

Macsol -TL3K/TL4K/TL5K



User Manual

- Installation
- Operation

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1. NOTES ON THIS MANUAL

1.1 Scope of Validation

The main purpose of this User's Manual is to provide instructions and detailed procedures for installing, operating, maintaining, and troubleshooting the following Macsolar Grid Tie Solar Inverter:

- Macsol – TL3K
- Macsol – TL4K
- Macsol – TL5K

Please keep this manual all time available in case of emergency.



1.2 Symbols Used



DANGER

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



WARNING

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



CAUTION

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



NOTICE

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



1.3 Target Group

Chapter 1, 2, 3, 4, 7, 8, 9, 10 and Chapter 11 are intended for anyone who is intended to use MacSolar Grid Tie Solar Inverter. Before any further action, the operators must first read all safety regulations and be aware of the potential danger to operate high-voltage devices. Operators must also have a complete understanding of this device's features and functions.



WARNING

Do not use this product unless it has been successfully installed by qualified personnel in accordance with the instructions in Chapter 5, "Installation".

Chapter 5, and Chapter 6 are only for qualified personnel who is intended to install or uninstall the MacSolar Grid Tie Solar Inverter.



NOTICE

Hereby qualified personnel means he/she has the professional training, knowledge, and experience in:

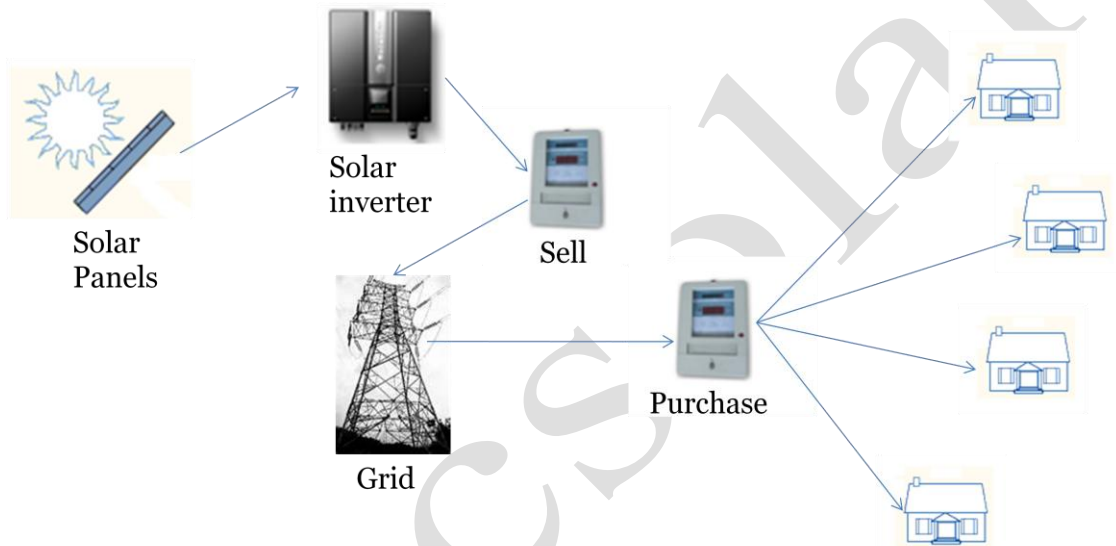
- Installing electrical equipment and PV power systems (up to 1000 V).
- Applying all applicable installation codes.
- Analyzing and reducing the hazards involved in performing electrical work.
- Selecting and using Personal Protective Equipment (PPE).

All installation, commissioning, maintenance, repair and recycling of MacSolar Inverter must be done only by qualified personnel.

2. PREPARATION

2.1 System Demonstration

Solar energy generation systems, based on photovoltaic modules, nowadays represent the most suitable solution, in particular for domestic power levels, to reduce the energy consumption produced by oil and gas. Moreover in different European countries, electricity companies are providing money incentives for the energy produced by renewable sources and injected into the utility grid.



The solar inverter is a critical component in a solar energy system. It performs the conversion of the variable DC output of the PV modules into a clean sinusoidal 50 or 60 Hz AC current that is then applied directly to the commercial electrical grid or to a local grid electrical network. Typically, communications capability is included so users can monitor the inverter and report on power and operating conditions, provide firmware updates and control the inverter grid connection. Depending on the grid infrastructure wired (RS-485, CAN, Power Line Communication, Ethernet) or wireless (Bluetooth, ZigBee/IEEE802.15.4, 6LoWPAN) networking options can be used.



2.2 Safety Instructions



DANGER

DANGER due to electrical shock and high voltage

DO NOT touch the operating component of the inverter, it might result in burning or death.

TO prevent risk of electric shock during installation and maintenance, please make sure that all AC and DC terminals are plugged out.

DO NOT touch the surface of the inverter while the housing is wet, it might lead to electrical shock.

DO NOT stay close to the instruments while there are severe weather conditions including storm, lighting, and etc.



WARNING

The installation, service, recycling and disposal of the inverters must be performed by qualified personnel only in compliance with national and local standards and regulations. Please contact your dealer to get the information of authorized repair facility for any maintenance or repairmen.

Any unauthorized actions including modification of product functionality of any form will affect the validation of warranty service, MacSolar may deny the obligation of warranty service accordingly.



CAUTION

The PV inverter will become hot during operation, please don't touch the heat sink or peripheral surface during or shortly after operation.

Risk of damage due to improper modifications.

Never modify or manipulate the inverter or other components of the system.



NOTICE

Public utility only

The PV inverter designed to feed AC power directly to the public utility power grid, do not connect AC output of the device to any private AC equipment.



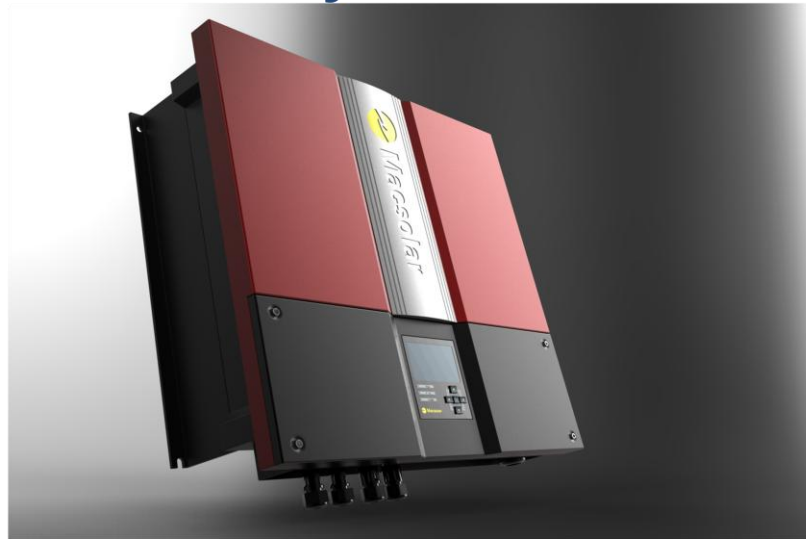
2.3 Explanations of Symbols on Inverter

Symbol	Description
	Dangerous electrical voltage This device is directly connected to public grid, thus all work to the inverter shall only be carried out by qualified personnel.
	DANGER to life due to high electrical voltage! There might be residual currents in inverter because of large capacitors. Wait 10 MINUTES before you remove the front lid.
	NOTICE, danger! This device directly connected with electricity generators and public grid.
	Danger of hot surface The components inside the inverter will release a log of heat during operation, DO NOT touch aluminum housing during operating.
	An error has occurred Please go to Chapter 10 “Trouble Shooting” to remedy the error.
	This device SHALL NOT be disposed of in residential waste Please go to Chapter 9 “Recycling and Disposal” for proper treatments.
	Without Transformer This inverter does not use transformer for the isolation function.
	German mark of conformity The inverter complies with the requirement of the German Grid Regulations.
	Certified Safety The inverter complies with the requirements of the Equipment and Product Safety Act in Europe.
	CE Mark Equipment with the CE mark fulfils the basic requirements of the Guideline Governing Low-Voltage and Electromagnetic Compatibility.
	No unauthorized perforations or modifications Any unauthorized perforations or modifications are strictly forbidden, if any defect or damage (device/person) is occurred, Mac solar shall not take any responsibility for it.

3. PRODUCT INFORMATION

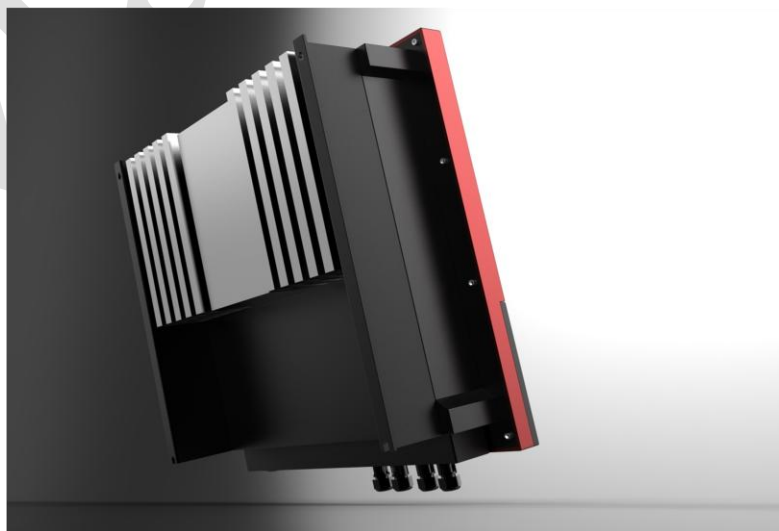
3.1 Overview

Industrial Layout



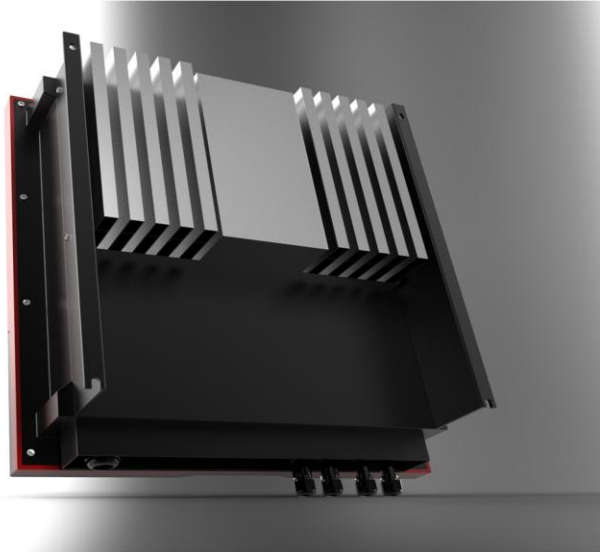
Reduced Heat Sink

Cut the overall machine weight



Shield

Protection for DC/AC/Monitoring Connections



3.2 Major Characteristics

MacSolar inverter has following characteristics which make MacSolar inverter “High Efficiency, High Reliability, High Cost Effective Ratio”

- High DC input voltage, can be connected with more PV panels.
- Wide MPPT voltage range can fit in different locations or various weather conditions.
- High MPP tracking accuracy, catch most of electricity from panels and converts it into money in your pocket.
- Complete set of protection methods.

Also, following protection methods are integrated in MacSolar inverter:

- Internal overvoltage
- DC insulation monitoring
- Ground fault protection
- Grid monitoring
- Ground fault current monitoring
- DC current monitoring
- Integrated DC switch

3.3 Datasheet

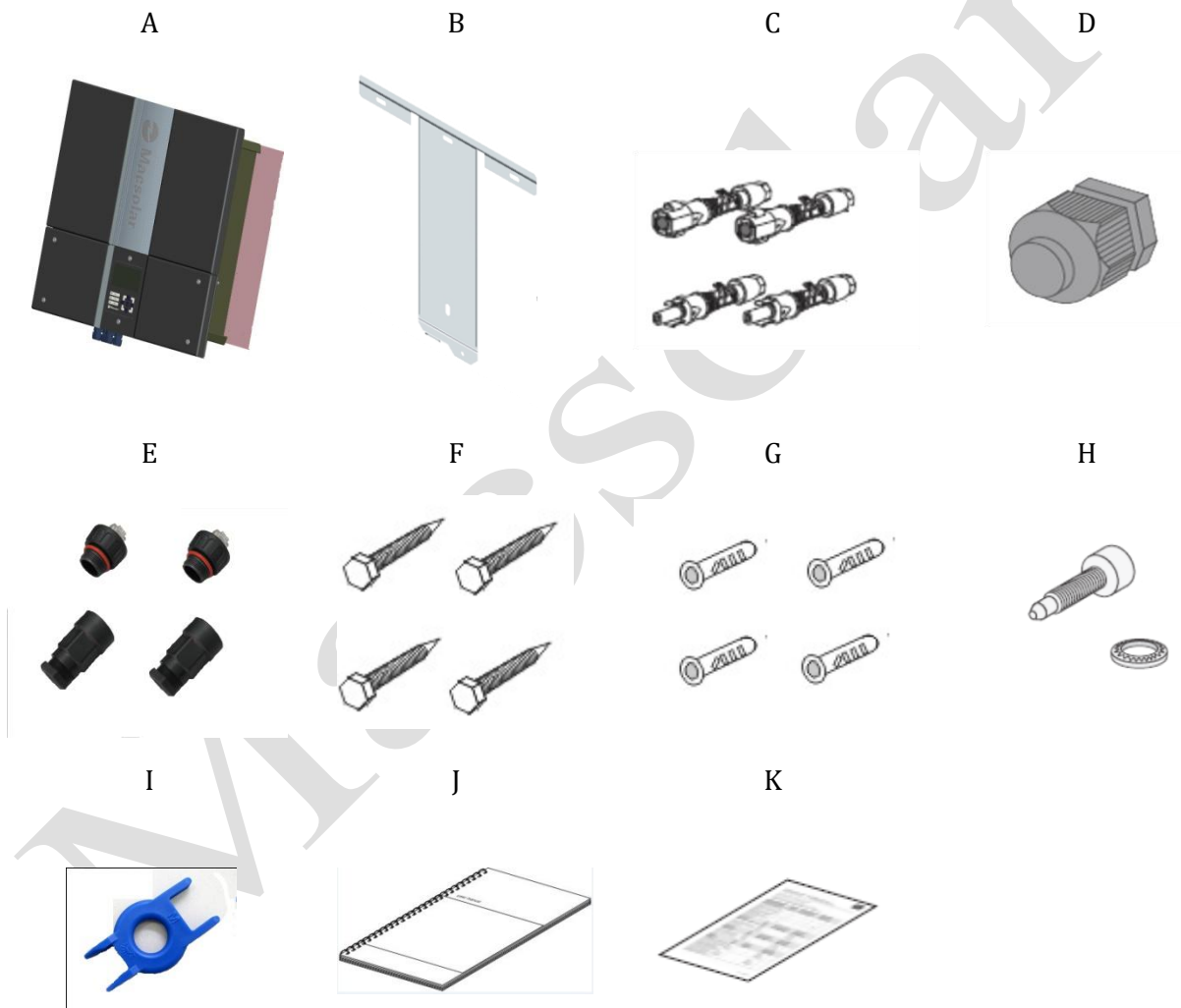
Type	Macsol-3k	Macsol-4k	Macsol-5k
Input (DC)			
Max. DC Power [W]	3400	4500	5600
Max. DC Voltage [V]	480		
PV-Voltage Range, MPPT [V]	100-480		
Max. Input Current [A]	21	21	28
Number of String Input Sets	2		
Number of MPP Trackers	1	2	
DC Switch	Integrated(Optional)		
Output (AC)			
Rated AC Power [W]	3000	4000	5000
Max. AC Power [W]	3160	4300	5120
Rated AC Current [A]	13.0	17.4	21.8
Max. AC Current [A]	14.4	19.1	24.0
Grid Voltage/Frequency Range	According to VDE 0126-1-1, RD1663, DK5940, AS4777		
Power Factor	0.99 (>30% of Full Load)		
AC Current Distortion (THD)	<2%		
Power Feed Starts At [W]	12	16	
Consumption at Night [W]	0		
Conversion Efficiency			
Max. Efficiency	97.50%	97.60%	
Euro Efficiency (at 360V _{dc})	96.50%	97.00%	
Protection			
Internal Overvoltage Protection	Yes		
DC Insulation Monitoring	Yes		
Ground Fault Protection	Yes		
DC Side Varistors	Thermal Protection		
AC Side Varistors	Yes		
Grid Monitoring	According to VDE 0126-1-1, RD1663, DK5940, AS4777		
Ground Fault Current Monitoring	According to VDE 0126-1-1, RD1663, DK5940, AS4777		
DC Current Monitoring	According to VDE 0126-1-1, RD1663, DK5940, AS4777		
Interface			
DC Connection	MultiContactΦ 4mm		
LCD Display	3.5 Inches, 256x160 Pixels, Backlight, Inverter Parameter and Data Display at Night		
Display Language	Multi Language		
Datalogger & Communication	RS485 (USB, GPRS, Ethernet Optional)		
Devide Data			
Isolation	Without Transformer		
Operating Temperature Range	-20 °C to +60 °C (40 °C to 60 °C with derating)		
Cooling Method	Natural Convection		
IP Protection	IP 65 (DIN EN 60529)		
Dimensions (WxHxD) [mm]	496x515x210		
Weight [kg]	20	20	23
Standard Warranty (Year)	5 / 8 (Optional)		



4. UNPACKING

4.1 Assembly parts

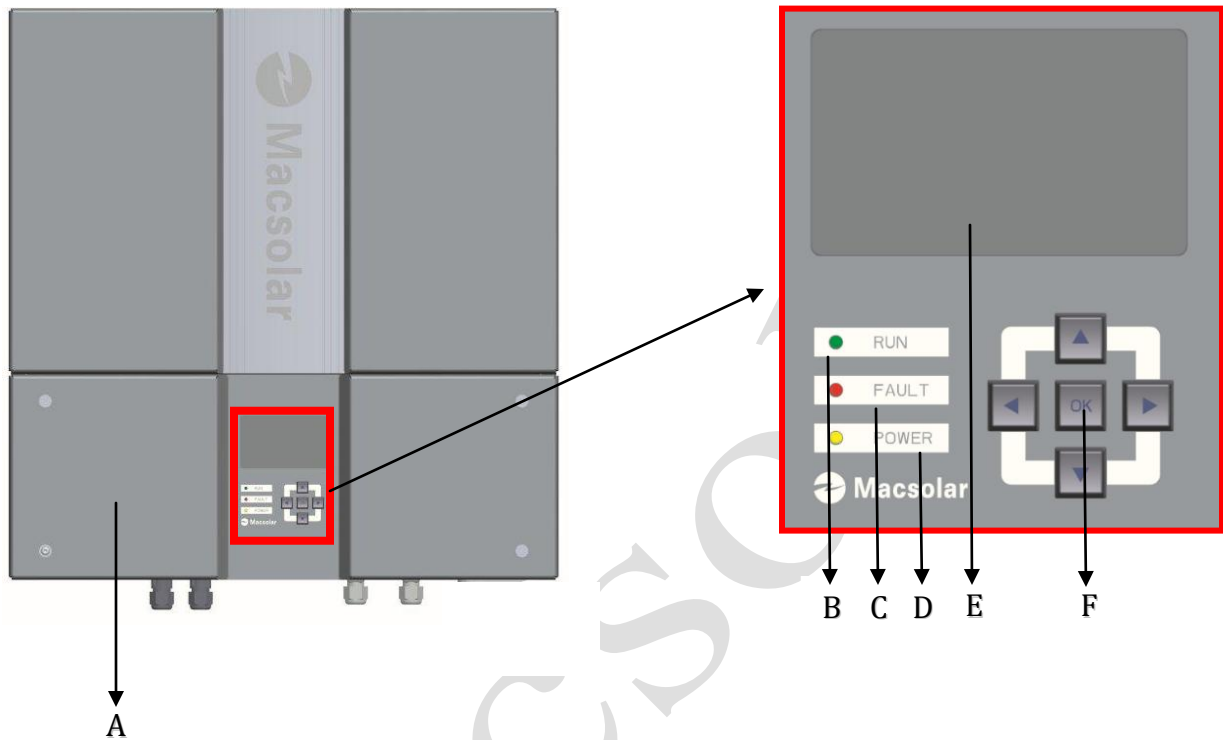
After you receive the Mac solar inverter, please check if there is any damage on the carton. Also, please check the inside completeness and for any visible external damage on the inverter or any accessories. Contact your dealer if anything is damaged or missing.



Object	Quantity	Description
A	1	MacSolar inverter
B	1	Rear panel
C	2 sets	DC connector
D	1	AC connector
E	2	RJ45 connector
F	4	M6×50 Expansion screw
G	4	Expansion tube
H	1 set	M6×12 Cylinder head screw and Lock washer
I	1	Ring tool to disconnect DC connector
J	1	Installation guide, including user manual
K	1	Warranty card

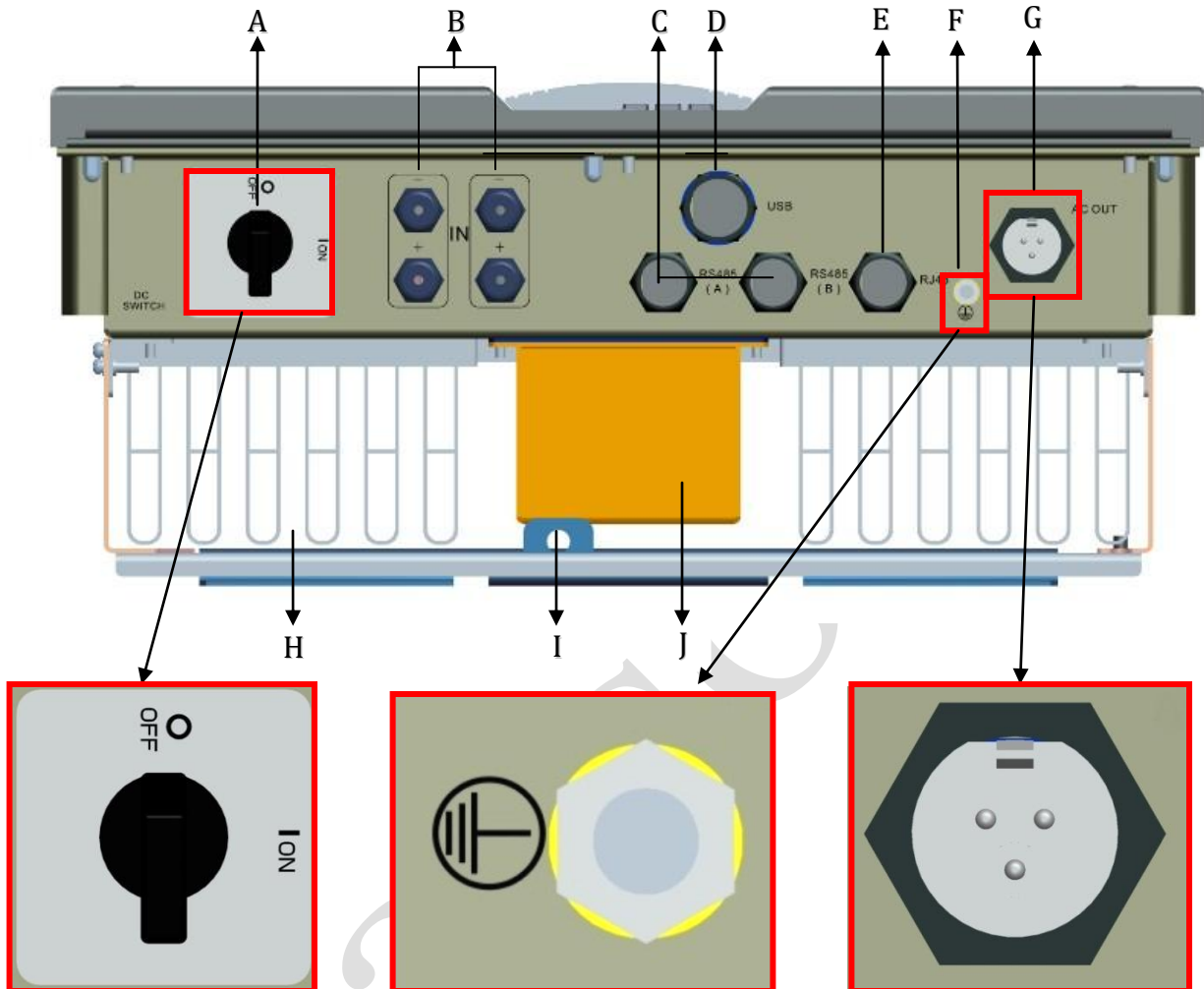
4.2 Product Appearance

Front:



Object	Description
A	Removable front lid for potential maintenance and repair
B	LED light – RUN
C	LED light – FAULT
D	LED light – POWER
E	LCD screen for checking the operating status and configuration
F	Control keyboard for displays and configuration of parameters

Bottom:




Object	Description
A	DC switch to turn off the inverter manually
B	DC input
C	Plug for connecting the RS485 communication module
D	USB plug for connecting the inverter to a PC directly via USB connection
E	Plug for connecting the RJ45, communication module
F	Reserved hole for possible grounding connection
G	AC output
H	Heat sink
I	Extra lock
J	Inductor box


4.3 Product Identification






You can identify the inverter by the side type label. Information such as serial number (SN.), type of the inverter, as well as inverter specifications are specified on the side type label. The type label is on the middle part of the right side of the inverter housing.





(Side type label example as on Macsol-TL3K)


MacSolar Made in China
www.macsolar-power.com

Type:Macsol-TL3K

	DC :	
	V _{DC} max:	580V
	V _{DC} rated:	360V
	V _{DC} MPP:	100V~580V
	P _{DC} max:	3200W
	I _{DC} max:	21A
	AC :	
	V _{AC} nom:	230V
	f _{AC} nom:	50/60Hz
	P _{AC} nom:	3000W
P _{AC} max:	3160W	
I _{AC} nom:	13.7A	
cos φ :	1	
		IP 65 -20°C to +60°C VDE0126-1-1

TEL: +86 21 68689998
 E-mail: service@macsolar-power.com
 ADD: Building 9, No.590 Ruiqing Road,
 201201, Shanghai
 P.R.China.

S/N └



4.4 Further Information

If you have any further questions concerning the type of accessories or installation, please check our website www.macsolar-power.com or contact our service hotline.

MacSolar

5. INSTALLATION

5.1 Safety



DANGER

DANGER to life due to potential fire or electricity shock.

DO NOT install the inverter near any inflammable or explosive items.

This inverter will be directly connected with HIGH VOLTAGE power generation device, the installation must be performed by qualified personnel only in compliance with national and local standards and regulations.



NOTICE

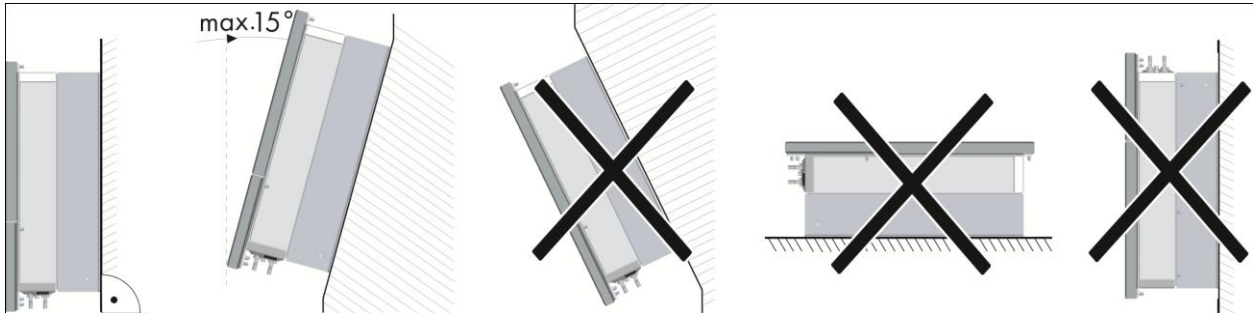
NOTICE due to the inappropriate or the harmonized installation environment may jeopardize the life span of the inverter.

Installation directly expose under intensive sunshine is not recommended.

The installation site **MUST** have good ventilation condition.



5.2 Mounting Instructions



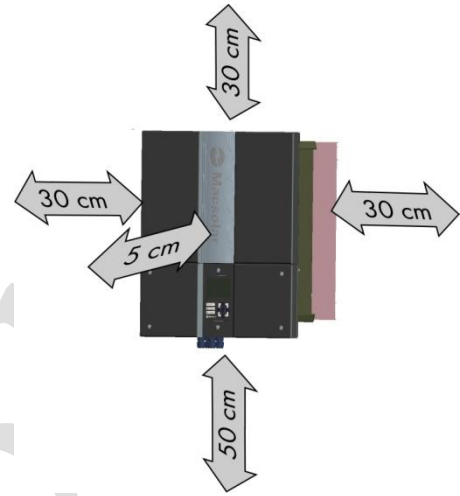
- Mac solar inverter is designed for installation both indoors and outdoors
- Please only mount the inverter in the direction as illustrated above
- Installation of the inverter in the vertical direction is recommended
- Tilted backwards by max.15 degree is allowed
- Never install the device with a forward tilt, horizontally or even upside down
- For the convenience of checking the LCD display and possible maintenance activities, please install the inverter at eye level
- Make sure the wall you selected is strong enough to handle the screws and the weight of the inverter
- Ensure the device is properly fixed to the rear panel
- Install the inverter directly exposes to strong sunshine is not recommended, the excess heating might lead to power reduction
- The ambient temperature of installation site should be between -20 °C and +40 °C (between -4 °F and 104 °F)
- Make sure the ventilation of the installation spot, not sufficient ventilation may affect the operating performance of the electronic components inside the inverter and the life span of the inverter might be jeopardized



5.3 Safety Clearance

To make sure the ventilation of the installation spot, if there are multiple Macsolar inverters installed in the same area, the following safety clearance shall be followed for proper ventilation conditions.

Direction	Minimum Clearance
Above	30 cm
Below	50 cm
Side	30 cm
Front	5 cm

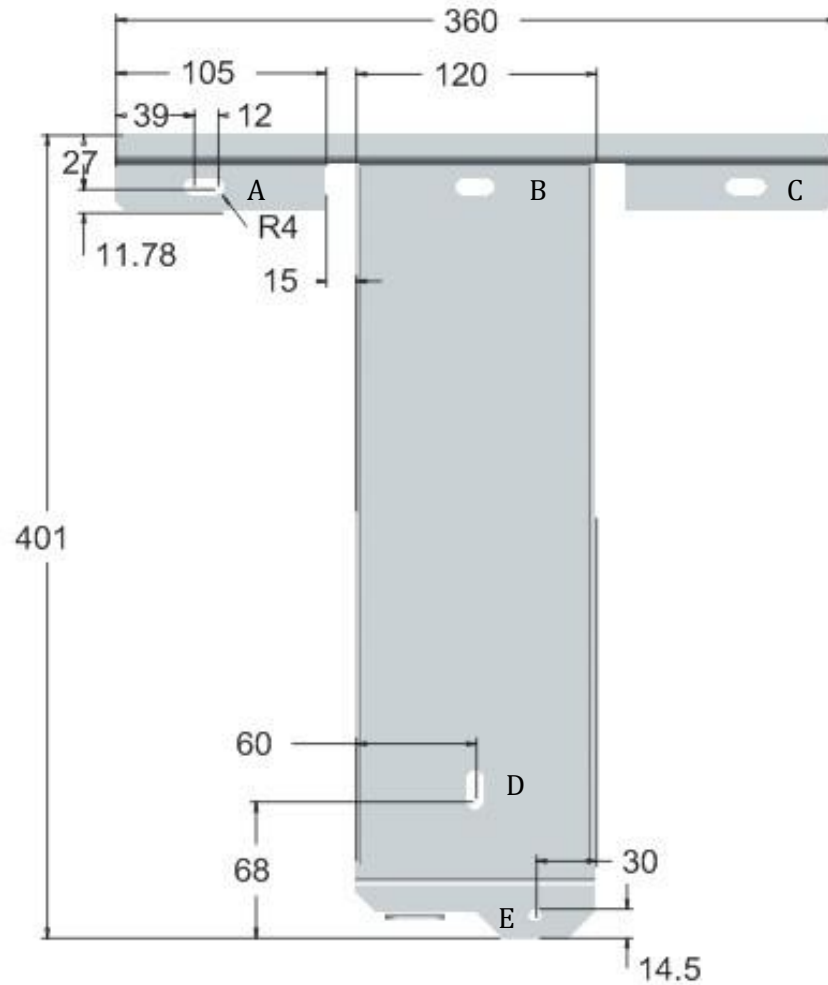


MacSolar



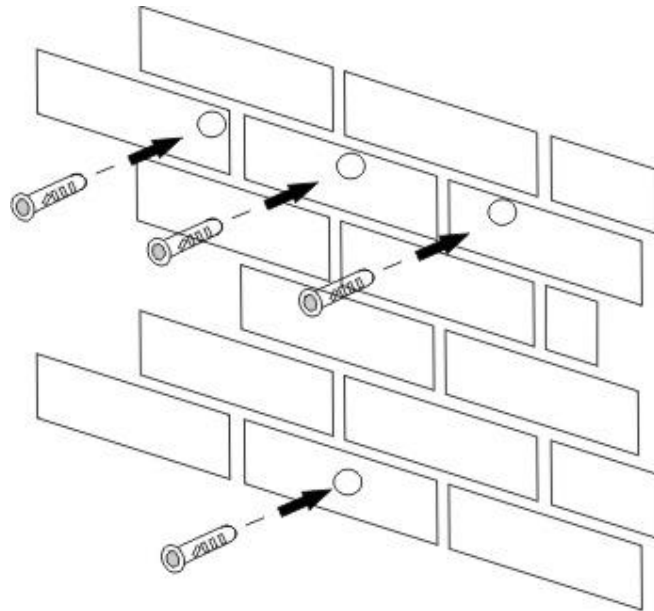
5.4 Mounting Procedure

1. Use the rear panel in the package as a drilling template and mark the positions of the drill holes.

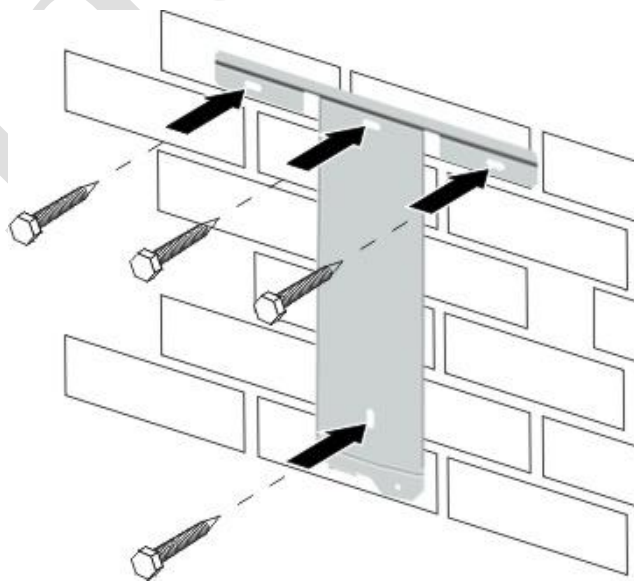




2. According to the marks, drill 4 holes (A/B/C/D) in the wall, and then place four expansion tubes in the holes using a rubber hammer.

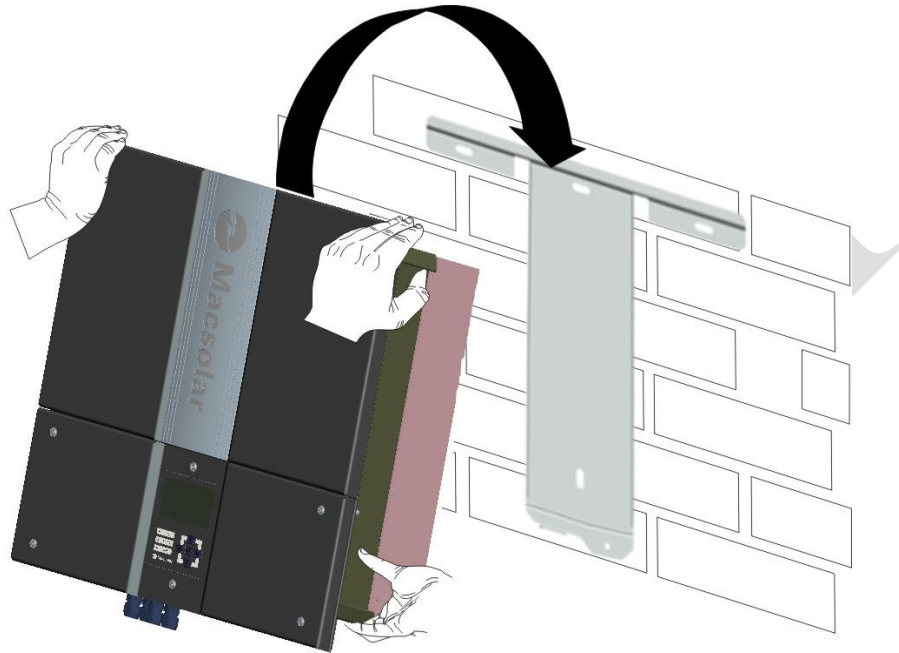


3. Mount the rear panel.
Wring four screws into the expansion tubes and tightly mount the rear panel on the wall.

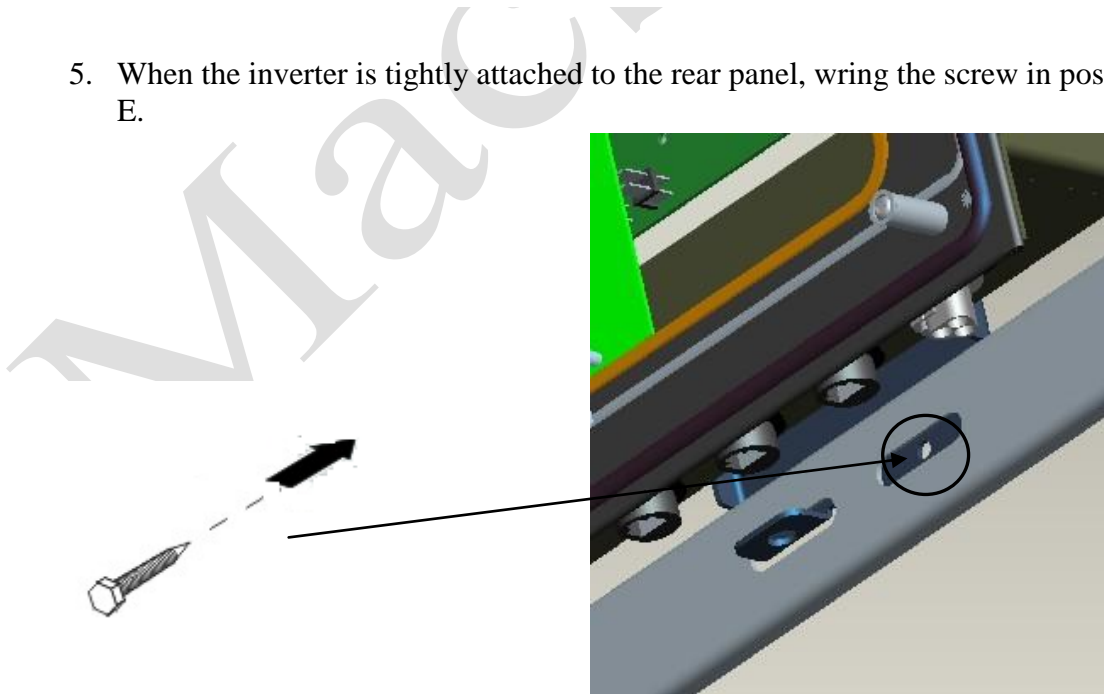




- Carefully attach the inverter to the rear panel according to the position of the screws. Make sure the backside of the inverter is closely against the rear panel.
 - When two people transport the inverter, make sure each one use the hand grip in right position as illustrated in the picture.



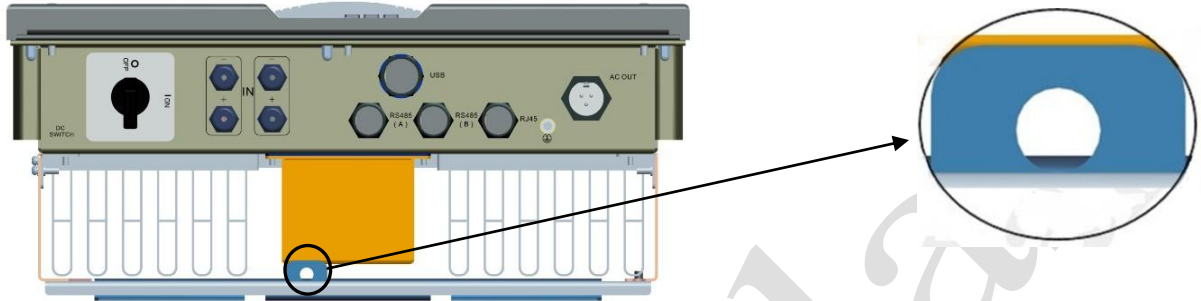
- When the inverter is tightly attached to the rear panel, wring the screw in position E.



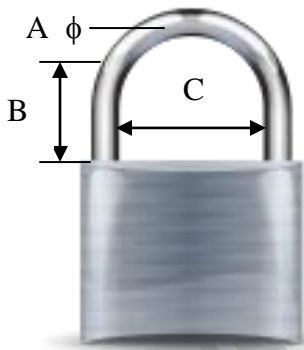
- Please carefully check the accessories and original carton to make sure during the installation every necessary part is used and nothing is missing.

5.5 Safety Lock

To prevent possible theft activity, Mac solar gives you an extra guard for your property. It is possible to lock the inverter to the rear panel with a padlock.



Recommended padlock dimension:



A. Shackle Diameter	6~9 mm
B. Vertical Clearance	8~15 mm
C. Horizontal Clearance	12~20 mm
Stainless, solid hanger and secured lock cylinder	

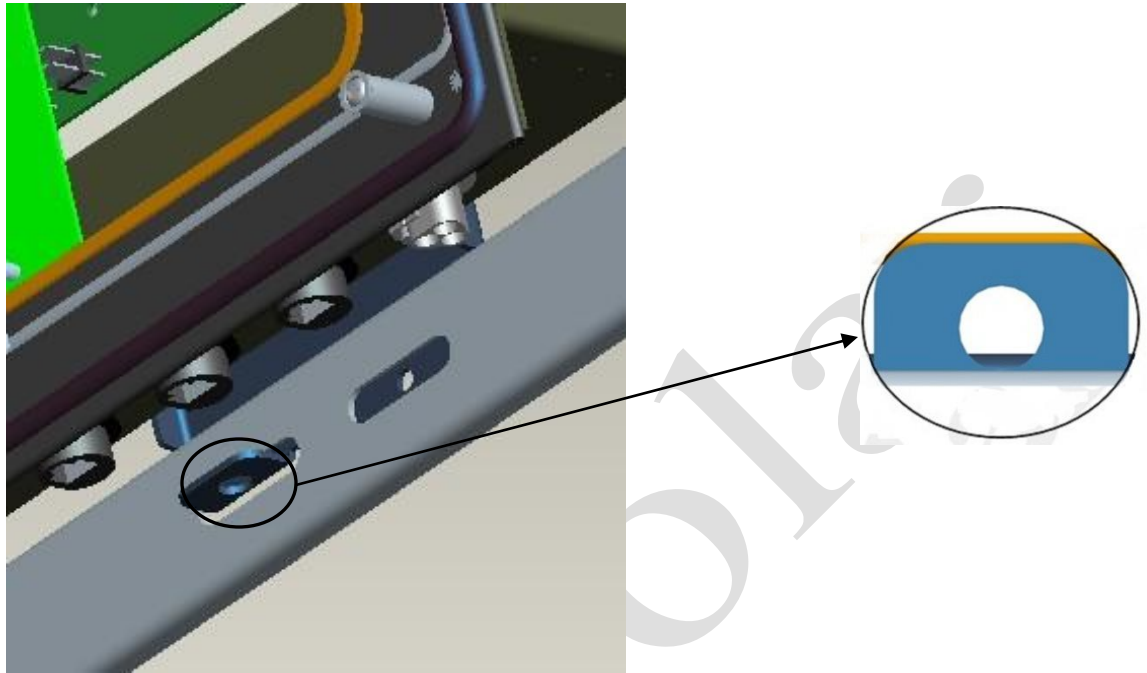


NOTICE

For further maintenance and possible repair, please keep the key of the padlock in a safe place.



After the inverter is attached to the rear panel, look at the bottom of the inverter, then the lock position will show as the following picture:

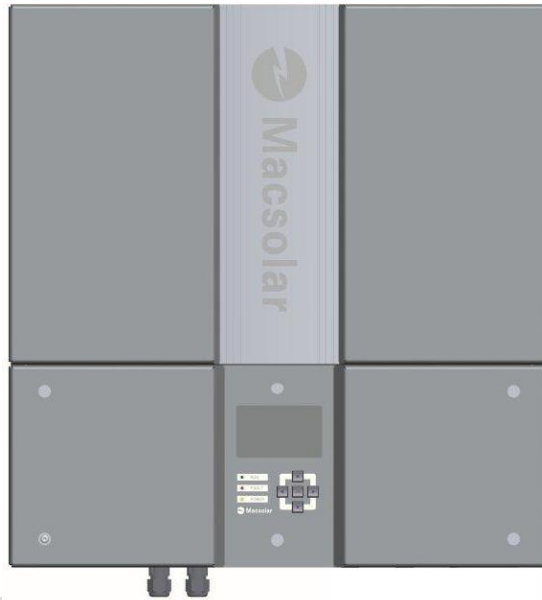




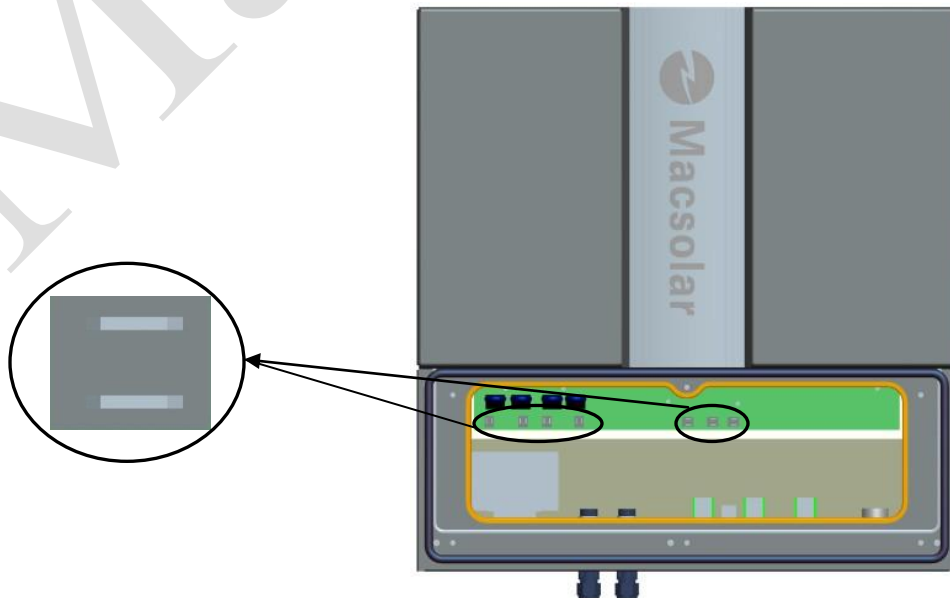
5.6 Check Varistors

If the one or more of the varistors might be out of function, please according to following steps to check or replace the varistors:

1. Loosen all 6 captive screws of the removable front lid. Right after the 6 captive screws are removed, please keep them at a distance. Lift the lid upwards and remove it.



2. Then you will see the 7 varistors in 2 groups: 4 in the left side and 3 in the middle area.



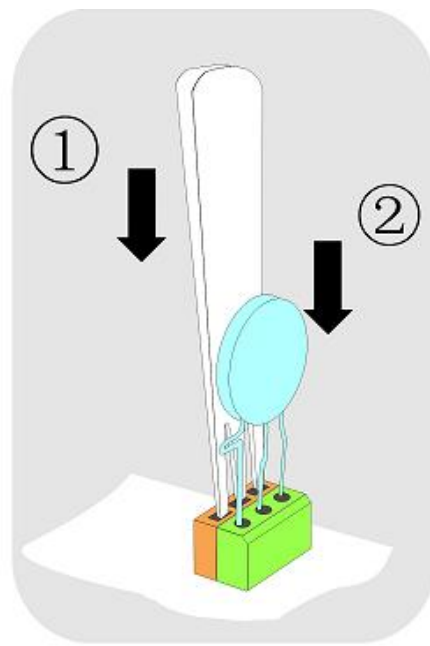
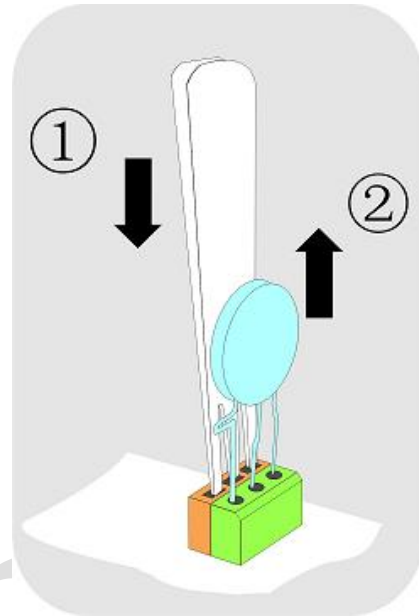


3. Remove and install the varistors

Remove:

First use specified tool and insert it to three holes in the left side of the varistor, then press it to the end.

Pull the varistor out.



Use specified tool and insert it to three holes in the left side of the varistor, then press it to the end.

Press the varistor in.

4. Put the lid back and re-screw all 6 screws, make sure the lid is tighten to the inverter.



6. ELECTRICAL CONNECTION

6.1 Safety



DANGER

DANGER to life due to potential fire or electricity shock.

With the inverter powered, comply with all prevailing national regulations on accidents prevention.

This inverter will be directly connected with HIGH VOLTAGE power generation device, the installation must be performed by qualified personnel only in compliance with national and local standards and regulations.

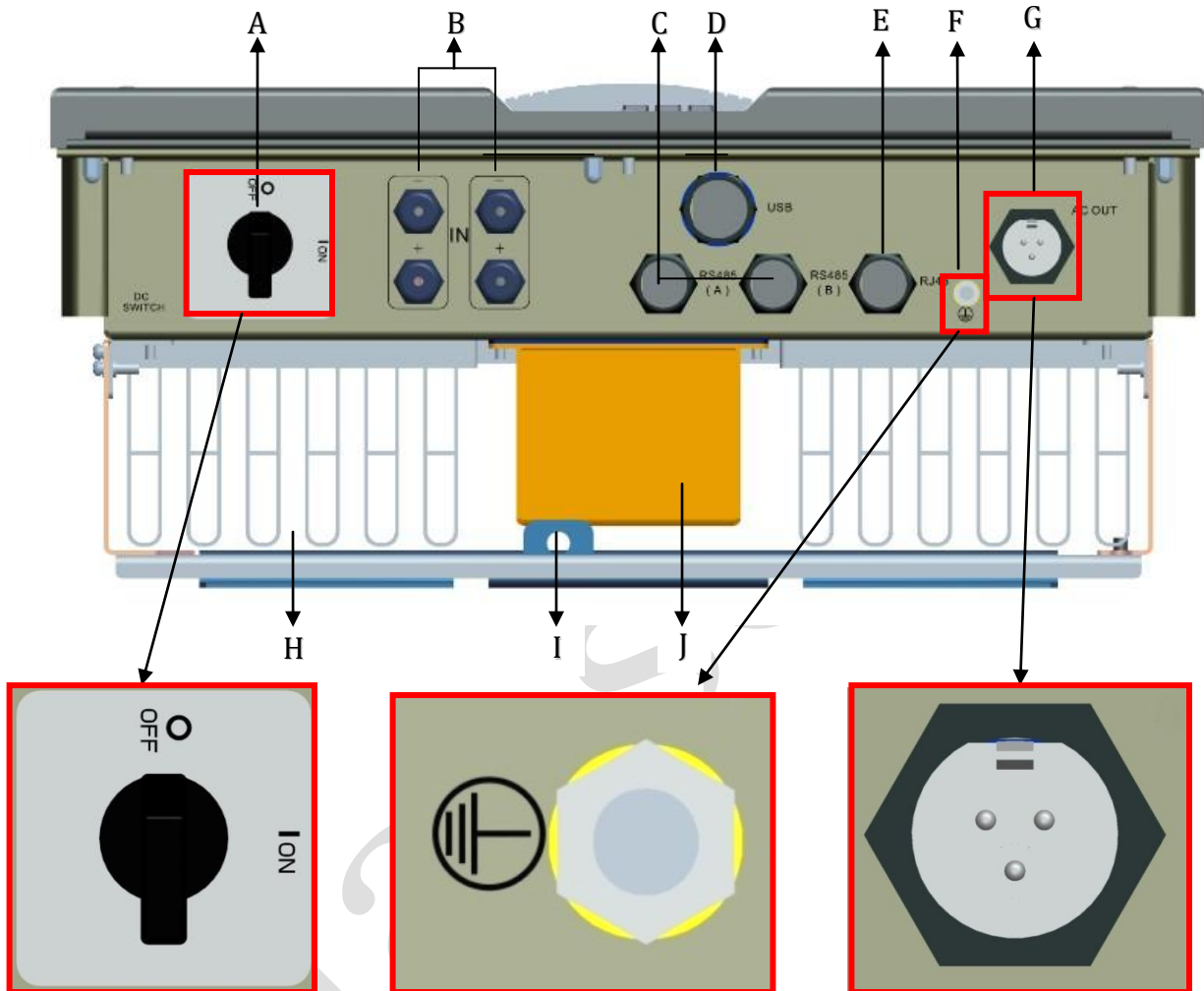


NOTICE

Electrical connections shall be carried out in accordance with the applicable regulations, such as conductor sections, fuses, PE connection.

6.2 Overview of Connection Area

Bottom:



Object	Description
A	DC switch to turn off the inverter manually
B	DC input
C	Plug for connecting the RS485 communication module
D	USB plug for connecting the inverter to a PC directly via USB connection
E	Plug for connecting the RJ45, communication module
F	Reserved hole for possible grounding connection
G	AC output
H	Heat sink
I	Extra lock
J	Inductor box



6.3 AC Side Connection



DANGER

DANGER to life due to potential fire or electricity shock.

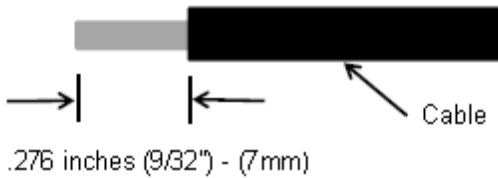
NEVER connect or disconnect the connectors under load.

Integrated RCD and RCM

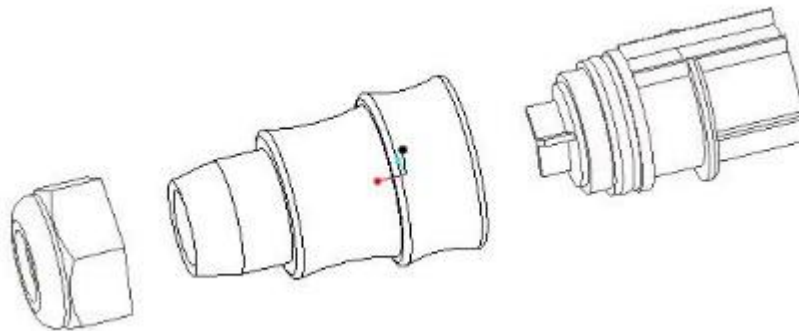
The Macsol inverter is equipped with integrated RCD (Residual Current Protective Device) and RCM (Residual Current Operated Monitor). The current sensor will detect the volume of the leakage current and compare it with the pre-set value. If the leakage current is above the permitted range, the RCD will disconnect the inverter from the AC load.

Assembly Instructions:

1. Strip the cable with the length 0.276 inches (9/32") - (7mm) and please be careful NOT to nick conductors.

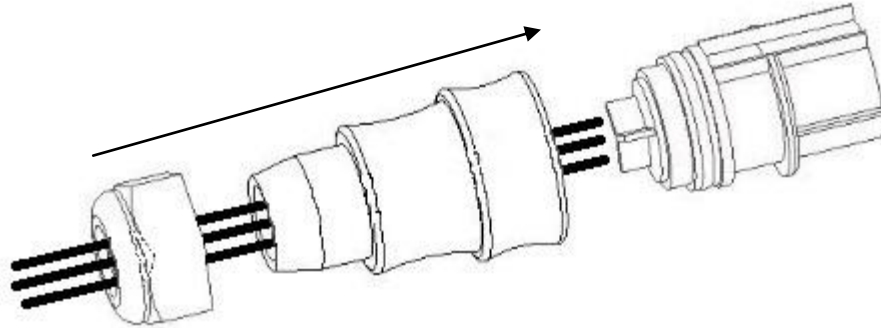


2. Screw off and separate each component of AC connector as follows.

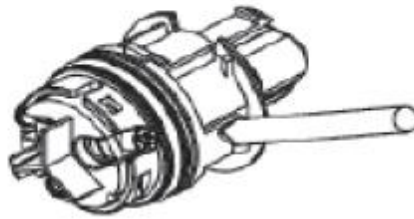




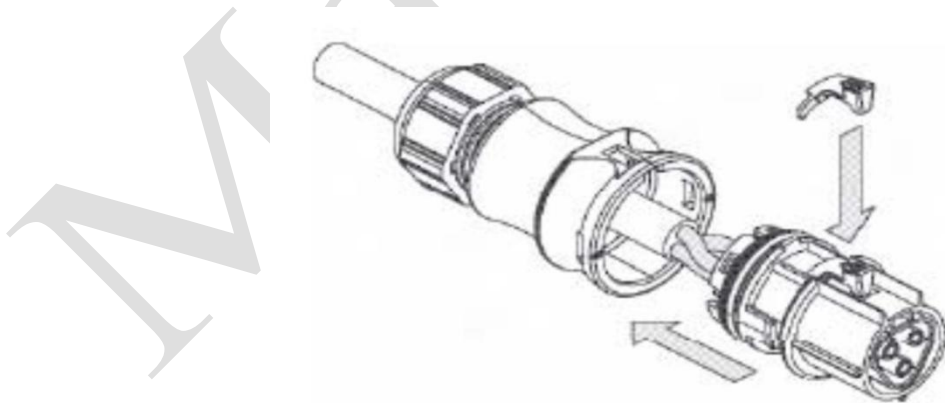
3. Pass the cable through each component from left to the right as follows.



4. Use a screw driver and loose the three screws at the side of the straight plug. Then insert the stripped **N, L and PE cable accordingly** to the corresponding position and fully tighten the screws.



5. Aim the terminals on the straight plug to the holes of the grommet, and then compress them together.



6. Finally, connect the straight plug to the AC terminal on inverter. **Pay attention to the polarity of the terminals to avoid wrong connecting.**



6.4 DC Side Connection

For Macsol – TL3K and Macsol – TL4K, there is only one MPP Tracker, for the two string inputs, the connected PV modules must meet following requirements:

- Same type
- Same quantity
- Identical alignment
- Identical tilt

For Macsol – TL5K, there are two MPP Trackers, thus each string input can connected with different type of PV modules as long as they meet following requirements;

Inverter Type	MPP Tracker	Max. DC Power	Max. DC Voltage	Max. DC Current
Macsol-TL3K	1	3200W	480V	21A
Macsol-TL4K		4500W		21A
Macsol-TL5K	2	5600W		28A



DANGER

DANGER to life due to potential fire or electricity shock.

NEVER connect or disconnect the connectors under load.



NOTICE

If only one string input is used for DC connection, please use the sealing plug to seal the left DC input set to ensure the inverter IP 65 protection.

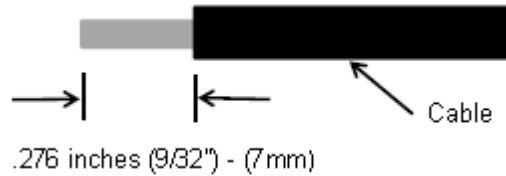


The DC connectors come pre-assembled and the caps are loose. The whole connector will include the male side and female side as showed below:



Assembly Instructions:

1. Strip the cable with the length 0.276 inches (9/32") - (7mm) and please be careful NOT to nick conductors.



Use specified strip tool in this step. Adjust the stripper stopper and put the cable in corresponding notch to strip the length of 7mm. Please see below figures.





2. Insert striped cable into contact barrel and insure all conductor strands are captured in the contact barrel and the conductors are visible in the contact barrel observation hole. Please see below figures.

Pin contact



Barrel observation hole
Conductor should be visible

Socket contact



Barrel observation hole
Conductor should be visible

3. Crimp contact barrel by using the hex crimping die. Please see below figures.

Crimped pin contact



Crimped socket contact



Cable requirements:

Cable Size	Cable pull – out force requirement
2.5 mm ²	Min. 310 N (70 Lbs)
4 mm ²	Min. 400 N (90 Lbs)
6 mm ²	Min. 450 N (100 Lbs)



4. Insert contact cable assembly into back of male and female connector. A “click” should be heard or felt when the contact cable assembly is seated correctly. Please see below figures.



Female side connector (F)



Male side connector (F)

5. Wrest the cap by using the torque of 2.6~2.9NM.



6. After wrest the cap tightly, align the 2 half connectors and mate them together by hand until a “click” is heard or felt.





6.5 DC Side Disconnection

When the separation of DC connectors is necessary, please use the specified tool (Ring tool or wrench tool) to separate them.

While using the ring tool or wrench tool, please make sure the wedge side of the fingers faces the female connector and push the tool down. Then separate the connector by hand. See below figures.



Separation by ring tool

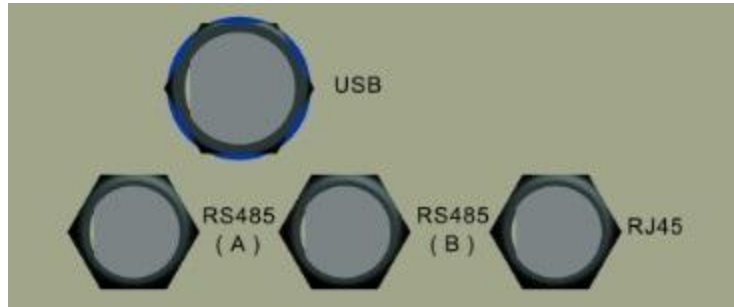


Separation by wrench tool



6.6 Communication and Monitoring Device

There are 4 plugs in the bottom side of the Macsolar inverter:



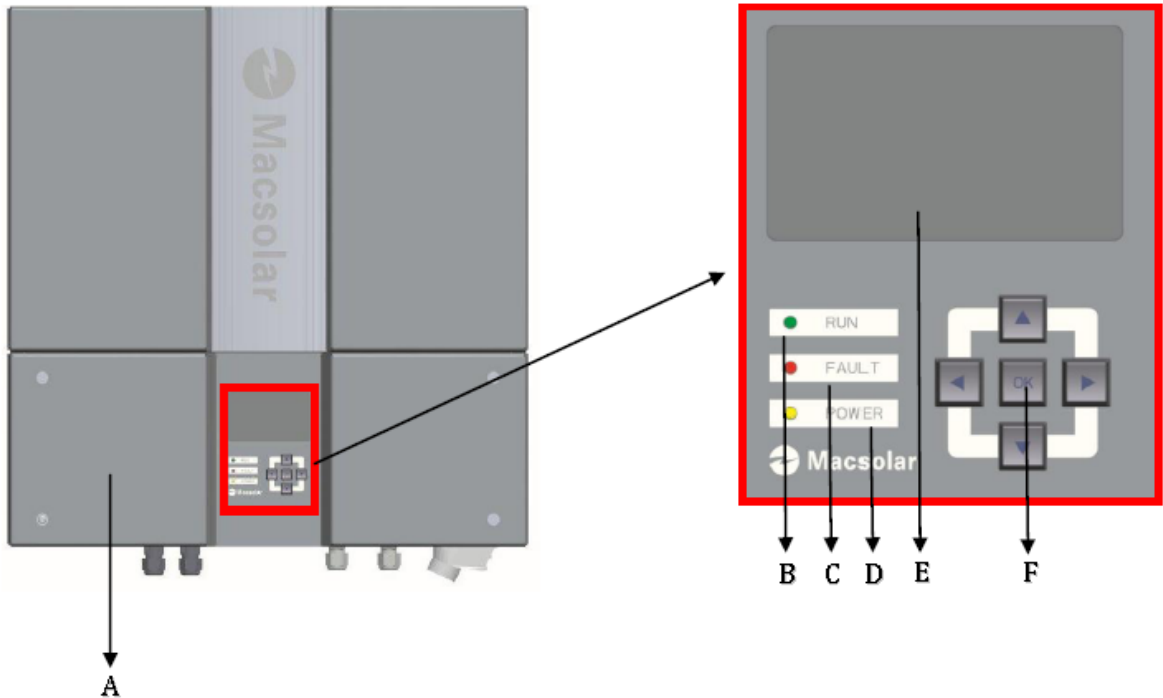
- 1 × USB
- 2 × RS485
- 1 × RJ45

All communication and monitoring plugs in Macsolar inverter are simply “plug and use”.

Please select the appropriate one according to the desired functionality and usage.

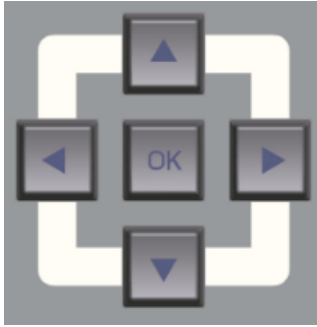
7. CONFIGURATION






7.1 LCD Display



Object	Description
A	Removable front lid for potential maintenance and repair
B	LED light – RUN
C	LED light – FAULT
D	LED light – POWER
E	LCD screen for checking the operating status and configuration
F	Control keyboard for displays and configuration of parameters

Press any key from the control keyboard to illuminate the LCD screen.



Item	Function
	“Right” key Depending on the selection: To navigate right To navigate to the next level menu
	“Down” key Depending on the selection: To navigate down Change to the next number
	“Left” key Depending on the selection: To navigate left To navigate to the previous level menu
	“Up” key Depending on the selection: To navigate up Change to the previous number
	“OK” key Depending on the selection: To confirm a selection To enter the main menu



NOTICE

Mac solar inverter is not an aligned measuring instrument for current, voltage or power consumption. A slight deviation of a few percent points is intrinsic to the system, the results from the inverter cannot be used for grid balance calculations. An aligned meter will be required to make calculations for the utility company.



7.2 Setup

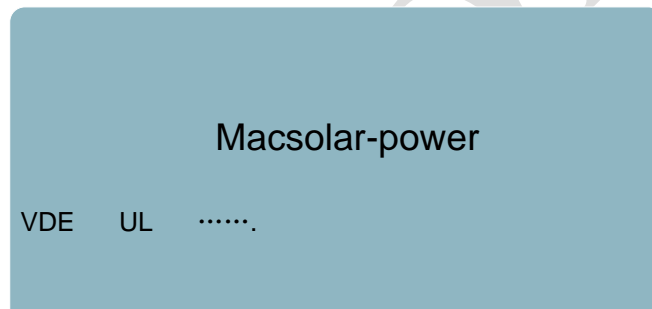


NOTICE

Make sure the DC switch shall switch to “Open”, otherwise Mac solar inverter cannot work due to power shortage.

DISPLAY

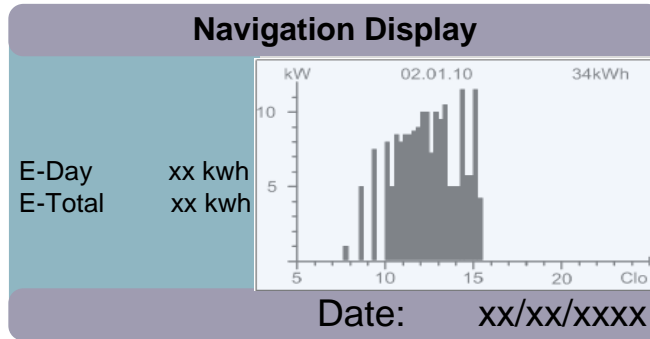
After initializing the inverter with the screen showing all certification this type of inverter has got;



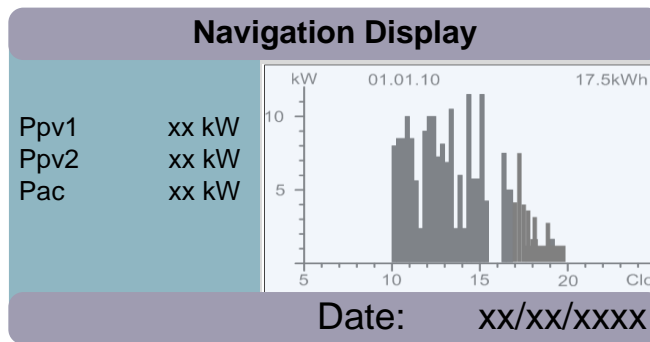
Now in this screen you can check all necessary information about the system;

Navigation Display			
Vpv1	xxVdc	Vpv2	xxVdc
Ipv1	xxAdc	Ipv2	xxAdc
Vgrid	xx Vac	Fgrid	xx.x Hz
Vac	xx V	Iac	xx A
Vbus	xx V	Temp-in	xx °C
Pdc	xx Kw	Pac	xx kW
Time-run	xx h		
E-Day	xx kWh	E-total	xx kWh
Date:			xx/xx/xxxx

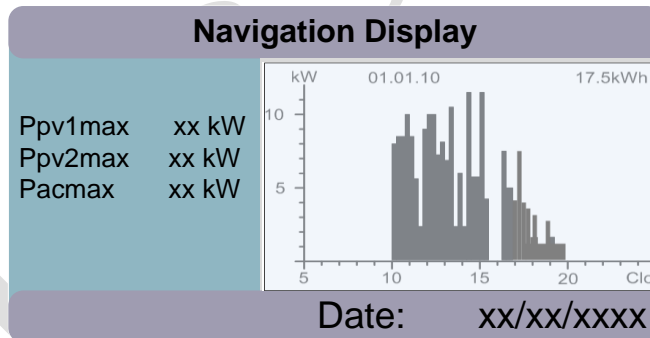
Then the following three screens will show one by one with default 30s interval, you can also change them by “Up/Down” key or “Left/Right” key;



Power Consumption Curve



Daily Power Consumption Curve



Monthly Peak Power Consumption Curve

YIELD POWER

Press “OK” key to enter the main menu, the default screen is the “Yield Power”, it will show the cumulated power consumption by Day/Week/Month/Year or by Hour;

Yield Power		
Yield Power	Day	xxxx kWh
Real-time Value	Week	xxxx kWh
Failure Information	Month	xxxx kWh
History Data	Year	xxxx kWh
Configuration	Per hour	xxxx W
Device Information		
Date:		xx/xx/xxxx

REAL-TIME VALUE

Press “Down” key to enter “Actual Value”, then “Actual Value” is highlighted, please press “Right” key or “OK” key to enter the submenu, and select the real-time information that you’d like to check;

Real-time Value	
Yield Power	
Real-time Value	
Failure Information	PV string1
History Data	PV string2
Configuration	AC
Device Information	
Date: xx/xx/xxxx	

PV string1		
Yield Power		
Real-time Value	PV string1 Power	xxxx W
Failure Information	PV string1 Voltage	xxxx V
History Data		
Configuration	PV string1 Current	xxxx A
Device Information		
Date:		xx/xx/xxxx

PV string2		
Yield Power		
Real-time Value	PV string2 Power	xxxx W
Failure Information	PV string2 Voltage	xxxx V
History Data		
Configuration	PV string2 Current	xxxx A
Device Information		
Date:		xx/xx/xxxx

AC		
Yield Power		
Real-time Value	AC Power	xxxx W
Failure Information	AC Voltage	xxxx V
History Data		
Configuration	AC Current	xxxx A
Device Information	AC frequency	xxxx
Date:		xx/xx/xxxx

FAILURE INFORMATION

Press “Left” key to back to main menu, and then enter “Failure Information”, here you can check all failure information including real-time failure and failure history;

Failure information	
Yield Power	
Real-time Value	
Failure Information	Latest Failure
History Data	Failure List
Configuration	
Device Information	
Date: xx/xx/xxxx	

Latest Failure	
Yield Power	
Real-time Value	Err No. xxxx
Failure Information	Reason xxxxxxxxxxx
History Data	Time xx:xx:xx
Configuration	
Device Information	
Date: xx/xx/xxxx	

In the “Failure List”, in 1 screen you can check up to 5 failures listed by the latest date;

Failure List	
Yield Power	
Real-time Value	1.Time:xx/xx/xx Code:xx
Failure Information	2.Time:xx/xx/xx Code:xx
History Data	3.Time:xx/xx/xx Code:xx
Configuration	4.Time:xx/xx/xx Code:xx
Device Information	5.Time:xx/xx/xx Code:xx
Date: xx/xx/xxxx	

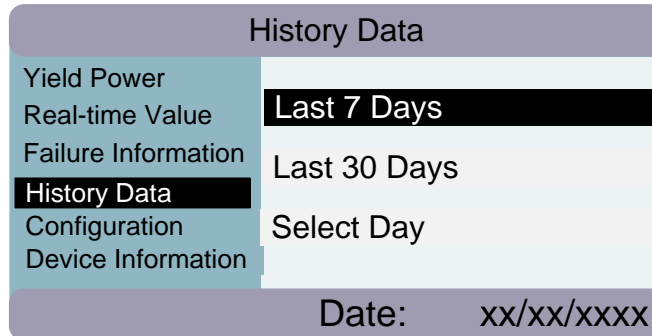
By click one particular failure, you can check the detailed data including Error Code, Error Reason and the failure occurred time;

Failure List	
Yield Power	
Real-time Value	
Failure Information	Error Code: xx
History Data	Error Reason:xxxxxxx
Configuration	Time:xx/xx/xx
Device Information	
Date: xx/xx/xxxx	

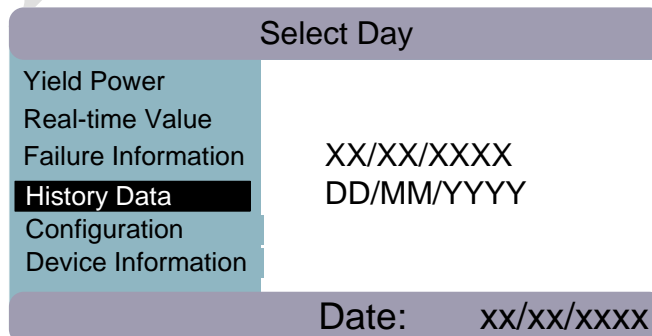
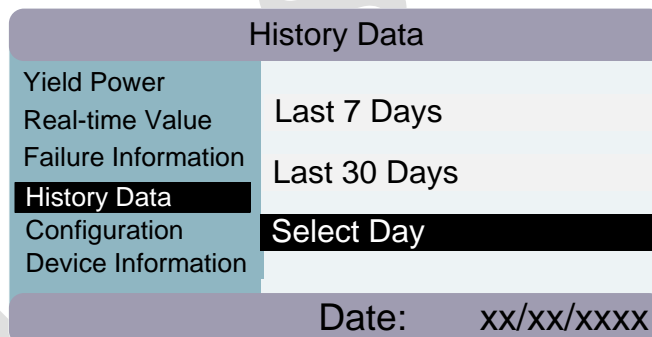
HISTORY DATA

Click the “Left” key to back to main menu and enter the “History Data” screen, here you can check the information for “Last 7 Days”, “Last 30 Days” or “Select Day”;

Select “Last 7 Days” or “Last 30 Days”, press “Right” or “OK” key to show the corresponding power consumption curves;



Select “Select Day”, enter the screen to select a particular date;



Press “Up/Down” and “Right/Left” key to select an object, then press “Up/Down” key to set the number;



When the date is settled, press “OK” key to enter the screen showing the historical data including E-today, E-total, Pmax and Pavg;

Select Day	
Yield Power	XX/XX/XXXX
Real-time Value	E-today xxx kWh
Failure Information	E-total xxx kWh
History Data	Pmax xxx kW
Configuration	Pavg xxx kW
Device Information	
Date: xx/xx/xxxx	

CONFIGURATION

Back to the main menu, and then enter the “Configuration”, here you can setup your “Display Language”, “Country”, “Date/Time”, “Password”, “IP address” as well as “LCD brightness”;

Configuration	
Yield Power	Display Language
Real-time Value	Country
Failure Information	Data/Time
Configuration	Password
Device Information	IP Address
	LCD Brightness
Date: xx/xx/xxxx	

“Display Language” Setup:

Language	
Yield Power	English
Actual Value	Deutsch
Failure information	Español
Configuration	
Device Information	
Date: xx/xx/xxxx	

Language	
Yield Power	Accept? YES NO
Real-time Value	
Failure Information	
Configuration	
Device Information	
Date: xx/xx/xxxx	

Language	
Yield Power	Configuration Successfully!
Real-time Value	
Failure Information	
Configuration	
Device Information	
Date: xx/xx/xxxx	

“Country” Setup:

Country	
Yield Power	Please Enter Your Password <input type="text" value="xxxx"/>
Real-time Value	
Failure Information	
Configuration	
Device Information	
Date: xx/xx/xxxx	



NOTICE

Possible device damage due to wrong configuration

Country setup will directly change the inverter inside configuration about grid voltage and grid frequency.

Country	
Yield Power	
Real-time Value	Great Britain
Failure Information	Deutschland
Configuration	España
Device Information	
Date: xx/xx/xxxx	

Country	
Yield Power	
Real-time Value	Accept?
Failure Information	YES
Configuration	NO
Device Information	
Date: xx/xx/xxxx	

Country	
Yield Power	
Real-time Value	
Failure Information	
Configuration	Configuration Successfully!
Device Information	
Date: xx/xx/xxxx	

“Time/Data” Setup:

Use “Left/Right” key to choose object, and then use “Up/Down” key to set the number;

Date/Time	
Yield Power	
Real-time Value	Date/Time
Failure Information	
Configuration	<input type="text" value="XX/XX/20XX HH:MM:SS"/>
Device Information	
Date: xx/xx/xxxx	

Country	
Yield Power	Configuration Successfully!
Real-time Value	
Failure Information	
Configuration	
Device Information	
Date: xx/xx/xxxx	

“Password” Setup:

Use “Left/Right” key to choose object, and then use “Up/Down” key to set the number;

Password	
Yield Power	Old Password <input type="text" value="xxxx"/> New Password <input type="text" value="xxxx"/> Confirm again <input type="text" value="xxxx"/>
Real-time Value	
Failure Information	
Configuration	
Device Information	
Date: xx/xx/xxxx	

Country	
Yield Power	Configuration Successfully!
Real-time Value	
Failure Information	
Configuration	
Device Information	
Date: xx/xx/xxxx	



“IP Address” Setup:

Use “Left/Right” key to choose object, and then use “Up/Down” key to set the number;



NOTICE

Possible communication failure due to wrong configuration

IP Address will directly affect the performance of the data logger.

Address	
Yield Power	Please Enter Your Password
Real-time Value	
Failure Information	
Configuration	
Device Information	
Date: xx/xx/xxxx	

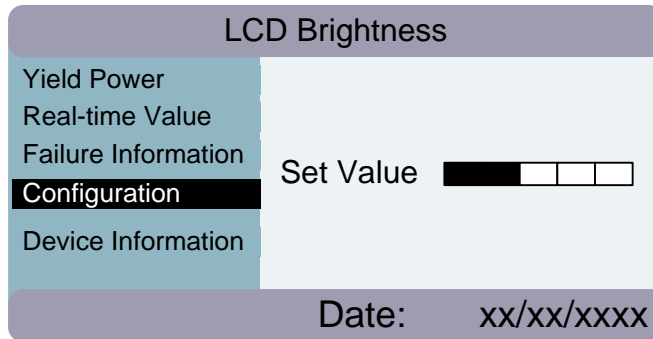
Address	
Yield Power	Please Enter Your Address
Real-time Value	
Failure Information	
Configuration	
Device Information	
Date: xx/xx/xxxx	

Country	
Yield Power	Configuration Successfully!
Real-time Value	
Failure Information	
Configuration	
Device Information	
Date: xx/xx/xxxx	



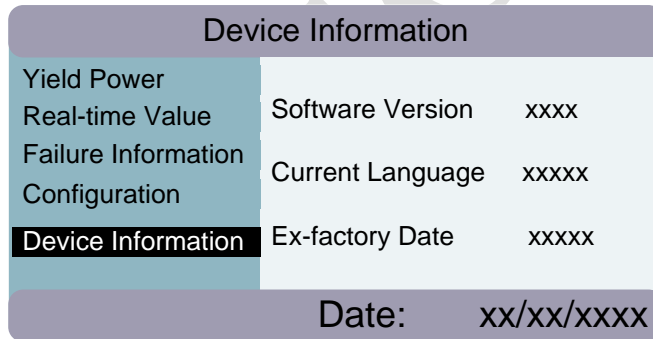
“LCD Brightness” Setup:

Use “Left/Right” key to choose object, and press “OK” key to confirm the selection;



DEVICE INFORMATION

Back to main menu, and then enter “Device Information”, you can check “Software Version”, “Current Language” and “Ex-factory Date”;





7.3 Error Message

If any of the following messages occurs in LCD Screen, or the status LED Light “Fault” is on, there is one or more error that has been detected by Macsolar Inverter.

Please go to Chapter “9. TROUBLESHOOTING” for further information.

Error Nr.	Information
0	Grid Vtg. Fault
1	Grid Vtg.10min Fault
2	Fac Fault
3	Utility Loss
4	High DC Bus
5	GFCI Fault
6	Over-temperature
7	Varistor Fault
8	PV-Overvoltage
9	Consistence Fault
10	Isolation Fault
11	DC INJ Fault
12	Device Fault
13	GFCI Device Fault
14	Comm. disturbed
15	Current Sensor Fault
16	CUP Ref 2.5V Fault
17	EEPROM R/W Fail
18	DC INJ Device Fault
19	Relay Fault
20	AC-Overcurrent



8. RECYCLING AND DISPOSAL



WARNING



This device SHALL NOT be disposed of in residential waste.

To comply with European Directive 2002/96/EC on waste Electrical and Electronic Equipment and its implementation as national law, electrical equipment that has reached the end of its life must be collected separately and returned to an approved recycling facility. Any device that you no longer required must be returned to your dealer or you must find an approved collection and recycling facility in your area.

Ignoring this EU Directive may have severe effects on the environment and your health.



9. TROUBLESHOOTING

Error No.	Message	Corresponding Action
0	<p>“Grid Vtg. Fault”</p> <p>The grid voltage has exceeded the permitted range according to local grid regulations.</p> <p>Following causes might lead to this error:</p> <ul style="list-style-type: none"> • Grid voltage is too high at the point of common coupling to the inverter. • Grid impedance at the terminal of the inverter is too high. <p>For safety consideration, the inverter will disconnect itself from the grid for a short period of time, and it will reconnect to the grid automatically after a short period of time if the grid voltage is back to the permitted range.</p>	<ul style="list-style-type: none"> • Check the grid voltage. • Check the grid connection of the inverter. <p>If the grid voltage exceeds the permitted range because of local grid conditions, please ask the utility operator if the voltage can be adjusted at the feed-in point or if changes in the values of the monitored operational limits are possible.</p> <p>If the grid voltage that checked is within the permitted range, yet this error is still showing in the LCD screen, please contact MacSolar Serviceline.</p>
0	<p>“Grid Vtg. Fault”</p> <p>The grid voltage has fallen below the permitted range according to local grid regulations.</p> <p>Following causes might lead to this error:</p> <ul style="list-style-type: none"> • Grid voltage is too low at the point of common coupling to the inverter. <p>For safety consideration, the inverter will disconnect itself from the grid for a short period of time, and it will reconnect to the grid automatically after a short period of time if the grid voltage is back to the permitted range.</p>	<ul style="list-style-type: none"> • Check the grid voltage. • Check the grid connection of the inverter. <p>If the grid voltage falls below the permitted range because of local grid conditions, please ask the utility operator if the voltage can be adjusted at the feed-in point or if changes in the values of the monitored operational limits are possible.</p> <p>If the grid voltage that checked is within the permitted range, yet this error is still showing in the LCD screen, please contact MacSolar Serviceline.</p>



Error No.	Message	Corresponding Action
1	<p>“Grid Vtg. 10min Fault”</p> <p>The average grid voltage over 10 minutes has been outside the permitted range according to local grid regulations.</p> <p>Following causes might lead to this error:</p> <ul style="list-style-type: none"> • Grid voltage is too high at the point of common coupling to the inverter. • Grid impedance at the terminal of the inverter is too high. <p>For safety consideration, the inverter will disconnect itself from the grid for a short period of time, and it will reconnect to the grid automatically after a short period of time if the grid voltage is back to the permitted range.</p>	<ul style="list-style-type: none"> • Check the grid voltage. • Check the grid connection of the inverter. <p>If the grid voltage exceeds the permitted range because of local grid conditions, please ask the utility operator if the voltage can be adjusted at the feed-in point or if changes in the values of the monitored operational limits are possible.</p> <p>If the grid voltage that checked is within the permitted range, yet this error is still showing in the LCD screen, please contact Macsolar Serviceline.</p>
2	<p>“Fac Fault”</p> <p>The grid frequency has left the permitted range.</p> <p>For safety consideration, the inverter will disconnect itself from the grid for a short period of time, and it will reconnect to the grid automatically after a short period of time if the grid frequency is back to the permitted range.</p>	<ul style="list-style-type: none"> • Within safety scope, check the grid frequency and observe how often major deviations occur. <p>If there are repeated frequency turbulences which lead to this error, please ask the utility operator if modification of the operating parameter is possible.</p> <p>If this error is not solvable, please contact Macsolar Serviceline.</p>
3	<p>“Utility Loss”</p> <p>The inverter has detected an error in the cabling and cannot connect to the grid.</p> <p>Following causes might lead to this error:</p> <ul style="list-style-type: none"> • Grid connection installation failure. • Cabling failure. • Incorrect country setting. 	<ul style="list-style-type: none"> • Check AC installation. • Check grid connection. • Check if the country setting is correct: <ul style="list-style-type: none"> – Via LCD screen (please refer to chapter 7.2 “Configuration”). – Via the remote communication: setting Parameter “Country”. <p>If this error is not solvable, please contact Macsolar Serviceline.</p>



Error No.	Message	Corresponding Action
4	<p>“High DC Bus”</p> <p>The voltage of the Bus which paralleling connected with the string is too high.</p> <p>Following causes might lead to this error:</p> <ul style="list-style-type: none"> • The DC input voltage connected to the inverter is too high. • Sudden DC surge. <p>For safety consideration, the inverter will shutdown itself.</p>	<ul style="list-style-type: none"> • Please immediately disconnect the inverter from the PV strings (see chapter 6.5 “DC side Disconnection”) or else the inverter might be damaged. • Check the DC voltage of the strings for adherence to the maximum input voltage of the inverter, before you reconnect the inverter to the PV strings.
5	<p>“GFCI Fault”</p> <p>The inverter has detected a ground fault in the PV generator.</p>	<ul style="list-style-type: none"> • The installer of the PV generator must solve the ground faults before you re-connect the strings. <p>If this error is not solvable, please contact MacSolar Serviceline.</p>
6	<p>“Over-temperature”</p> <p>The delivered power of the inverter was reduced below rated power because of abnormal temperature within 0.5s.</p> <p>Following causes might lead to this error:</p> <ul style="list-style-type: none"> • At least one or more of the thermally monitored varistors are defective. • Overheating inside. • Not sufficient ventilation. 	<p>If this event occurs often:</p> <ul style="list-style-type: none"> • Please ensure sufficient ventilation. • Check the varistors. <p>If this error is not solvable, please contact MacSolar Serviceline.</p>
7	<p>“Varistor Fault”</p> <p>At least one of the varistors from the DC or AC side is defected.</p> <p>Following causes might lead to this error:</p> <ul style="list-style-type: none"> • Varistor is bust due to over-voltage protection. 	<p>If this event occurs:</p> <ul style="list-style-type: none"> – Please check the varistors as chapter 5.6 “Check Varistors”. <p>If this error is not solvable, please contact MacSolar Serviceline.</p>



Error No.	Message	Corresponding Action
8	<p>“PV-Overvoltage”</p> <p>The DC input voltage which connects to the inverter is too high. Following causes might lead to this error:</p> <ul style="list-style-type: none"> • The open-circuit voltage of the PV generator is higher than the maximum DC input voltage of the inverter. • Sudden DC surge. • Environment temperature too high. 	<ul style="list-style-type: none"> • Please immediately disconnect the inverter from the PV strings (see chapter 6.5 “DC side Disconnection”) or else the inverter might be damaged. <p>Check the DC voltage of the strings for adherence to the maximum input voltage of the inverter, before you reconnect the inverter to the PV strings.</p>
9	<p>“Consistence Fault”</p> <p>Following causes might lead to this error:</p> <ul style="list-style-type: none"> • Interference device 	<p>If this event occurs often:</p> <ul style="list-style-type: none"> – Please contact Macsolar Serviceline.
10	<p>“Isolation Fault”</p> <p>There is a sudden isolation fault which is detected by the inverter. Normally this fault will only exist for a very short period of time and shall not have any bad influence to the inverter.</p>	<p>If this event occurs often:</p> <ul style="list-style-type: none"> – Please contact Macsolar Serviceline.
11	<p>“Device Fault”</p> <p>A fault has occurred in one or more major components of the inverter. For safety consideration, the inverter will shutdown itself.</p>	<p>If this event occurs:</p> <ul style="list-style-type: none"> – Please contact Macsolar Serviceline.
12	<p>“DC INJ Fault”</p> <p>The alternative component of the DC current is out of the permitted range.</p>	<p>If this event occurs often:</p> <ul style="list-style-type: none"> – Please contact Macsolar Serviceline.
13	<p>“GFCI Device Fault”</p> <p>The internal sensor has detected that the GFCI Device is out of function. For safety consideration, the inverter will shutdown itself.</p>	<p>If this event occurs:</p> <ul style="list-style-type: none"> – Please contact Macsolar Serviceline.
14	<p>“Comm. Disturbed”</p> <p>A fault has occurred in the internal communication of the inverter. However, the inverter continues feeding into the grid.</p>	<p>If this event occurs often:</p> <ul style="list-style-type: none"> – Please contact Macsolar Serviceline.



Error No.	Message	Corresponding Action
15	“Current Sensor Fault” A fault has occurred in one or more current sensor of the inverter. For safety consideration, the inverter will shutdown itself.	If this event occurs: – Please contact Macsolar Serviceline.
16	“CPU Ref 2.5V Fault” The CPU voltage that detected by internal sensor is deviating the pre-set 2.5V reference line.	If this event occurs: – Please contact Macsolar Serviceline.
17	“EEPROM R/W Fail” Internal device fault. For safety consideration, the inverter will shutdown itself.	If this event occurs: – Please contact Macsolar Serviceline.
18	“DC INJ Device Fault” A fault has occurred in the sensor which detects the alternative component of the DC current. For safety consideration, the inverter will shutdown itself.	If this event occurs: – Please contact Macsolar Serviceline.
19	“Relay Fault” A fault has occurred in the relay which will automatically disconnect the inverter from the grid. For safety consideration, the inverter will shutdown itself.	If this event occurs: – Please contact Macsolar Serviceline.
20	“AC-Overcurrent” The detected AC current has exceeded the pre-set Max. AC Current. Following causes might lead to this error: <ul style="list-style-type: none">• Short circuit happens in the output circuit.	If this event occurs often: Please contact Macsolar Serviceline.

10. GUARANTY SCOPE AND GUARANTY SERVICE

10.1 Macsolar Factory Guaranty Scope

This guaranty declaration is solely applied to the following Macsolar Grid Tie Solar Inverter:

- Macsol – TL3K
- Macsol – TL4K
- Macsol – TL5K

For the above named products, you will receive a Macsolar factory warranty card which will valid for 5 years from the date of purchase. The Macsolar factory warranty covers any costs which you incur for repair or replacement parts during the agreed period beginning at the date of purchase of the device, subject to the conditions listed below. This is not associated with a durability warranty.

You have the possibility of purchasing an extension of this Macsolar factory warranty within the 5 year term of the Macsolar factory warranty. The prices are based on the respective Macsolar price list valid at the time the warranty extension was signed.

10.2 Guaranty Conditions

This guaranty declaration is solely applied when any defect of Macsolar inverter is detected.

If a device becomes defective during the Macsolar guaranty period, and it is proved that further functional performance is impossible, the device will be, as selected by Macsolar:

- Repair the defect at the factory free of charge within the guaranty period.
- Exchange for a replacement device of equivalent value according to model and age.

If it is the latter case, the remainder of the warranty entitlement will be automatically transferred to the replacement device. In this case, you will not receive a new certificate since your entitlement is already documented at Macsolar.



NOTICE

If exchange for a replacement device of equivalent value according to model and age is needed. The defected unit must, where possible, be returned in its original or equivalent packaging.

MacSolar will only perform guaranty service only if the user provides a copy of invoice which was issued to the user by the dealer and a completed warranty card. If any one of these two is missing, MacSolar has the rights to deny the guaranty service or only provide paid service.

10.3 Guaranty Exclusion

Guaranty declaration is excluded in the following cases:

- Transport damage
- Improper installation and installation that does not comply with standards
- Use of the devices in ways not intended
- Improper operations without following the user manual
- Operation of units with defective protective equipment which might lead to damage
- Unauthorized modifications to the units or repair attempts
- Influence of foreign objects and force majeure (lightning, grid overvoltage, severe weather, fire)
- Insufficient ventilation of the unit
- Failure to observe the relevant safety regulations

If the device becomes defective when in any of the above cases, MacSolar will not perform guaranty service and the user shall take whole responsibility for the defects.



11. CONTACT

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MacSolar

ABBREVIATION

LCD	Liquid Crystal Display
LED	Light Emitting Diode
MPPT	Maximum Power Point Tracking
PV	Photovoltaic
GFDI	Ground Fault Detector/Interrupter
Vdc	Voltage at the DC side
Vac	Voltage at the AC side
Vmpp	Voltage at the Maximum Power Point
Impp	Amperage at Maximum Power Point
Voc	Open Circuit Voltage
Isc	Short Circuit Current
AC	Alternating Current (Form of electricity supplied by Utility Company)
DC	Direct Current (Form of electricity generated by PV modules)
VDE 0126-1-1	German standards for establishing suitability for Grid Connection of the Inverter.
UL 1741	US standards for establishing suitability for Grid Connection of the Inverter.
DC Switch	Switch in the DC Circuit. Disconnects DC source from Inverter. May be integrated or external to Inverter.