KSolare

User Manual

5G PRO INVERTER

KSY:- 4KW- 6.2KW- 2 MPPT

Single-Phase Grid-tied Solar Inverter

1 Notes on this Manual

General Notes

The KSY series is a transformerless solar inverter with indenpendent MPP tracker.
It converts the direct current (DC) from a photovoltaic (PV) array to grid-compliant alternating current (AC) and feeds it into the utility grid.

1.1 Area of validity

This manual describes mounting, installation, commissioning and maintenance of the following inverters:

KSY 4KW-6.2KW -1Ph

1.2 Target group

This manual is for qualified electricians only, who must perform the tasks exactly as described.
All persons installing inverters must be trained and experienced in general safety which must be observed when working on electrical equipments. Installation personnel should also be familiar with local requirements, rules and regulations.

1.3 Symbols used in this manual

The safety precautions and general information are used in this manual as follows:

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, can result in death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, can result in minor or moderate injury.

NOTICE

NOTICE indicates a situation which, if not avoided, can result in property damage.

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INFORMATION provides tips which are valuable for the optimal installation and operation of the inverter.

⚠ DANGER

Danger to life due to high voltages of the PV array

When exposed to sunlight, the PV array generates dangerous DC voltage which is present in the DC conductors and the live components of the inverter. Touching the DC conductors or the live components can lead to lethal electric shocks. If you disconnect the DC connectors from the inverter under load, an electric arc may occur leading to electric shock and burns.

- Do not touch non-insulated cable ends.
- Do not touch the DC conductors.
- Do not touch any live components of the inverter.
- Have the inverter mounted, installed, commissioned and maintained only by qualified persons with the appropriate skills.
- Prior to performing any work on the inverter, disconnect it from all voltage sources as described in this document then wait 5 minutes at least.

⚠ WARNING

Risk of injury due to electric shock and fire caused by high leakage current

- The inverter must be reliably grounded in order to protect property and personal safety.

⚠ CAUTION

Risk of injury due to hot heat sink

- The heat sink may get hot during operation. Do not touch!

⚠ CAUTION

Possible damage to health as a result of the effects of electromagnetic radiation

- Please maintain a distance of at least 20cm from the inverter when it is in operation.

NOTICE

Grounding the PV array

- Comply with local regulations for grounding the PV array. We suggest the frames of PV modules must be reliably grounded.
- Do not ground any of the terminals of the strings.

NOTICE

Damage to the seal of the cover in sub-zero conditions

- If you open the cover in sub-zero condition,the sealing of the cover can be damaged.This can lead moisture entering the inverter.
- Do not open the cover at ambient temperatures lower than -5℃.
- If a layer of ice has formed on the seal of the cover in sub-zero comditions,remove it prior to opening the inverter(e.g. by melting the ice with warm air). Observe the applicable safety regulation.

NOTICE

Damage to the inverter due to electrostatic discharge

- Touching electronic components can cause damage to or destroy the inverter through electrostatic discharge.
- Ground yourself before touching any component.

2.4 Symbols on the label

Symbol	Explanation
	Danger of life due to electric shock
	Risk of burns due to hot surface.
	Do not dispose of this inverter with household waste.
	CE mark.
	Certified safety The product is TUV-tested and complies with the requirements of the EU Equipment and Product Safety Act.
	RCM Mark The product complies with the requirements of the applicable Australian
	Danger of high voltage and electric shock, wait at least 5 munites to allow after the inverter has been disconnected from the grid and PV array.
	Refer to the manual accompanying the inverter.
	Risk of danger, warning and caution Safety information important for human safety. Failure to observe the safety information in this manual may result in injury or death.

3 Unpacking

3.1 Scope of delivery

Object	Description	Quantity
A	PV Inverter	1 piece
B	Wall-mounting bracket	1 piece
C	Mounting accessory kit: Wall anchors and hexagon bolts (2×) M5×12 mm pan head screw (1×)	1 set
D	DC connector	1 pair / 2 pairs(*)
E	AC Plug connector	1 piece
F	WiFi stick(optional)	1 piece (optional)
H	Documentation	1 set

*2 pairs for KSY - 4KW-6.2KW-1Ph-2MPPT

			
A	B	C	D
			
E	F	H	

Carefully check all of the components in the carton. If anything is missing, contact your dealer.

3.2 Checking for transport damage

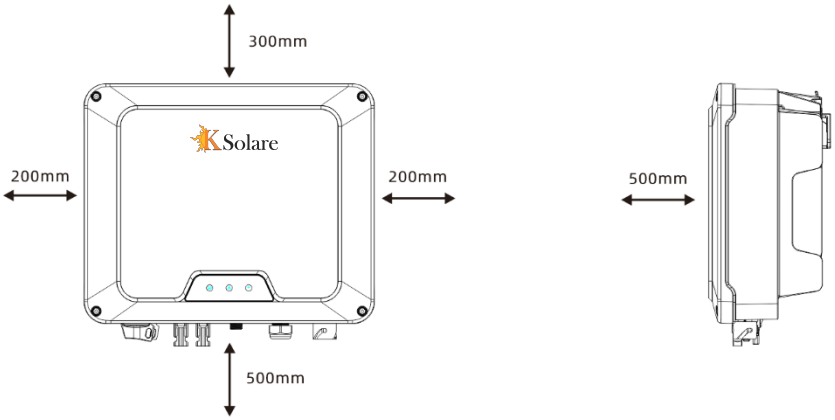
Thoroughly inspect the packaging upon delivery. If you detect any damage to the packaging which indicates the inverter may have been damaged, inform the responsible shipping company immediately. We will be glad to assist you if required.

4 Mounting

4.1 Ambient conditions

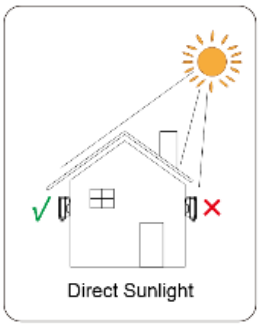
1. Be sure the inverter is installed out of the reach of children.
2. Mount the inverter in areas where it cannot be touched inadvertently.
3. Ensure good access to the inverter for installation and possible service.
4. To make sure that heat can dissipate, observe the following minimum clearance to walls, other inverters, or objects:

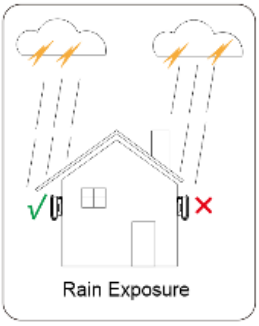
Direction	Min. clearance
Upward	300 mm
Sides	200 mm
Downawrd	500 mm
Front	500 mm



5. The ambient temperature should be below 40°C to ensure optimal operation.
6. Recommend to mount the inverter under the shaded site of the building or mount an awning above the inverter.
7. Avoid exposing the inverter to direct sunlight, rain and snow to ensure optimal operation and extend service life.
8. The mounting method, location and surface must be suitable for the inverter's weight and dimensions.

9. If mounted in a residential area, we recommend mounting the inverter on a solid surface. Plasterboard and similar materials are not recommended due to audible vibrations when in use.
10. Do not put any objects on the inverter.
11. Do not cover the inverter.



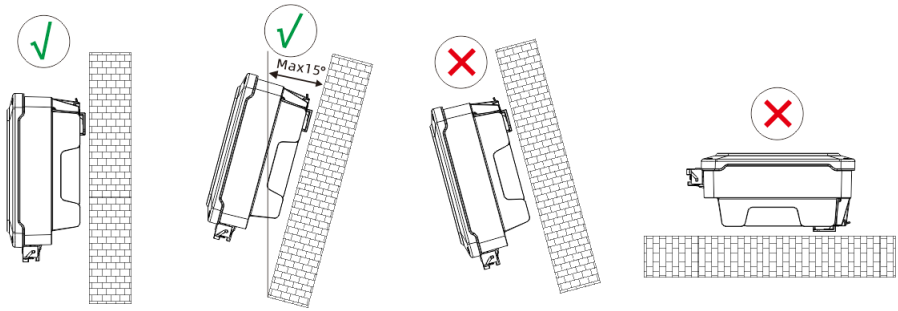


4.2 Selecting the mounting location

⚠ DANGER

Danger to life due to fire or explosion

- Do not mount the inverter on flammable construction materials.
- Do not mount the inverter in areas where flammable materials are stored.
- Do not mount the inverter in areas where there is a risk of explosion.

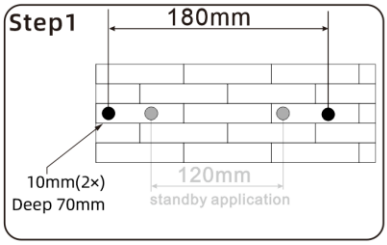


1. Mount the inverter vertically or tilted backward by a maximum of 15°.
2. Never mount the inverter tilted forward or sideways.
3. Never mount the inverter horizontally.
4. Mount the inverter at eye level to make it easy to operate and to read the display.
5. The electrical connection area must point downwards.

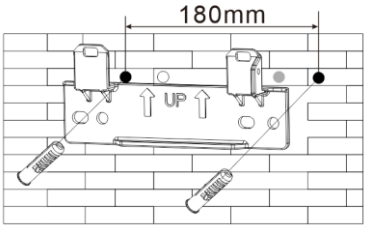
4.3 Mounting the inverter with the wall bracket

Mounting procedures:

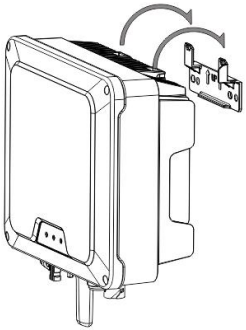
1. Use the wall bracket as a drilling template and mark the positions of the drill holes. Drill 2 holes required using a drill with 10 mm bit. The holes must be about 70 mm deep. Keep the drill vertical to the wall, and hold the drill steady to avoid tilted holes.



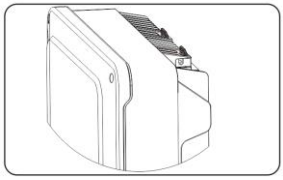
2. After drilling holes in the wall, place two screw anchors into the holes, then attach the wall mounting bracket to the wall using the self-tapping screws and washers delivered with the inverter.



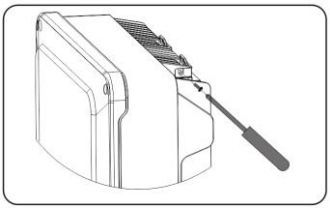
3. Holding the inverter and attach it tilted slightly downwards to the wall bracket.

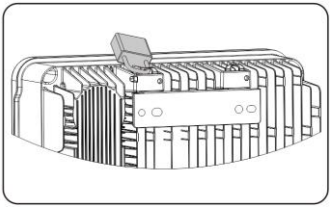


3. Check both sides of the heat sink to ensure that it is securely in place.



4. Push the inverter as far as possible and attach it to both sides of the wall bracket using the M5 screws.Install an antitheft lock (optional), the lock is prepared by customer.





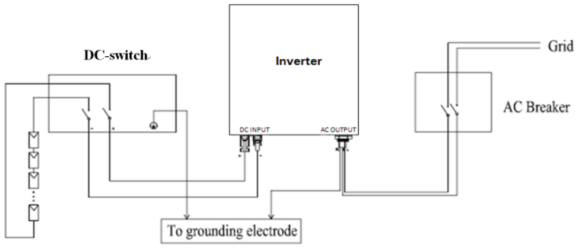
Dismante the inverter in reverse order.

5 Electrical Connection

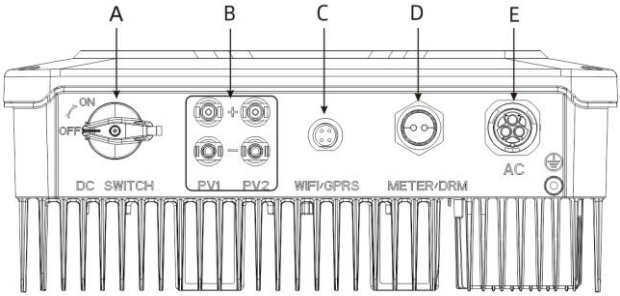
5.1 System layout of units without integrated DC switch

Local standards or codes may require that PV systems are fitted with an external DC switch on the DC side. The DC switch must be able to safely disconnect the open-circuit voltage of the PV array plus a safety reserve of 20%.

Install a DC switch to each PV string to isolate the DC side of the inverter. We recommend the following electrical connection:



5.2 Overview of the connection area



Object	Description
A	DC SWITCH: switch on or off for PV-load.
B	DC input: plug-in connector to connect the strings.
C	WIFI/GPRS (optional): transmit and receive Wi-Fi or GPRS signal.
D	METER/DRM: connect the monitoring device with network cable.
E	AC OUTPUT: plug-in connector, connect the grid.

5.3 AC connection

5.3.1 Conditions for the AC connection

Cable Requirements

The grid connection is established using three

conductors (L, N, and PE).

We recommend the following specifications for stranded copper wire.

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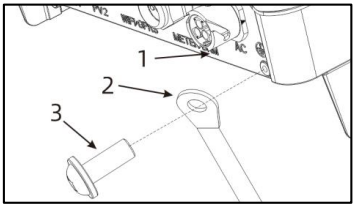
Object	Description	Value
A	External diameter	9 to 14 mm
B	Conductor cross-section	2.5 to 6 mm²
C	Stripping length of the insulated conductors	approx. 12 mm
D	Stripping length of the outer sheath of AC cable	approx. 50 mm
The PE conductor must be 8mm longer than the L and N conductors		

Larger cross-sections should be used for longer cables.

KSY 4KW-6.2KW -1Ph - 2MPPT

Object	Description	Value
A	External diameter	9 to 14 mm
B	Conductor cross-section	4 to 6 mm²
C	Stripping length of the insulated conductors	approx. 12 mm
D	Stripping length of the outer sheath of AC cable	approx. 50 mm
The PE conductor must be 8mm longer than the L and N conductors		



Information on grounding components:

Object	Description
1	Housing
2	M5 terminal lug with protective conductor
3	M5×12 pan head screw

5.4 DC Connection

⚠ DANGER

Danger to life due to high voltages in the inverter

- Before connecting the PV array, ensure that the DC switch is switched off and that it cannot be reactivated.
- Do not disconnect the DC connectors under load.

5.4.1 Requirements for the DC Connection

Use of Y adapters for parallel connection of strings

The Y adapters must not be used to interrupt the DC circuit.

- Do not use the Y adapters in the immediate vicinity of the inverter.

The adapters must not be visible or freely accessible.

- In order to interrupt the DC circuit, always disconnect the inverter as described in this document "Disconnecting the Inverter from Voltage Sources").

Requirements for the PV modules of a string:

- PV modules of the connected strings must be of: the same type, identical alignment and identical tilt.
- The thresholds for the input voltage and the input current of the inverter must be adhered to
- On the coldest day based on statistical records, the open circuit voltage of the PV array must never exceed the maximum input voltage of the inverter. -
- The connection cables of the PV modules must be equipped with the connectors included in the scope of delivery.
- The positive connection cables of the PV modules must be equipped with the positive DC connectors. The negative connection cables of the PV modules must be equipped with the negative DC connectors.

5.4.2 Assembling the DC connectors

Assemble the DC connectors as described below. Be sure to observe the correct polarity.

Cable requirements:

External diameter: 5 mm to 8 mm

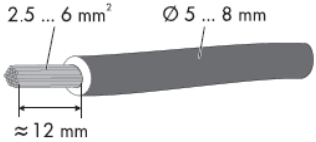
Conductor cross-section: 2.5 mm² to 6 mm²

Number of conductors: at least 7

Nominal voltage: at least 600V

Proceed as follows to assemble each DC connector.

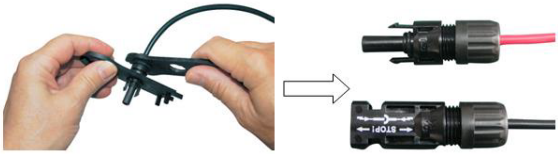
1. Switch off the DC-switch and secure against being inadvertently switched back on. Eliminate any existing ground faults or short circuits in the strings.
2. Strip the cable as follows:



3. Put the contact barrel with stripped cable in the corresponding crimping notch, ensure all conductor strands are captured in the contact barrel, and then crimp the contact.

4. Insert contact cable assembly into back of the MC4 plug connector until it audibly locks into place.

5. Screw the cap nut by using the torque of 2.6~2.9Nm.



6. After screw the cap nut tightly, connect the fault-free strings of the PV generator into DC input connectors on the inverter until it audibly locks into place.

7. When you want to separate the DC connectors, please use the specified tool to do it. Please make sure the wedge side of the fingers face the MC4 plug connector and push the tool down, as follows.
8. Please use sealing caps for tight sealing of unplugged DC input connectors.
   If using H4 connector, the operating procedures are similar as that of MC4 connector.

5.4.3 Connecting the PV array

NOTICE

The inverter can be destroyed by overvoltage

If the voltage of the strings exceeds the maximum DC input voltage of the inverter, it can be destroyed due to overvoltage. All warranty claims become void.

- Do not connect strings with an open-circuit voltage greater than the maximum DC input voltage of the inverter.
- Check the design of the PV system.

1. Ensure that the individual miniature circuit-breaker is switched off and ensure that it cannot be accidentally reconnected.
2. Ensure that the DC switch is switched off and ensure that it cannot be accidentally reconnected.
3. Ensure that there is no ground fault in the PV array.
4. Check whether the DC connector has the correct polarity.
   If the DC connector is equipped with a DC cable having the wrong polarity, the DC connector must be reassembled. The DC cable must always have the same polarity as the DC connector.
5. Ensure that the open-circuit voltage of the PV array does not exceed the maximum DC input voltage of the inverter.
6. Connect the assembled DC connectors to the inverter until they audibly snap into place.
7. Ensure that all DC connectors are securely in place.

7 Commissioning

NOTICE

Risk of injury due to incorrect installation

- We strongly recommend carrying out preliminary checks before commissioning to avoid possible damage to the device caused by faulty installation.

7.1 Electrical checks

Carry out the main electrical tests as follows:

① Check the PE connection with a multimeter: make sure that the inverter's exposed metal surface has a ground connection.

② Check the DC voltage values: check that the DC voltage of the strings does not exceed the permitted limits. Refer to the Section 2.1 "Intended use" about designing the PV system for the maximum allowed DC voltage.

③ Check the polarity of the DC voltage: make sure the DC voltage has the correct polarity.

④ Check the PV array's insulation to ground with a multimeter: make sure that the insulation resistance to ground is greater than 1 MOhm.

⑤ Check the grid voltage: check that the grid voltage at the point of connection of the inverter complies with the permitted value.

7.2 Mechanical checks

Carry out the main mechanical checks to ensure the inverter is waterproof:

① Make sure the inverter has been correctly mounted with wall bracket.

② Make sure the cover has been correctly mounted.

③ Make sure the communication and AC cable gland has been mounted properly and adequately locked.

7.3 Start-Up

After finishing the electrical and mechanical checks, switch on the miniature circuit-breaker and DC-switch in turn. Once the DC input voltage is sufficiently high and the grid-connection conditions are met, the inverter will start operation automatically. Usually, there are three states during operation:

Indicator lights in Green/Red/Yellow correspondently refer to:

POWER LED	ON=Inverter is feeding power
	BLINK=DC is on,but the inverter is not feeding power
	OFF=DC is off
FAULT LED	ON=Inverter is faulty
	OFF=No fault
COM LED	BLINK=Communication device is connected to inverter
	OFF=No communication

During periods of low radiation, the inverter may continuously start up and shut down. This is due to insufficient power generated by the PV array.
If this fault occurs often, please call service.

Quick Troubleshooting

If the inverter is in "Fault" mode, refer to Section 11 "Troubleshooting".

8 Disconnecting the Inverter from Voltage Sources

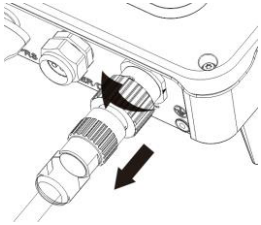
Prior to performing any work on the inverter, disconnect it from all voltage sources as described in this section. Always adhere strictly to the prescribed sequence.

Procedure:

1. Disconnect the miniature circuit-breaker and secure against reconnection.
2. Disconnect the DC switch and secure against reconnection.
3. Use a current clamp meter to ensure that no current is present in the DC cables.
4. please use the specified tool to do it. Please make sure the wedge side of the fingers face the female connector and push the tool down, as following figure.

5. Ensure that no voltage is present at the DC inputs of the inverter.

6. 6. Loosen and remove the AC connector.

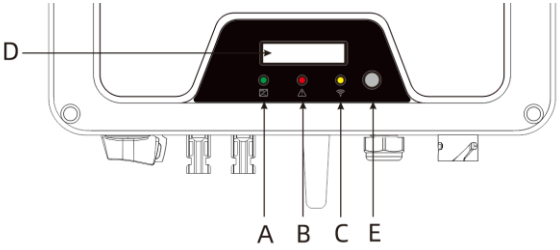


9 Operation(optional)

The information provided here covers the LEDs, the control button and the display messages.

9.1 Overview of the control panel

The inverter is equipped with a text display, three LEDs indicators and a control button.



Object	Description
A	Normal (Green LED)
B	Fault (Red LED)
C	Communication (Yellow LED)
D	Display
E	Control button

KSolare

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