



Lesso Three Phase PV Inverter

(50-70)K **Installation and Operation Manual**

Ver 1.0

The 1st and 2nd floors of the workshop in Zone 2, No. 58, Longzhou West Road,
Longjiang Town, Shunde District, Foshan City, Guangdong Province, P.R.China

Please adhere to the actual products in case of any discrepancies in this user manual.

If you encounter any problem on the PV Inverter, please find out the PV Inverter S/N
and contact us, we will try to respond to your question ASAP.



Guangdong Lesso Banhao New Energy Technology Group Co., Ltd

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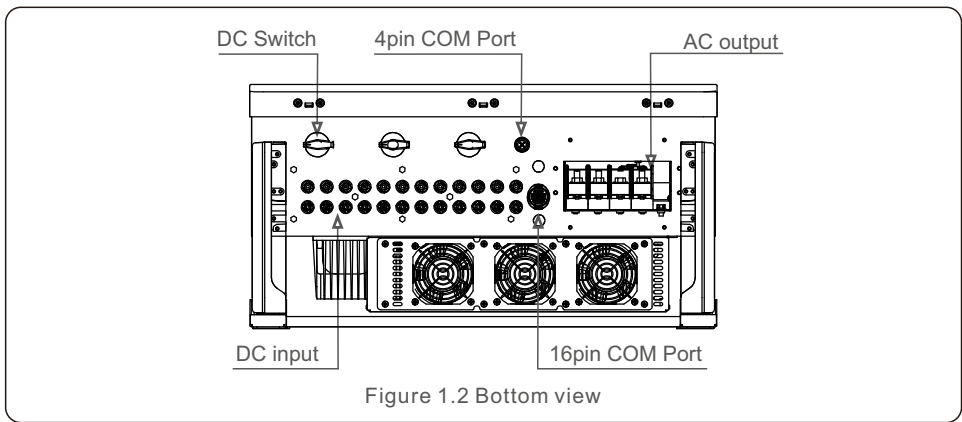
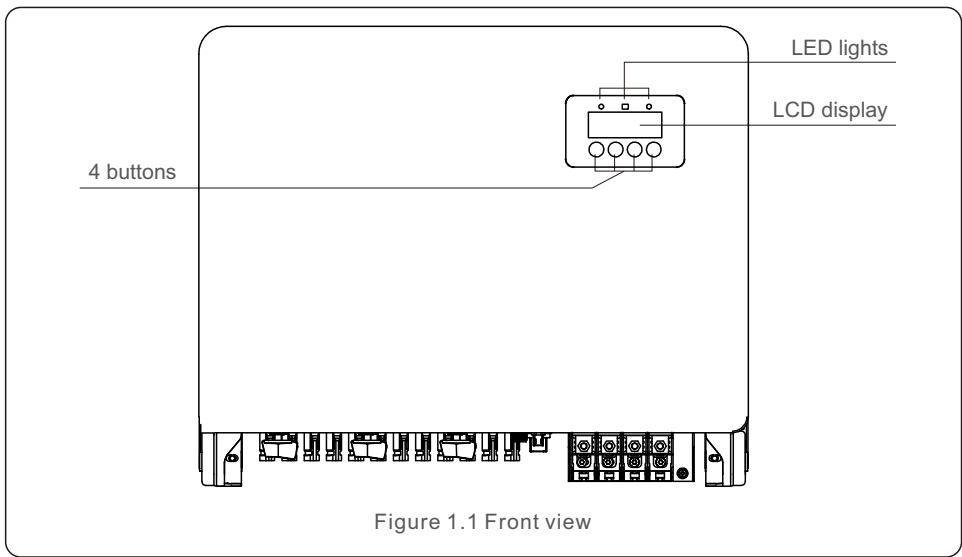
1. Introduction

1.1 Product Description

Lesso Three phase PV Inverters convert DC power from the photovoltaic(PV) array into alternating current(AC) power that can satisfy local loads as well as feed the power distribution grid.

This manual covers the three phase PV Inverter model listed below:

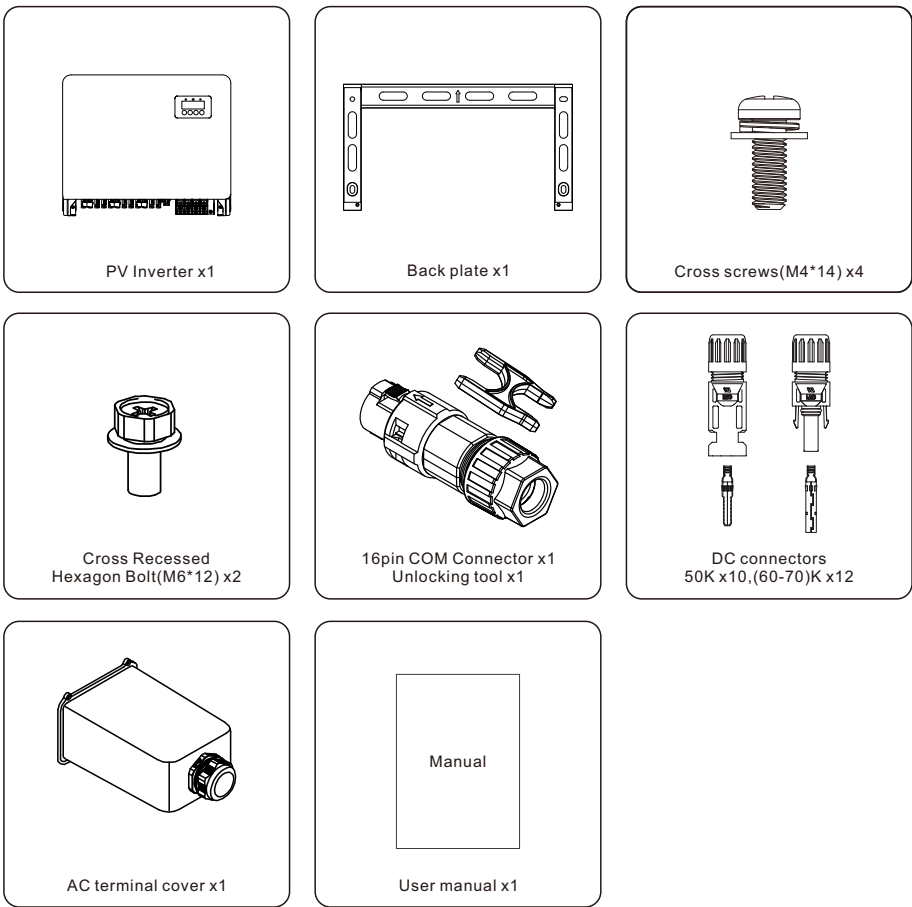
LSBH50KTL3, LSBH60KTL3, LSBH60KTL3-E1, LSBH70KTL3-E1



1. Introduction

1.2 Unpacking and storage

When you receive the PV Inverter, please ensure that all the parts listed below are included:



If anything is missing, please contact your local Lesso distributor.

1. Introduction

1.3 Storage

If the PV Inverter is not to be installed immediately, storage instructions and environmental conditions are below:

- Use the original box to repackage the PV Inverter, seal with adhesive tape with the desiccant inside the box.
- Store the PV Inverter(s) in a clean and dry place, free of dust and dirt.
- Storage temperature must be between -40°C and 70°C and the humidity should be between 0 and 95% non-condensing.
- Stack no more than four (4) PV Inverters high.
- Keep box(es) away from corrosive materials to avoid damage to the PV Inverter enclosure.
- Inspect packaging regularly. If packaging is damaged(wet, pest damage, etc), repackage the PV Inverter immediately.
- Store the PV Inverter(s) on a flat, hard surface - not inclined or upside down.
- After long-term storage, the PV Inverter needs to be fully examined and tested by qualified service or technical personnel before using.
- Restarting after a long period of non-use requires the equipment to be inspected and, in some cases, the removal of oxidation and dust that has settled inside the equipment will be required.

2. Safety Instructions

Improper use may result in electric shock hazards or burns. This product manual contains important instructions that are required to be followed during installation and maintenance. Please read these instructions carefully before use and keep them in an easily locatable place for future reference.

2.1 Safety symbols

Safety symbols used in this manual, which highlight potential safety risks and important safety information, are listed below:



WARNING

Symbol indicates important safety instructions, which if not correctly followed, could result in serious injury or death.



NOTE

Symbol indicates important safety instructions, which if not correctly followed, could result in damage to or the destruction of the PV Inverter.



CAUTION, RISK OF ELECTRIC SHOCK

Symbol indicates important safety instructions, which if not correctly followed, could result in electric shock



CAUTION, HOT SURFACE

Symbol indicates safety instructions, which if not correctly followed, could result in burns.

2.2 General safety instructions



WARNING

Do not connect PV array positive (+) or negative (-) to ground – doing so could cause serious damage to the PV Inverter.



WARNING

Electrical installations must be done in accordance with local and national electrical safety standards.



WARNING

To reduce the risk of fire, branch circuit over-current protective devices (OCPD) are required for circuits connected to the PV Inverter.



CAUTION

The PV array (solar panels) supplies a DC voltage when exposed to light.

2. Safety Instructions



CAUTION

Risk of electric shock from energy stored in the PV Inverter's capacitors. Do not remove cover until five (5) minutes after disconnecting all sources of supply have passed, and this can only be done by a service technician. The warranty may be voided if any unauthorized removal of cover occurs.



CAUTION

The PV Inverter's surface temperature can reach up to 75°C . To avoid risk of burns, do not touch the surface when the PV Inverter is operating. PV Inverter must be installed out of the reach of children.



WARNING

The PV Inverter can only accept a PV array as a DC input. Using any other type of DC source could damage the PV Inverter.

2.3 Notice for use

The PV Inverter has been constructed according to applicable safety and technical guidelines. Use the PV Inverter in installations that meet the following requirements ONLY:

- 1). The PV Inverter must be permanently installed.
- 2). The electrical installation must meet all the applicable regulations and standards.
- 3). The PV Inverter must be installed according to the instructions stated in this manual.
- 4). The system design must meet PV Inverter specifications.
- 5). The PV Inverter is for industrial/commercial application only.

To start-up the PV Inverter, the Grid Supply Main Switch (AC) must be turned on, BEFORE the DC Switch is turned on. To stop the PV Inverter, the Grid Supply Main Switch (AC) must be turned off before the DC Switch is turned off.

2.4 Notice for Disposal

This product shall not be disposed of with household waste. They should be segregated and brought to an appropriate collection point to enable recycling and avoid potential impacts on the environment and human health. Local rules in waste management shall be respected .



3. Installation

3.1 Environmental considerations

3.1.1 Select a location for the PV Inverter

When selecting a location for the PV Inverter, consider the following:



WARNING: Risk of fire

Despite careful construction, electrical devices can cause fires.

- Do not install the PV Inverter in areas containing highly flammable materials or gases.
- Do not install the PV Inverter in potentially explosive atmospheres.
- The mounting structure where the PV Inverter is installed must be fireproof.

- The temperature of the PV Inverter heat-sink can reach 75°C.
- The PV Inverter is designed to work in an ambient temperature range between -25 to 60°C.
- If multiple PV Inverters are installed on site, a minimum clearance of 500mm should be kept between each PV Inverter and all other mounted equipment. The bottom of the PV Inverter should be at least 500mm above of the ground or floor (see Figure 3.1).
- The LED status indicator lights and the LCD located on the PV Inverter's front panel should not be blocked.
- Adequate ventilation must be present if the PV Inverter is to be installed in a confined space.

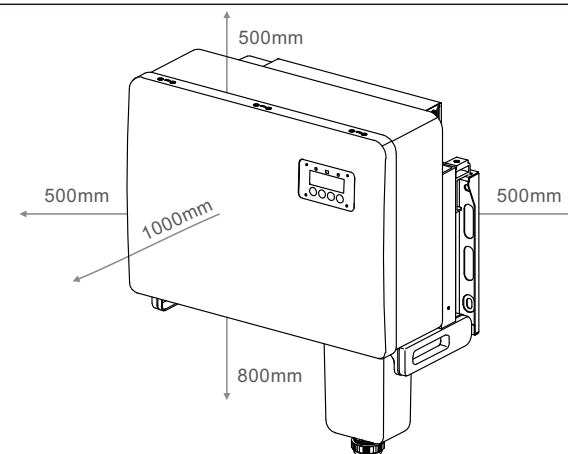


Figure 3.1 Distances required between PV Inverters



NOTE

Nothing should be stored on or placed against the PV Inverter.

3. Installation

3.1.1.1 Examples of correct and incorrect installations

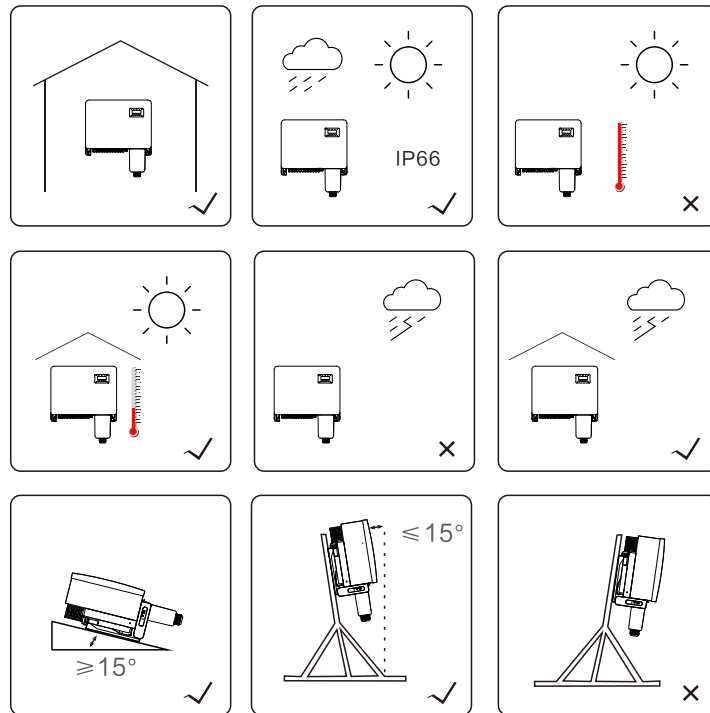


Figure 3.2 Recommended Installation locations

3.1.2 Other environmental considerations

3.1.2.1 Consult technical data

Consult the specifications section (section 10) for additional environmental conditions (protection rating, temperature, humidity, altitude, etc.).

3.1.2.2 Vertical wall installation

This model of Lesso PV Inverter should be mounted vertically (90 degrees or backwards 15 degrees) .

3. Installation

3.1.2.3 Avoiding direct sunlight

Installation of the PV Inverter in a location exposed to direct sunlight should be avoided.

Direct exposure to sunlight could cause:

- Power output limitation (with a resulting decreased energy production by the system).
- Premature wear of the electrical/electromechanical components.
- Premature wear of the mechanical components (gaskets) and user interface.

3.1.2.4 Air circulation

Do not install in small, closed rooms where air cannot freely circulate. To prevent overheating, always ensure that the air flow around the PV Inverter is not blocked.

3.1.2.5 Flammable substances

Do not install near flammable substances. Maintain a minimum distance of three (3) meters (10 feet) from such substances.

3.1.2.6 Living area

Do not install in a living area where the prolonged presence of people or animals is expected. Depending on where the PV Inverter is installed (for example: the type of surface around the PV Inverter, the general properties of the room, etc.) and the quality of the electricity supply, the sound level from the PV Inverter can be quite high.

3.2 Product handling

Please review the instruction below for handling the PV Inverter:

1. The red circles below denote cutouts on the product package.

Push in the cutouts to form handles for moving the PV Inverter (see Figure 3.3).

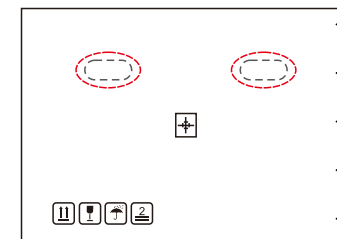


Figure 3.3 Handles used to move the PV Inverter shown circled in red

2. Two people are required to remove the PV Inverter from the shipping box. Use the handles integrated into the heat sink to remove the PV Inverter from the carton (see Figure 3.4).

3. Installation

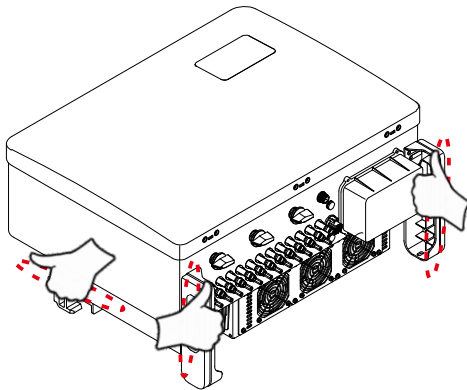


Figure 3.4 PV Inverter handles



WARNING

Due to the weight of the PV Inverter, contusions or bone fractures could occur when incorrectly lifting and mounting the PV Inverter. When mounting the PV Inverter, take the weight of the PV Inverter into consideration. Use a suitable lifting technique when mounting.

3.3 Mounting the PV Inverter

The PV Inverter can be mounted to the wall or metal array racking. The mounting holes should be consistent with the size of the bracket or the dimensions shown in Figure 3.5.

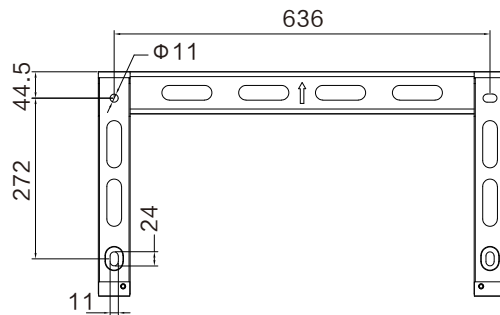


Figure 3.5 PV Inverter wall mounting

unit:mm

3. Installation

3.3.1 Wall mounting

Refer to figure 3.6 and figure 3.7 PV Inverter shall be mounted vertically.

The steps to mount the PV Inverter are listed below.

1. Refer to Figure 3.6, drill holes for expansion bolt(M10*90) based on the hole diameter of bracket using a precision drill keeping the drill perpendicular to the wall. Max depth is 90mm.
2. Make sure the bracket is horizontal. And the mounting holes (in Figure 3.6) are marked correctly. Drill the holes into wall at your marks.
3. Use the suitable mounting screws to attach the bracket on the wall.

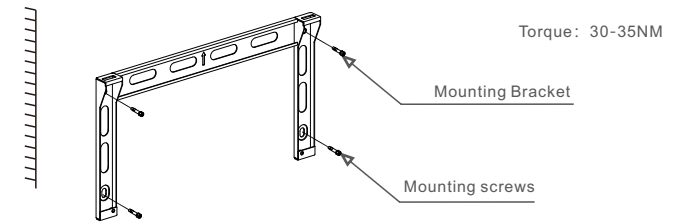


Figure 3.6 PV Inverter wall mounting

4. Lift the PV Inverter and hang it on the bracket, and then slide down to make sure they match perfectly.

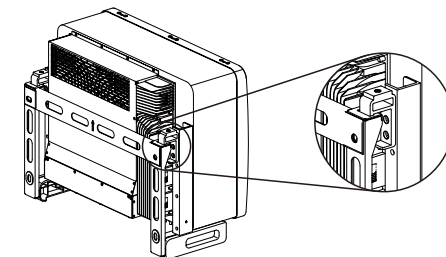


Figure 3.7 Install the PV Inverter

5. Use screws in the packaging to fix the PV Inverter to the mount bracket.

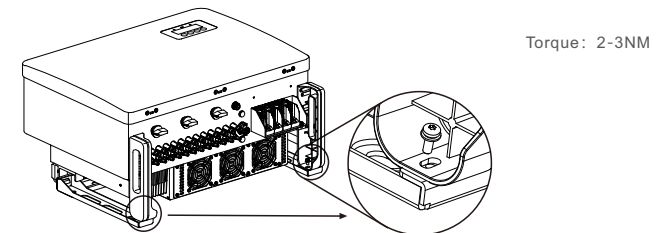


Figure 3.8 Fix the PV Inverter

3. Installation

3.3.2 Rack mounting

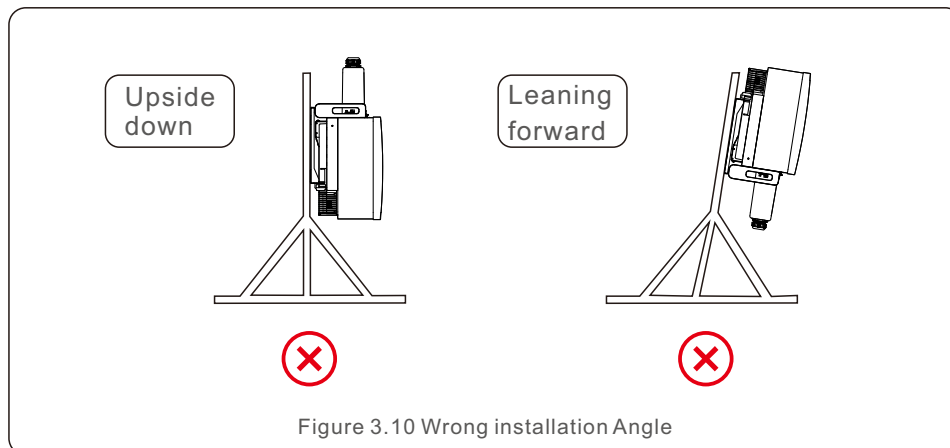
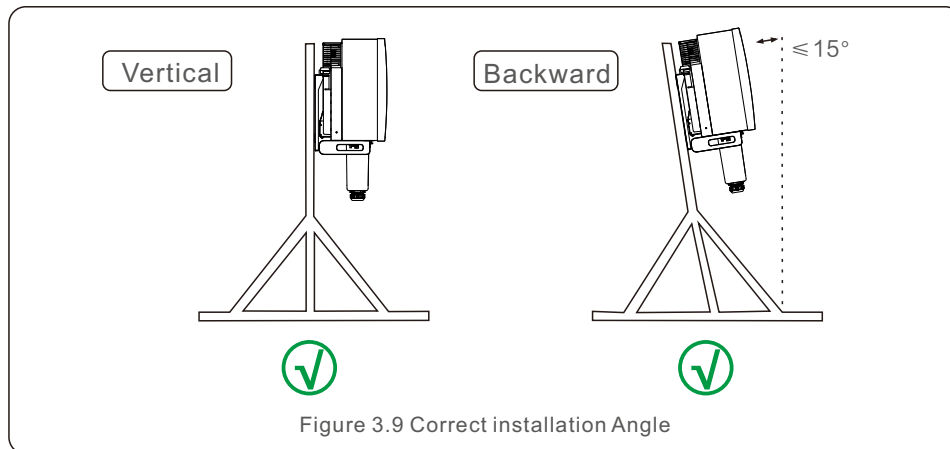
The steps to mounted to the rack are listed below:

1. Select a location for the PV Inverter

- With an IP66 protection rating, the PV Inverter can be installed both outdoors and indoors.
- When the PV Inverter is running, the temperature of the chassis and heat sink will be higher, Do not install the PV Inverter in a location that you accidentally touch.
- Do not install the PV Inverter in a place where it is stored in a flammable or explosive material.

2. Installation angle

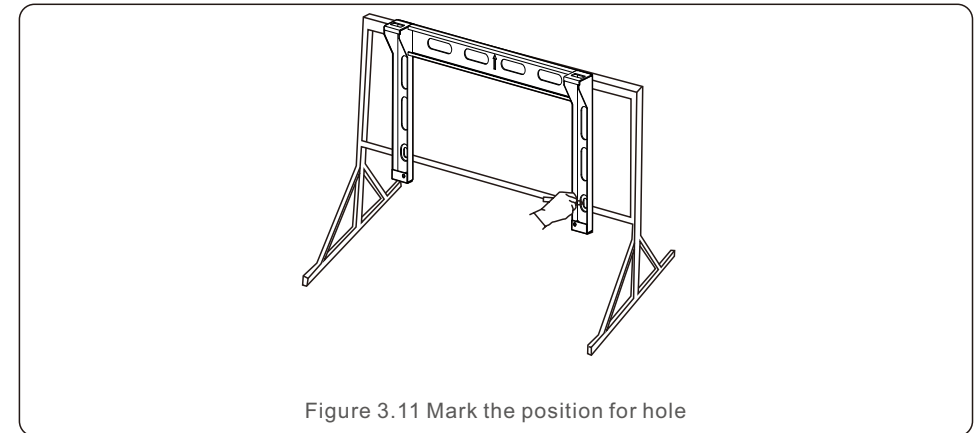
Please install the PV Inverter vertically. If the PV Inverter cannot be mounted vertically, it may be tilted backward to 15 degrees from vertical.



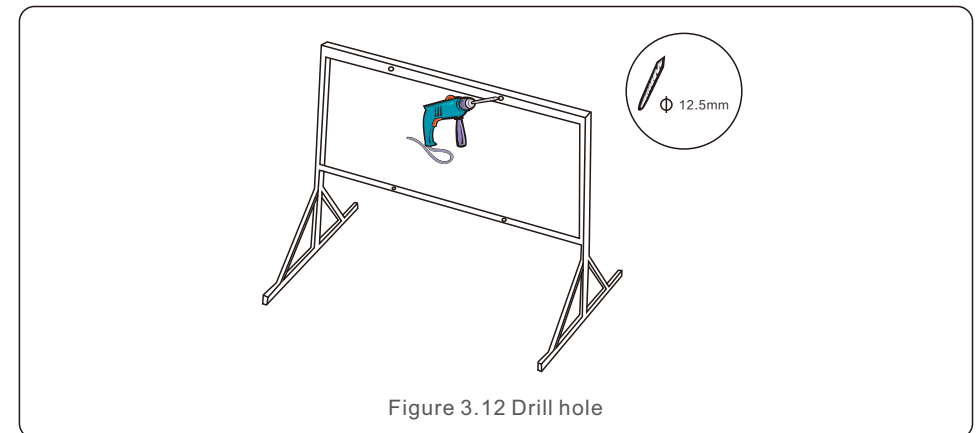
3. Installation

3. Install mounting plate

- 1) Remove the bracket and fasteners from the packaging. Mark the position for hole, drilling according to the hole positions of the bracket.



- 2) Drill the marked holes. It is recommended to apply anti-corrosive paint at the hole for corrosion protection.



3. Installation

3) Align the mounting plate with the holes, Insert the hexagon bolt (M10X40)through the mounting plate into the hole. Secure the bracket to the metal frame firmly. Torque the nut to 36FT-LB (35NM).

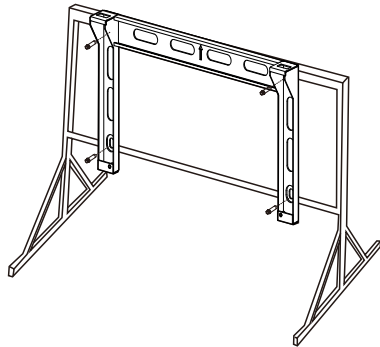


Figure 3.13 Construction bolt

4) Lift the PV Inverter above the bracket and then slide down to make sure they match perfectly.

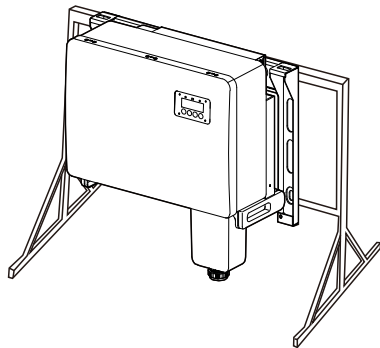


Figure 3.14 Mount the PV Inverter

3. Installation

3.4 Electrical Connections

PV Inverter design uses PV style quick-connect terminal. The top cover needn't be opened during DC electrical connection. The labels located the bottom of the PV Inverter are described below in table 3.1. All electrical connections are suitable for local or national standard.

| Parts | Connection | Cable size | Torque |
|-----------------|---------------------|-----------------------|------------|
| DC terminal | PV strings | 4-6mm ² | NA |
| Ground terminal | AC ground | 25-50mm ² | 5-6N.m |
| Grid terminal | Grid | 35-70mm ² | 10-20N.m |
| 16pin COM Port | Communication cable | 0.75-3mm ² | 0.4-0.6N.m |
| 4pin COM Port | Datalogging Stick | NA | NA |

Table 3.1 Electrical connection symbols

The electrical connection of the PV Inverter must follow the steps listed below:

1. Switch the Grid Supply Main Switch (AC) OFF.
2. Switch the DC Isolator OFF.
3. Connect the PV Inverter to the grid.
4. Assemble PV connector and connect to the PV Inverter.

3. Installation

3.4.1 Grounding

To effectively protect the PV Inverter, two grounding methods must be performed.

Connect the AC grounding cable (Please refer to section 3.4.3)

Connect the external grounding terminal.

To connect the grounding terminal on the heat sink, please follow the steps below:

- 1) Prepare the grounding cable: recommend to use the outdoor copper-core cable. The grounding wire should be at least half size of the hot wires.
- 2) Prepare OT terminals: M10.



Important:

For multiple PV Inverters in parallel, all PV Inverters should be connected to the same ground point to eliminate the possibility of a voltage potential existing between PV Inverter grounds.

- 3) Strip the ground cable insulation to a suitable length (see Figure 3.15).

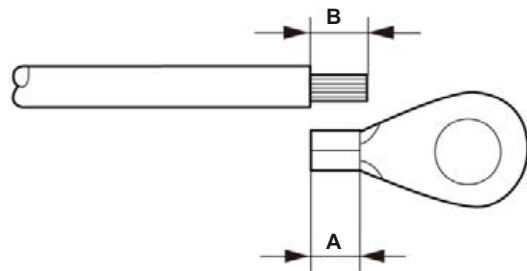


Figure 3.15 Suitable length



Important:

B (insulation stripping length) is 2mm~3mm longer than A (OT cable terminal crimping area).

- 4) Insert the stripped wire into the OT terminal crimping area and use the hydraulic clamp to crimp the terminal to the wire (see Figure 3.16).

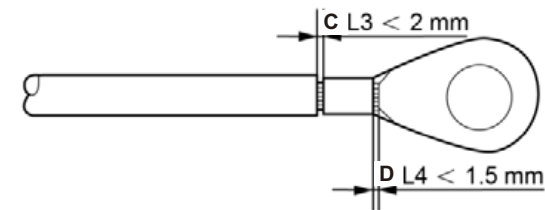


Figure 3.16 Strip wire



Important:

After crimping the terminal to the wire, inspect the connection to ensure the terminal is solidly crimped to the wire.

- 5) Remove the screw from the heat sink ground point.
- 6) Connect the grounding cable to the grounding point on the heat sink, and tighten the grounding screw, Torque is 5-6Nm (see figure 3.17).

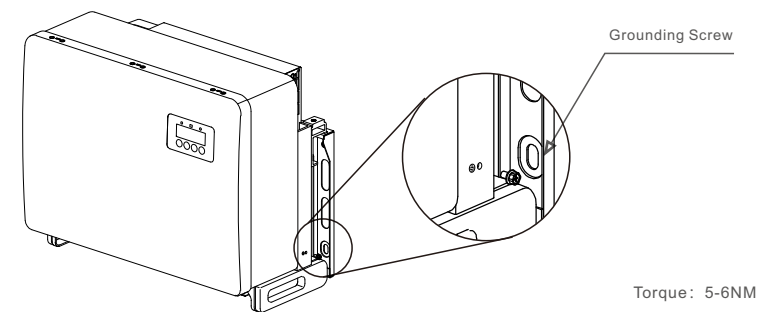


Figure 3.17 Fixed cable



Important:

For improving anti-corrosion performance, after ground cable installed, apply silicone or paint.

3. Installation

3.4.2 Connect PV side of PV Inverter



WARNING
Before connecting the PV Inverter, make sure the PV array open circuit voltage is within the limit of the PV Inverter. Otherwise, the PV Inverter could be damaged.



WARNING
DO NOT connect the PV array positive or PV array negative cable to ground. This can cause serious damage to the PV Inverter!



WARNING
MAKE SURE the polarity of the PV array output conductors matches the DC- and DC+ terminal labels before connecting these conductors to the terminals of the PV Inverter.

Please see table 3.1 for acceptable wire size for DC connections. Wire must be copper only. The steps to assemble the DC connectors are listed as follows:

1. Strip off the DC wire for about 7mm, Disassemble the connector cap nut.
2. Insert the wire into the connector cap nut and contact pin.

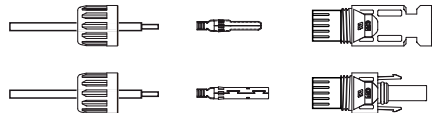


Figure 3.18 Disassemble the Connector Cap nut

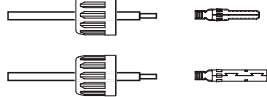


Figure 3.19 Insert the Wire into the Connector Cap nut and contact pin

3. Crimp the contact pin to the wire using a proper wire crimper.
4. Insert metal connector into top of connector, and tighten nut with torque 3-4 Nm.

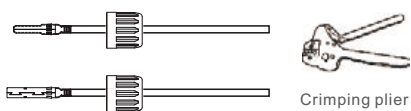


Figure 3.20 Crimp the contact pin to the wire

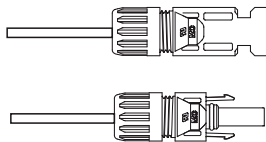


Figure 3.21 Connector with Cap nut Screwed on

5. Measure PV voltage of DC input with multimeter, verify DC input cable polarity (see figure 3.22), and ensure each string voltage is in range of PV Inverter operation. Connect DC connector with PV Inverter until hearing a slight clicking sound indicating successful connection. (see figure 3.23)

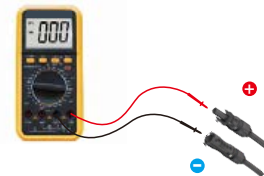


Figure 3.22 Multimeter measurement

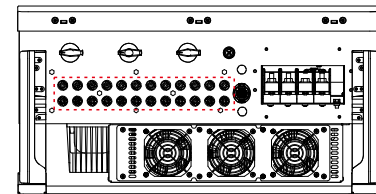


Figure 3.23 Connect the DC Connectors to the PV Inverter

| Cable type | Traverse area (mm ²) | | Outside diameter of cable (mm) |
|---|----------------------------------|-------------------|--------------------------------|
| | Range | Recommended value | |
| Industry generic PV cable (model:PV1-F) | 4.0~6.0 (12~10AWG) | 4.0 (12AWG) | 5.5~9.0 |



CAUTION
If DC inputs are accidentally reversely connected or PV Inverter is faulty or not working properly, it is NOT allowed to turn off the DC switch. Otherwise it may cause DC arc and damage the PV Inverter or even lead to a fire disaster. The correct actions are:
*Use a clip-on ammeter to measure the DC string current.
*If it is above 0.5A, please wait for the solar irradiance reduces until the current decreases to below 0.5A.
*Only after the current is below 0.5A, you are allowed to turn off the DC switches and disconnect the PV strings.
* In order to completely eliminate the possibility of failure, please disconnect the PV strings after turning off the DC switch to avoid secondary failures due to continuous PV energy on the next day.
Please note that any damages due to wrong operations are not covered in the device warranty.

Requirements for the PV modules per MPPT input:

- All PV modules must be of the same type and power rating.
- Please ensure the PV strings are evenly connected to the PV Inverter and try to utilize all the MPPT trackers.
- All PV modules must be aligned and tilted identically.
- The open-circuit voltage of the PV array must never exceed the maximum input voltage of the PV Inverter, even at the coldest expected temperature. (see section 10 "Specifications" for input current and voltage requirements)
- Each string connected to a single MPPT must consist of the same number of series-connected PV modules.

3. Installation

3.4.2.1 DC connection high voltage danger notice



CAUTION
RISK OF ELECTRIC SHOCK

Do not touch an energized DC conductor. There are high voltages present when PV modules are exposed to light causing a risk of death due to an electric shock from touching a DC conductor!

Only connect the DC cables from the PV module to the PV Inverter as described in this manual.



CAUTION
POTENTIAL DAMAGE TO THE PV Inverter DUE TO OVERVOLTAGE

The DC input voltage of the PV modules must not exceed the maximum rating of the PV Inverter. (see section 10 “Specifications”)

Check the polarity and the open-circuit voltage of the PV strings before connecting the DC cables to the PV Inverter.

Confirm proper string length and voltage range before connecting DC cable to the PV Inverter.

3.4.3 Connect grid side of PV Inverter



WARNING
An over-current protection device must be used between the PV Inverter and the grid.

- 1). Connect the three (3) AC conductors to the three (3) AC terminals marked “L1”, “L2” and “L3”. Refer to local code and voltage drop tables to determine the appropriate wire size and type.
- 2). Connect the grounding conductor to the terminal marked “PE” (protective earth, the ground terminal).

Over-Current Protection Device (OCPD) for the AC side

To protect the PV Inverter's AC connection line, we recommend installing a device for protection against over-current and leakage, with the following characteristics noted in Table 3.2:



NOTE
Use AL-CU transfer (bi-metallic) terminal or anti-oxidant grease with aluminum cables and terminals.

3. Installation

| PV Inverter | Rated voltage(V) | Rated output current (Amps) | Current for protection device (A) |
|---------------|------------------|-----------------------------|-----------------------------------|
| LSBH50KTL3 | 220/380,230/400 | 76.0/72.2 | 100 |
| LSBH60KTL3 | 220/380,230/400 | 91.2/86.6 | 125 |
| LSBH60KTL3-E1 | 480 | 72.2 | 100 |
| LSBH70KTL3-E1 | 480 | 84.2 | 100 |

Table 3.2 Rating of grid OCPD

3.4.3.1 Connecting the PV Inverter to the utility grid

All electrical installations must be carried out in accordance with the local standards and the National Electrical Code® ANSI/NFPA 70 or the Canadian Electrical Code® CSA C22.1. The AC and DC electric circuits are isolated from the enclosure. If required by section 250 of the National Electrical Code®, ANSI/NFPA 70, the installer is responsible for grounding the system.

The grid voltage must be within the permissible range. The exact operating range of the PV Inverter is specified in section 10 “Specifications”.

3.4.3.2 Wiring procedure



CAUTION
RISK OF ELECTRIC SHOCK. Prior to starting the wiring procedure, ensure that the three-pole circuit breaker is switched off and cannot be reconnected.



NOTE
Damage or destruction of the PV Inverter's electronic components due to moisture and dust intrusion will occur if the enclosure opening is enlarged.

3. Installation



CAUTION

Risk of fire if two conductors are connected to one terminal. If a connection of two conductors to a terminal is made, a fire can occur.
NEVER CONNECT MORE THAN ONE CONDUCTOR PER TERMINAL.



NOTE

Use M8 crimp terminals(M6 for PE) to connect to the PV Inverter AC terminals.

| Cable specification | | Copper-cored cable |
|--|-------------|--------------------|
| Traverse cross sectional area (mm ²) | Range | 10~70 |
| | Recommended | 35 |
| Cable outer diameter (mm) | Range | 37~44 |
| | Recommended | 40 |

1) Strip the end of AC cable insulating jacket about 300mm then strip the end of each wire.

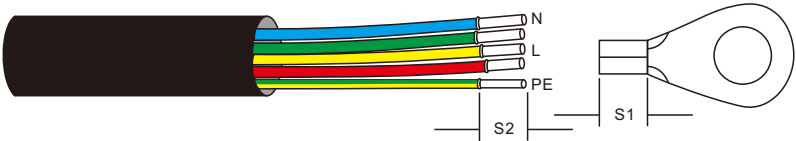


Figure 3.24 Strip AC cable



NOTE

S2 (insulation stripping length) is 2mm-3mm longer than S1.
(OT cable terminal crimping area)

2) Strip the insulation of the wire past the cable crimping area of the OT terminal, then use a hydraulic crimp tool to crimp the terminal. The crimped portion of the terminal must be insulated with heat shrinkable tube or insulating tape.



NOTE:

If choosing aluminum alloy cable, you must use copper aluminum transfer terminal in order to avoid direct contact between copper bar and Aluminum alloy cable. (Please select a copper aluminum transfer terminal based on your cable specification).

3. Installation

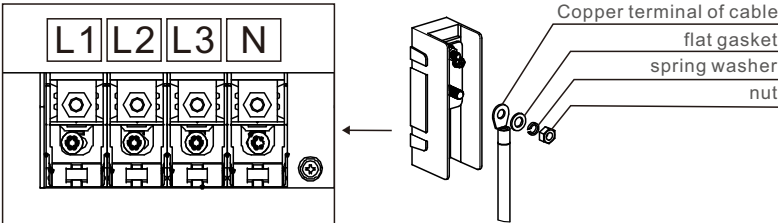


Figure 3.25 Copper aluminum transfer terminal

- 3) Leave the AC breaker disconnected to ensure it does not close unexpectedly.
- 4) Remove the 4 screws on the PV Inverter junction box and remove the junction box cover.
- 5) Insert the cable through the nut, sheath, and AC terminal cover. Connect the cable to the AC terminal block in turn, using a socket wrench. Tighten the screws on the terminal block. The torque is 10~20Nm.

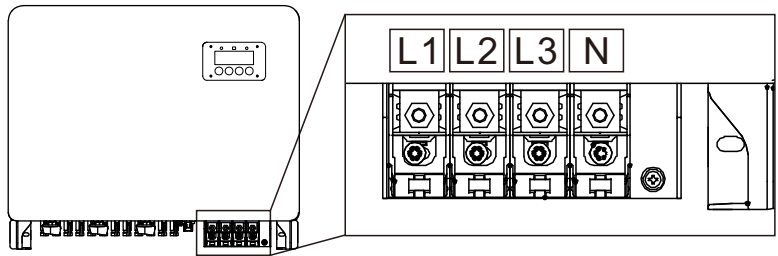


Figure 3.26 wiring with Neutral

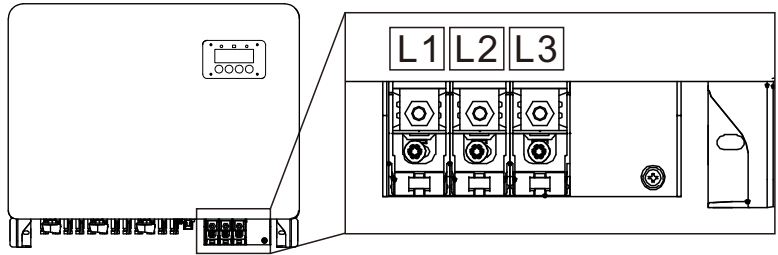


Figure 3.27 wiring without Neutral

4. Comm. & Monitoring

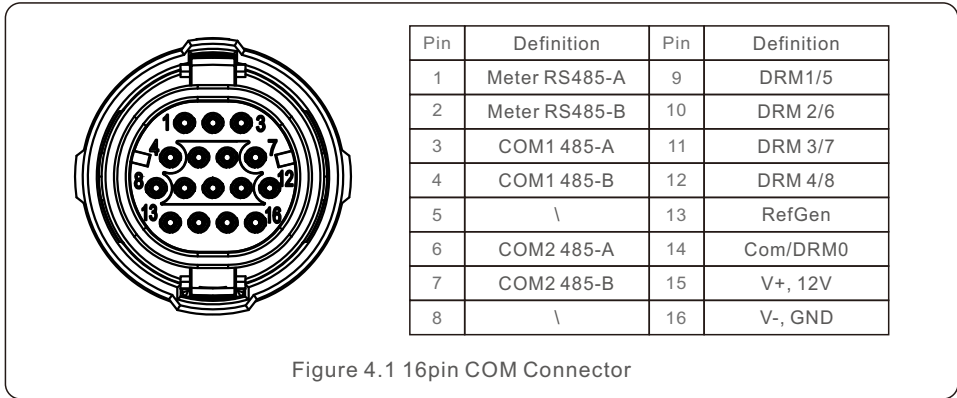
There are 2 communication ports on the PV Inverter.

One is a 4-Pin COM port and the other is a 16-Pin COM port.

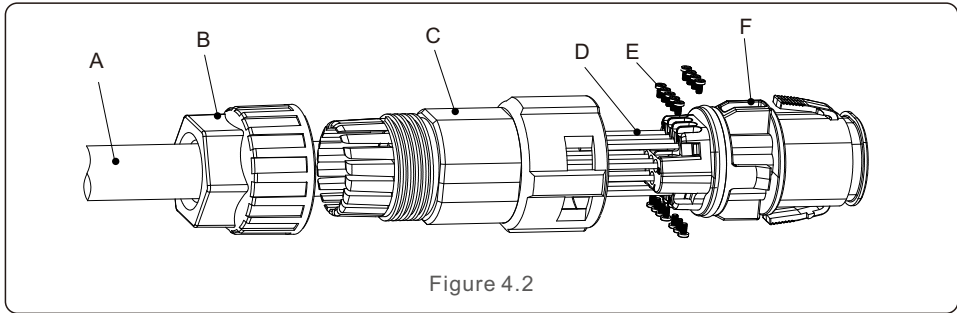
The 4-Pin COM port is used to connect Lesso datalogging sticks (Please refer to manuals of Lesso datalogging sticks for details).

The 16-Pin COM port is used for multiple PV Inverter daisy chain connection/DRM connection/ Logic Interface Connection/Meter connection.

The PV Inverter package will include a 16-Pin COM connector to be used on this 16-Pin COM port. The Pin definition is shown below. Facing the connector, Pin 1 is on the left of the first row. The rest polarity is showing in below diagram.



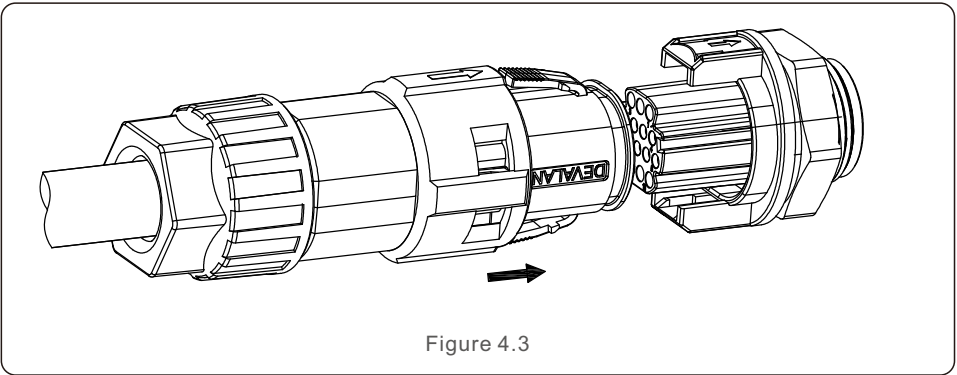
The following is the assembly diagram of the 16-Pin COM connector.



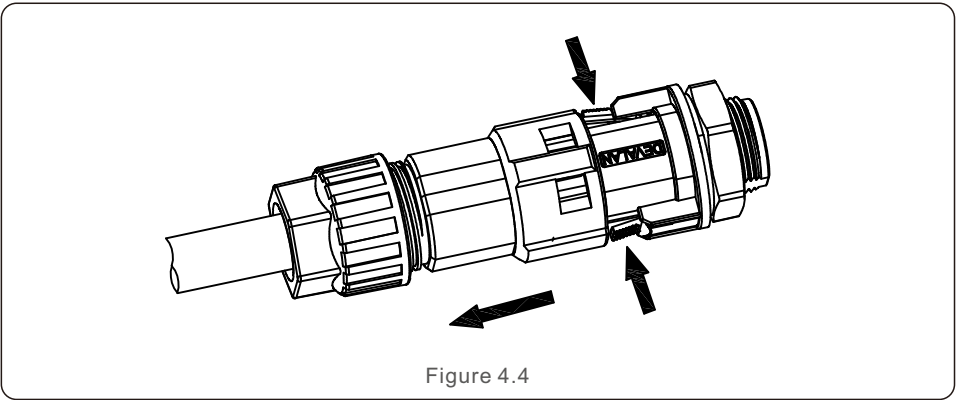
- A-Main cable (Diameter: 4-6mm)
- B-Locking Nut (Torque: 3.5-4N.m)
- C- Sleeve
- D-COM Wire (Dimension: 0.75-3mm², stripping length: 10-12mm)
- E-Locking Screw (Torque: 0.4-0.6N.m)
- F-Connector

4. Comm. & Monitoring

- Connect Steps:
1. Lead the main cable through the locking nut and the sleeve.
 2. Strip the COM wires and insert into corresponding pin terminals. Then fasten the locking screws for the pin terminals.
 3. Push the sleeve onto the connector and fasten the locking nut on the end of the sleeve.
 4. Connect the connector to the 16-Pin COM port at the bottom of the PV Inverter.



- Disconnect Steps:
1. Press the button on both sides of the connector and pull the connector to disconnect from the COM port.



4. Comm. & Monitoring

2. Use the unlock tool to insert into the groove on the sleeve and pull the sleeve to disconnect from the connector.

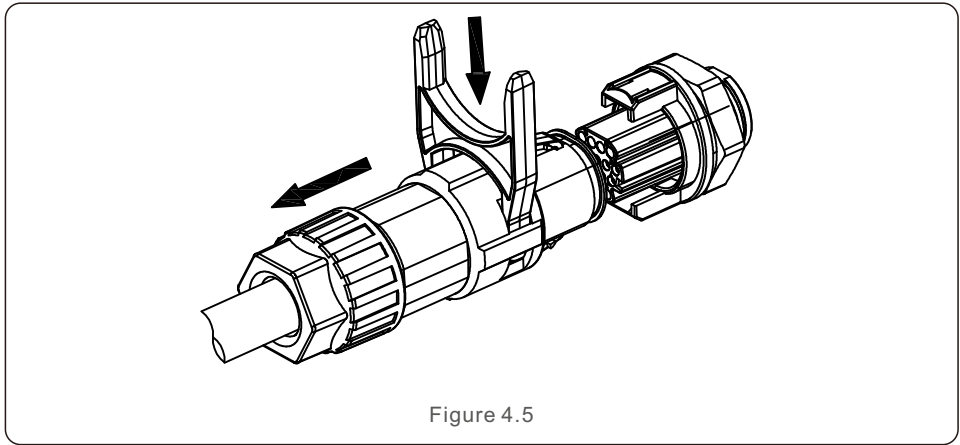


Figure 4.5

4.1 PV Inverter monitoring connection

Lesso can provide optional accessories such as one-to-one datalogging sticks including WiFi stick, GPRS stick and LAN stick for the monitoring of a single PV Inverter or one-to-multiple datalogging boxes including WiFi box and GPRS Box for the monitoring of multiple PV Inverters. Please refer to corresponding manuals for details.

4.1.1 Monitoring for a single PV Inverter

Every PV Inverter can connect a Lesso one-to-one datalogging stick for remote monitoring purpose. The datalogging stick should be directly connected to the 4-pin COM port at the bottom of the PV Inverter. It is a simple plug and play design with fast installation time. Details and the rest configuration process please refer to the datalogging stick manual.

4. Comm. & Monitoring

4.1.2 Monitoring for multiple PV Inverters

When multiple PV Inverters need to run daisy chain communication together, Pin3/4 and Pin6/7 of the 16-Pin COM Port can be used.

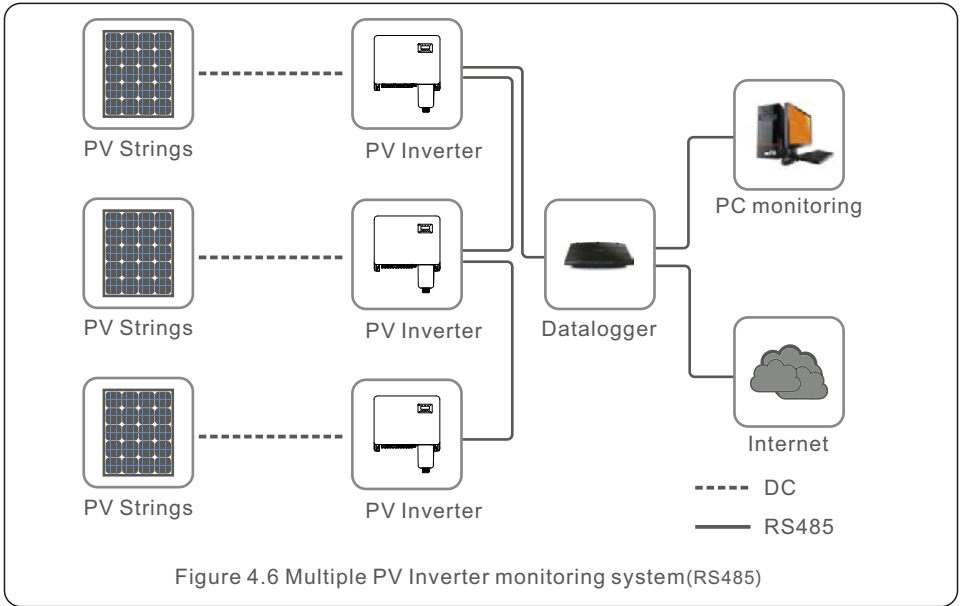


Figure 4.6 Multiple PV Inverter monitoring system(RS485)

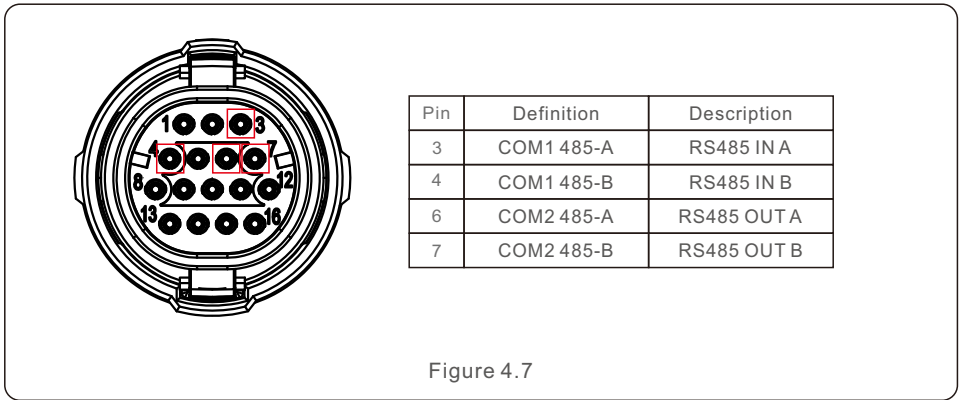


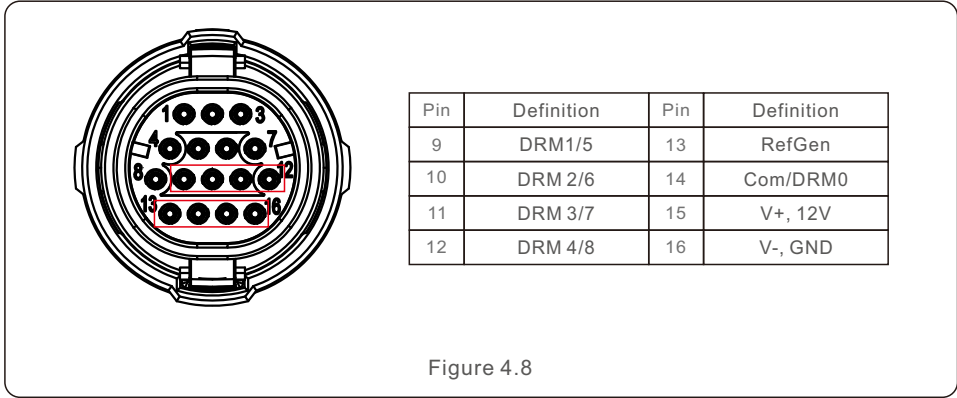
Figure 4.7

The bus RS485 cable can run into a Lesso one-to-multiple datalogging box or any compatible 3rd party monitoring devices, PPC or plant SCADA.

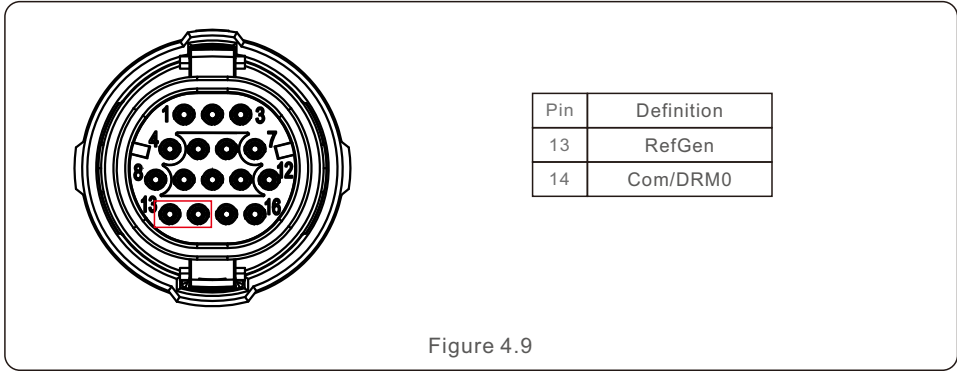
4. Comm. & Monitoring

4.2 DRM Connection/ Logic Interface Connection

The AS/NZS 4777.2:2020 requires PV Inverters to support demand response modes (DRM). Lesso Australian version PV Inverters fully comply with the DRM requirements in AS/NZS 4777.2:2015. The pin definition is showing below. For details on the working logic, please refer to the standard document of AS/NZS 4777.2:2020. The DRM controlling device is not in the scope of supply of Lesso.



Some European countries may require a simply logic interface relay or contactor switch to operate the RUN/STOP of PV Inverters. For Lesso European version PV Inverters, the Pin 13 and Pin 14 can be used to perform the control logic (Not available in South Africa). The logic interface relay or contactor switch is not in the scope of supply of Lesso. When the relay is closed (Short between Pin13 and Pin14), the PV Inverter can operate normally. When the relay is opened (Open between Pin13 and Pin14), the PV Inverter will reduce its output power to zero within 5s.

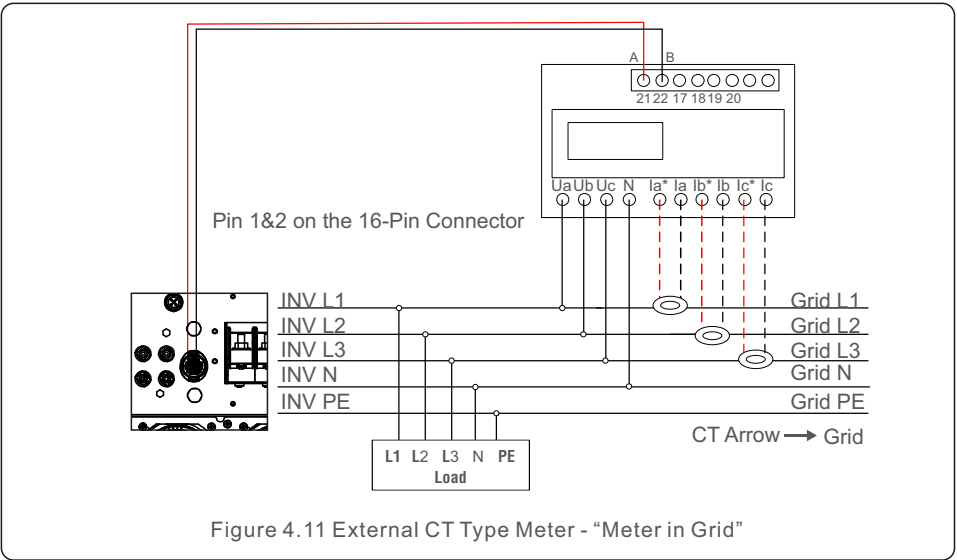
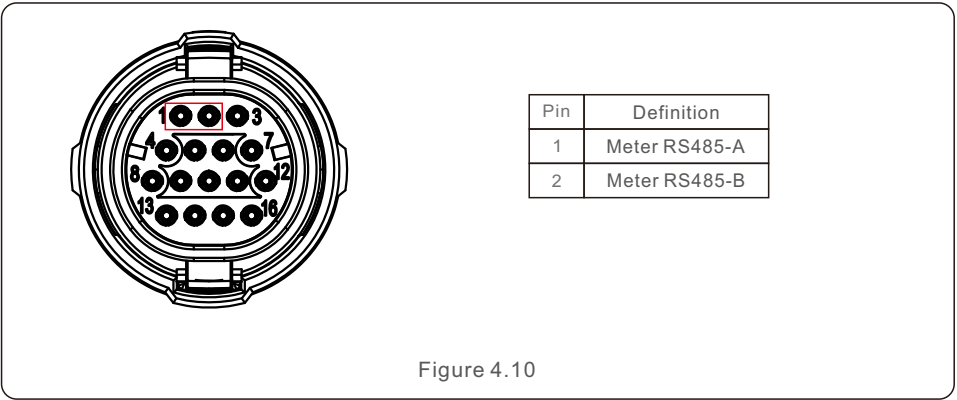


After wiring connection of DRM or Logic interface, please refer to section 7.5.8.1 to enable the DRM/Logic interface function..

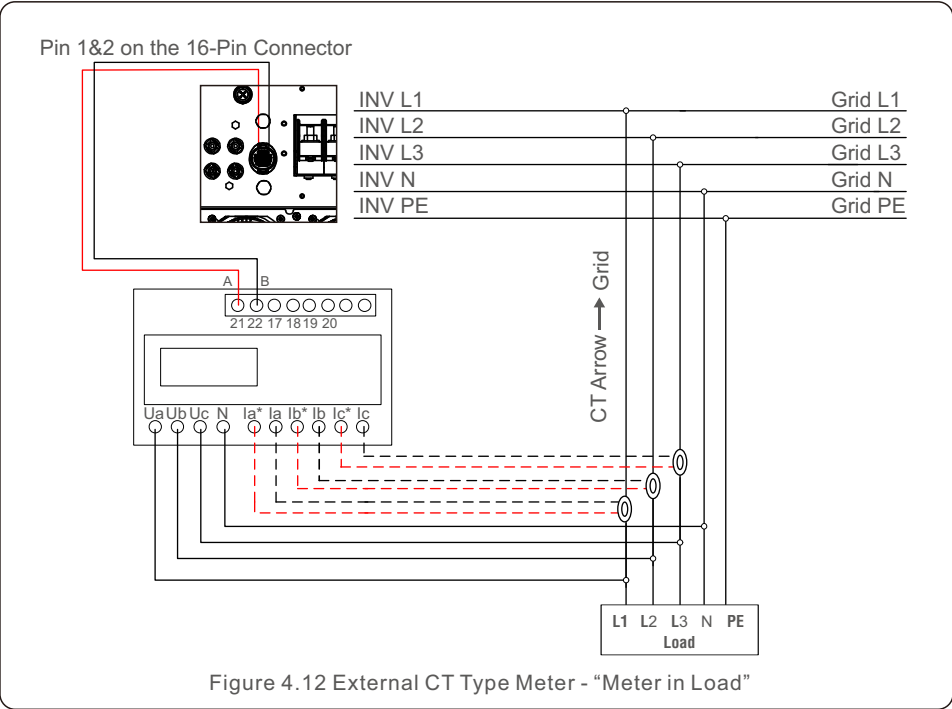
4. Comm. & Monitoring

4.3 Meter Connection

The PV Inverter can work with a three phase smart meter to achieve Export Power Management function and/or 24hour consumption monitoring function. The Pin 1 and Pin 2 of the 16-Pin COM port are used for Meter RS485 communication.



4. Comm. & Monitoring



5. Commissioning

5.1 Selecting the appropriate grid standard

5.1.1 Verifying grid standard for country of installation

Lesso PV Inverters are used worldwide and feature preset standards for operating on any grid. Although the grid standard is set at the factory, it is essential the grid standard be verified for the country of installation before commissioning.

The menu for changing the grid standard or for creating a custom standard is accessible as described in Section 6.7 and below.



WARNING
Failure to set the correct grid standard could result in improper operation of the PV Inverter, PV Inverter damage or the PV Inverter not operating at all.

5.2 Changing the grid standard

5.2.1 Procedure to set the grid standard



NOTE
This operation is for service technicians only. The PV Inverter is customized according to the local grid standard before shipping. There should be no requirement to set the standard.



NOTE
The "User-Def" function can only be used by the service engineer. Changing the protection level must be approved by the local utility.

- 1). From the main screen on the display, select ENTER. There are 4 sub-menu options, use the UP/DOWN arrows to highlight ADVANCED SETTINGS. Press enter to select.

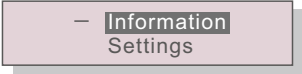


Figure 5.1

- 2). The screen will show that a password is required. The default password is "0010", press the DOWN key to move cursor, press the UP key to change the highlighted digit.

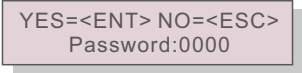


Figure 5.2

5. Commissioning

3). Use the UP/DOWN keys to highlight the SELECT STANDARD option. Press enter to select.

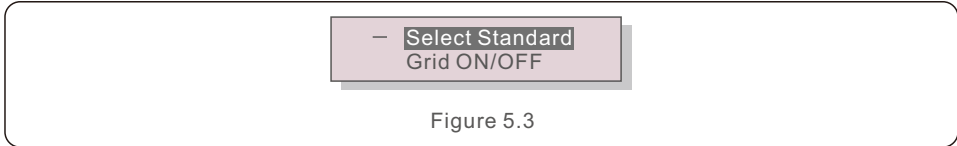


Figure 5.3

4). Select the grid standard for the country of installation.

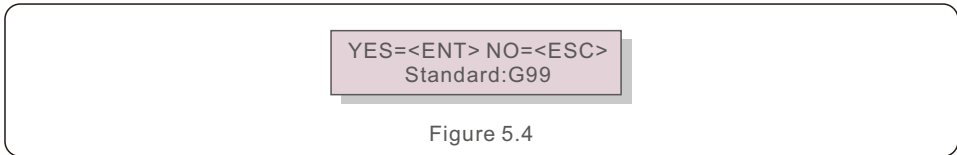


Figure 5.4

Press the UP or DOWN key to select the standard. Press the ENTER key to confirm the setting. Press the ESC key to cancel changes and return to the previous menu.

5.3 Setting a custom grid standard



WARNING

- Failure to set the correct grid standard could result in improper operation of the PV Inverter, PV Inverter damage or the PV Inverter not operating at all.
- Only certified personnel should set the grid standard.
- Only set the grid configuration that is approved by your location and national grid standards.

1). Please refer to section 6.7 “Advanced Settings” for procedures to create a custom grid configuration for User-Def menu option.

5. Commissioning

5.4 Preliminary checks



WARNING

High Voltage.
AC and DC measurements should be made only by qualified personnel.

5.4.1 DC Connections

Verify DC connections.

- 1). Lightly tug on each DC cable to ensure it is fully captured in the terminal.
- 2). Visually check for any stray strands that may not be inserted in the terminal.
- 3). Check to ensure the terminal screws are the correct torque.

5.4.2 AC Connections

Verify AC connections.

- 1). Lightly tug on each AC cable to ensure it is fully captured in the terminal.
- 2). Visually check for any stray strands that may not be inserted in the terminal.
- 3). Check to ensure the terminal screws are the correct torque.

5.4.3 DC configuration

Verify DC configuration by noting the number of panels in a string and the string voltage.

5.4.3.1 VOC and Polarity

Measure VOC, and check string polarity. Ensure both are correct and VOC is in specification.



WARNING

Input voltages higher than the maximum value accepted by the PV Inverter (see “Specifications” in section 10) may damage the PV Inverter. Although Lesso PV Inverters feature reverse polarity protection, prolonged connection in reverse polarity may damage these protection circuits and/or the PV Inverter.

5.4.3.2 Leakage to ground

Measure leakage to ground to check for a DC ground fault.

5. Commissioning

5.4.3.2.1 Detection of leakage to ground

Lesso PV Inverters are transformer-less and do not have an array connection to ground. Any measurement of a fixed voltage between ground and either the positive or negative string wiring indicates a leakage (ground fault) to ground and must be corrected prior to energizing the PV Inverter or damage to the PV Inverter may result.

5.4.4 AC configuration

Verify AC configuration.

5.4.4.1 Measure Vac and frequency

Measure VAC and verify voltage is within local grid standards.

- 1). Measure each phase to ground (L-G).
- 2). Measure phases to the other phases in pairs (L-L). PH A to PH B, PH B to PH C and PH C to PH A.
- 3). If the meter is equipped, measure the frequency of each phase to ground.
- 4). Ensure each measurement is within local grid standards and the PV Inverter specifications as noted in section 10 "Specifications".

5.4.4.2 Phase rotation test

A phase rotation test is recommended to ensure the phases have been connected in the appropriate order. Lesso PV Inverters do not require a specific phase rotation connection. However, the local utility may require a specific phase rotation or a record of the phase configuration of the installation.

6. Start and Shutdown

6.1 Start-up procedure

To start-up the PV Inverter, it is mandatory that the steps below are followed in the exact order outlined.

1. Ensure the commissioning checks in Section 5 have been performed.
2. Switch the AC switch ON.
3. Switch the DC switch ON. If the PV array (DC) voltage is higher than the PV Inverter's start-up voltage, the PV Inverter will turn on. The red DC POWER LED and LCD will be continuously lit.
4. Lesso PV Inverters are powered from the DC side. When the PV Inverter detects DC power that is within start-up and operating ranges, the PV Inverter will turn on. After turn-on, the PV Inverter will check internal parameters, sense and monitor AC voltage, hertz rate and the stability of the supply grid. During this period, the green OPERATION LED will flash and the LCD screen will show INITIALIZING. This tells the operator that the PV Inverter is preparing to generate AC power.
5. After the locally mandated delay (300 seconds for IEEE-1547 compliant PV Inverters), the PV Inverter will start generating AC power. The green OPERATION LED will light continuously and the LCD screen will show GENERATING.



CAUTION

The PV Inverter's surface temperature can reach up to 75°C (167° F). To avoid risk of burns, do not touch the surface when the PV Inverter is in the operational mode. Additionally, the PV Inverter must be installed out of the reach of children.

6.2 Shutdown procedure

To stop the PV Inverter, it is mandatory that the steps below are followed in the exact order outlined.

1. Select "Grid Off" in the Advanced Setting of PV Inverter LCD.
2. Turn off the AC Switch between Lesso PV Inverter and Grid.
3. Wait approximately 30 seconds (during this time, the AC side capacitors are dissipating energy). If the PV Inverter has DC voltage above the start-up threshold, the red POWER LED will be lit. Switch the DC switch OFF.
4. Confirm all LED's switch OFF (~one (1) minute).

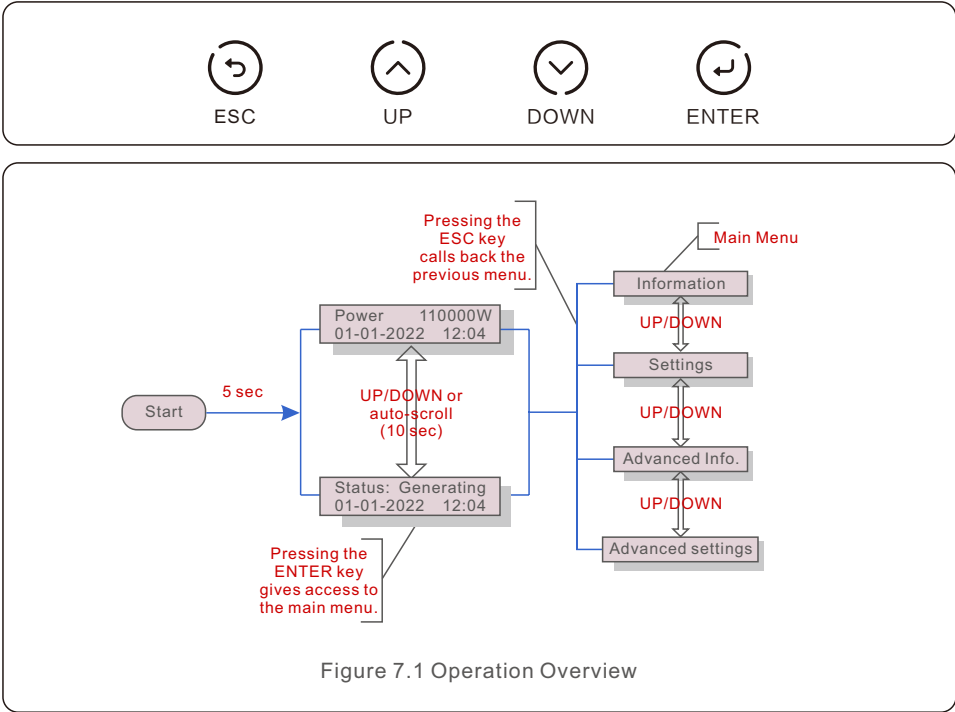


CAUTION

Although the PV Inverter DC disconnect switch is in the OFF position and all the LED's are OFF, operators must wait five (5) minutes after the DC power source has been disconnected before opening the PV Inverter cabinet. DC side capacitors can take up to five (5) minutes to dissipate all stored energy.

7. Normal operation

In normal operation, LCD screen alternatively shows PV Inverter power and operation status (see Figure 7.1). The screen can be scrolled manually by pressing the UP/DOWN keys. Pressing the ENTER key gives access to Main Menu.



7.1 Main Menu

There are four submenus in the Main Menu (see Figure 7.1):

- 1. Information
- 2. Settings
- 3. Advanced Info.
- 4. Advanced Settings

7.2 Information

The Lesso three Phase PV Inverter main menu provides access to operational data and information. The information is displayed by selecting "Information" from the menu and then by scrolling up or down.

7. Normal operation

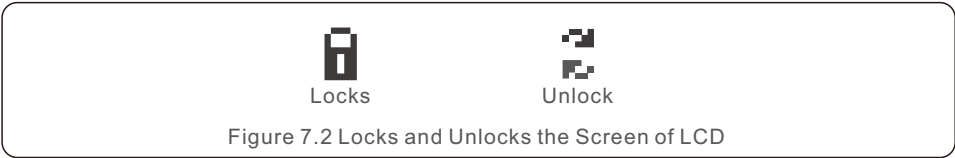
| Display | Duration | Description |
|---|----------|---|
| V_DC01: 0000.0A I_DC01: +000.0A ... V_DC06: 0000.0A I_DC06: +000.0A | 10 sec | V_DC: Shows input DC voltage. I_DC: Shows input DC current. |
| V_A: 000.0V I_A: 000.0A ... V_C: 000.0V I_C: 000.0A | 10 sec | V_A(B,C): Shows the grid's voltage value. I_A(B,C): Shows the grid's current value. |
| Status: Generating Power: 0000W | 10 sec | Status: Shows instant status of the PV Inverter. Power: Shows instant output power value. |
| Rea_Power: 0000Var App_Power: 0000VA | 10 sec | Rea_Power: Shows the reactive power of the PV Inverter. App_Power: Shows the apparent power of the PV Inverter. |
| Grid Frequency F_Grid 00.00Hz | 10 sec | F_Grid: Shows the grid's frequency value. |
| Total Energy 0000000 kwh | 10 sec | Total generated energy value. |
| This Month: 0000kwh Last Month: 0000kwh | 10 sec | This Month: Total energy generated this month. Last Month: Total energy generated last month. |
| Today: 00.0kwh Yesterday: 00.0kwh | 10 sec | Today: Total energy generated today. Yesterday: Total energy generated yesterday. |
| PV Inverter SN 0000000000000000 | 10 sec | Display series number of the PV Inverter. |
| Export_P:NULL Export_I:NULL | 10 sec | Power of EPM. Current of EPM. |
| Work Mode: NULL DRM NO.:08 | 10 sec | Work Mode: Shows current working mode. DRM NO.: Shows DRM Number. |
| I_DC01: +05.0A I_DC02: +04.9A ... I_DC12: +05.2A | 10 sec | I_DC01 : Shows input 01 current value. I_DC02 : Shows input 02 current value. ... I_DC12 : Shows input 12 current value. |

Table 7.1 Information list

7. Normal operation

7.2.1 Unlock Screen

The screen will automatically lock in one minute if there is no further operation.
Press and hold the ESC and ENTER keys at the same time for about ten seconds to unlock.



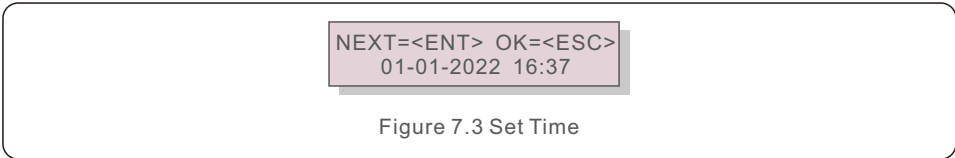
7.3 Settings

The following submenus are displayed when the Settings menu is selected:

- 1.Set Time
- 2.Set Address

7.3.1 Set Time

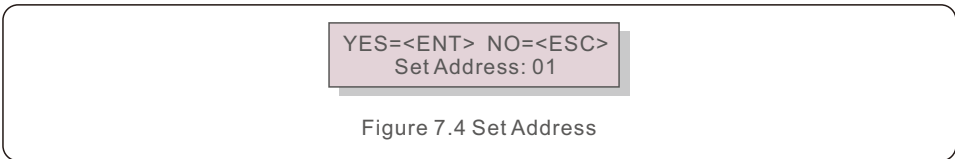
This function allows time and date setting. When this function is selected, the LCD will display a screen as shown in Figure 7.3.



Press the UP/DOWN keys to set time and date. Press the ENTER key to move from one digit to the next (from left to right). Press the ESC key to save the settings and return to the previous menu.

7.3.2 Set Address


This function is used to set the address when muti PV Inverters are connected to three monitor.
The address number can be assigned from "01"to "99"(see Figure 7.4). The default address number of Lesso Three Phase PV Inverter is "01".



Press the UP/DOWN keys to set the address. Press the ENTER key to save the settings.
Press the ESC key to cancel the change and return to the previous menu.

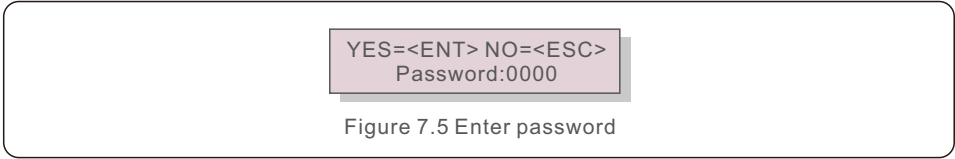
7. Normal operation

7.4 Advanced Info - Technicians Only



NOTE:
To access to this area is for fully qualified and accredited technicians only.
Enter menu "Advanced Info." and "Advanced settings" (need password).

Select "Advanced Info." from the Main Menu. The screen will require the password as below:

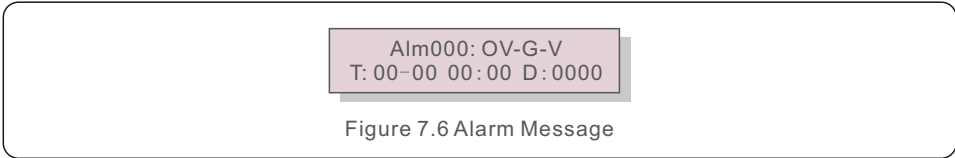


The default password is "0010".
Please press "down" to move the cursor, press "up" to select the number.
After enter the correct password the Main Menu will display a screen and be able to access to the following information.

- 1.Alarm Message
- 2. Running message
- 3.Version
- 4. Daily Energy
- 5. Monthly Energy
- 6. Yearly Energy
- 7. Daily Records
- 8.Communication Data
- 9. Warning Message

7.4.1 Alarm Message

The display shows the 100 latest alarm messages (see Figure 7.6). Screens can be scrolled manually by pressing the UP/ DOWN keys. Press the ESC key to return to the previous menu.



7.4.2 Running Message

This function is for maintainece person to get running message such as internal temperature, Standard No.1,2,etc.
Screens can be scrolled manually by pressing the UP/DOWN keys.
Press UP/DOWN key to move one date from another.

7. Normal operation

7.4.3 Version

The screen shows the model version of the PV Inverter. And the screen will show the software ver by pressing the UP and DOWN at the same time. (see Figure 7.7).

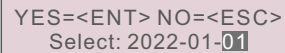


Model: 08
Software Version: D20001

Figure 7.7 Model Version and Software Version

7.4.4 Daily Energy

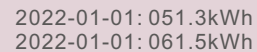
The function is for checking the energy generation for selected day.



YES=<ENT> NO=<ESC>
Select: 2022-01-01

Figure 7.8 Select date for daily energy

Press DOWN key to move the cursor to day, month and year, press UP key to change the digit. Press Enter after the date is fixed.



2022-01-01: 051.3kWh
2022-01-01: 061.5kWh

Figure 7.9 Daily energy

Press UP/DOWN key to move one date from another.

7.4.5 Monthly Energy

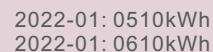
The function is for checking the energy generation for selected month.



YES=<ENT> NO=<ESC>
Select: 2022-01

Figure 7.10 Select month for monthly energy

Press DOWN key to move the cursor to day and month, press UP key to change the digit. Press Enter after the date is fixed.



2022-01: 0510kWh
2022-01: 0610kWh

Figure 7.11 Month energy

7. Normal operation

7.4.6 Yearly Energy

The function is for checking the energy generation for selected year.



YES=<ENT> NO=<ESC>
Select: 2019

Figure 7.12 Select year for yearly energy

Press DOWN key to move the cursor to day and year, press UP key to change the digit. Press Enter after the date is fixed.



2022: 0017513kWh
2021: 0165879kWh

Figure 7.13 Yearly energy

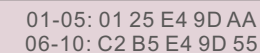
Press UP/DOWN key to move one date from another.

7.4.7 Daily Records

The screen shows history of changing settings. Only for maintenance personnel.

7.4.8 Communication Data

The screen shows the internal data of the PV Inverter (see Figure 7.14), which is for service technicians only.



01-05: 01 25 E4 9D AA
06-10: C2 B5 E4 9D 55

Figure 7.14 Communication Data

7.4.9 Warning Message

The display shows the 100 latest warn messages (see Figure 7.15). Screens can be scrolled manually by pressing the UP/ DOWN keys. Press the ESC key to return to the previous menu.



Msg000:
T: 00-00 00:00 D: 0000

Figure 7.15 Warning Message

7. Normal operation

7.5 Advanced Settings - Technicians Only



NOTE:
To access to this area is for fully qualified and accredited technicians only.
Please follow 7.4 to enter password to access this menu.

Select Advanced Settings from the Main Menu to access the following options:

1. Select Standard
2. Switch ON/OFF
3. Clear Energy
4. Reset Password
5. Power Control
6. Calibrate Energy
7. Special Settings
8. STD. Mode Settings
9. Restore Settings
10. HMI Update
11. Internal EPM set
12. External EPM set
13. Restart HMI
14. Fan Test
15. DSP Update
16. Compensation Set
17. I/V Curve

7.5.1 Selecting Standard

This function is used to select the grid's reference standard (see Figure 7.16).

YES=<ENT> NO=<ESC>
Standard:G99

Figure 7.16

Selecting the "User-Def" menu will access to the following submenu (see Figure 7.17),

→ OV-G-V1: 400V
OV-G-V1-T: 1.0S

Figure 7.17

Below is the setting range for "User-Def". Using this function, the limits can be changed manually. (These voltage values are the phase voltage)

7. Normal operation

| | |
|------------------------|------------------------|
| OV-G-V1: 220---374V | OV-G-F1: 50.1-65Hz |
| OV-G-V1-T: 0.01---300S | OV-G-F1-T: 0.01---300S |
| OV-G-V2: 220---374V | OV-G-F2: 50.1-65Hz |
| OV-G-V2-T: 0.01---300S | OV-G-F2-T: 0.01---300S |
| UN-G-V1: 110---277V | UN-G-F1: 45-59.9Hz |
| UN-G-V1-T: 0.01---300S | UN-G-F1-T: 0.01---300S |
| UN-G-V2: 110---277V | UN-G-F2: 45-59.9Hz |
| UN-G-V2-T: 0.01---300S | UN-G-F2-T: 0.01---300S |
| Startup-T: 10-600S | Restore-T: 10-600S |

Table 7.2 Setting ranges for User-Def (L-N)



NOTE
The initial value of the User-Def standard is for reference only. It does not represent a correct value suitable for use.



NOTE
For different countries, the grid standard needs to be set as different according to local requirements. If there is any doubt, please consult Lesso service technicians for details.

7.5.2 Switch ON/OFF

→ Grid ON/OFF
24H Switch

Figure 7.18 Switch ON/OFF

7.5.2.1 Grid ON/OFF

This function is used to start up or stop the power generation of Lesso Three Phase PV Inverter.

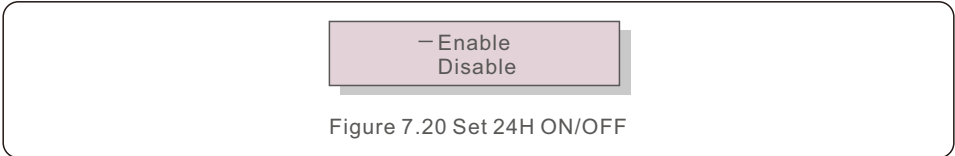
→ Grid ON
Grid OFF

Figure 7.19 Set Grid ON/OFF

7. Normal operation

7.5.2.2 24H Switch

This function controls the 24H hours consumption function enable or disable.



NOTE:

When this is enabled, the PV Inverter LCD will still be alive at night with the power LED light on. If the grid is in malfunction at night, the system can't recover even after the grid is back to normal but the consumption data will still be recorded in the meter. Until the sunrise, the system will start to work again while the meter data can be uploaded to the Lesso monitoring system to calibrate the load consumption data.

7.5.3 Clear Energy

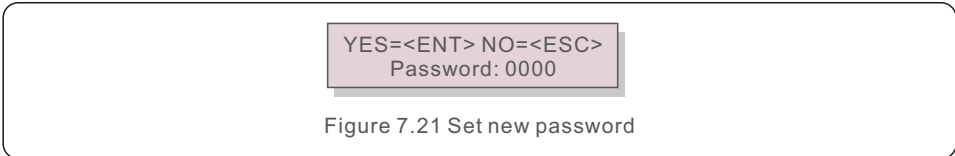
Clear Energy can reset the history yield of PV Inverter



These two functions are applicable by maintenance personnel only, wrong operation will prevent the PV Inverter from working properly.

7.5.4 Reset Password

This function is used to set the new password for menu "Advanced info." and "Advanced information".



Enter the right password before set new password. Press the DOWN key to move the cursor, Press the UP key to revise the value. Press the ENTER key to execute the setting. Press the ESC key to return to the previous menu.

7. Normal operation

7.5.5 Power Control

Active and reactive power can be set through power setting button.

There are 4 item for this sub menu:

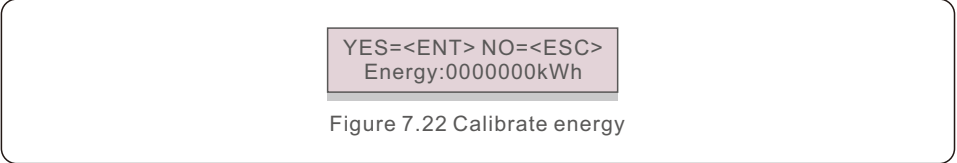
- 1. Set output power
- 2. Set Reactive Power
- 3. Out_P With Restore
- 4. Rea_P With Restore



This function is applicable by maintenance personnel only, wrong operation will prevent the PV Inverter from reaching maximum power.

7.5.6 Calibrate Energy

Maintenance or replacement could clear or cause a different value of total energy. Use this function could allow user to revise the value of total energy to the same value as before. If the monitoring website is used the data will be synchronous with this setting automatically.



Press the DOWN key to move the cursor. Press the UP key to revise the value. Press the ENTER key to execute the setting. Press the ESC key to return to the previous menu.

7.5.7 Special Settings



This function is applicable by maintenance personnel only, wrong operation will prevent the PV Inverter from reaching maximum power.

7. Normal operation

7.5.8 STD Mode Settings

Selecting “STD Mode. Settings” displays the sub-menu shown below:

- 1. Working Mode Set
- 2. Power Rate Limit
- 3. Freq Derate Set
- 4. 10mins Voltage Set
- 5. Power Priority
- 6. Initial Settings
- 7. Voltage PCC Set



This function is applicable by maintenance personnel only, wrong operation will prevent the PV Inverter from reaching maximum power.

7.5.8.1 Enable DRM/Logic Interface Settings

Please follow below settings to enable the DRM/Logic Interface function. The setting is "OFF" by default. If the setting is set to "ON", but the external DRM controlling device or logic interface relay is not connected or logic interface relay is opened, the PV Inverter will display "LimbyDRM" and the PV Inverter output power will be limited to zero.

- 1. Select "Initial Settings"
- 2. Select "DRM" and set it to "ON"

7.5.9 Restore Settings

There are 5 items in initial setting submenu. Restore setting could set all item in 7.5.7 special setting to default. The screen shows as below:

Are you sure?
YES=<ENT> NO=<ESC>

Figure 7.23 Restore Settings

Press the Enter key to save the setting after setting grid off.
Press the ESC key to return the previous mean.

7. Normal operation

7.5.10 HMI Update



This section is applicable to maintenance personnel only.

Selecting “Updater” displays the sub-menu shown below:

HMI Current Ver.: 02
YES=<ENT> NO=<ESC>

Figure 7.24

Updater is for updating LCD firmware. Press the ENTER key to start the process.
Press the ESC key to return to the previous menu.

7.5.11 Internal EPM Set



NOTE:

This section includes two functions related to the smart meter. Please refer to section 4.3 for detailed connection diagrams.

Function 1: Internal Export Power Management Function

PV Inverters can work with a smart meter to dynamically limit the export power of the system. Zero injection can be achieved.

Smart meter can be installed either on the grid side OR the load side.

Function 2: 24 Hour Consumption Monitoring Function

Only applicable if Lesso monitoring system is used.

PV Inverters can work with a smart meter to monitor the load consumption data for the whole day and the data will be displayed on the Lesso monitoring system.

Smart meter can only be installed on the grid side.

7. Normal operation



NOTE:

Please refer to below instructions for different user scenarios.

Scenario 1. Only Function 1 is required

Step 1: Refer to Section 4.3 to connect the smart meter on the grid side or load side.

Step 2: Select the Section 7.5.11.1 Mode Select as Option 2(Meter in Load) or Option 3 (Meter in Grid) accordingly.

Step 3: Configure the Section 7.5.11.2 to set the allowed backflow power.

Step 4: Configure the Section 7.5.11.3 to enable the failsafe function (If necessary).

Step 5: Configure the Section 7.5.11.4 to modify the work mode (If necessary).

Scenario 2. Both Function 1 and 2 are required

Using a Smart Meter:

Step 1: Refer to Section 4.3 to connect the smart meter on the grid side.

Step 2: Select the Section 7.5.11.1 Mode Select as Option 3(Meter in Grid).

Step 3: Select the Section 7.5.2.2 24H Switch as "Enable".

Step 4: Configure the Section 7.5.11.2 to set the allowed backflow power.

Step 5: Configure the Section 7.5.11.3 to enable the failsafe function (If necessary).

Step 6: Configure the Lesso monitoring system (Please refer to the manual of monitoring device).

If customer does not want to enable the export power control function, please change the "backflow power" to the max output power of the PV Inverter in Step 4 OR simply select the mode as "consumption monitor" in Step 2 and skip Step 4-5.

Select EPM Settings from the Main Menu to access the following options:

1. Mode Select 2. Backflow Power 3. Fail safe ON/OFF 4. Backflow Work Mode

7.5.11.1 Mode Select

There are 4 settings in this menu as below:

1. OFF 2. Meter in Load 3. Meter in Grid 4. Consumption Monitor

OFF: Functions are disabled

Meter in Load: Lesso Smart Meter is connected in the load branch circuit.

Meter in Grid: Lesso Smart Meter is connected in the grid connection point (The backflow power is default as 0W).

Consumption Monitor: Lesso Smart Meter is connected in the grid connection point (The backflow power setting is not applicable).

7. Normal operation

7.5.11.2 Backflow Power

The setting is used to define the allowed export power into the grid.

The setting range is between 00000W to 29900W.

->Set Backflow Power

Figure 7.25 Set the backflow power

YES=<ENT> NO=<ESC>
Power:-00000W

Figure 7.26

Press the UP/DOWN keys to set data. Press the ENTER key to set backflow power.

Then press DOWN keys to move the cursor, press UP to change the number.

Press the ESC key to save the settings and return to the previous menu.

7.5.11.3 Fail safe ON/OFF

This setting is used to give out an alarm (stop PV Inverter generation as well) when the Meter connection is lost during operation.

It can prevent potential backflow power into the grid when the system loses control.

YES=<ENT> NO=<ESC>
Fail Safe Set:ON

Figure 7.27 Set the Fail Safe ON/OFF

It is only mandatory to turn on this function when the PV Inverter is installed in UK due to the G100 regulation. For other regions, customers can enable or disable the function as they desire.



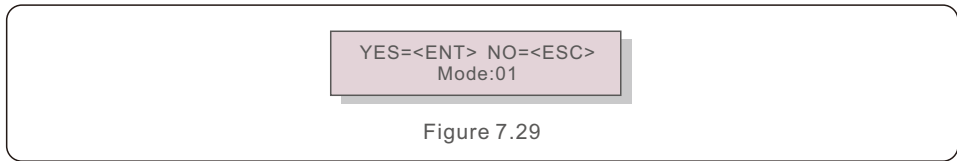
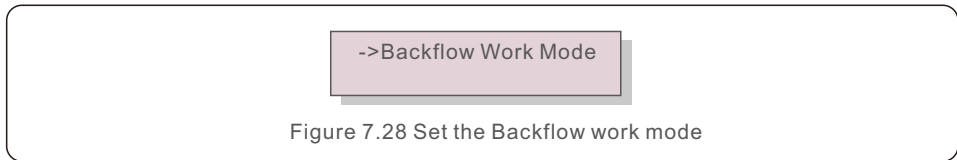
NOTE:

When the failsafe function is ON and CT/Meter is disconnected somehow, the PV Inverter will stop generation and give "Failsafe" alarm on the LCD. When the failsafe function is OFF and CT/Meter is disconnected somehow, the PV Inverter will keep the output power as the last moment when the CT/Meter is still connected. After a restart, the PV Inverter will output at full power without limit.

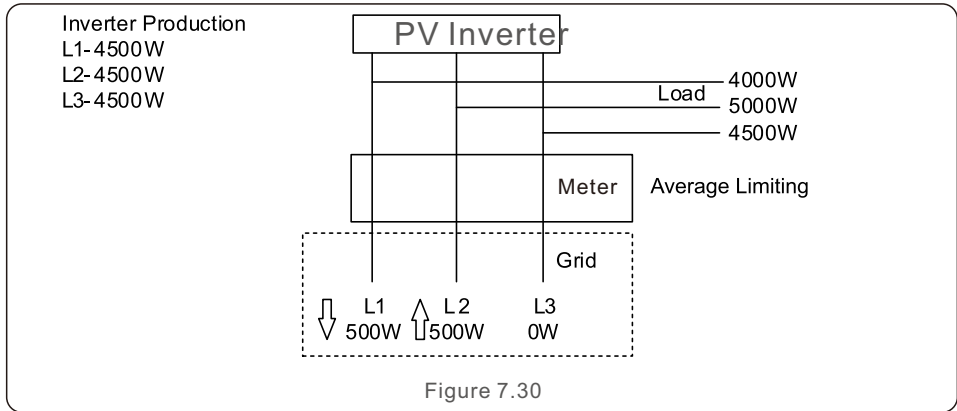
7. Normal operation

7.5.11.4 Backflow Work Mode

This submenu is used for set backflow work mode: 01, 02. "01" is the default mode.

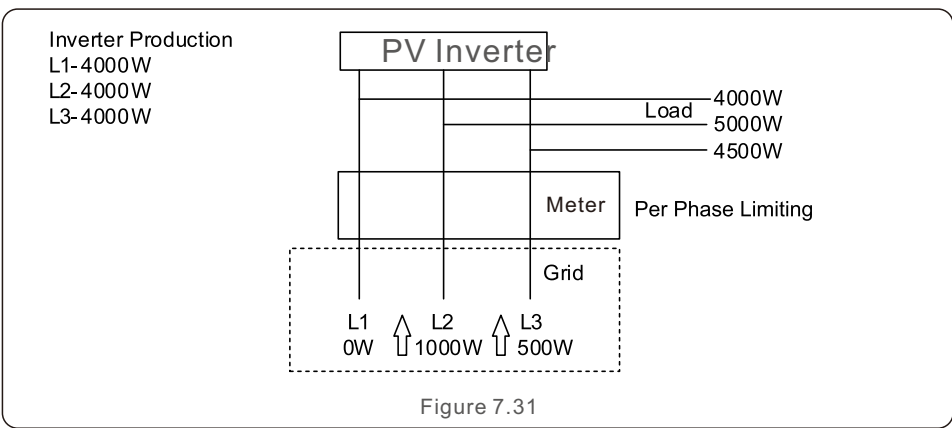


Mode "01", As shown in the figure 7.30, the average limiting mode, the output power of each phase is the average of the three-phase load power, and it is more than the phase of the lowest power in three phases.



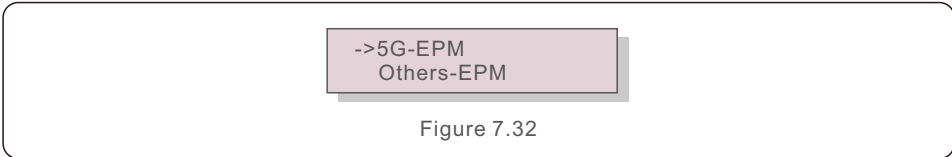
7. Normal operation

Mode "02", As shown in the figure 7.31 the per phase limiting mode, the PV Inverter only generate the power that equals to one of three-phase load power that is the lowest load power of a certain phase.



7.5.12 External EPM Set

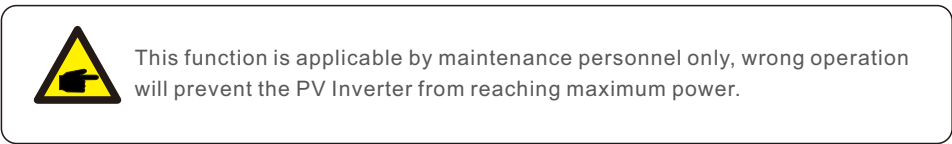
This setting should only be turned on when Lesso external EPM device is used. Two options are available: 5G-EPM and Others-EPM.



5G-EPM Failsafe Option should be turned ON when 5G series EPM device is used
Others-EPM Failsafe Option should be turned ON when 2G series EPM device is used
Only one option can be activated each time.

7.5.13 Restart HMI

The function is used for restart the HMI.



7. Normal operation

7.5.14 FAN Test



This section is applicable to maintenance personnel only.

Selecting “Fan Test” displays the sub-menu shown below:

Are you sure?
YES=<ENT> NO=<ESC>

Figure 7.33

Fan Test is a factory test function. Press the ENTER key to start the test.
Press the ESC key to return to the previous menu.

7.5.15 DSP Update

The function is used for update the DSP.

→ Master DSP Update
Slave DSP Update

Figure 7.34 DSP Update

7.5.16 Compensation Set

This function is used to calibrate PV Inverter output energy and voltage. It will not impact the energy count for PV Inverter with RGM.
Two sections are included: Power Parameter and Voltage Parameter.
The screen shows:

YES=<ENT> NO=<ESC>
Power para: 1. 000

Figure 7.35 Voltage Parameter

Press the Down key to move the cursor.
Press the Up key to change the digit.
Please press the Enter to save the setting and press the ESC key to return to the previous menu.



This setting is used for grid operators, do not change this setting unless specifically instructed to.

7. Normal operation

7.5.17 I/V Curve

This function is used to scan the I/V characteristic curves of each PV strings.

→ Set I/V Curve
I/V Curve Scan

Figure 7.36 I/V Curve

7.5.17.1 Set I/V Curve

This setting can set the scanning voltage start point and the voltage interval.

Start_V: 850V
Interval_V: 010V

Figure 7.37 Set I/V Curve

Start_V: The start voltage of the I/V scan. (Adjustable from 100V-1100V)
Interval_V: The scanning voltage interval. (Adjustable from 001V-100V)
In total, 60 data points can be scanned.

7.5.17.2 I/V Curve Scan

Press “ENT” to start the I/V curve scan.

Scanning...01

Figure 7.38 I/V Curve Scan (1)

After it is completed, the screen will display “Scan OK” and then enter the following section.

Select String No.: 01

Figure 7.39 I/V Curve Scan (2)

01_850V: 9.56A
02_860V: 9.44A

Figure 7.40 I/V Curve Scan (3)

7. Normal operation

7.6 AFCI function

Lesso PV Inverters have the built-in AFCI function which can detect the arc fault on the DC circuit and shut down the PV Inverter to prevent a fire disaster.

7.6.1 Enable the AFCI function

The AFCI function can be enabled in the following.

Path: Advanced Setting -> Password: 0010 -> Special Settings -> AFCI Set ->

AFCI ON/OFF -> ON

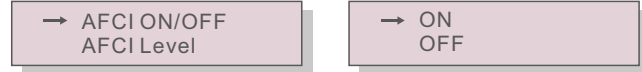


Figure 7.41 Set AFCI



Warning:

The "AFCI Level" is reserved for Lesso technicians ONLY. Do not change the sensitivity otherwise it will lead to frequent false alarms or malfunctions. Lesso is not responsible for any further damages caused by unauthorized modifications.



NOTE:

The setting corresponds to the current status as well which can be used to inspect the ON/OFF state of the AFCI function.

7.6.2 Arc Fault

During the normal operation, if an DC arc is detected, the PV Inverter will shut down and give out the following alarm:

ARC-FAULT
Restart Press ESC 3s

Figure 7.42 Arc Fault

Installer needs to thoroughly inspect the DC circuit to ensure all the cables are correctly fastened.

Once the DC circuit issue has been fixed or it is confirmed to be OK, press "ESC" for 3s and wait for the PV Inverter to restart.

8. Maintenance

Lesso Three Phase PV Inverter does not require any regular maintenance. However, cleaning the dust on heat-sink will help the PV Inverter to dissipate the heat and increase its life time. The dust can be removed with a soft brush.



CAUTION:

Do not touch the PV Inverter's surface when it is operating. Some parts of the PV Inverter may be hot and cause burns. Turn off the PV Inverter (refer to Section 6.2) and wait for a cool-down period before any maintenance or cleaning operation.

The LCD and the LED status indicator lights can be cleaned with a damp cloth if they are too dirty to be read.



NOTE:

Never use any solvents, abrasives or corrosive materials to clean the PV Inverter.

8.1 Night Time PID-Recovery Function

Lesso Three phase PV Inverters integrates optional Night Time PID-Recovery module and it can recover the PID effect during night thus protect the PV system from degradation.

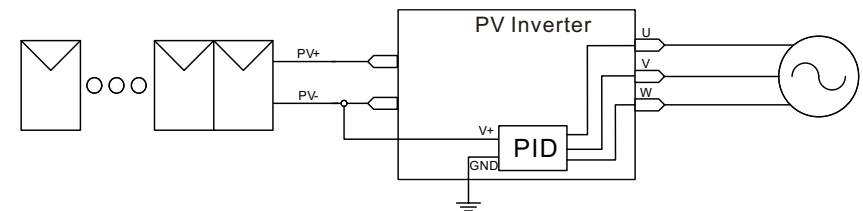


Figure 8.1

The Night Time PID-Recovery module repairs the PID effect of the PV model at night. When operating, the PV Inverter LCD screen displays "PID-repairing" information, and the red light is on. The Night Time PID-Recovery function is always ON when AC is applied. If maintenance is required and turn off the AC switch can disable the Night Time PID-Recovery function.



WARNING :

Due to the similar functional logic, when the night time PID-Recovery function is integrated, the night time var compensation function can not be used. Also, the negative grounding option is not available for PV Inverters with night time PID-Recovery function.

8. Maintenance



WARNING :

The PID function is automatic. When the DC bus voltage is lower than 50Vdc, the PID module will start creating 450 Vdc between PV- and ground. No need any control or settings



NOTE:

If you need to maintain the PV Inverter at night, please turn off the AC switch first, then turn off the DC switch, and wait 5 minutes before you do other operations.

8.2 Fan Maintenance

If the fan does not work properly, the PV Inverter will not be cooled effectively, and it may affect the effective operation of the PV Inverter .

Therefore, it is necessary to clean or replace a broken fan as follows:

1. Turn off the "Grid ON/OFF" switch on the PV Inverter LCD.
2. Disconnect the AC power.
3. Turn the DC switch to "OFF" position.
4. Wait for 15 minutes at least.
5. Remove the 8 screws on the fan plate and pull out the fan assembly slowly.

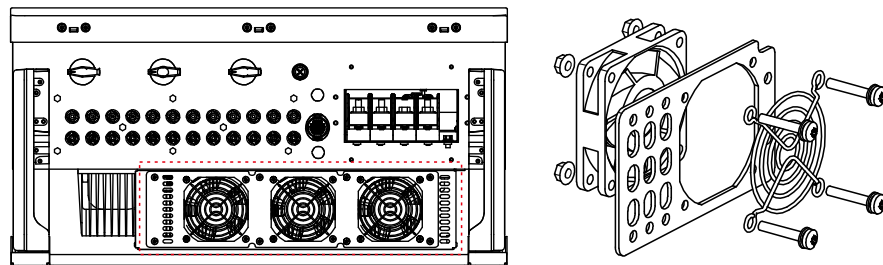


Figure 8.2

6. Disconnect the fan connector carefully and take out the fan.
7. Clean or replace the fan. Assemble the fan on the rack.
8. Connect the electrical wire and reinstall the fan assembly. Restart the PV Inverter.

9. Troubleshooting

The PV Inverter is designed in accordance with the most important international grid-tied standards and safety and electromagnetic compatibility requirements. Before delivering to the customer, the PV Inverter has been subjected to several tests to ensure its optimal operation and reliability.

In case of failure, the LCD screen will display an alarm message. In this case, the PV Inverter may stop feeding into the grid. The failure descriptions and their corresponding alarm messages are listed in Table 9.1:

| Alarm Message | Failure description | Solution |
|------------------------------------|-----------------------------|--|
| No power | PV Inverter no power on LCD | 1.Check PV input connections 2.Check DC input voltage (single phase >120V, three phase >350V) 3.Check if PV+/- is reversed |
| LCD show initializing all the time | Can not start-up | 1.Check if the connector on main board or power board are fixed. 2.Check if the DSP connector to power board are fixed. |
| OV-G-V01/02/03/04 | Over grid voltage | 1.Resistant of AC cable is too high. Change bigger size grid cable 2.Adjust the protection limit if it's allowed by electrical company. |
| UN-G-V01/02 | Under grid voltage | 1.Use user define function to adjust the protection limit if it's allowed by electrical company. |
| OV-G-F01/02 | Over grid frequency | |
| UN-G-F01/02 | Under grid frequency | |
| G-IMP | High grid impedance | |
| NO-GRID | No grid voltage | 1.Check connections and grid switch. 2. Check the grid voltage inside PV Inverter terminal. |
| OV-DC01/02/03/04 | Over DC voltage | 1.Reduce the module number in series |
| OV-BUS | Over DC bus voltage | 1.Check PV Inverter inductor connection 2.Check driver connection |
| UN-BUS01/02 | Under DC bus voltage | |
| GRID-INTF01/02 | Grid interference | 1.Restart PV Inverter 2.Change power board |
| OV-G-I | Over grid current | |
| IGBT-OV-I | Over IGBT current | |
| DC-INTF OV-DCA-I | DC input overcurrent | 1.Restart PV Inverter 2.Identify and remove the string to the fault MPPT 2.Change power board |
| IGFOL-F | Grid current tracking fail | 1.Restart PV Inverter or contact installer. |
| IG-AD | Grid current sampling fail | |
| OV-TEM | Over Temperature | 1.Check PV Inverter surrounding ventilation. 2.Check if there's sunshine direct on PV Inverter in hot weather. |

9. Troubleshooting

| Alarm Message | Failure description | Solution |
|---|---|---|
| INI-FAULT | Initialization system fault | 1.Restart PV Inverter or contact installer. |
| DSP-B-FAULT | Comm. failure between main and slave DSP | |
| 12Power-FAULT | 12V power supply fault | |
| PV ISO-PRO 01/02 | PV isolation protection | 1.Remove all DC input, reconnect and restart PV Inverter one by one. 2.Identify which string cause the fault and check the isolation of the string. |
| ILeak-PRO 01/02/03/04 | Leakage current protection | 1.Check AC and DC connection 2.Check PV Inverter inside cable connection. |
| RelayChk-FAIL | Relay check fail | 1.Restart PV Inverter or contact installer. |
| DCinj-FAULT | High DC injection current | |
| AFCI self-detection (model with AFCI module) | AFCI module self-detect fault | 1.Restart PV Inverter or connect technician. |
| Arcing protection (model with AFCI module) | Detect arc in DC circuit | 1. Check PV Inverter connection whether arc exists and restart PV Inverter. |
| Reve-DC | One of the DC string is reversely connected | 1. Please check the PV Inverters' PV string polarity, if there are strings reversely connected wait for the night when the solar irradiance is low and the PV string current down below 0.5A. Turn off the two DC switches and fix the polarity issue. |
| Screen OFF with DC applied | PV Inverter internally damaged | 1.Do not turn off the DC switches as it will damage the PV Inverter. 2.Please wait for the solar irradiance reduces and confirm the string current is less than 0.5A with a clip-on ammeter and then turn off the DC switches. 3.Please note that any damages due to wrong operations are not covered in the device warranty. |

Table 9.1 Fault message and description

9. Troubleshooting



NOTE

If the PV Inverter displays any alarm message as listed in Table 9.1, please turn off the PV Inverter (refer to Section 6.2 to stop your PV Inverter) and wait for 15 minutes before restarting it (refer to Section 6.1 to start your PV Inverter). If the failure persists, please contact your local distributor or the service center. Please keep ready with you the following information before contacting us.

1. Serial number of Lesso Three Phase PV Inverter;
2. The distributor/dealer of Lesso Three Phase PV Inverter (if available);
3. Installation date.
4. The description of problem (i.e. the alarm message displayed on the LCD and the status of the LED status indicator lights. Other readings obtained from the Information submenu (refer to Section 6.2) will also be helpful.);
5. The PV array configuration (e.g. number of panels, capacity of panels, number of strings, etc.);
6. Your contact details.

10. Specifications

| Model | LSBH50KTL3 |
|--|---|
| Max. DC input voltage (Volts) | 1100 |
| Rated DC voltage (Volts) | 600 |
| Start-up voltage (Volts) | 195 |
| MPPT voltage range (Volts) | 180...1000 |
| Max. input current (Amps) | 5*32 |
| Max short circuit input current (Amps) | 5*40 |
| MPPT number/Max input strings number | 5/10 |
| Rated output power (Watts) | 50000 |
| Max. output power (Watts) | 55000 |
| Max. apparent output power (VA) | 55000 |
| Rated grid voltage (Volts) | 3/N/PE, 220/380, 230/400 |
| Rated grid output current (Amps) | 76.0/72.2 |
| Max. output current (Amps) | 83.6 |
| Power Factor (at rated output power) | 0.8leading~0.8lagging |
| THDi (at rated output power) | <3% |
| Rated grid frequency (Hertz) | 50/60 |
| Max. efficiency | 98.7% |
| EU efficiency | 98.3% |
| Dimensions (W*H*D) | 691*578*338mm |
| Weight | 54.5kg |
| Topology | Transformerless |
| Self consumption (night) | < 1W |
| Operating ambient temperature range | -25°C...+60°C |
| Relative humidity | 0~100% |
| Ingress protection | IP66 |
| Cooling concept | Intelligent redundant cooling |
| Max.operation altitude | 4000m |
| Grid connection standard | VDE-AR-N 4105, VDE V 0124, VDE V 0126-1-1, UTE C15-712-1, NRS 097-1-2, G99, EN 50549-1/-2, RD 1699, UNE 206006, UNE 206007-1, IEC61727,DEWA |
| Safty/EMC standard | IEC 62109-1/-2, IEC62116 & IEC 61000-6-1/-2/-3/-4 |
| DC connection | MC4 connector |
| AC connection | OT Terminal (max 70 mm²) |
| Display | LCD, Capacitive touch buttons |
| Communication connections | RS485/USB, Optional: Wi-Fi, GPRS |
| Warranty | 5 years (extend to 20 years) |

10. Specifications

| Model | LSBH60KTL3 |
|--|---|
| Max. DC input voltage (Volts) | 1100 |
| Rated DC voltage (Volts) | 600 |
| Start-up voltage (Volts) | 195 |
| MPPT voltage range (Volts) | 180...1000 |
| Max. input current (Amps) | 6*32 |
| Max short circuit input current (Amps) | 6*40 |
| MPPT number/Max input strings number | 6/12 |
| Rated output power (Watts) | 60000 |
| Max. output power (Watts) | 66000 |
| Max. apparent output power (VA) | 66000 |
| Rated grid voltage (Volts) | 3/N/PE, 220/380, 230/400 |
| Rated grid output current (Amps) | 91.2/86.6 |
| Max. output current (Amps) | 100.3 |
| Power Factor (at rated output power) | 0.8leading~0.8lagging |
| THDi (at rated output power) | <3% |
| Rated grid frequency (Hertz) | 50/60 |
| Max. efficiency | 98.7% |
| EU efficiency | 98.3% |
| Dimensions (W*H*D) | 691*578*338mm |
| Weight | 54.5kg |
| Topology | Transformerless |
| Self consumption (night) | < 1W |
| Operating ambient temperature range | -25°C...+60°C |
| Relative humidity | 0~100% |
| Ingress protection | IP66 |
| Cooling concept | Intelligent redundant cooling |
| Max.operation altitude | 4000m |
| Grid connection standard | VDE-AR-N 4105, VDE V 0124, VDE V 0126-1-1, UTE C15-712-1, NRS 097-1-2, G99, EN 50549-1/-2, RD 1699, UNE 206006, UNE 206007-1, IEC61727,DEWA |
| Safty/EMC standard | IEC 62109-1/-2, IEC62116 & IEC 61000-6-1/-2/-3/-4 |
| DC connection | MC4 connector |
| AC connection | OT Terminal (max 70 mm²) |
| Display | LCD, Capacitive touch buttons |
| Communication connections | RS485/USB, Optional: Wi-Fi, GPRS |
| Warranty | 5 years (extend to 20 years) |

10. Specifications

| Model | LSBH60KTL3-E1 |
|--|---|
| Max. DC input voltage (Volts) | 1100 |
| Rated DC voltage (Volts) | 720 |
| Start-up voltage (Volts) | 195 |
| MPPT voltage range (Volts) | 180...1000 |
| Max. input current (Amps) | 6*32 |
| Max short circuit input current (Amps) | 6*40 |
| MPPT number/Max input strings number | 6/12 |
| Rated output power (Watts) | 60000 |
| Max. output power (Watts) | 66000 |
| Max. apparent output power (VA) | 66000 |
| Rated grid voltage (Volts) | 3/PE, 480 |
| Rated grid output current (Amps) | 72.2 |
| Max. output current (Amps) | 79.4 |
| Power Factor (at rated output power) | 0.8leading~0.8lagging |
| THDi (at rated output power) | <3% |
| Rated grid frequency (Hertz) | 50/60 |
| Max. efficiency | 98.7% |
| EU efficiency | 98.4% |
| Dimensions (W*H*D) | 691*578*338mm |
| Weight | 54.5kg |
| Topology | Transformerless |
| Self consumption (night) | < 1W |
| Operating ambient temperature range | -25°C...+60°C |
| Relative humidity | 0~100% |
| Ingress protection | IP66 |
| Cooling concept | Intelligent redundant cooling |
| Max.operation altitude | 4000m |
| Grid connection standard | VDE-AR-N 4105, VDE V 0124, VDE V 0126-1-1, UTE C15-712-1, NRS 097-1-2, G99, EN 50549-1/-2, RD 1699, UNE 206006, UNE 206007-1, IEC61727,DEWA |
| Safty/EMC standard | IEC 62109-1/-2, IEC62116 & IEC 61000-6-1/-2/-3/-4 |
| DC connection | MC4 connector |
| AC connection | OT Terminal (max 70 mm²) |
| Display | LCD, Capacitive touch buttons |
| Communication connections | RS485/USB, Optional: Wi-Fi, GPRS |
| Warranty | 5 years (extend to 20 years) |

10. Specifications

| Model | LSBH70KTL3-E1 |
|--|---|
| Max. DC input voltage (Volts) | 1100 |
| Rated DC voltage (Volts) | 720 |
| Start-up voltage (Volts) | 195 |
| MPPT voltage range (Volts) | 180...1000 |
| Max. input current (Amps) | 6*32 |
| Max short circuit input current (Amps) | 6*40 |
| MPPT number/Max input strings number | 6/12 |
| Rated output power (Watts) | 70000 |
| Max. output power (Watts) | 77000 |
| Max. apparent output power (VA) | 77000 |
| Rated grid voltage (Volts) | 3/PE, 480 |
| Rated grid output current (Amps) | 84.2 |
| Max. output current (Amps) | 92.6 |
| Power Factor (at rated output power) | 0.8leading~0.8lagging |
| THDi (at rated output power) | <3% |
| Rated grid frequency (Hertz) | 50/60 |
| Max. efficiency | 98.7% |
| EU efficiency | 98.4% |
| Dimensions (W*H*D) | 691*578*338mm |
| Weight | 54.5kg |
| Topology | Transformerless |
| Self consumption (night) | < 1W |
| Operating ambient temperature range | -25°C...+60°C |
| Relative humidity | 0~100% |
| Ingress protection | IP66 |
| Cooling concept | Intelligent redundant cooling |
| Max.operation altitude | 4000m |
| Grid connection standard | VDE-AR-N 4105, VDE V 0124, VDE V 0126-1-1, UTE C15-712-1, NRS 097-1-2, G99, EN 50549-1/-2, RD 1699, UNE 206006, UNE 206007-1, IEC61727,DEWA |
| Safty/EMC standard | IEC 62109-1/-2, IEC62116 & IEC 61000-6-1/-2/-3/-4 |
| DC connection | MC4 connector |
| AC connection | OT Terminal (max 70 mm²) |
| Display | LCD, Capacitive touch buttons |
| Communication connections | RS485/USB, Optional: Wi-Fi, GPRS |
| Warranty | 5 years (extend to 20 years) |