a cause of electrocution.
- **Even if power has not been turned on, do not open the front cover except in the event of regular inspection.**
  It becomes a cause of electrocution since voltage has been charged over prolonged period of time inside the inverter even if the power has been turned off.
- **Turn off the power at the time of wiring work or regular inspection, and make sure to check that the DC voltage in the inverter has been fully discharged with measuring device such as multi-tester (VOM), etc. after 10 minutes.**
  It becomes a cause of electrocution.
- **Do not use if the sheathing on cable has been damaged.**
  It becomes a cause of electrocution.
- **Do not use while heavy objects that impart excessive stress is placed on the electric cable.**
  It becomes a cause of electrocution due to damages to the sheathing on cable.

⚠ Caution

- **Do not install in close vicinity of inflammable substance.**
  It becomes a cause of fire if installed onto or attached close to combustible material.
- **Cut off the inverter input (solar cell) and output (AC system) power in the event of inverter breakdown.**
  If it is not cut off, fire can breakout due to secondary accident.

- **Do not touch inverter for several minutes while the power is connected or cut off.**
  It becomes a cause of burn if it comes in contact with human body since it is very hot.

- **Do not input power into inverter with damaged product and components even if installation is completed.**
  It becomes a cause of electrocution.
- **Make sure foreign matters including screw, metallic substance, water and oil do not enter inverter.**
  It becomes a cause of fire.

Precautions in use

(1) Transportation
- Transfer in proper method in accordance with the weight of the product.
- Check for any abnormalities in the outer appearance of the product.
- Do not pile up in multiple layers in excess of the stipulated regulation.
- Do not open the front cover during product transportation
- Do not drop or impart strong impact to the inverter since it is a precision device.

(2) Application method
- If the automatic operation functions is set at basic value, it operates automatically if the operating voltage is exceeded and stops automatically if the voltage falls below the operating voltage.
- It can be started and stopped with Operation/Stop key on the keypad.
- Since the inverter will be reinitiated after prescribed standard by time if the breakdown contents are reset, manipulate the breakdown reset switch after having assessed the cause.
- Do not remodel the internal aspects of the product.
- In the case of initializing the parameter, set the parameter necessary prior to operation again. If the parameter is initialized, the parameter values will be changed to those set at the time of shipment from factory.

(3) Measures to prevent occurrence of abnormality
- If the inverter becomes destroyed and uncontrollable, there are cases in which the mechanical device is left unattended in hazardous situation. In order to prevent such situation, install additional safety device such as circuit breaker, etc.

(4) Repair inspection and component replacement
- Do not conduct meg-test (measurement of insulation resistance) for the control circuit of inverter.
- Refer to Chapter 6 for inspection.

(5) Discard
- Discard as ordinary industrial waste.

(6) General issues

- Although there are portions of explanation with missing front cover or circuit breaker in the pictorial explanation indicated in this User and Installation Manual for more detailed explanation, make sure to operate the product in accordance with the User and Installation Manual after having installed the front cover and circuit breaker, etc. according to the relevant regulations.

Precautions in installation

(7) Installation

- Install in accordance with the contents of the User and Installation Manual.
- This product can be installed indoor and outdoor.
- Install product within 30m from solar cell panel.
- Install in location without humidity or dust, and away from direct sunlight and sections that generate high heat.
- At the time of indoor installation, make sure to secure space of more than 20cm above, left and right of the inverter.
- At the time of outdoor installation, make sure to secure space of more than 1m from the ground.
- Installation work must be performed by specialist or technician.
- Do not place heavy objects on top of the product.
- Do not spray on or keep this product near inflammable substances.
- Please comply with the standards indicated in the User Manual for the installation direction.
- Do not drop or impart strong impact onto the inverter since it is a precision device.
- Execute class 3 (200V class) grounding for inverter.
- Do not use other household appliances in close vicinity of this product. Abnormality or noise can be made in the household appliances.
- Make sure to use the rack provided for exclusive use of the product and take precautions against sharp parts in the rack.
- Prior to installing the inverter, install solar cell power (DC) circuit breaker and install the inverter while the solar cell power is turned OFF. After the installation, turn the solar cell power ON for operation. If the inverter is installed while the solar cell power (DC) is ON, there is a concern that inverter may be damaged or operate erroneously.

(8) Wiring

- Erroneous terminal contact can become a cause of inverter breakage.
- At the time of connecting the DC connector, pay attention to the (+/-) electrodes. Refer to the installation method in Chapter 3.
- At the time of connecting AC connector, pay attention to the distinction between power and grounding cables. Refer to the installation method in Chapter 3.
- Wiring and inspection must be performed by specialist or technician.
- After having installed the main body of the inverter, execute wiring works (connect connectors).

(9) Adjustment at the time of trial run

- Check various set values prior to operation.

2. Product overview

2.1 Basic issues

2.1.1 Contents you need to be aware prior to the use

If inverter is used erroneously, it may not operate normally or its lifespan may be shortened. In the worst case, inverter can be broken or impart fatal injuries to human body. As such, sufficiently understand the contents of this User and Installation Manual before using this product.

2.1.2 External appearance of the product

2.1.3 Check the product

After having taken the inverter out of the packaging box, inspect the nameplate on the lateral side of the main body to check the format and rated output of the inverter is the same as those of the product you ordered. In addition, check for any breakage during delivery.

(1) Inverter types

DSP -1 2 3K 6 -OD

Code	Name
DSP	DASS Tech.

Code	Phase
1	Single phase
2	Three phase

Code	AC voltage
2	220V
3	380V

Code	Type
OD	Outdoor type

Code	Type
6	Series No.

Code	AC voltage
3K	3kW

(2) Components – Please contact our company if there are any components missing including User and Installation Manual, output (AC) connector, installation rack and components for fixation at the time of installation, etc., and if there is any breakage in the product.

2.1.4 Preparation of device and components necessary for operation

Since there are some differences in the items to be prepared for operation, prepare components according to the need (example: multi-tester for checking voltage and wiring, and motorized tools for installation rack installation, etc.)

2.1.5 Installation

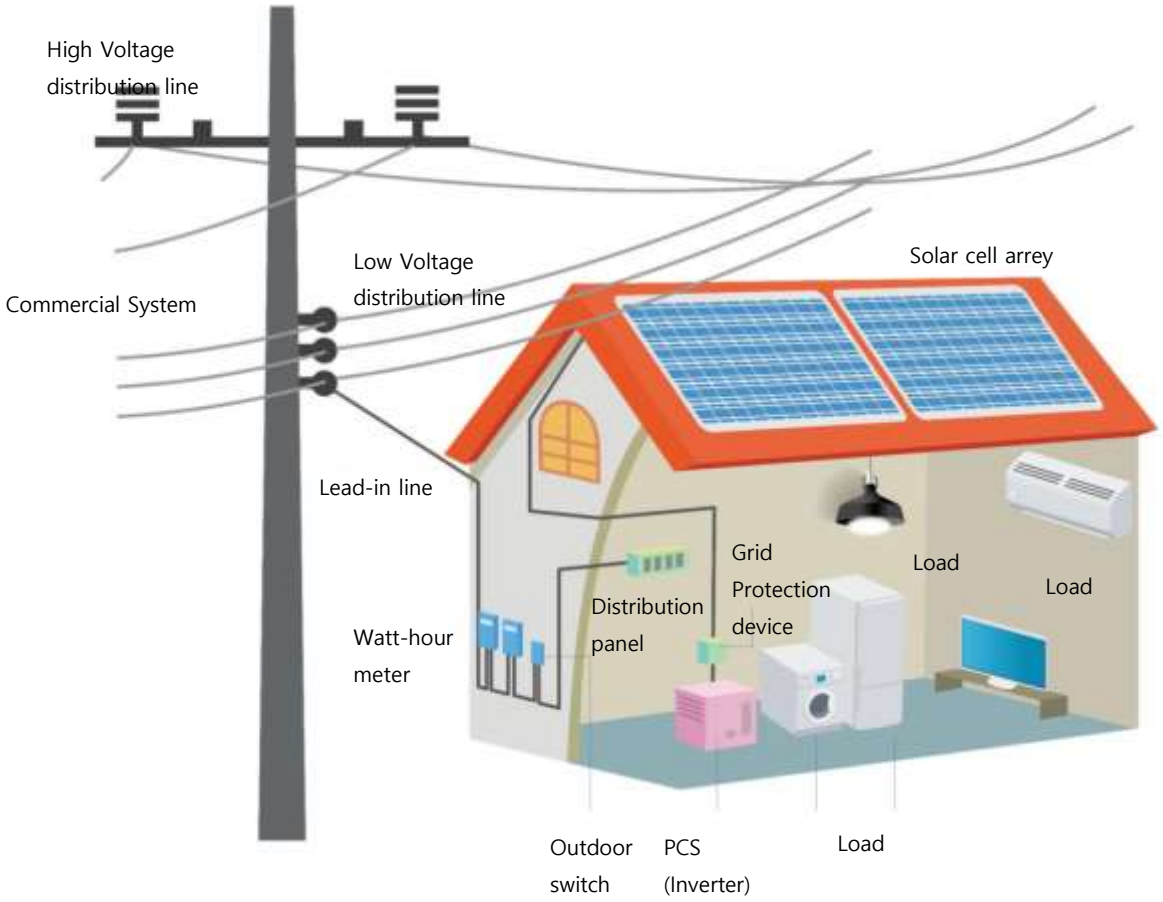
Accurately install the inverter in a location without direct sunlight with considerations for the location and direction of the installation as well as the surrounding spaces in order to prevent degradation of the lifespan or performances of the inverter.

2.1.6 Wiring

Connect the solar cell power (DC) and system power (AC) by using terminal block and connector. If not connected accurately, inverter and surrounding devices can suffer breakage. As such, wire with caution.

2.1.7 Photovoltaic system composition

Proper contact is needed for the inverter under proper setting of the peripheral devices. Erroneous system composition and contact can make normal operation impossible or result in substantial degradation of lifespan. In the worst case, inverter can be damaged due to fire. As such, use the inverter properly in accordance with the instructions of this Manual and precautions.



2.1.8 Product features

(1) High efficiency power conversion

It achieves highly efficient power conversion in PWM format by using IGBT semiconductor device with high efficiency of more than 96% of the rated output.

(2) Digital control

System control is more convenient through the use of high-performance digital controller that allows confirmation through LCD keypad. Moreover, operation, input and output status, and abnormality of inverter are monitored and indicated, and inverter will be stopped in the event of occurrence of abnormality. It also gets operated and stopped automatically by detecting the voltage of solar cell module.

(3) Transformerless inverter

DSP-123K6-OD inverter is a transformerless type solar cell inverter appropriate for dispersion type power system designed to be appropriate for industrial, building and household uses.

(4) Dispersion power system and economic value

Since solar power generation uses power generation format that can be installed at anywhere with sunlight, it is a format that can achieve economic use due to its ability to establish dispersed power in the units of building or residence and solar power generation plant.

(5) Maximum Power Point Tracking (MPPT) control

Since occurrence of direct current that is not uniform in accordance with the temperature, humidity, climate, environment and insolation given the output characteristics of solar cells, inverter controls the solar cell modules to maintain the maximum power point through MPPT control.

(6) Ease of parallel operation

If the capacity of solar cell module increases, it is possible to easily connect additional inverter in parallel to increase the capacity without the need of separate additional equipment.

(7) Convenience of installation and operation

It is designed to allow easy and safe connection between solar cell and system power by using dedicated connector. It is also designed to indicate the status of inverter through the frontal LCD keypad in real time. In addition, installation is more convenient than the separate connection-board installation method since it is in integrated junction box format.

(8) High reliability and low noise

Factors that induce defectiveness were reduced by optimizing the inverter components and, in particular, high reliability and low noise were realized by removing inverter-cooling fan with mechanical lifespan.

(9) Electromagnetic conformity (EMC)

It was manufactured to be appropriate for household electromagnetic conformity (EMC) by optimizing the inverter power circuit design (KSC IEC 61000-6-1, KSC IEC 61000-6-3, KSC IEC 61000-6-4).

2.2 Product specifications

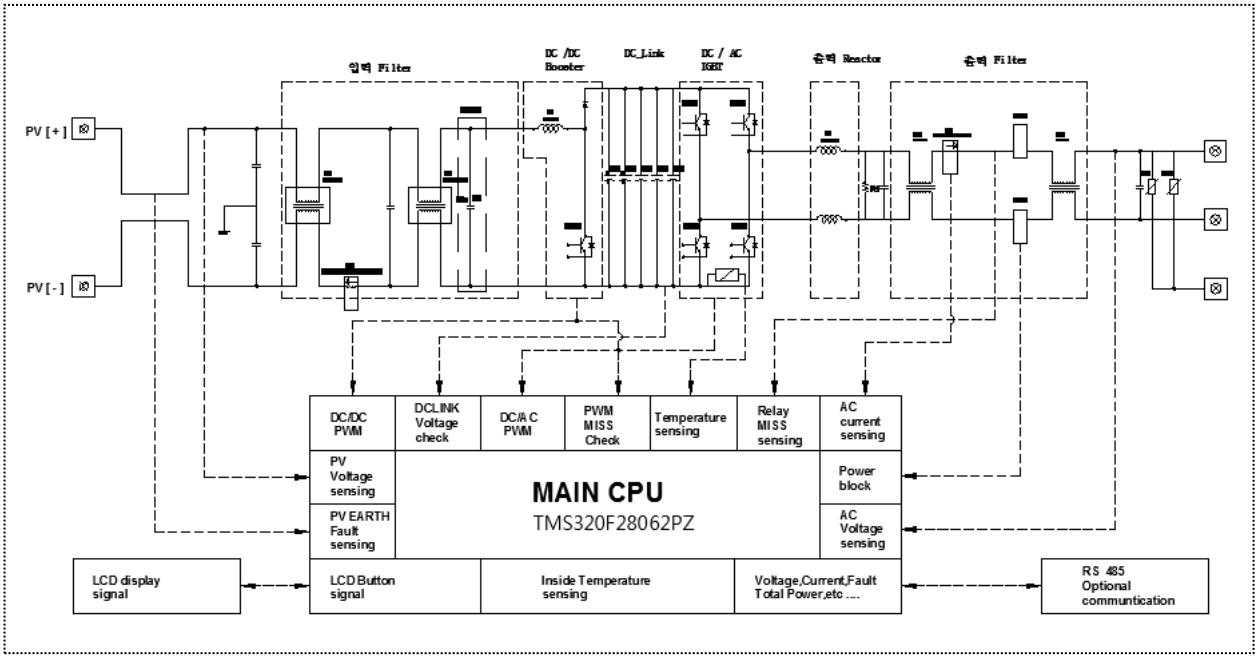
Model name		DSP - 123K6-OD
Input	Range of operating voltage (25℃)	100V ~ 500V
	Operating MPPT voltage range (25℃)	200V ~ 400V
	Rated voltage (25℃)	360V
	Operation initiation voltage (25℃)	150V
	Maximum input current (25℃)	18A
Output	Rated output capacity	3.5 kW
	Rated voltage	System voltage (AC 220/230V +10%/-12%)
	Frequency modulation rate	System frequency (50/60Hz +0.5Hz/-0.7Hz)
	Constant	Single phase and 2 lines
	Power factor	0.95 abnormality
	Current distortion power (current THD)	Less than 5% of total
		Less than 3% of each difference
	Control format	PWM format
	Prevention of single operation	Within 0.5 seconds
	Efficiency	96% abnormality
Structure	Cooling method	Natural air cooling
	Protection structure	IP 65
	Device noise	Less than 50 dB
	External dimension	358*376*150 mm
	Total weight	9kg
External interface		RS485
Monitoring terminal unit (Option)		DSP-WR5/DSP-ZR5/CM-04A001 (wired/wireless, RS485)
Protection functions	Inverter	Excessive input voltage, output short circuit, overload, inverter overheating protection, and prevention of DC output discharge
	System	Single operation protection, system over-voltage and under-voltage protection, and system over-frequency and under-frequency protection
Application environment	Ambient temperature	-20℃ ~ 50℃
	Preservation temperature	-20℃ ~ 65℃
	Ambient humidity	Relative humidity (RH) of less than 90% (absence of dew formation)
	Vibration at elevation	Less than 5.9m/sec²(=0.6g) at under 1,000m
	Ambient environment	There must be no corrosive gas, inflammable gas, oil mist and dust, etc.

※ Specifications of this product can change without prior notice for reasons such as improvement of quality. Please inquire at the time of product purchase.

3. Installation

3.1 Block diagram

1) DSP-123K6-OD



※ Sections marked with broken line indicate the inner aspect of the inverter.

3.2 Installation location

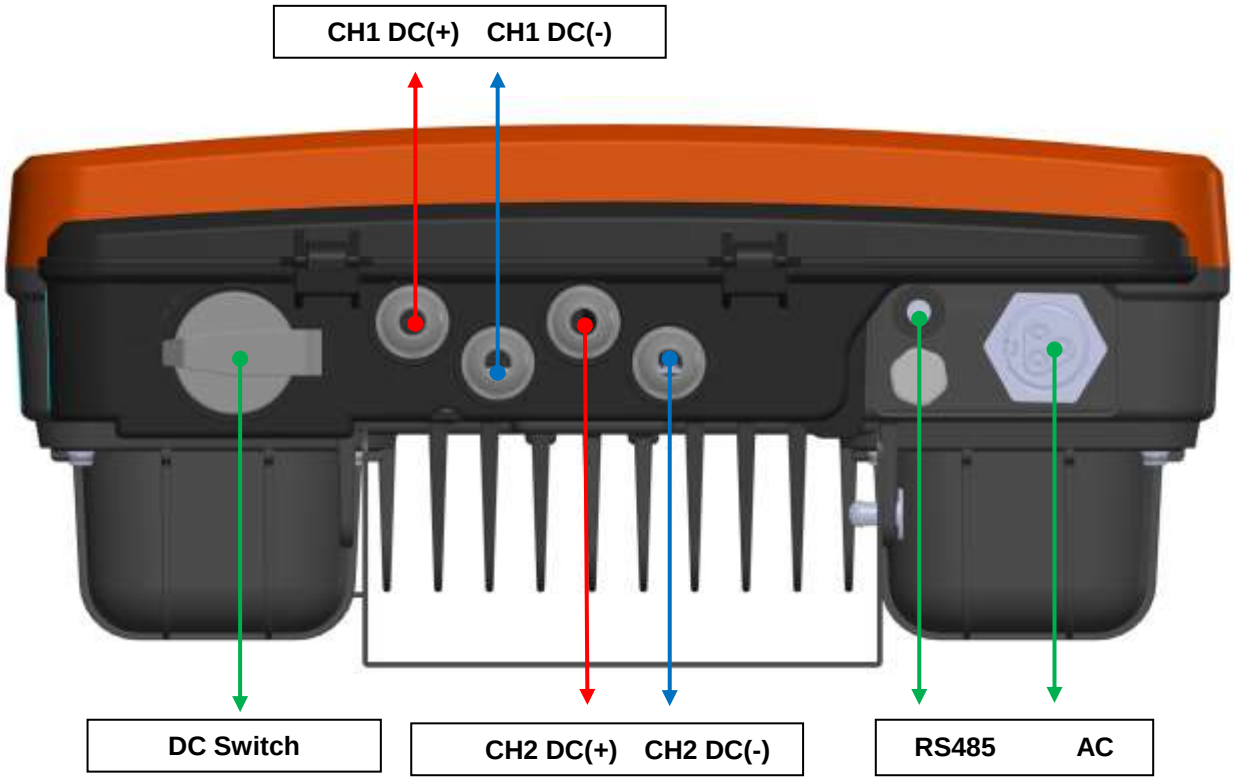
Please install at a location that satisfied the following conditions.

1) Please install at a location without direct sunlight.
2) Do not install at a location with vibration.
3) Since the inverter lifespan is greatly affected by the surrounding temperature, make sure that the temperature in the area of installation does not exceed the allowed temperature range (-20 ~ 50℃).
4) Avoid location with high temperature and humidity (less than relative humidity of 90% and absence of dew formation).
5) Since inverter generates high level of heat, make sure to install it on surface with non-flammable material.
6) Install the inverter by securing sufficient space around it to allow harmonious dispersion of heat.
7) Avoid location with oil mist, inflammable gas, fibrous dust, dust and moisture, etc.
8) Install it erect by firmly securing with bolts.
9) Install at a location without salinity. (In particular, if it is installed in seacoast, corrosion of the product can occur. As such, avoid the product coming in contact with salinity in the methods such as use of separate casing or indoor installation, etc.)

3.3 Wiring diagram for connecting terminal

Section for connection with the connector is situated at the bottom of the inverter.
Read the terminal-wiring diagram carefully before connecting the connector.

1) Explanations on the main circuit connecting terminal section



Terminal signs	Terminal names	Explanations
DC [+]	PV input power (+)	Connect with the (+) terminal of the output power of solar cell
DC [-]	PV input power (-)	Connect with (-) terminal of output power of solar cell
RS485	Communication terminal	Connect with the signal line of monitoring system
AC	System power connection terminal	Output from the inverter is connected to the KEPCO system and grounding line.

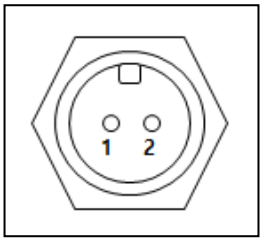
Note) Refer to 6. Explanations on connection board for more details

2) Explanations on RS485C communication terminal and connector

- Communication output terminal (inside the inverter)**:**

RS485 Communication	
BUS(+)	**BUS(-)**
Red	**Black**
①	②

- Communication connector terminal (outside the inverter)**:**



R485 communication terminal is designed as above.

Communication connector is an optional item. Please inquire with our company if you need communication connection.

3) Setting of communication protocol

- This product supports 2 different communication protocol modes, namely, Dass Tech protocol and integrated new renewable energy convergence support monitoring system (REMS).
- The basic value is set at integrated new renewable energy convergence support monitoring system (REMS) at the time of shipping from the factory. ID is set at '1' as the basic value.
- There is a need to change the communication protocol setting at the time of using Dass Tech protocol.
- After having accessed Setting menu - Selection Set – REMS Monitor menu, change the set value to Disable and save with Enter key. Then, cut off the input power to and discharge inverter prior to reconnecting the power to convert to Dass Tech protocol.

3.4 Wiring

3.4.1 Main circuit wiring

1) Precautions at the time of wiring the main circuit

- For input power, connect the **CH1/CH2(+)terminal of solar cell panel to the internal PV1(+)/PV2(+) terminal inside the junction box** and **CH1/CH2(-)terminal of solar cell panel to the PV1(-)/PV2(-)terminal inside the junction box** before inputting power.
  Take precaution against loss due to fire arising from erroneous wiring of the junction box.
- Do not disassemble connector during operation.
- In the event of emergency power OFF during operation, turn OFF the DC switch of junction box.

- In the event of altering wiring due to occurrence of incongruity, make sure that the LCD on the keypad of the main body is turned off prior to conducting rewiring work. Since the internal capacitor of inverter is charged at high voltage immediately after the power has been turned off. As such, take precaution against danger of electrocution.

- For prevention of electrocution, make sure to execute Class 3 grounding for the inverter and keep the grounding resistance to less than 100Ω.

- For grounding of inverter, connect to the dedicated grounding terminal. Do not use casing or bracket screw as grounding terminal.

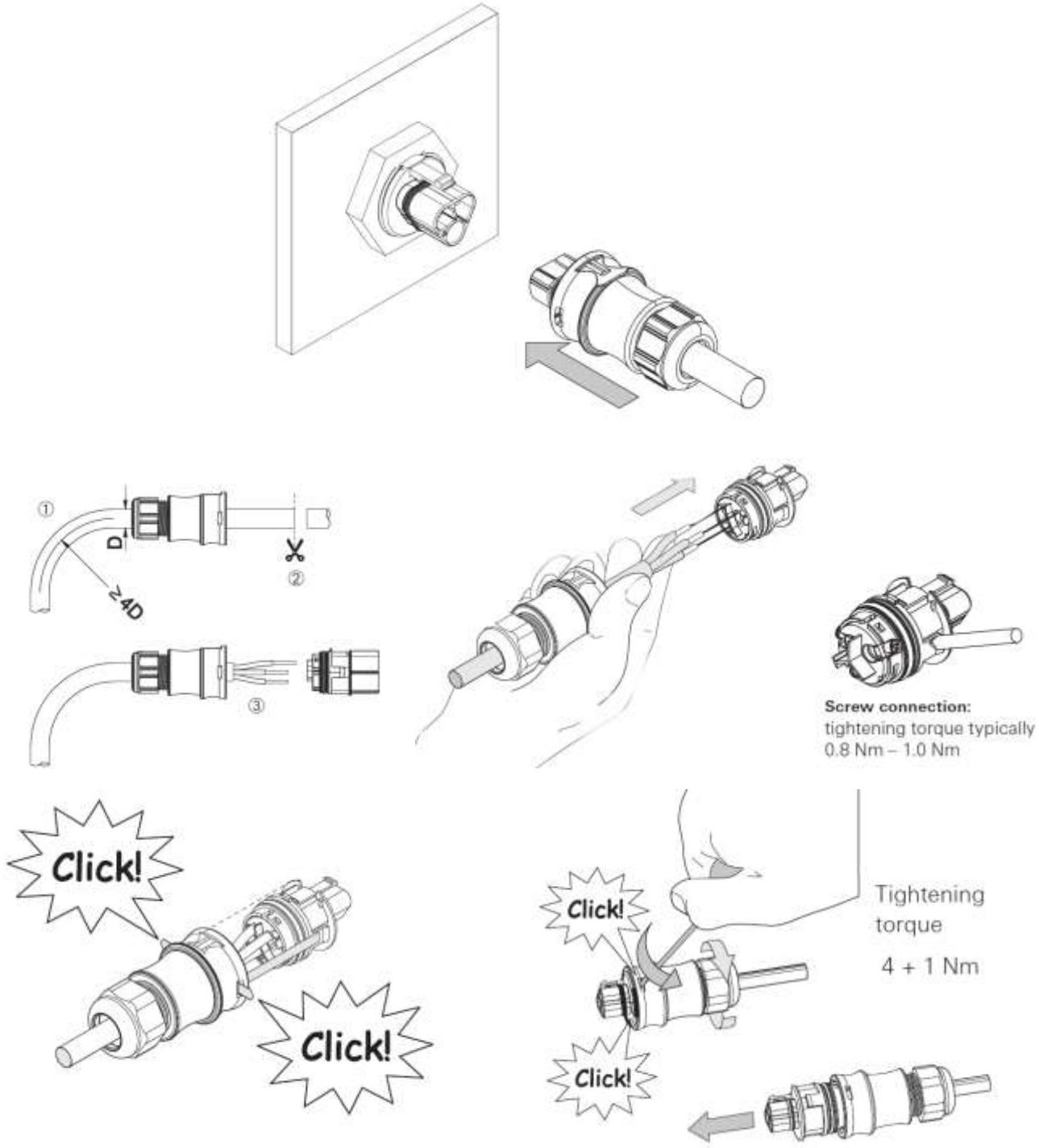
- Use dedicated grounding cable. Use the grounding point as near to the inverter as possible. Use grounding cable with the following thickness by maintaining the length as short as possible.

Capacity	Ground cable thickness (mm^2)
1.5 ~ 3.5 kW	4.0
5 kW	6.0

- Check the maximum input voltage of inverter and output voltage of solar cell array. If the output voltage of solar cell array exceeds the maximum input voltage of inverter, it could result in severe damage of the inverter.

- Set the output voltage by considering the temperature coefficient at the time of wiring of solar cell module. If the output voltage of solar cell array is set without such consideration, excessive or substandard input voltage of inverter can occur depending on the atmospheric temperature.

2) AC Connector installation



3.4.2 Communication circuit wiring

1) Precautions at the time of communication circuit wiring

- Use communication connector at the time of control circuit terminal wiring. Refer to 3.3 Terminal wiring diagram.

4. Operation

4.1 Explanations on the display window functions

4.1.1 Exterior of display window

4.1.2 Display window functions and LED indications

Status LED	Explanations
PV	Indicates the status of solar cell string (Green light: Normal solar cell string)
GRID	Indicates the status of the system (Green light: Normal system)
RUN	Indicates the status of inverter operation (Green light: Normal inverter power generation)
FAULT	Indicates inverter breakdown (Red light: Lights up if inverter breakdown occurs)
CH-1,CH-2	Indicates breakdown for each channel at the time of disconnection of junction box FUSE (Red light: Disconnection of junction box FUSE)

LCD display window for power generated	Explanations
100% LED	Lights up at the time of 61 ~ 100 [%] power generation
60% LED	Lights up at the time of 31 ~ 60 [%] power generation
30% LED	Lights up at the time of initial operation and 1 ~ 30 [%] power generation

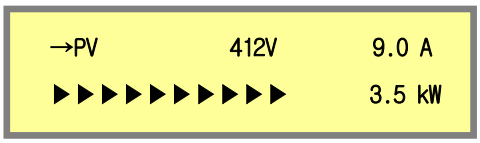
4.2 Display mode for basic status (2-line and 16-character LCD)

Once the power to inverter is turned ON, information on the LCD display window is automatically converted at every 10-second intervals.

4.2.1 Solar cell input

Input display **Input voltage** **Input current**

PV: solar cell DC voltage DC current

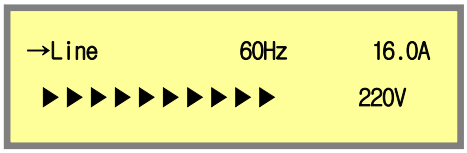


Status of inverter operation **Unit**

4.2.2 System power input

Input display **System power frequency** **System power current**

Line: System 60.0 Hz Output current



Status of inverter operation **Output voltage**

4.2.3 Check total power generated

Input display **Total power generated**

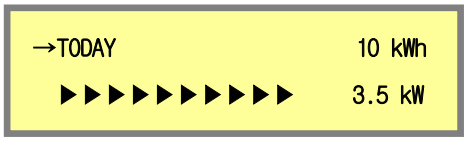
Total: Total power generated kWh

Status of inverter operation **Unit**

4.2.4 Check power generated on the day

Input display **Total power generated**

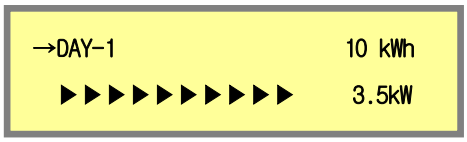
TODAY: Power generated on the day kWh



Status of inverter operation **Unit**

4.2.5 Check power generated on the previous day

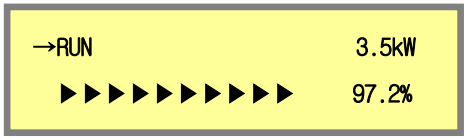
Input display	Total power generated
DAY-1: Power generated on previous day	kWh



Status of inverter operation **Unit**

4.2.6 Check current power generation

Input display	Power generated at the moment
RUN: Status of operation	kW

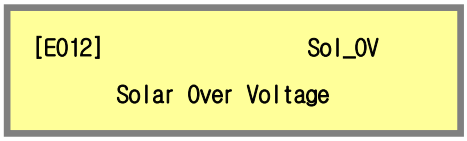


Status of inverter operation **Unit**

4.2.7 Error status

- Indicated for 5 minutes at the time of error occurrence

Input display	Name of error
Error code:	S-OV



Explanations on error

4.3 Operating method

4.3.1 Issues to be checked prior to operation

Check the status of wiring and installation of inverter.

In particular, check whether the input polarity of solar cell is accurately connected and whether the system line connection is made accurately.

Supply DC solar cell power to inverter. When DC power is supplied, the inverter will automatically check abnormality in AC power before commencing operation automatically after having undergone 300 seconds of operation countdown.

(If needed, apply power by turning ON the DC switch after having checked DC voltage by turning off the DC switch of junction box.)

4.3.2 Automatic operation

At the time of shipment from factory, the initial setting is in automatic operation mode.
If the solar cell module voltage increases above the set value due to sunlight, the inverter will be initiated automatically.
At the time of sunset, the solar cell module voltage will be dropped. If it falls below the set voltage, the inverter will stop operating automatically. The system power is always monitored and the operation will be stopped automatically in the event of abnormality.

5. Functions

5.1 Explanations on functions

5.1.1 System monitoring

Presence of normal and abnormal system voltage is determined by the difference in the voltage with the normal voltage (Fault high vtg., Fault low vtg.). If this value is larger or smaller than the designated value, the inverter will be stopped. If the frequency of the system voltage (Line frequency) is outside the range of Fault high freq. and Fault low freq. values, it does not operate and stops the inverter.

In order to initiate power generation in normal system status, wait until operation countdown (Line tran. time) is completed before operating with the system. The frequency of system voltage used can be set in accordance with the system frequency.

5.1.2 MPPT control and total power generated

Since the output of the solar cell module changes in accordance with the ambient temperature, humidity and sunlight, Maximum Power Point Tracking (MPPT) algorithm needs to be executed harmoniously. Format applied to this product has almost no pulsation of current. Inverter will be stopped if the inverter cannot be operated anymore due to the solar cell reaching the stop voltage (PV stop voltage).

Since the total power generated (Total power) is remembered by being accumulated, it is possible to check the total power generated.

5.1.3 Initialization and measures to be taken at the time of abnormality

In the event of occurrence of abnormality in which the inverter is stopped, relevant message will be displayed. Once the cause of the abnormality is removed, the system will recommence operation after the standby time. If the same symptom occurs or reoperation does not occur, please contact our company. A total of 100 faults will be stored in the order of the faults being scanned scan from No. 0 to 99 with the most recent fault being numbered with 0.

It is possible to discern the variables or the past abnormal status by using the UP and DOWN button on the keypad inside the inverter.

Parameter values can be changed by using the internal keypad in the event of stoppage of inverter.
Initialization includes Parameter initialization and Fault initialization. Parameter initialization sets all parameters or optional functions at the value set at the time of the shipment from factory, while Fault initialization put the system in ready status by removing all the records of faults generated in the past.

Erroneous operation of inverter can occur if the internal keypad is manipulated arbitrarily. Please contact our company in such event.

5.1.4 Breakdown (Fault)

1) Breakdown (Fault)

Protection against Input over voltage

If the voltage of solar cell is above the stipulated voltage, the system will be stopped to protect the inverter.

Protection against output overcurrent

If output overcurrent occurs in the inverter under the abnormal conditions of load state, the system will be stopped to protect the inverter.

Protection against output overload

If there is abnormal output over prescribed period of time in excess of the rated output of the inverter, the system will be stopped to protect the inverter.

Protection against overheating of inverter

If the internal temperature of the inverter exceeds 105℃, overheating is prevented by stopping the operation of the system. Once the internal temperature of the inverter returns to normal level, it will be reset and re-operated normally.

Protection against earth fault

System will be stopped if leakage current occurs due to earth fault.

Protection against system fault (Over/Under frequency fault, Over/Under voltage fault)

System will be stopped in the event of abnormality in the system power (protection of the system and voltage, low system voltage, over-frequency and under-frequency of the system)

PWM control fault (Over current 2)

System will be stopped in the event of occurrence of abnormality in the internal PWM control of the inverter.

6. Explanations on junction box (DSP-123JB-OD)

6.1 Basic issues

6.1.1 Issues to be aware prior to the use

① Please use the product after having sufficiently familiarized with the contents of this User Manual.

② Make sure to install away from direct sunlight and in a cool location with good ventilation. Fuse may become short-circuited due to heat if the internal temperature increases because of direct sunlight.

③ Do not open the junction box cover unless by skilled technician. Even if the lamp for confirmation of power doesn't light up at the time of inverter breakdown, there could be high current flowing in the junction box. In addition, even of the fuse is short-circuited, electricity is continuously being supplied by the solar cells. As such, arbitrary removal of fuse can induce electric shock, burn, fire and death. Make sure to request inspection to specialist solar cell technician.

④ Never remove the internal fuse while the inverter is in operation. Since high current flows through the inverter generating power, you can get burnt or fire can generate along with risk of death in serious cases due to generation of powerful sparks if fuse is removed forcibly.

⑤ Install the junction box in a location that allows the user to inspection it conveniently. Power lamp doesn't light up for the photovoltaic inverter in the event of short-circuiting of junction box fuse. Under normal state, CH1 and CH2 lamps of the inverter section do not operate. (If CH1 and CH2 LED of the inverter section flickers, inspect the fuse of connection board.)

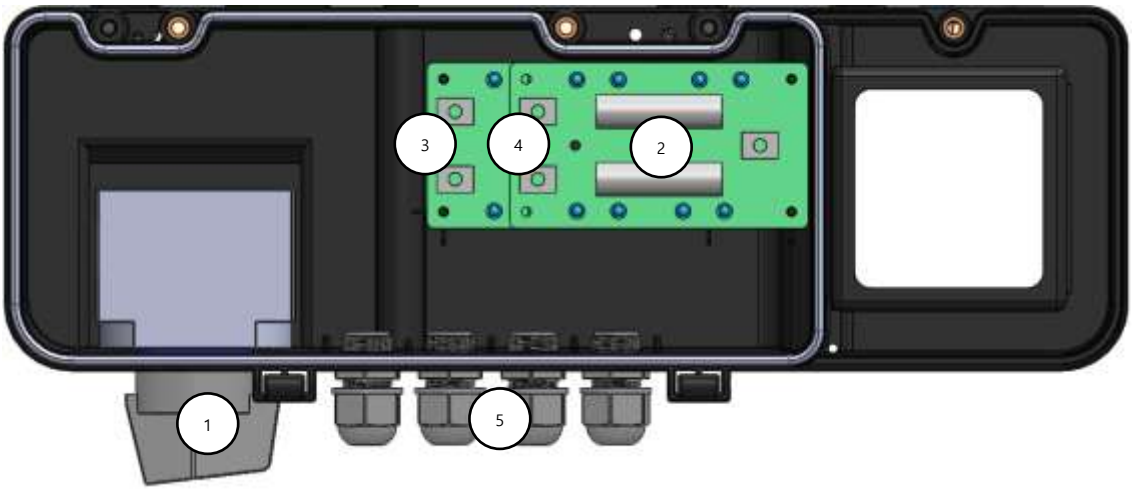
⑥ Do not use impact wrench or motorized tools at the time of connecting cable and tightening of the external cover of the junction box. Take precaution against breakage of fixation bolt for the terminal block and external cover of internal PCB at the time of tightening them.

※ Repair for breakage arising from negligence in installation will be charged.

⑦ If power has not been applied to inverter, check the status of ON and OFF of the DC switch first.

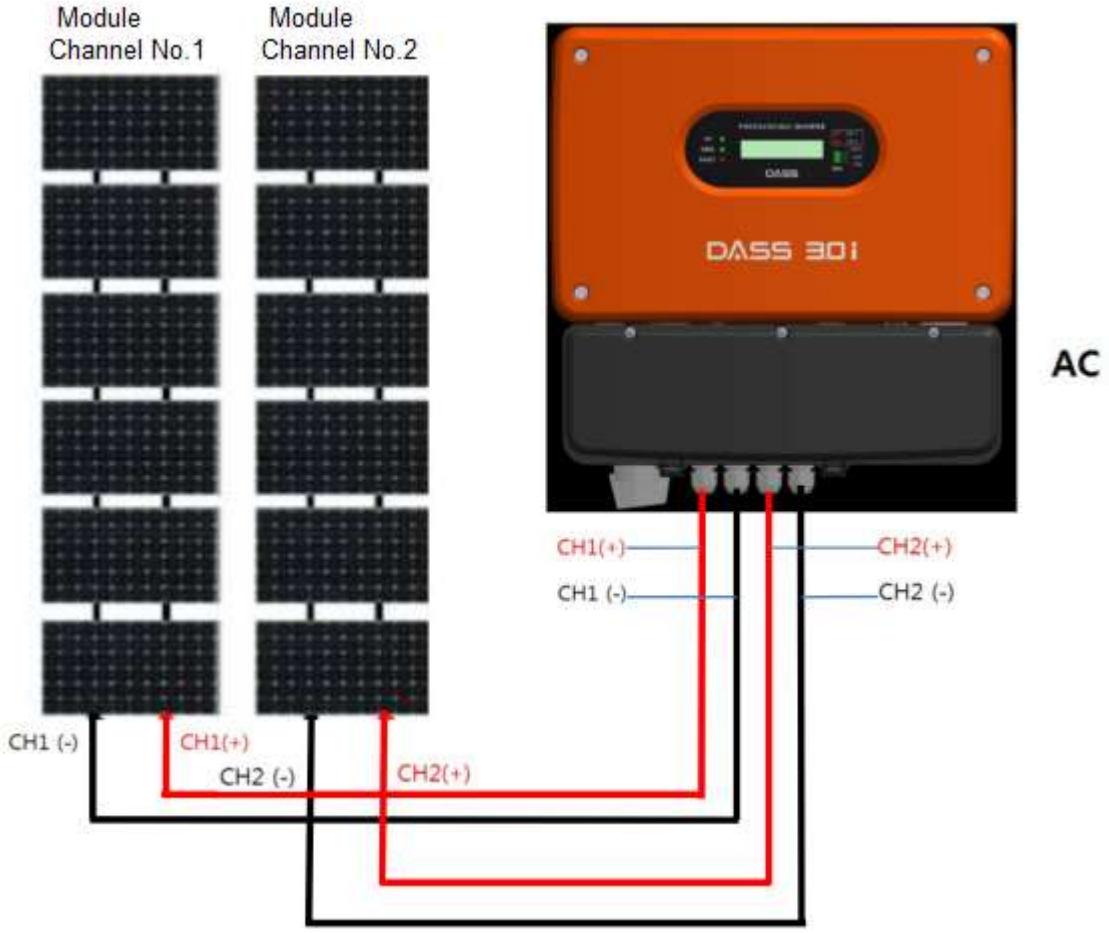
⑧ This product is a junction box for exclusive use in DSP-123K6-OD and cannot be used for separation type or other type of products.

6.2 Components block diagram and names



① DC switch: 600Vdc 25A
② DC FUSE: 1000VDC 20A
③ DC (-) input terminal: 30A
④ DC (+) input terminal: 30A
⑤ DC input (CH 1+,CH1-,CH2+,CH2-)

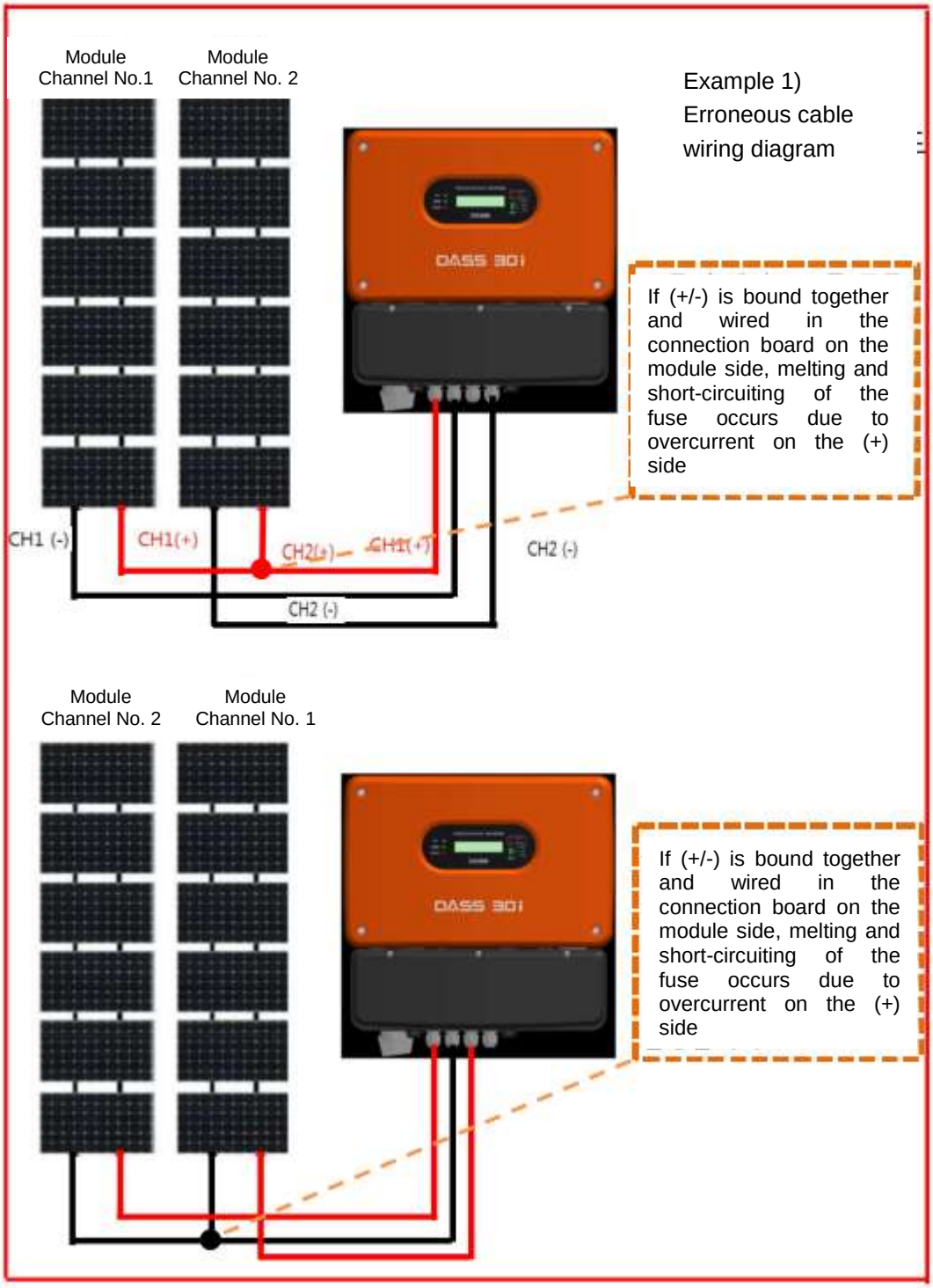
6.3 Precautions at the time of wiring



※ At the time of module wiring, make sure to check the input voltage range of inverter and temperature coefficient of module.

※ At the time of cable wiring to the terminal block, make sure to use compression terminal (O or U type). There is a possibility of inducing fire due to defective contact if cable is connected directly.

※ Fuse will melt and short circuited due to exceeding of allowed current if (+) or (-) cable is used commonly. Make sure to wire the cable in accordance with the cable-wiring diagram.


Module
Channel No.1
Module
Channel No. 2
Example 1)
Erroneous cable
wiring diagram
DASS 301
If (+/-) is bound together and wired in the connection board on the module side, melting and short-circuiting of the fuse occurs due to overcurrent on the (+) side
CH1 (-)
CH1(+)
CH2(+)
CH1(+)
CH2 (-)
CH2 (-)
Module
Channel No. 2
Module
Channel No. 1
DASS 301
If (+/-) is bound together and wired in the connection board on the module side, melting and short-circuiting of the fuse occurs due to overcurrent on the (+) side

7. Maintenance

7.1 General maintenance

- Operation of photovoltaic inverter is initiated automatically if voltage above the operation initiation voltage is applied and stops operation automatically if the voltage falls below the said operation initiation voltage in accordance with the reduction in insolation. In the case of temporary abnormality (spontaneous power blackout, etc.), it will be reinitiate automatically once the cause of abnormality is removed. Therefore, although there basically is no need for separate daily inspection, continuous monitoring and regular inspection is needed to prevent unexpected breakdown and to ensure efficient power generation system operation.

7.2 Maintenance items and inspection intervals

- **Inspection items and intervals can differ depending on the installation and application environment.**

Inspection items	Inspection interval	Inspection methods	Remarks
Power generated/ operation status	Every day	Check the display and monitoring system	
External status	3 months	Visually check the breakage and contamination of external aspects	Dust / moisture
Connector	3 months	Status of fixation and connection of the connector	Check generation of heat
Cable	3 months	Check the sheath, generation of heat and state of contact of input/output cables	Check generation of heat
FAN (corresponding model)	6 months	Check the state of operation and noise of FAN	Limited to forced air cooling type
Grounding state	12 months	Check short circuit and grounding resistance of grounding cable	Less than 10Ω
Input circuit breaker	12 months	Check the status of operation of DC circuit breaker	Check On/Off state
Display window screen	12 months	Check discoloration and deformation of display window LCD	Visual inspection
Control power	12 months	Check the status of power of internal SMPS	Check voltage
Relay/MC	12 months	Check the status of operation of relay or electronic contact device (MC)	Check On/Off state
Capacitor	12 months	Check denting or expansion of capacitor	Visual inspection
Other inspections	12 months	Check breakage or abnormality within the inverter	Visual inspection
Internal cleaning	6/12 months	Remove dust inside the product (IP44: 6 months/IP65: 12 months)	Filter (corresponding product)

7.3 Maintenance method for inverter

- Check the status of operation. All inspections must be executed after having waited for more than 30 minutes of standby time until the charged voltage of internal capacitor has been fully discharged, after all the input power (solar cell) and output power (AC system) has been turned off, following stopping of inverter. This excludes items that can only be checked only if power has been applied to the inverter including control power, display window screen inspection, etc. There is risk of electrocution accident if inspection is made while the power has been turned on for the inverter.
- Inspections, other than daily inspection items such as confirmation of status of power generated/operation, must be executed by specialized maintenance company. It can be requested to electric safety administrator, manufacturer and specialized maintenance company, etc.
- Precautions prior to inspection
  - ① Prepare measurement instruments (multi-tester, etc.), tools and safety equipment according to the need.

② Cut off the output power (AC system power) of inverter. In the case of DSP-3334K series product, there is no separate circuit breaker in the inverter. Turn off the switch of incoming and distribution panel.
③ Cut off the input power of inverter (solar cell). Turn the DC switch at the bottom of inverter to OFF position (refer to 4. Operational items)
④ Standby for more than 30 minutes after the power in the display window of inverter is completely turned off.
⑤ Measure the input/output power terminal block inside the inverter with multi-tester to make sure that the voltage is 0V.
⑥ Execute inspection.

- Precautions after the inspection
  ① Check whether the relevant works have been completely concluded or there is a worker still performing works.
  ② Check whether all the measurement instruments, tools and installation items used in the works have been removed.
  ③ Check whether there are any components disassembled for the works have been left out and whether it has been assembled in the original state prior to the works.
  ④ Check the tightening status of bold and presence of foreign substances inside the product.
  ⑤ After having completed assembly to the original state, apply input power and output power before checking whether the inverter is operating normally by making reference to **4. Operation** items.

7.3.1 Inspection of status of power generated/operation
① Inspect the power generated according to insolation.
② Power generated at the moment/previous day/accumulated is indicated in the display panel. As such, check the current power generation status and occurrence of errors.
③ It is possible to remotely check the current status and past history conveniently if the photovoltaic monitoring system is installed.

7.3.2 Conditions of exterior
① Inspect presence of peeling of painting, dents and breakage in the external aspects of the inverter.
② Inspect for abnormality in the contact areas where power is applied due to occurrence of corrosion.
③ Inspect the state of fixation of inverter by checking the status of fixation of the welded parts and screws of the installation rack used exclusively to install the inverter on the wall.
④ Check whether the environment has a lot of dust. If there is a lot of dust inside the inverter, remove the dust by using compressed air or vacuum cleaner. However, use of volatile substances such as benzene and thinner, etc. are prohibited.
⑤ If corrosion has occurred, it would be due to the environment with abundance of moisture or high salinity. As such, measures need to be taken to prevent humidity and air filtration. If problems in operation occur, please contact the manufacturer.

7.3.3 Connector
① Check breakage and deformation of input DC connector.
② Refer to 3. Installation item. There is a possibility of loss due to fire arising from grounding resistance in the event of occurrence of defective compression and assembly by not complying with stipulated working procedures.

7.3.4 Electric cables
① Check unsheathing and cut in the cable.
② Check the state of compression and tightening of screw at the area of use of compression terminal block.

7.3.5 FAN (limited to corresponding model)
① Check the status of FAN operation on the lateral aspect of the inverter.
② FAN operates and stops automatically according to the internal temperature of the inverter. As such the stoppage of FAN could be normal. Inspect by making reference to the internal

temperature of the inverter.

③ If there is abnormality noise other than ordinary sound of operation, inspect presence of foreign substances inside the product.

7.3.6 State of grounding

① Check the state of connection or cut in the grounding cable.

② Check the type of grounding works at the time of initial installation and measure the grounding resistance in accordance with the specifications of the corresponding grounding works.

7.3.7 Input circuit breaker

① Inspect the operation of lever and breakage of DC switch at the bottom of inverter.

② Check whether power is cut off when the lever is in OFF position and power is properly applied when the lever is in ON position.

7.3.8 Display window screen

① Check whether the display composition of the display window is same as that of the 4.5 Display window screen items.

② Check discoloration of LCD window.

7.3.9 Control power

① There is SMPS circuit inside the inverter for operation of inverter.

② In the event of abnormality of the corresponding SMPS, inverter will issue warning or error code and its operation will be stopped.

③ Inspect SMPS and, in the event of occurrence of error, contact the manufacturer.

7.3.10 Relay/MC

① Relay/MC (different for each model) inside the inverter gets turned ON/OFF according to the status of operation of inverter to control the state of output.

② At the time of stoppage / operation of inverter, inspect whether the relay / MC operation sound (clicking sound) occurs and whether error has occurred. In the event of occurrence of abnormality in relay/MC, errors such as Relay Short/Open, MC Error, etc. will occur and stops the operation of inverter.

7.3.11 Capacitor

① Capacitor for controlling of power inside the inverter has been installed.

② Even if the inverter operation has been stopped, there could still be large amount of power remaining in the capacitor. Take precautions against electrocution accidents at the time of inspection.

③ Visually check the breakage and denting of capacitor.

④ If the electrolytic solution inside the capacitor has leaked outside, contact the manufacturer immediately.

7.3.12 Other inspections

① Inspect breakage and contamination of the internal circuit board (PCB) an components of inverter.

② Visually check the contact point of circuit board, connection section of connector, deformation and loss due to fire of the components.

③ Please contact the manufacturer in the event of problems that occur in the circuit board or internal components.

7.3.13 Cleaning

① Our inverter is designed as indoor and outdoor types depending on the models.

② Internal aspects of the models below IP44 needs to be cleaned in the interval of 6 months while the products below IP65 in the interval of 12 months.

③ However, adjust the cleaning interval in accordance with the corresponding external environment.

7.4 Symptoms of breakdown

This product will indicate the details of abnormality that occurs and stops operation automatically.
If abnormality occurs, details of abnormality will be displayed in the keypad window.

Causes and measures to be taken for breakdown

No.	Cause of breakdown	Display content	Cause	Measures to be taken
1	Input over-voltage	DC-Link OV	If the solar cell voltage is above the stipulated voltage	Operate the inverter after inspection of the solar cell module. If it cannot be re-operated, make inquiries to service center.
2	Output overcurrent	Over current	If there is output overcurrent of the inverter	Make inquiries to service center.
3	Output overload	Over load	If the output of inverter is above the rated power	Make inquiries to service center.
4	Inverter overheating	Over heat	Internal temperature of the inverter exceeds 105℃	If it cannot be re-operated, make inquiries to service center.
5	Grounding faults	Earth fault	Occurrence of leakage current	Check the status of grounding and insulation of wiring. If it cannot be re-operated, make inquiries to service center.
6	System frequency fault	Under/Over frequency	System frequency fault	Make inquiries to service center in the event of continuing fault after having contacted KEPCO.
7	System voltage fault	Under/Over voltage	System voltage fault	Make inquiries to service center in the event of continuing fault after having contacted KEPCO.
8	Detection of direct output current	Out DC current	DC output is infused into the system	Make inquiries to service center.
9	PWM abnormality	Over Current2	Abnormality inside the inverter	Make inquiries to service center.
10	Fuse short circuit	CH-1/CH-2	Fuse short circuit	Make inquiries to service center.

7.5 Repairing breakdowns

Check the presence of abnormality in the inverter.
In the event of fault in the product, check the date, time and indicated details of fault.
Request service by checking the following:

1) Model name
2) Manufacturing No.
3) Place of purchase
4) Year of purchase
5) Warranty
6) Details of faults

8. Quality assurance

8.1 Warranty (Inverter)

DASS Tech

Warranty

Product name		Grid-connected photovoltaic inverter (PCS)
Model code		DSP-123K6-OD
Purchase date		
Warranty period		5 years from the date of purchase
Customer	Name	
	Address	
	Contact No.	
Sales agency	Name	
	Address	
	Contact No.	

- Our company will not be responsible for safety accidents and breakdowns that occur due to the negligence of the user or use of this product in violation of the relevant specifications.
- Specifications and external design of this product can change without prior notice.
- This Warranty is only valid within the Republic of Korea.
- Please keep this Warranty along with the User Manual safely as it will not be reissued.

◀ Free warranty service ▶

In the event of breakdown during the warranty period under normal use, repairs will be provided at no charge.

◀ Warranty service at charge ▶

Repairs will be provided at charge in any of the following situations:

- In the event of occurrence of breakdown due to intention or negligence of the user
- In the event of occurrence of breakdown due to defective connecting device arising from abnormality in the power used
- In the event of occurrence of breakdown due to natural disaster
- In the event of having remodeled or repaired the product by those other than the designated service centers
- If Dass Tech nameplate is not attached
- In the event of occurrence of breakdown due to unauthorized dismantling, repair and replacement by the user
- In the event of replacing expendable components with lapsed lifespan
- In the event of remodeling or repair by those other than designated service staff
- If the free warranty period has lapsed

8.2 Warranty (Junction Box)

DASS Tech

Warranty

Product name		Grid-connected photovoltaic junction box
Model code		DSP-123JB-OD
Purchase date		
Warranty period		5 years from the date of installation
Customer	Name	
	Address	
	Contact No.	
Sales agency	Name	
	Address	
	Contact No.	

- Our company will not be responsible for safety accidents and breakdowns that occur due to the negligence of the user or use of this product in violation of the relevant specifications.
- Specifications and external design of this product can change without prior notice.
- This Warranty is only valid within the Republic of Korea.
- Please keep this Warranty along with the User Manual safety, as it will not be reissued.

◀ Free warranty service ▶

In the event of breakdown during the warranty period under normal use, repairs shall be provided at no charge.

◀ Warranty service at charge ▶

Repairs will be provided at charge in any of the following situations:

- In the event of occurrence of breakdown due to intention or negligence of the user
- In the event of occurrence of breakdown due to defective connecting device arising from abnormality in the power used
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- In the event of replacing expendable components with lapsed lifespan
- In the event of remodeling or repair by those other than designated service staff
- If the free warranty period has lapsed

Customer Service Center: 1588-7468
Main Tel. No. of headquarters: 043-218-5670
Fax: 043-218-5671
E-mail: webmaster@dassteh.com

The specifications of this product can be changed without prior notification for purposes including improvement of quality. Please inquire at the time of purchase.

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Ver. 1.3

DASS Tech