Hybrid Inverter

SUN-5K-SG01HP3-EU-DM2

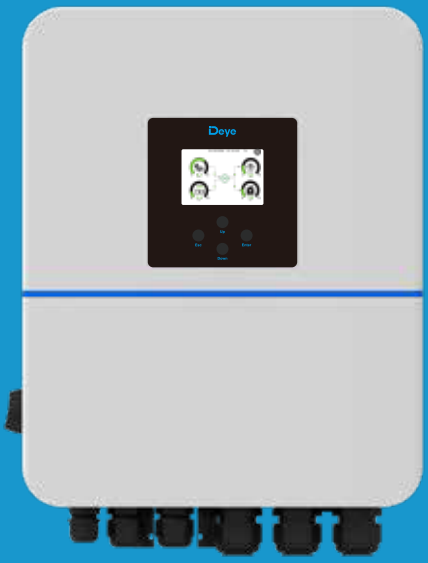
SUN-6K-SG01HP3-EU-DM2

SUN-8K-SG01HP3-EU-DM2

SUN-10K-SG01HP3-EU-DM2

SUN-12K-SG01HP3-EU-DM2

User Manual



Contents

About This Manual

This manual provides information and guidelines for the installation, operation, and maintenance of the SUN-(5/6/8/10/12)K-SG01HP3-EU-DM2 inverter. Please note that it does not contain comprehensive information about the photovoltaic (PV) system.

How to Use This Manual

Before undertaking any operation involving the inverter, it is crucial to thoroughly read this manual and any associated documents. Ensure that these documents are stored safely and are readily accessible at all times.

Please be aware that the contents of this manual may undergo periodic updates or revisions as a result of ongoing product development. Consequently, the information contained herein is subject to change without prior notice. The latest manual can be acquired via service@deye.com.cn

1. Safety Introductions

Labels description

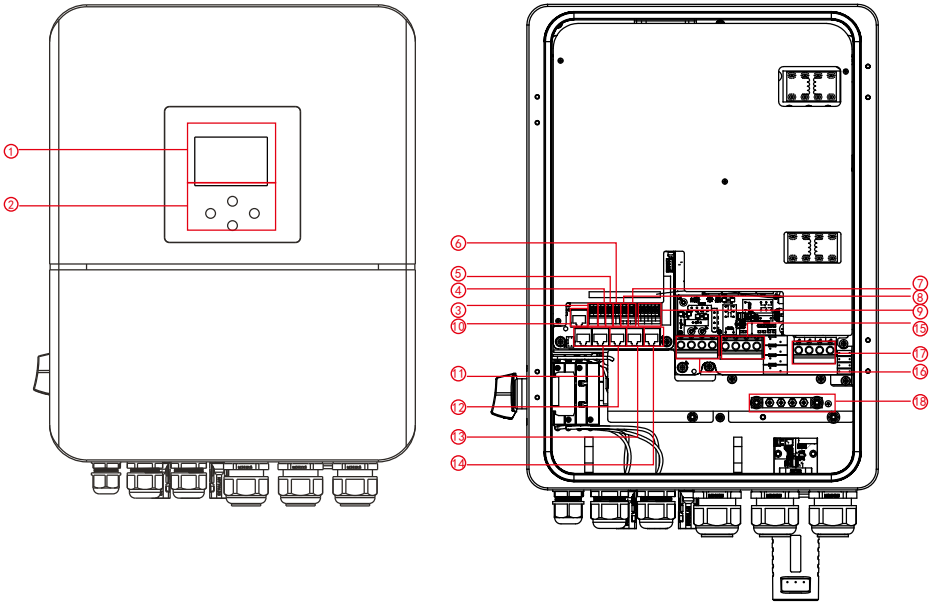
Label	Description
	Caution, risk of electric shock symbol indicates important safety instructions, which if not correctly followed, could result in electric shock.
	The DC input terminals of the inverter must not be grounded.
	Surface high temperature, Please do not touch the inverter case.
	The AC and DC circuits must be disconnected separately, and the maintenance personnel must wait for 5 minutes before they are completely powered off before they can start working.
	CE mark of conformity
	Please read the instructions carefully before use.
	Symbol for the marking of electrical and electronics devices according to Directive 2002/96/EC. Indicates that the device, accessories and the packaging must not be disposed as unsorted municipal waste and must be collected separately at the end of the usage. Please follow Local Ordinances or Regulations for disposal or contact an authorized representative of the manufacturer for information concerning the decommissioning of equipment.

· This chapter contains important safety and operating instructions. Read and keep this manual for future reference.
· Before using the inverter, please read the instructions and warning signs of the battery and corresponding sections in the instruction manual.
· Do not disassemble the inverter. If you need maintenance or repair, take it to a professional service center.
· Improper reassembly may result in electric shock or fire.
· To reduce risk of electric shock, disconnect all wires before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
· Caution: Only qualified personnel can install this device with battery.
· Never charge a frozen battery.
· For optimum operation of this inverter, please follow required specification to select appropriate cable size. It is very important to correctly operate this inverter.
· Be very cautious when working with metal tools on or around batteries. Dropping a tool may cause a spark or short circuit in batteries or other electrical parts, even cause an explosion.
· Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to "Installation" section of this manual for the details.
· Grounding instructions - this inverter should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
· Never cause AC output and DC input short circuited. Do not connect to the mains when DC input short circuits.

2. Product Introductions

This is a multifunctional inverter, combining functions of inverter, solar charger and battery charger to offer uninterruptible power support with portable size. Its comprehensive LCD display offers user configurable and easy accessible button operation such as battery charging, AC/solar charging, and acceptable input voltage based on different applications.

2.1 Product Overview

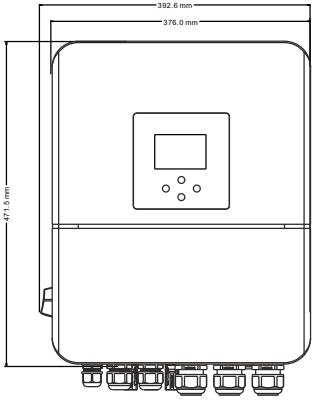


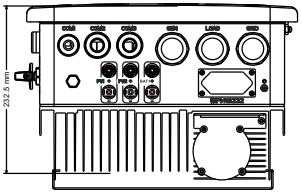
SUN-5/6/8/10K-SG01HP3-EU-DM2

SUN-12K-SG01HP3-EU-DM2

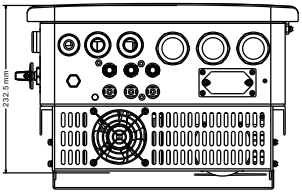
1: LCD display	7: Shut DownB-B	13: BMS port	19: Power on/off button
2: Function buttons	8: Shut Down+/-	14: RS485 port	20: DC switch
3: Gen Start	9: CT	15: Load	21: PV input with two MPPT
4: Dry 1	10: Meter port	16: Generator input	22: Battery input
5: Dry 2	11: Parallel port	17: Grid	23: WiFi Interface
6: Rsd+/Rsd-	12: DRM port	18: GND	

2.2 Product Size



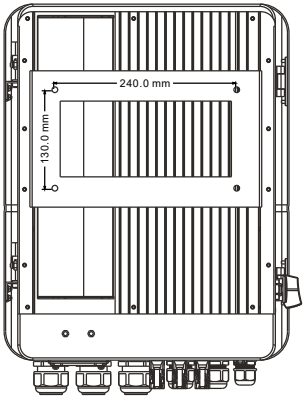


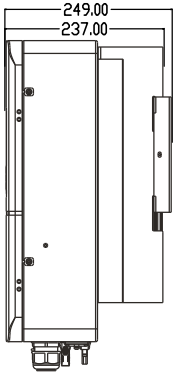
SUN-5/6/8/10K-SG01HP3-EU-DM2



SUN-12K-SG01HP3-EU-DM2

Inverter Size





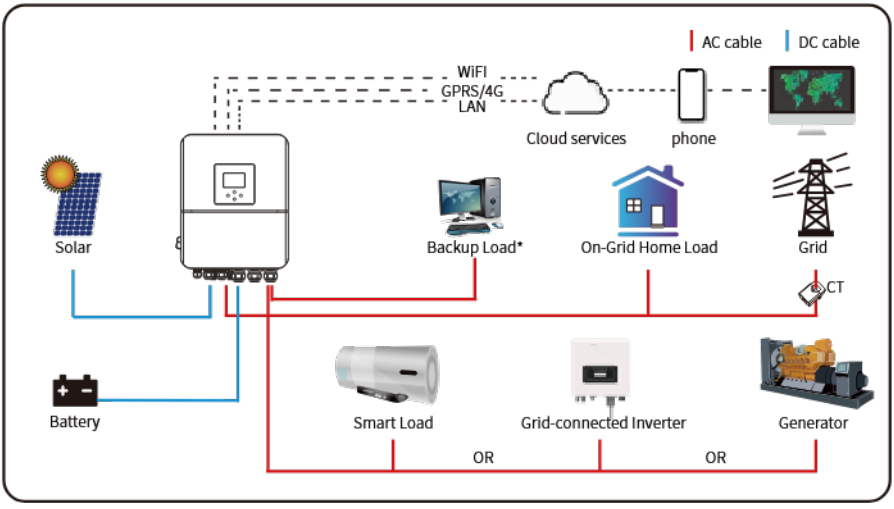
2.3 Product Features

- 230V/400V Three phase Pure sine wave inverter.
- Self-consumption and feed-in to the grid.
- Auto restart while AC is recovering.
- Programmable supply priority for battery or grid.
- Programmable multiple operation modes: On grid, off grid and UPS.
- Configurable battery charging current/voltage based on applications by LCD setting.
- Configurable AC/Solar/Generator Charger priority by LCD setting.
- Compatible with mains voltage or generator power.
- Overload/over temperature/short circuit protection.
- Smart battery charger design for optimized battery performance
- With limit function, prevent excess power overflow to the grid.
- Supporting WIFI monitoring and have 2 MPP Trackers, and each MPP Tracker can connect 1 or 2 PV strings.
- Smart settable three stages MPPT charging for optimized battery performance.
- Time of use function.
- Smart Load Function.

2.4 Basic System Architecture

The following illustration shows basic application of this inverter.
It also includes following devices to have a complete running system.
- Generator（Fro off-grid mode）or Utility Grid
- PV modules

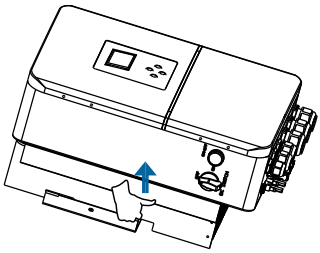
Consult with your system integrator for other possible system architectures depending on your requirements.
This inverter is designed to power a range of appliances commonly found in homes and offices, including motor type appliances like refrigerators and air conditioning units. Before use, it's advisable to verify appliance compatibility with this inverter.



*Connected to the LOAD port

2.5 Product handling requirements

Lift the inverter out of the packaging box and transport it to the designated installation location.



transport

CAUTION:

Improper handling may cause personal injury!

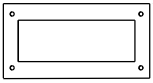
- Arrange an appropriate number of personnel to carry the inverter according to its weight, and installation personnel should wear protective equipment such as anti-impact shoes and gloves.
- Placing the inverter directly on a hard ground may cause damage to its metal enclosure. Protective materials such as sponge pad or foam cushion should be placed underneath the inverter.
- Move the inverter by one or two people or by using a proper transport tool.
- Move the inverter by holding the handles on it. Do not move the inverter by holding the terminals.

3. Installation

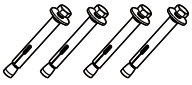
3.1 Parts List

Check the equipment before installation. Please make sure nothing is damaged in the package. You should have received the items in the following package:

Hybrid inverter x1

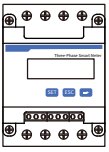


Wall mounting bracket x1



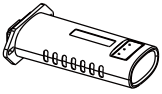
Stainless steel anti-collision bolt M6×60 x4

Communication cable x1

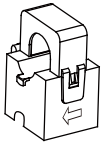


Meter(optional) x 1

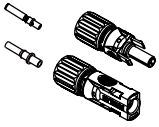
User manual x1



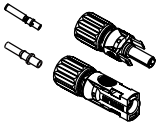
Data logger(optional) x1



Sensor Clamp x 3



Battery Plug connectors including metal terminal xN(blue)

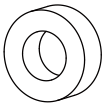


DC+/DC- Plug connectors including metal terminal xN(black)

*1,2

Magnetic ring for BMS and Meter communication cable x2

*3,4



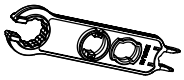
Magnetic ring for GEN/LOAD wires x2

*5

magnetic ring for CTx1

*6

Magnetic ring for grid port x1



Solar Photovoltaic Connector Special Spanner x1

*1,2: 33×23×15 mm
*3,4: 50×32×20 mm
*5: 25.9×28×13 mm
*6: 27×46×25 mm(If this magnetic ring is not included in the accessory package, it should have already been pre installed at the inlet of the grid cable.)

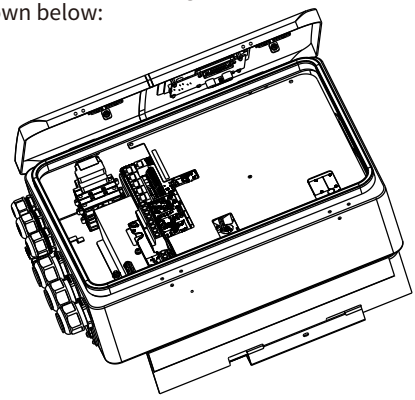
3.2 Mounting instructions

Installation Precaution

This Hybrid inverter is designed for outdoor use(IP65), Please make sure the installation site meets below conditions:

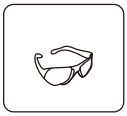
· Not in direct sunlight, rain exposure, snow laying up during installation and operation.
· Not in areas where highly flammable materials are stored.
· Not in potential explosive areas.
· Not directly expose to the cold air to avoid condensation inside the inverter casing .
· Not near the television Antenna or antenna cable.
· Not higher than altitude of about 2000 meters above sea level.
· Not in environment of precipitation or humidity(>95%)

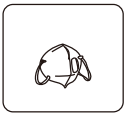
Excessive heat buildup, heavy rainfall or water pooling, can impact the performance and longevity of the inverter. Before connecting all wires, please take off the metal cover by removing screws as shown below:

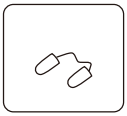


Installations Tools

Installation tools can refer to the following recommended ones. Also, use other auxiliary tools on site.

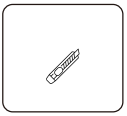

Protective goggles

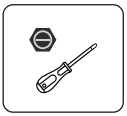

Anti-dust mask


Earplugs

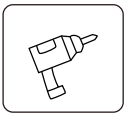

Work gloves


Work shoes


Utlity Knife


Slotted screwdriver


Cross screwdriver


Percussion drill

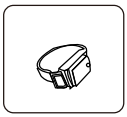

Pliers


Marker

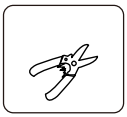

Level


Rubber hammer

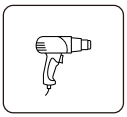

socket wrenches set


Anti-static wrist strap

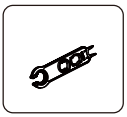

Wire cutter


Wire stripper

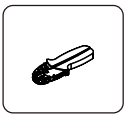

Hydraulic pliers


Heat gun


Crimping tool4-6mm^2


Solar connector wrench


Multimeter ⩾1100 Vdc

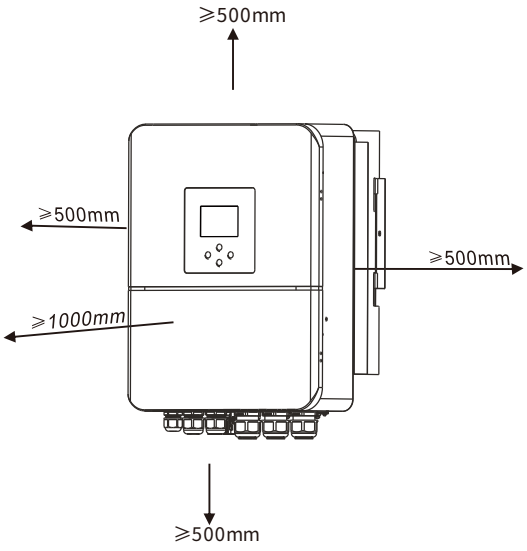

RJ45 crimping plier


Cleaner


Spanner

Considering the following points before selecting where to install:

· Please select a vertical wall with load-bearing capacity for installation, suitable for installation on concrete or other non-flammable surfaces,installation as follows.
· Install this inverter at eye level in order to allow the LCD display to be read at all times.
· The ambient temperature is recommeded to be between -40~60°C to ensure optimal operation.
· Be sure to keep enough distance between other objects and the inverter surfaces as shown in the diagram to guarantee sufficient heat dissipation and have enough space for removing wires.

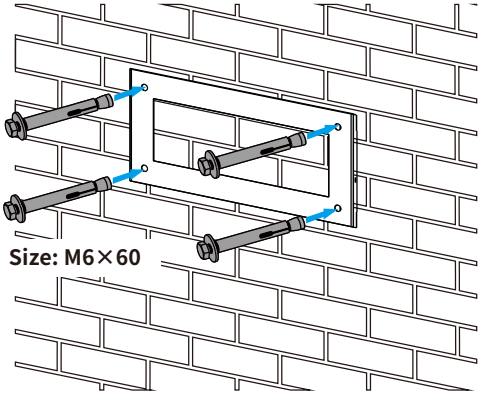


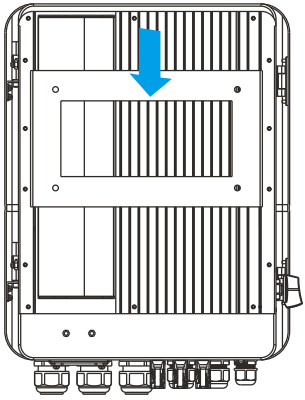
For a proper ventilation of the inverter and avoid overheating, allow a clearance of approximately 50 cm around the inverter and at least 100 cm to the front as shown in the above figure.

Mounting the inverter

Remember that this inverter is heavy! Please be careful when lifting out from the package. Choose the recommend drill head(as shown in below pic) to drill 4 holes on the wall, 62-70mm deep.

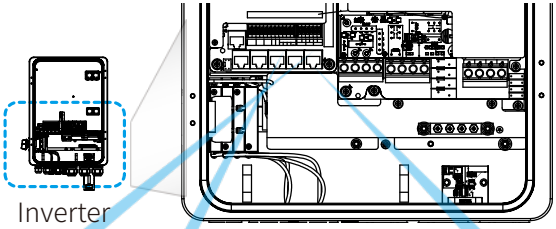
1. Use a proper hammer to fit the expansion bolt into the holes.
2. Screw out the nuts of the expansion bolts, align the holes of the mounting bracket with the 4 expansion bolts, and then push in the mounting bracket, tighten the nuts of expansion bolts.
3. Mount the inverter on the mounting bracket and use screws to fix the inverter with mounting bracket.

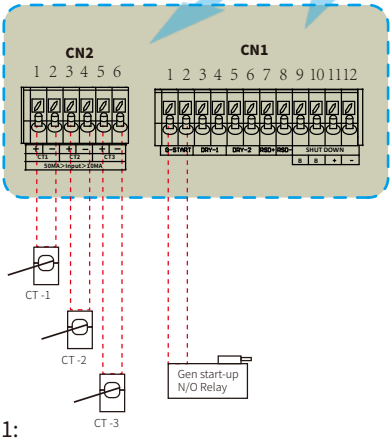




Inverter mounting bracket installation

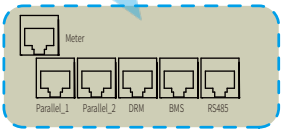
3.3 Function port definition





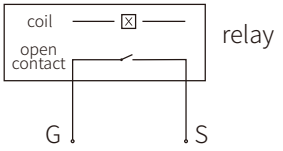
CN1:
G-start (1,2): dry contact signal for startup the diesel generator.
When the "GEN signal" is active, the open contact (GS) will switch on (no voltage output).
DRY-2 (5,6): reserved.
RSD+,RSD- (7,8): When battery is connected and the inverter is in "ON" status, it will provide 12Vdc.
SHUT DOWN (9,10,11,12): when the terminal "B" & "B" is
short-circuited with additional wire connection, or there' s 12Vdc input at the terminal "+ & - ", then the 12Vdc of RSD+ & RSD- will disappear immediately, and the inverter will shutdown immediately.

CN2:
CT-1 (1,2): current transformer (CT-R) for"zero export to CT"mode clamps on L1 when in three phase system.
CT-2 (3,4): current transformer (CT-S) for"zero export to CT"mode clamps on L2 when in three phase system.
CT-3 (5,6): current transformer (CT-T) for"zero export to CT"mode clamps on L3 when in three phase system.
If the secondary current of CT is within the range of 10MA-50MA, use terminals 1-6.

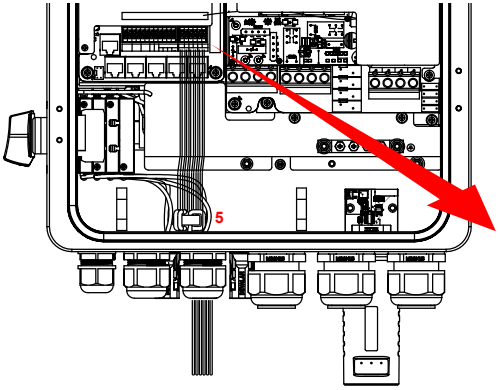


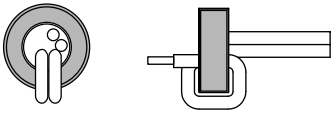
Meter: for energy meter communication
Parallel_1: Parallel communication port 1.
Parallel_2: Parallel communication port 2 . (These two ports have no particular orders)

DRM: Logic interface for AS/NZS 4777.2:2020.
BMS: BMS port for battery communication port .
RS485: RS485 port.



GS (diesel generator startup signal)

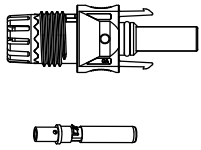




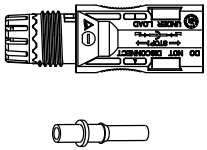
Thread the end of the CT's wires through the magnetic ring 5 and wrap the wires around it one lap. Fix the magnetic ring near the wiring terminals, as shown in the above diagram. Repeat this operation for the other two CTs.

3.4 Battery connection

For safe operation and compliance, a separate DC over-current protector or disconnect device is required between the battery and the inverter. In certain applications, a disconnect switch may not be necessary, but it is always essential to have DC overcurrent protection in place. Refer to the typical amperage in the **page 28** for the required fuse or circuit breaker size.



Pic 3.1 DC+ male connector



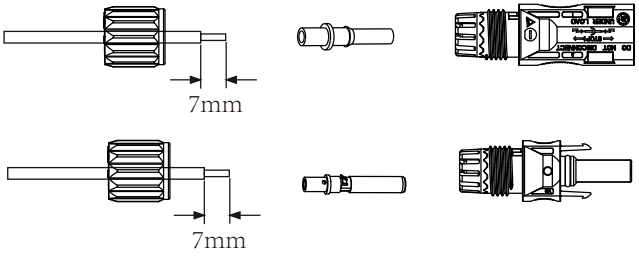
Pic 3.2 DC- female connector

Safety Hint:
Please use approved DC cable for battery system.

Model	Wire Size	Cross section（mm^2）
5/6/8/10/12kW	8AWG	$6mm^2$

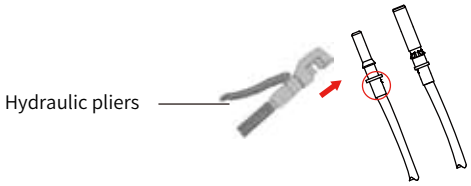
Chart 3-2

The steps to assemble the battery connectors are listed as follows:
a) Strip the insulation of the battery wire by 7 mm, disassemble the cap nut of the connetctor, thread one battery wire through the cap nut of the connector (see Pic 3.3). Repeat the process with the other wire, paying special attention to their polarity of the connector.



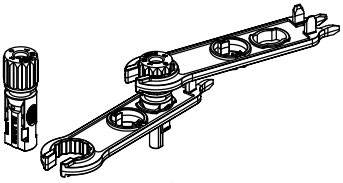
Pic 3.3 Disassemble the connector cap nut

b) Crimping metal terminals with crimping pliers as shown in picture 3.4.



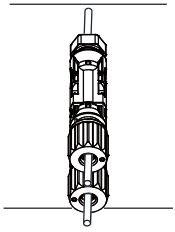
Pic 3.4 Crimp the contact pin to the wire

c) Insert the contact pin to the top part of the connector and screw up the cap nut to the top part of the connector completely, as shown in Pic 3.5.



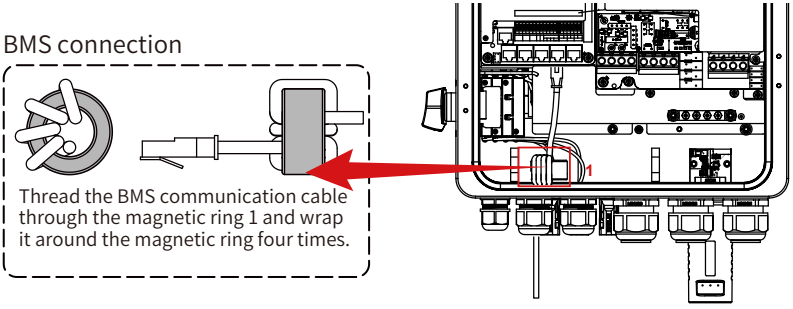
Pic 3.5 connector with cap nut screwed on

d) Finally insert the DC connector into the positive and negative battery inputs of the inverter, shown as pic 3.6



Pic 3.6 DC input connection

BMS connection



3.5 Grid connection and backup load connection

· Before connecting to the grid, a separate AC breaker must be installed between the inverter and the grid, and also between the backup load and the inverter. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current. Check the recommended values in the following tables according to local regulations in each country. The recommended specifications for AC breakers here are based on the Max.Continuous AC passthrough current of inverter, you can also choose the AC breaker of backup side according to the actual total operating current of all the backup loads.

· There are three terminal blocks with "Grid" "Load"and "GEN" markings. Please do not misconnect input and output connectors.

AC Breaker for backup load

Model	Recommended AC breaker
5/6/8/10/12kW	50A

AC Breaker for grid

Model	Recommended AC breaker
5/6/8/10/12kW	50A

Note:
In final installation,breaker certified according to IEC 60947-1 and IEC 60947-2 shall be installed with the equipment.

All wiring must be performed by a qualified personnel.It is very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable as below. There are two tables below, the first table recommends cable specififications based on bypass current(Max.Continuous AC passthr ough), and the second table is based on Max.Three-phase Unbalanced Output Current .

Grid connection and backup load connection (Copper wires) (bypass)

Model	Wire Size	Cross section(mm^2)	Torque value(max)
5/6/8/10/12kW	8AWG	6	3.4Nm

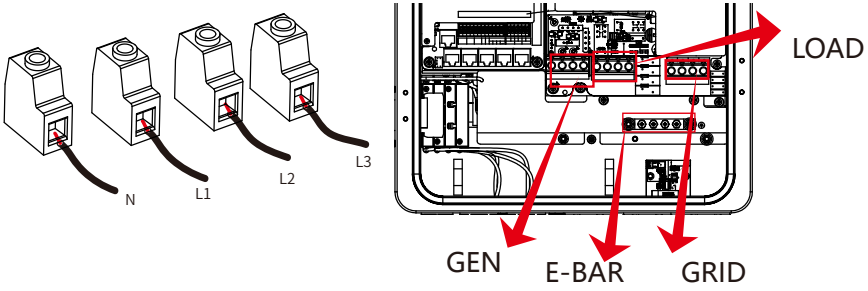
Grid connection and backup load connection (Copper wires)

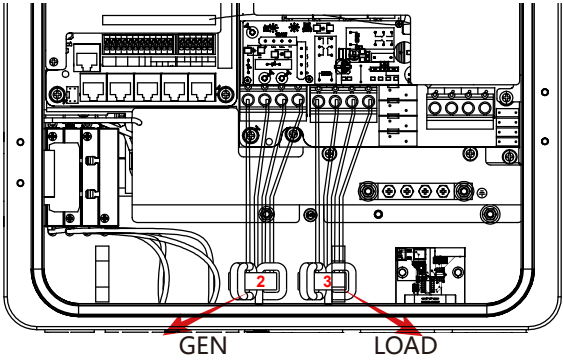
Model	Wire Size	Cross section(mm^2)	Torque value(max)
5kW	14AWG	1.5	2.8Nm
6/8kW	12AWG	2.5	2.8Nm
10kW	10AWG	4.0	2.8Nm
12kW	8AWG	6.0	2.8Nm

Chart 3-3 Recommended Size for AC wires

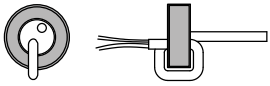
Please follow below steps to implement Grid, load and Gen port connection:

1. Before making Grid, load and Gen port connection, be sure to turn off AC breaker or disconnector first.
2. Remove insulation sleeve 10mm length, unscrew the bolts. For GRID port, just insert the wires into the terminals according to polarities indicated on the terminal block. For GEN and Load ports, thread the wires through the magnetic ring firstly, then insert these wires into the terminals according to polarities indicated on the terminal block. Tighten the terminal screws and make sure the wires are completely and safely connected.



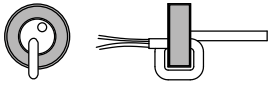


3



Wrap the wires of GEN port one lap around the magnetic ring 3, then thread the end of wires through the magnetic ring.

4



Wrap the wires of Load port one lap around the magnetic ring 4, then thread the end of wires through the magnetic ring.

Be sure that AC power source is disconnected before attempting to wire it to the unit.

3. Make sure all the wires are securely and completely connected.
4. Some appliances, such as air conditioners and refrigerators, may need a time delay before recconneting them after a power outage. This delay allows the refrigerant gas to stabilize and prevents potential damage. Check if your appliance has a built-in time-delay function before connecting it to our inverter. Examples of appliances that may require a delay include:
Air conditioners: Balancing refrigerant gas.
Refrigerators: Stabilizing the compressor.
Freezers: Allowing the cooling system to balance.
Heat pumps: Protecting against power fluctuations.
This inverter will protect your appliances by triggering an overload fault if no time delay is present. However, internal damage may still occur. Refer to the manufacturer's documentation for specific time-delay requirements.

3.6 PV Connection

Before connecting to PV modules, please install a separately DC circuit breaker between inverter and PV modules. It is very important for system safety and efficient operation to use appropriate cable for PV module connection.

To avoid any malfunction, do not connect any PV modules with possible leakage current to the inverter. For example, grounded PV modules will cause leakage current to the inverter. When using PV modules, please ensure the PV+ & PV- of solar panel is not connected to the system ground bar.

It is requested to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.

3.6.1 PV Module Selection:

When selecting proper PV modules, please be sure to consider below parameters:
1) Open circuit Voltage (Voc) of PV modules can not exceed max. PV Input Voltage of inverter.
2) Open circuit Voltage (Voc) of PV modules should be higher than min.PV Input Voltage of inverter.
3) The PV modules used to connected to this inverter shall be Class A rating certified according to lEC 61730.

Inverter Model	5kW	6kW	8kW	10kW	12kW
PV Input Voltage	600V (180V-1000V)				
PV Array MPPT Voltage Range	150V-850V				
No. of MPP Trackers	2				
No. of Strings MPP Tracker	1+1				

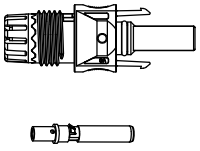
Chart 3-5

3.6.2 PV Module Wire Connection:

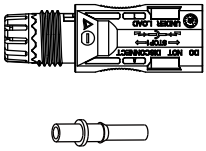
1. Switch the Grid Supply Main Switch(AC)OFF.
2. Switch the DC lsolator OFF.
3. Assemble PV input connector to the inverter.

Safety Hint:
Before connection, please make sure the polarity of PV array matches the "DC+" and "DC-" symbols.

Safety Hint:
Before connecting to inverter, please make sure that the open circuit voltage of PV strings haven't exceeded the max.PV input voltage of the inverter.



Pic 6.1 DC+ male connector



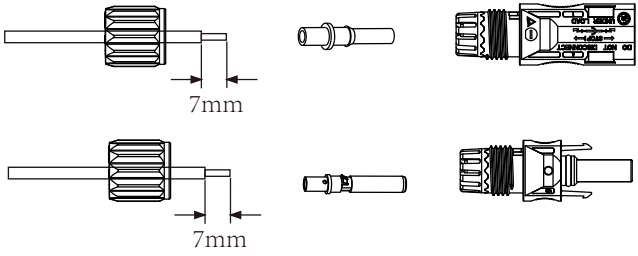
Pic 6.2 DC- female connector

Safety Hint:
Please use approved DC cable for PV system.

Cable type	Cross section (mm^2)	
	Range	Recommended value
Industry generic PV cable (model: PV1-F)	2.5-4 (12-10AWG)	4(10AWG)

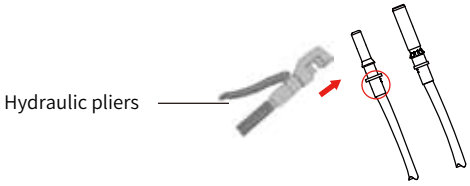
Chart 3-6

The steps to assemble the PV connectors are listed as follows:
a) Strip the insulation of the PV wire by 7 mm, disassemble the cap nut of the MC4 connetctor, thread one PV wire through the cap nut of the connector (see Pic 6.3). Repeat this operation with all the PV wires, paying special attention to their polarity of the connector.



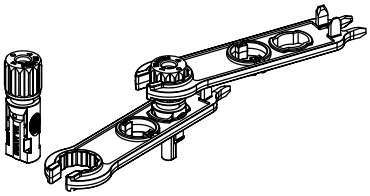
Pic 6.3 Disassemble the connector cap nut

b) Crimping metal terminals with crimping pliers as shown in Pic 6.4.



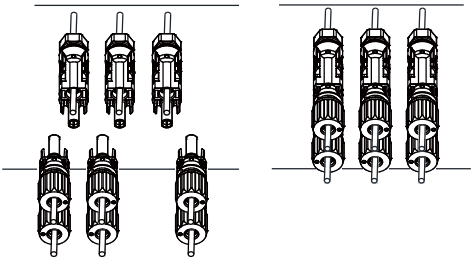
Pic 6.4 Crimp the contact pin to the wire

c) Insert the contact pin to the top part of the connector and screw up the cap nut to the top part of the connector completely, as shown in Pic 6.5.



Pic 6.5 connector with cap nut screwed on

d) Finally insert the PV connectors into the positive and negative PV inputs of the inverter，as shown in Pic 6.6.



Pic 6.6 DC input connection

Warning:
When operating the PV strings, be aware that sunlight exposure can generate high voltages in the PV strings. Avoid contact with exposed electrical connecters or terminals to prevent electrical shock or injury. For safety, it is best to operate the PV strings at night or when PV modules are not exposed to sunlight. If daytime operation is necessary, cover the PV modules to minimize sunlight exposure and prevent high voltage generation.
Remember to turn off the DC breaker or switch before performing any maintenance or adjustments. Do not turn off the DC breaker or switch when high voltage or high current is present to avoid damage or hazards. Prioritize personal safety.

Warning:
Please use its own DC power connector from the inverter accessories. Do not interconnect the connectors of different manufacturers. The Isc current of PV modules should not exceed the Max.PV Isc current of this model inverters. If exceeds, it may damage the inverter and is not covered by Deye's warranty.