CyberPower®

Reliability. Quality. Value.

User's Manual

CPSPV7000ETL/ CPSPV8000ETL/ CPSPV9000ETL

CPSPV10000ETL/ CPSPV12000ETL

CPSPV18000ETL/ CPSPV20000ETL

Index

1 Information on this Manual

1.1 Validity

This installation guide contains installation, commissioning, communication, trouble shooting. Information of CPS Mini Central series:

- CPSPV7000ETL
- CPSPV8000ETL
- CPSPV9000ETL
- CPSPV10000ETL
- CPSPV12000ETL
- CPSPV18000ETL
- CPSPV20000ETL

With this installation guide, users are able to install and operate the inverters easily. This manual does not cover any details concerning equipment connected to the CPS Mini Central series. Store this manual where accessible at all times.

1.2 Target Group

This manual is for qualified persons such as PV system installers or electricians.

Notes: For possible changes in this manual, CyberPower Systems, Inc. accepts no responsibilities to inform the users

1.3 Symbols Used

The following types of safety instructions and general information appear in this document as described below:

Symbol	description
	Read the manual
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, could result in death or serious injury.

	CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	NOTICE indicates a situation which, if not avoided, could result in property damage.
	Information that you must read and know to ensure optimal operation of the system.

2 Safety

2.1 Intended Use

CPS Mini Central series inverters are to be used solely to feed solar energy converted photovoltaically into the public grid. CPS Mini Central series inverters are multi-string inverters with multi-MPP trackers, which mean they are able to connect to different PV module arrays. The equipment may only be operated in compliance with its intended use.

Grid-tied PV system Overview:
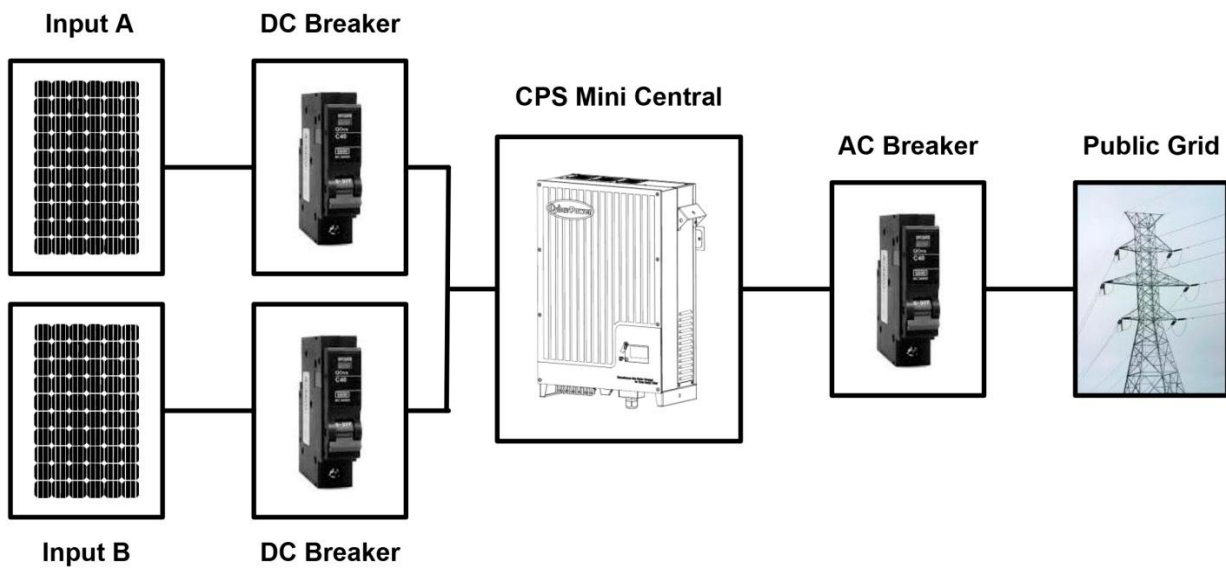
Fig 1.1

The inverter may only be operated with a permanent connection to the public power grid. The inverter is not intended for mobile use. Any other or additional use is not considered as intended use. The manufacturer is not responsible for any damages resulting from unintended use. Damage caused by such unintended use is at the sole risk of the operator.

As drawings shown above, a complete Grid-tied PV system consists of PV modules, PV inverters, public grid and other components. Moreover, PV inverters always act as key components.

PV modules Capacitive Discharge Currents
PV modules with large capacities relative to earth, such as thin-film PV modules with cells on a metallic substrate, may only be used if their coupling capacity does not exceed 470nF. During feed-in operation, a leakage current flows from the cells to earth, the size of which depends on the manner in which the PV modules are installed (e.g. foil on metal roof) and on the weather (rain, snow). This "normal" leakage current may not exceed 50mA due to the fact that the inverter would otherwise automatically disconnect from the electricity grid as a protective measure.

	If PV modules of the PV system require POSITIVE or NEGATIVE to connect to GROUND, or the capacitance relative to ground of the modules is large, please contact CyberPower Systems, Inc. for technical support before installation.
i **Information**	

2.2 Safety Precautions

The CPS Mini Central series is designed and tested according to international safety requirements; however, certain safety precautions must be observed when installing and operating this inverter. Read and follow all instructions, cautions and warnings in this installation manual.

2.2 Assembly Warnings

⚠ **WARNING**	➢ Prior to installation, inspect the unit to ensure absence of any transport or handling damage, which could affect insulation integrity or safety clearances; failure to do so could result in safety hazards. ➢ Unauthorized removal of necessary protections, improper use, incorrect installation and operation may lead to serious safety, shock hazards or equipment damage. ➢ In order to minimize the potential of a shock hazard due to hazardous voltages, cover the entire solar array with dark material prior to connecting the array to any equipment.
⚠ **CAUTION**	Grounding the PV modules: Comply with the local requirements for grounding the PV modules and the PV generator. CyberPower recommends connecting the generator frame and other electrically conductive surfaces in a manner which ensures continuous conduction and ground these in order to have optimal protection of the system and personnel.

2.3 Electrical Connection Warnings

⚠ **DANGER**	➢ Some components in the inverter are live. Touching live components can result in serious injury or death.
	➢ Danger to life due to high voltages in the inverter
	   ● All work on the inverter may be carried out by qualified personnel only.
	   ● The appliance is not to be used by children or persons with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
	➢ Children are forbidden to play around the CPS Mini Central series.

⚠ **WARNING**	➢ Make all electrical connections (e.g. conductor termination, fuses, PE connection, etc.) in accordance with prevailing regulations. When working with the inverter powered on, adhere to all prevailing safety regulations to minimize risk of accidents. ➢ The CPS Mini Central series may only be operated with PV generators (modules and cabling) with protective insulation. Do not connect any source of energy other than PV modules to the CPS Mini Central series. ➢ Systems with inverters typically require additional control (e.g., switches, disconnects) or protective devices (e.g., fusing circuit breakers) depending upon the prevailing safety rules. ➢ Please read this manual carefully, the manufacturer or supplier is not responsible for damage caused by incorrect operation, installation, wiring, transport, etc.
⚠ **CAUTION**	➢ The CPS Mini Central series is to be used solely to feed solar energy converted photovoltaically into the public grid. The inverter is suitable for mounting indoors and outdoors. ➢ You can use the AC current generated as follows:<table><tr><td>House grid:</td><td>Energy flows into the house grid. The consumers connected, for example, household devices or lighting, consume the energy. The energy left over is fed into the public grid. When the CPS Mini Central series do not generate any energy, e.g., at night, the consumers which are connected are supplied by the public grid. The energy displayed on the LCD of inverter is for reference only. When energy is fed into the public grid, the energy meter spins backwards.</td></tr><tr><td>Public grid:</td><td>Energy is fed directly into the public grid. The CPS Mini Central series need install a separate energy meter. The energy produced is compensated at a rate depending on the electric power company.</td></tr></table>

2.4 Operation Warnings

⚠ **WARNING**	➢ Ensure all covers and doors are closed and secure during operation. ➢ Although designed to meet all safety requirements, some parts and surfaces of Inverter are still hot during operation. To reduce the risk of injury, do not touch the heat sink at the back of the PV-Inverter or nearby surfaces while Inverter is operating. ➢ Incorrect sizing of the PV plant may result in voltages being present which could destroy the inverter. The inverter display will read the error message " PV Voltage High " ● Turn the rotary switch of the DC Disconnect to the Off position immediately. ● Contact installer.
⚠ **CAUTION**	➢ All operations regarding transport, installation and start-up, including maintenance must be operated by qualified, trained personnel and in compliance with all prevailing codes and regulations. ➢ Anytime the inverter has been disconnected from the power network, use extreme caution as some components can retain charge sufficient to create a shock hazard; to minimize occurrence of such conditions, comply with all corresponding safety symbols and markings present on the unit and in this manual. ➢ In special cases, there may still be interference for the specified application area despite maintaining standardized emission limit values (e.g. when sensitive equipment is located at the setup location or when the setup location is near radio or television receivers).In this case, the operator is obliged to take proper action to rectify the situation. ➢ Possible damage to health as a result of the effects of radiation! ● Do not stay closer than 20 cm to the inverter for any length of time.

2.5 Symbols on the inverter

Symbol	Explanation
⚡	Electrical voltage!
🔥	Risk of burns!
⏚	Point of connection for grounding protection.
⎓	Direct Current (DC)
∼	Alternating Current (AC)
CE	CE mark. The inverter complies with the requirements of the applicable EC guidelines.

3 Product Description

3.1 CPS Mini Central series overview
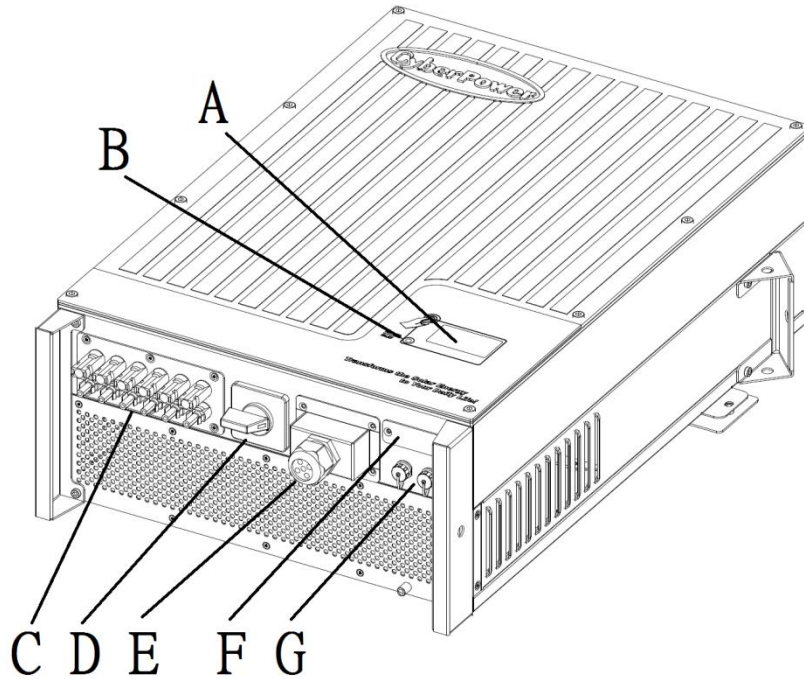
Position	Description
A	LCD
B	LED
C	PV input terminals
D	DC Switch
E	AC output
F	RS232 lid
G	RS485

Symbol on the inverter
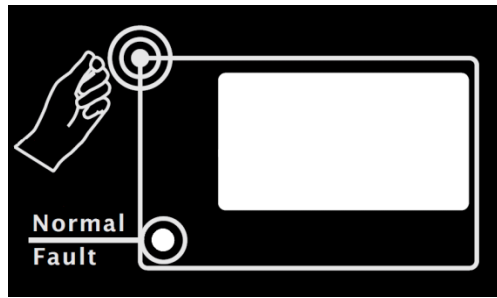
Symbol	Description	Explanation	
Tap symbol	Tap symbol	Indicates display operation (see Section 6).	
Inverter state symbol	Inverter state symbol	Green/constant	Operation
		Red/constant	1、Fault-- contact installer 2、Standby module
		Red/flashing	1、Fans Fault-- contact installer 2、Software update

3.2 Type label

The type labels provide a unique identification of the inverter (The type of product, Device-specific characteristics, Certificates and approvals). The type labels are on the right-hand side of the enclosure.

CyberPower
PV Grid Inverter

| Model Name	CPSPV20000ETL
Max. DC voltage	1000V
DC voltage range	300V-1000V
Full load voltage range	400V-800V
Max. input current per string	26A
Max. apparent power	20kVA
Norminal output current	29A
Norminal output voltage	230V/400V(3/N/PE)
AC Frequency range	50Hz -6/+5Hz
Power Factor	0.9leading-0.9laging
Safety Level	Class I
Protection Degree	IP65
Operation Ambient Temperature	-25°C - +60°C

CE VDE 0126-1-1
CE, IEC 62109

More detail about the type label as the chart below:

Model Name	CPSPV7000ETL	CPSPV8000ETL	CPSPV9000ETL
Max DC voltage	1000V	1000V	1000V
Max input current	15A / 15A	15A / 15A	15A / 15A
MPP voltage range	300V-1000V	300V-1000V	320V-1000V
AC Nominal voltage	3/N/ PE 230V/400V	3/N/ PE 230V/400V	3/N/ PE 230V/400V
AC grid frequency; Range	50/60Hz -6Hz/+5Hz	50/60Hz -6Hz/+5Hz	50/60Hz -6Hz/+5Hz
Max. AC output power	7KW	8kW	9KW
Nominal output current	10.2A	11.6A	13.1A
Max. output current	11.7A	13.3A	15.0A
Protection Degree	IP65	IP65	IP65
Operation temperature range	-25°C ~ +60°C	-25°C ~ +60°C	-25°C ~ +60°C

Model Name	CPSPV10000ETL	CPSPV12000ETL	CPSPV18000ETL	CPSPV20000ETL
Max DC voltage	1000V	1000V	1000V	1000V
Max input current	15A / 15A	17A / 17A	23A / 23A	26A / 26A
MPP voltage range	300V-1000V	300V-1000V	300V-1000V	300V-1000V
AC Nominal voltage	3/N/ PE 230V/400V	3/N/ PE 230V/400V	3/N/ PE 230V/400V	3/N/ PE 230V/400V
AC grid frequency; Range	50/60Hz -6Hz/+5Hz	50/60Hz -6Hz/+5Hz	50/60Hz -6Hz/+5Hz	50/60Hz -6Hz/+5Hz
Max. AC output power	10KW	12kW	18KW	20KW
Nominal output current	14.4A	17.5A	26.0A	29.0A
Max. output current	16.0 A	19.0 A	28.6 A	32.0 A
Protection Degree	IP65	IP65	IP65	IP65
Operation temperature range	-25°C ~ +60°C	-25°C ~ +60°C	-25°C ~ +60°C	-25°C ~ +60°C

3.3 Size and weight
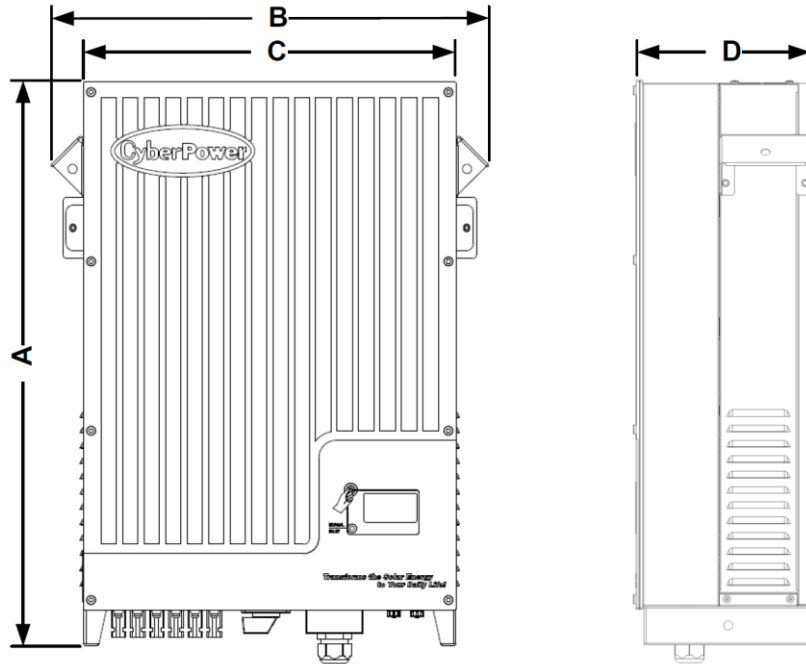
	A(mm)	B(mm)	C(mm)	D(mm)	Weight(kg)
CPSPV7000ETL ~ CPSPV12000ETL	740	490	405	235	41
CPSPV18000ETL CPSPV20000ETL	740	570	485	235	60

3.4 Transportation

The inverter is thoroughly tested and inspected strictly before delivery. Our inverters leave our factory in proper electrical and mechanical condition. Special packaging ensures safe and careful transportation. However, transport damage may still occur. The shipping company is responsible in such cases. Thoroughly inspect the inverter upon delivery. Immediately notify the responsible shipping company if you discover any damage to the packaging which indicates that the inverter may have been damaged or if you discover any visible damage to the inverter. We will be glad to assist you, if required. When transporting the inverter, the original or equivalent packaging should to be used, and the maximum layers for original carton is four, as this ensures safe transport.

3.5 Storage of Inverter

If you want to storage the inverter in your warehouse, you should choose an appropriate location to store the inverter.

➢ The unit must be stored in original package and desiccant must be left in the package.

➢ The storage temperature should be always between -25℃ and +60℃. And the storage relative humidity should be always between 0 and 95%.

➢ If there are lots of inverters need to be stored, the maximum layers for original carton is four.

➢ After long term storage, local installer or service department of CyberPower should perform a comprehensive test before installation

i **Information**	After long term storage, the Real Time Clock of the inverter maybe not correct, it will cause the Energy produced today (E_day) error, you need to set the time and date, refer to Fig 6.3.15 or 6.4.3 text line.

3.6 The advantage of the CPS Mini Central inverters

The features of CPS Mini Central series inverter are below:

● Dual independent MPP trackers
● Integrated DC disconnect switch
● Wide PV voltage range：300V~1000V
● The maximum efficiency is 98%
● The Europe efficiency is 97.5%
● IP65 environmental protection
● Easy to install

4 Unpacking

Before opening the packing box of CPS Mini Central inverters, please note that whether there are any visible external damages.

Once open the packing box, please check the delivery for completeness and for any visible external damages of the inverter. If there are anything damaged or missing, please contact your dealer. Complete delivery should contain as follows.
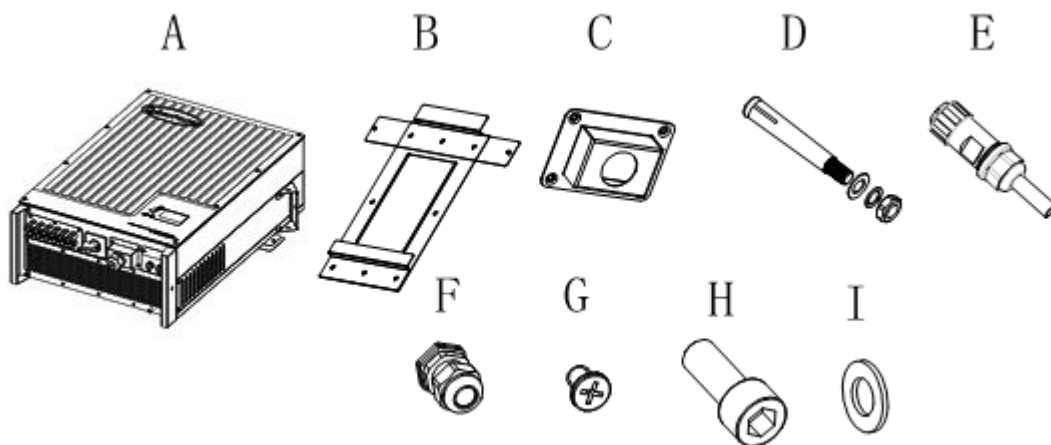

Fig 4.1

Item	quantity	Description
A	1	CPS Mini Central inverter
B	1	Mounting frame
C	1	Waterproof cover
D*	6/8	Explosion screw
E	2	RS485 connector
F	1	Cable gland for AC connection
G	4	M4 cross recessed countersunk head screws
H	3	M6 socket head cap screws
I	2	Flat mat
--	1	Warranty(not show in the picture)
--	1	User manual (not show in the picture)

*Number of D is 6 for CPSPV7000ETL~CPSPV12000ETL, and 8 forCPSPV18000WTL/CPSPV20000ETL.

Information	Though the packaging box of CPS Mini Central inverter is durable, please treat the packing box gently and avoid dispose the packing box.

5 Installation

5.1 Safety instruction

| ⚠🔥	**Danger to life due to fire or explosion** ➢ Despite careful construction, electrical devices can cause fires. ➢ Do not install the inverter on easily flammable materials and where flammable materials are stored.
⚠♨	**Risk of burns due to hot enclosure parts** Mount the inverter in such a way that it cannot be touched inadvertently.

➢ All electrical installations shall be done in accordance with the local and national electrical codes. Do not remove the casing. Inverter contains no user serviceable parts. Refer servicing to qualified service personnel. All wiring and electrical installation should be conducted by a qualified service personnel.

➢ Carefully remove the unit from its packaging and inspect for external damage. If you find any imperfections, please contact your local dealer.

➢ Be sure that the inverters connect to the ground in order to protect property and personal safety.

➢ The inverter must only be operated with PV generator. Do not connect any other source of energy to it.

➢ Both AC and DC voltage sources are terminated inside the PV Inverter. Please disconnect these circuits before servicing.

➢ This unit is designed to feed power to the public power grid (utility) only. Do not connect this unit to an AC source or generator. Connecting Inverter to external devices could result in serious damage to your equipment.

➢ When a photovoltaic panel is exposed to light, it generates a DC voltage. When connected to this equipment, a photovoltaic panel will charge the DC link capacitors.

➢ Energy stored in this equipment's DC link capacitors presents a risk of electric shock. Even after the unit is disconnected from the grid and photovoltaic panels, high voltages may still exist inside the PV-Inverter. Do not remove the casing until at least 5 minutes after disconnecting all power sources.

➢ Although designed to meet all safety requirements, some parts and surfaces of Inverter are still hot during operation. To reduce the risk of injury, do not touch the heat sink at the back of the PV-Inverter or nearby surfaces while Inverter is operating.

5.2 Selecting the Installation Location

This is guidance for installer to choose a suitable installation location, to avoid potential damages to device and operators.

1) The wall selected to install the inverter must be strong and firm enough to support and bear the weight of the inverter for a long period time. (Refer to Chapter 11 Specifications)

2) The location selected must be suitable for inverters' dimension. (Refer to 3.3 Dimensions and Fig.5.2 Required Clearances)

3) Do not install the inverter on structures constructed of flammable or thermo labile materials.

4) Never install the inverter in environment of little or no air flow, nor dust environment.

5) The Ingress Protection rate is IP65 which means the inverter can be installed outdoors and indoors.

6) Do not expose the inverter to direct sunlight, in order to avoid the power and efficiency derating caused by excessive heating.

7) The humidity of the installation location should be 0~95% without condensation.

8) The ambient temperature of the inverter should be -25℃~+60℃.

9) The installation location must be freely and safely to get at all times.

10) Vertically installation and make sure the connection of inverter must be downwards. Never install horizontal and avoids forward and sideways tilt.(Refer to drawings below)
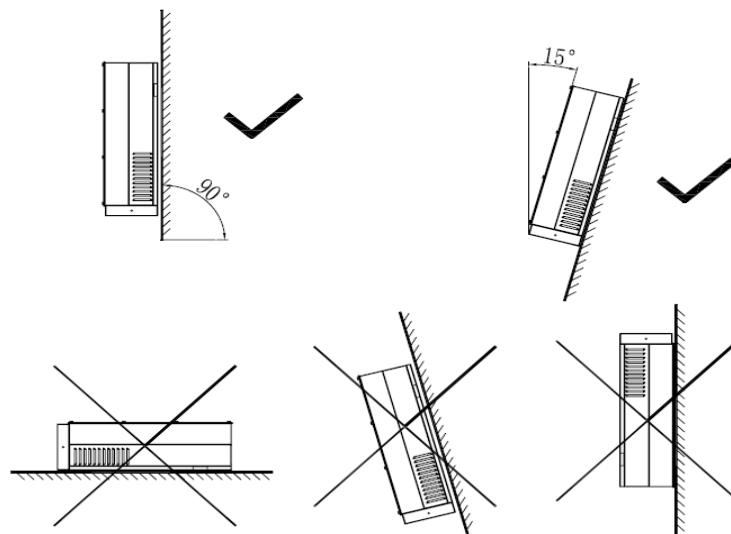
Fig 5.1

11) Notice the minimum clearances of the inverter. (Refer to 3.3 Dimensions and Fig.5.2 Required Clearances).
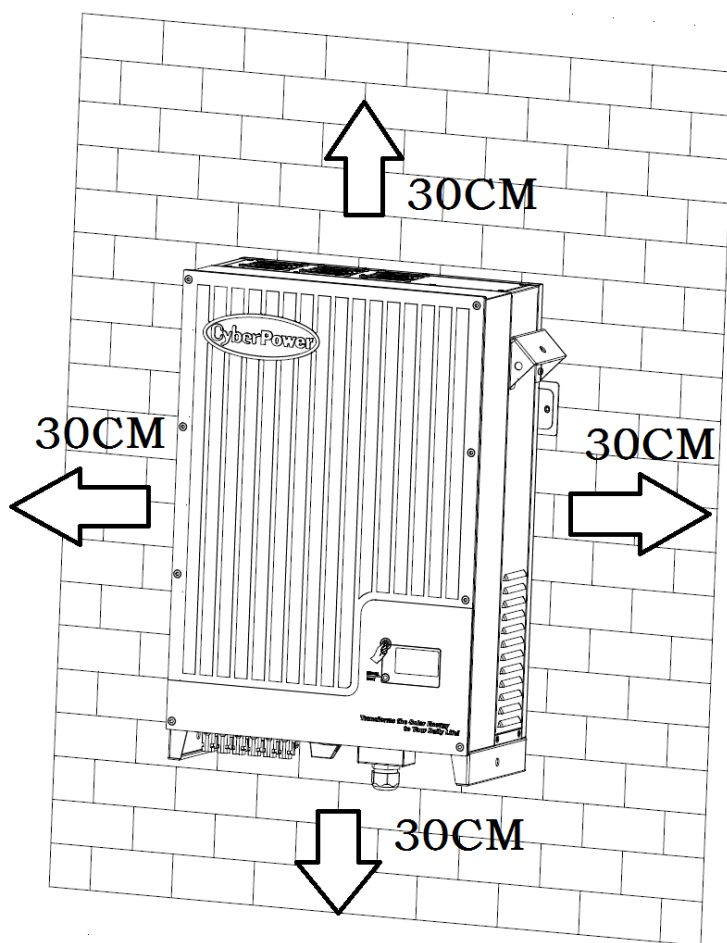
Fig 5.2

12) Do not install the inverter near television antenna or any other antennas and antenna cables.

13) Do not install the inverter in living area, the noise caused by the machine may affect on daily life.

14) For security reasons, don't install the inverter in place where the children can reach.

5.3 Installation guide

5.3.1 Mounting the Bracket

⚠	**DANGER**
In order to avoid electrical shock or other injury, inspect existing electronic or plumbing installations before drilling holes.	

To mount the inverter on the wall, we should mount the bracket to the wall firmly first of all.

a) Bracket of CPSPV7000ETL-CPSPV12000ETL   b) Bracket of CPSPV18000ETL/CPSPV20000ETL
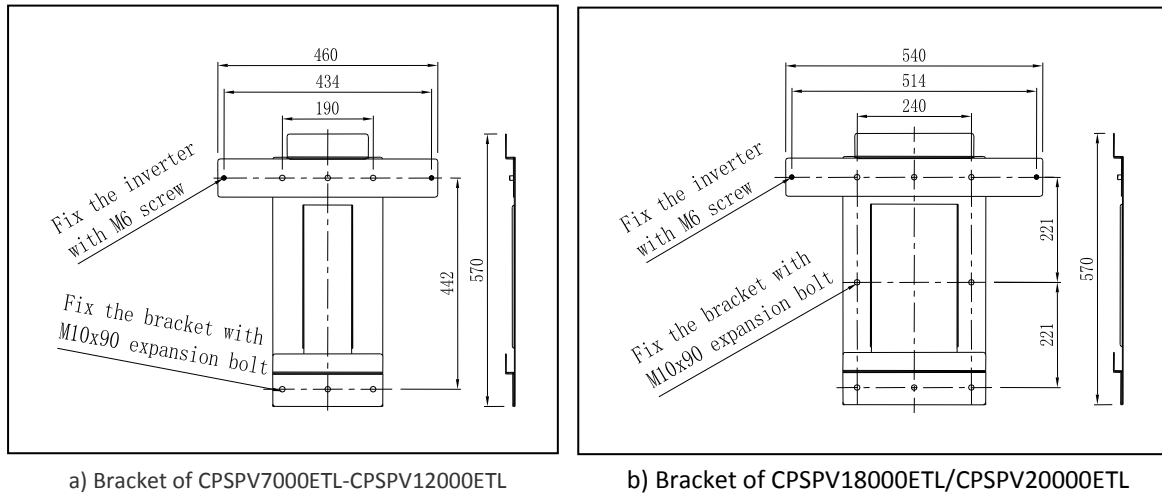
Fig 5.3

Hint: Data units in mm

Steps:

- Drill holes for screws while use the mounting frame as template.6 holes for CPSPV7000ETL - CPSPV12000ETL and 8 for CPSPV18000ETL/CPSPV20000ETL.
- Fix the mounting frame on the wall as the figures shown below, combine as the screws as the Items Fig 4.1 shows (items D)
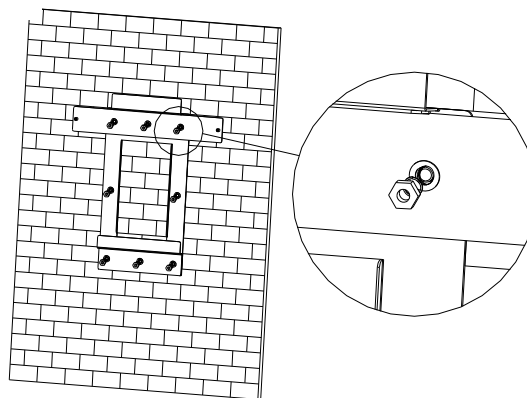
Fig 5.4

5.3.2 Mounting Inverter

> ⚠️ **WARNING**
>
> Falling equipment can cause serious or even fatal injury, never mount the inverter on the bracket unless you are sure that the mounting frame is really firmly mounted on the wall after carefully checking.

After the bracket is firmly mounted on the wall, then mount the inverter on the bracket.

- Rise up the CPS Mini Central a little higher than the bracket. Considering the weight of CPS Mini Central, you need to hang on the inverter. During the process please maintain the balance of the CPS Mini Central.
- Hang the inverter on the bracket through the match hooks on bracket and the back of the inverter.

- Installed one M6*10 screw at each side of inverter to reliable fixed it on the wall. Please reference in Fig 5.5(b).
- Connection of a second protective conductor. Please reference in Fig5.6.
- Recommend awning installation, the purpose is to extend the inverter service life and reduce the power derating of the inverter. The dimension of the awning refer to Fig5.8.
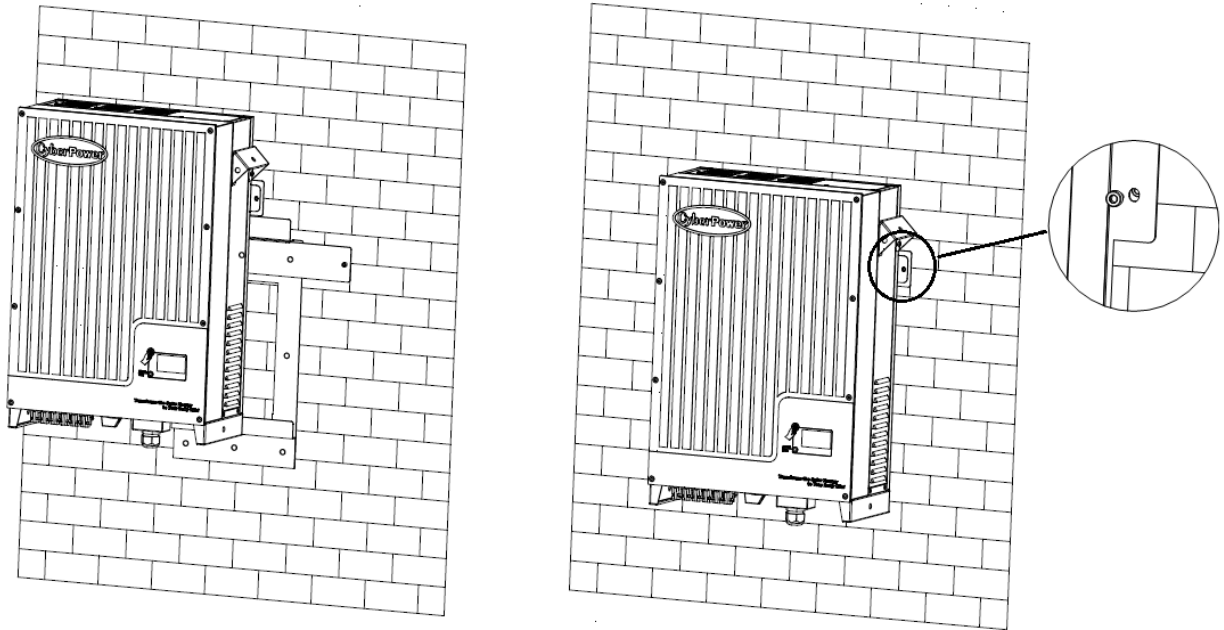
Fig 5.5
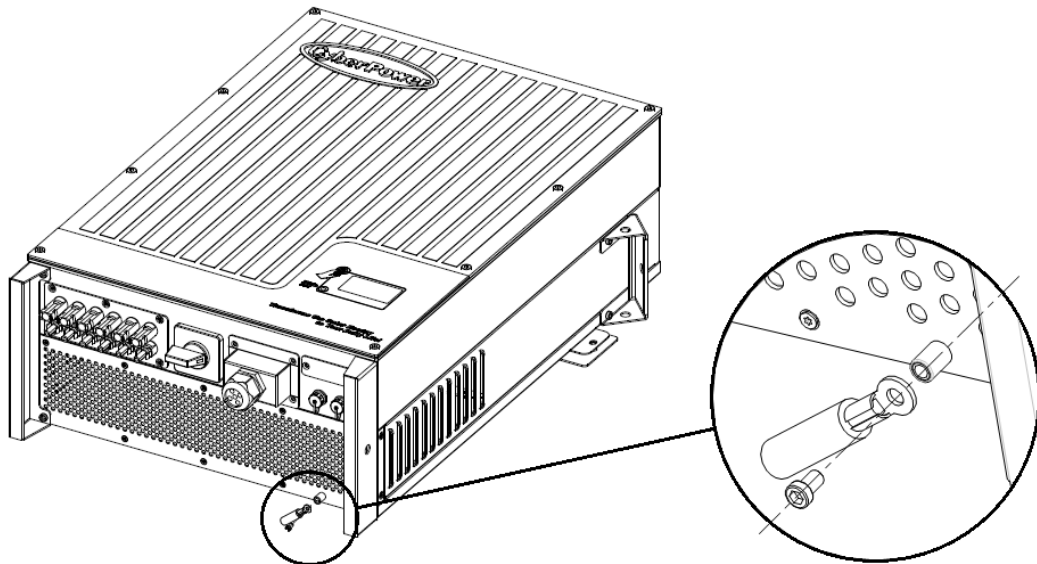
Fig. 5.6

5.3.3 Installation layout

i	**Information**

Avoid exposing inverter to direct sunlight, rain or snow to extend the inverter service life despite the IP65 protection degree. Exposure to the sunlight may cause additional internal heating which will cause power derating.
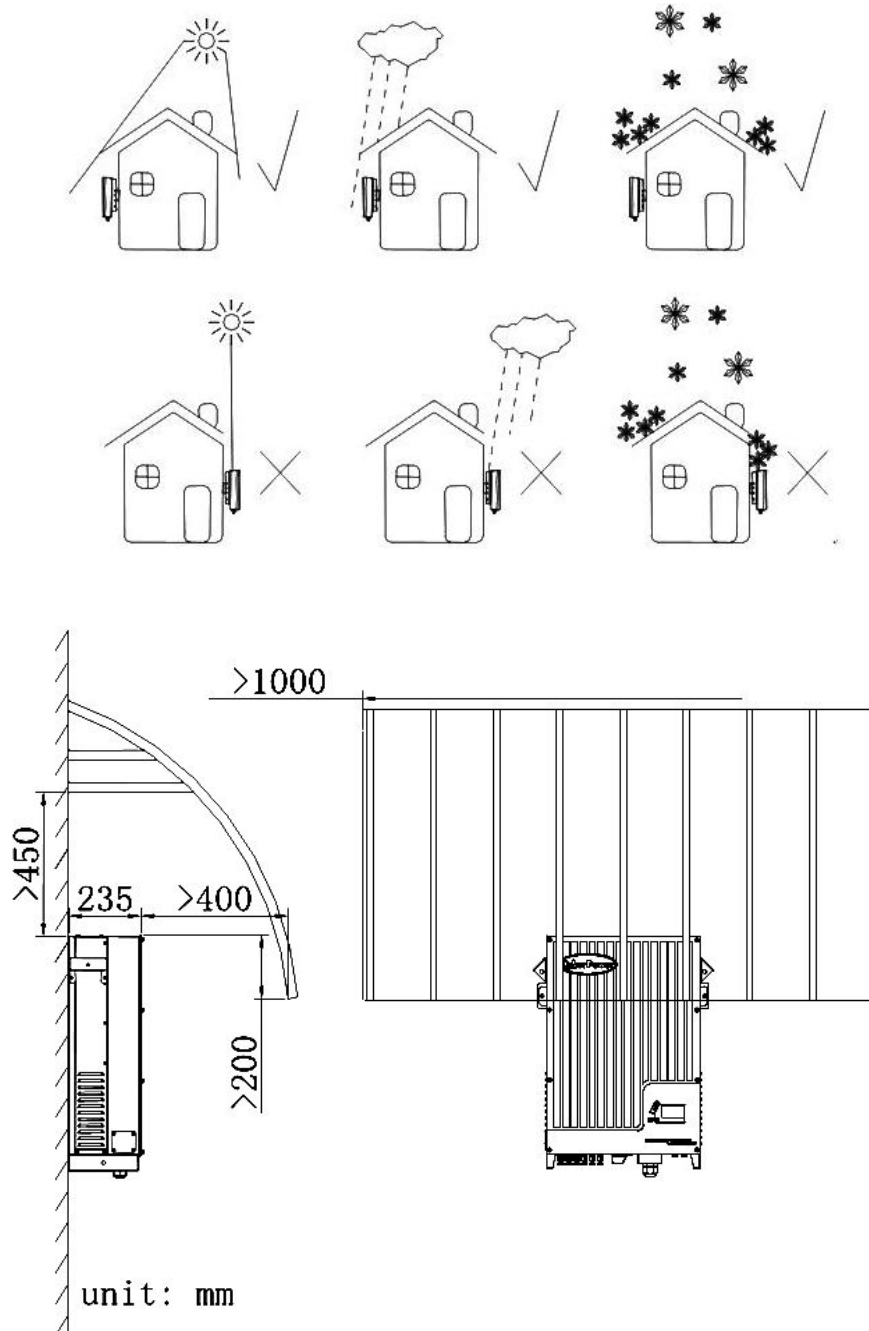
Fig. 5.8

More than one inverter need to be installed, the dimensions below should be considered.
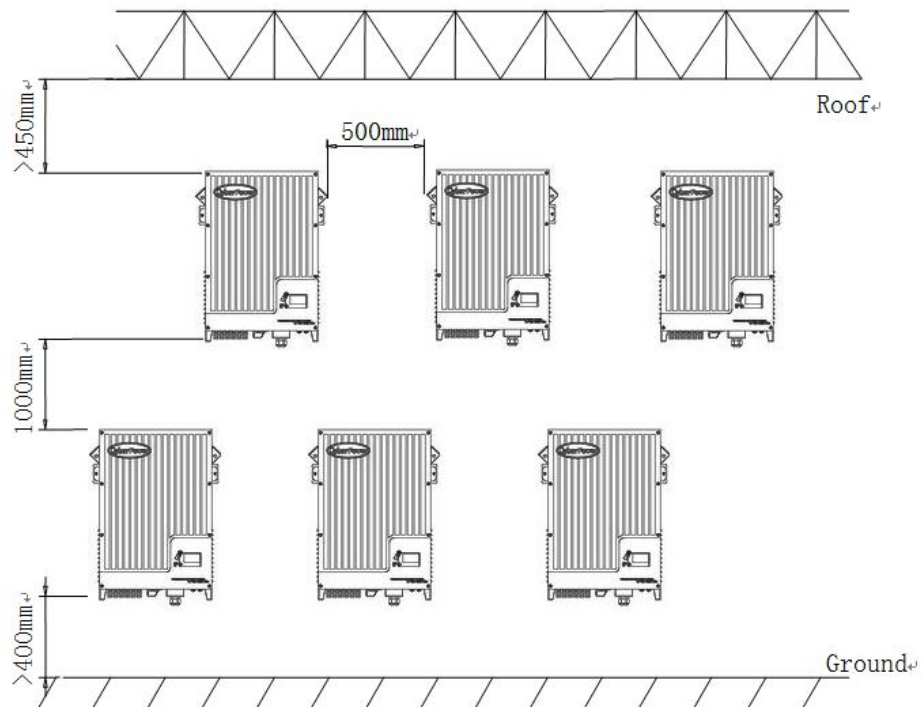
Fig. 5.9

5.4 Electrical Connections

5.4.1 Safety

| ⚡ ⚠ DANGER	Danger to life due to lethal voltages! High voltages which may cause electric shocks are present in the conductive parts of the inverter. Prior to performing any work on the inverter, disconnect the inverter on the AC and DC sides
⚠ WARNING	Danger of damage to electronic components due to electrostatic discharge. Take appropriate ESD precautions when replacing and installing the inverter.

5.4.2 Wiring AC Output

Conditions for the AC Connection

You must comply with the connection requirements of your utility operator.

All usages must comply with the regulations.

Residual-current protective device

The inverter is equipped with an integrated universal residual-current monitoring unit.

If the network operator stipulates a residual-current protective device, you must use a residual-current protective device that triggers in the event of a residual-current of 100 mA or more.

Connection of a second protective conductor

In some installation countries, a second protective conductor is required to prevent a touch current in the event of a malfunction in the original protective conductor.
For installation countries falling within the scope of validity of the IEC standard 62109, you must Install the protective conductor on the AC terminal with a conductor cross-section of at least 10 mm² Cu.
Or Install a second protective conductor on the earth terminal with the same cross-section as the original protective conductor on the AC terminal

Load disconnection unit

You must install a **separate** three-phase miniature circuit-breaker or other load disconnection unit for each inverter in order to ensure that the inverter can be safely disconnected under load.
- Measure the public grid voltage and frequency (Voltage: 400Vac; Frequency: 50Hz/60Hz; in 3-Phase);
- Open the breaker between the PV inverter and utility;

Specification of AC breaker: CPSPV70000ETL: 16A/400V

CPSPV8000ETL/ CPSPV9000ETL: 20A/400V

CPSPV10000ETL/ CPSPV12000ETL: 25A/400V

CPSPV18000ETL/ CPSPV20000ETL: 50A/400V

Cable requirements:

Model	Diameter(mm)	Area(mm²)	Available wire gauge (AWG)
CPSPV70000ETL	2.05~4.11	4~16	12~6
CPSPV80000ETL	2.05~4.11	4~16	12~6
CPSPV90000ETL	2.05~4.11	4~16	12~6
CPSPV100000ETL	2.05~4.11	4~16	12~6
CPSPV120000ETL	2.05~4.11	4~16	12~6
CPSPV180000ETL	2.59~4.11	6~16	10~6
CPSPV200000ETL	2.59~4.11	6~16	10~6

Conductor Cross section	Max. cable length(m)						
	CPSPV 7000ETL	CPSPV 8000ETL	CPSPV 9000ETL	CPSPV 10000ETL	CPSPV 12000ETL	CPSPV 18000ETL	CPSPV 20000ETL
6.0 mm²	70	60	54	48	40	27	25
10.0 mm²	140	125	110	72	60	40	36
16.0 mm²	220	200	175	105	88	59	53
AC connector type	Conductor cross-section (mm²)					Stripping length (mm)	
Connector 1	4.0-6.0					8	
Connector 2	4.0-6.0					8	

| Terminal 3 | 6.0-16.0 | 10 |

> ⚠ **NOTICE**
>
> ## Please do not use single-core wire cable.

There are three types of AC connector for CPS Mini Central series inverters. Please follow the instructions corresponding to the parts we offer you.

AC terminal :

1) The AC side terminals of the inverter are like the following figure, it is clear to confirm that 'L1, L2, L3' represents three live line output, 'N' represents neutral line and ⏚ is grounding line.

2) Connect five standard cables into relevant terminals. The five cables should be put through the protection shell, as figure below.

3) Fasten the protection shell onto the bottom of the inverter, make sure the four screws are tightened, the completed appearance is like the below figure.

5.4.3 Wiring DC Input

<table>
<tr>
<td>⚡ ⚠ **DANGER**

Danger to life due to lethal voltages!
Before connecting the PV array, ensure that the DC switch and AC breaker are disconnect from the inverter. **NEVER** connect or disconnect the DC connectors under load.</td>
</tr>
<tr>
<td>⚠ **WARNING**

Improper operation during the wiring process can cause fatal injury to operator or unrecoverable damage to the inverter. Only qualified personnel can perform the wiring work.</td>
</tr>
<tr>
<td>⚠ **WARNING**

Risk of damage to the inverter.
If the voltage of the PV modules exceeds the maximum input voltage of the inverter, it can be destroyed by the overvoltage. This will void all warranty claims.
Do not connect strings to the inverter that have an open-circuit voltage greater than the maximum input voltage of the inverter.</td>
</tr>
<tr>
<td>⚠ **WARNING**

To reduce the risk of electric shock, avoid touching the live components and treat the terminals carefully.</td>
</tr>
<tr>
<td>ⓘ **Information**

The PV modules should have an IEC61730 Class A rating*.
Please use the same brand male and female PV connectors.
Under any conditions the total circuit current should never exceed the Max. Current.</td>
</tr>
<tr>
<td>⚠ **NOTICE**

Excessive voltages can destroy the measuring device
Only use measuring devices with a DC input voltage range up to at least 1,000 Vdc.</td>
</tr>
</table>

*Relate only to transformerless installation.

1 Check the connection cables of the PV modules for correct polarity and make sure that the maximum open circuit voltage of each string should never exceed 1000V.

2 The diagram drawing of DC side is shown as below, notice that the connectors are in paired (male and female connectors). The connectors for PV arrays and inverters are MC (multi-connector) connectors;
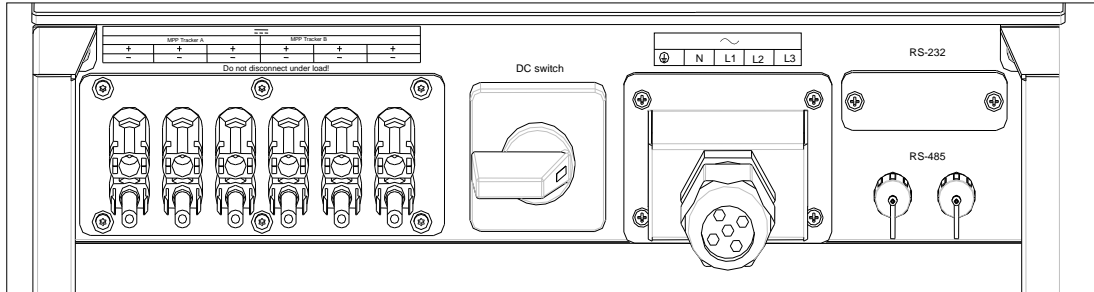
Fig.5.21
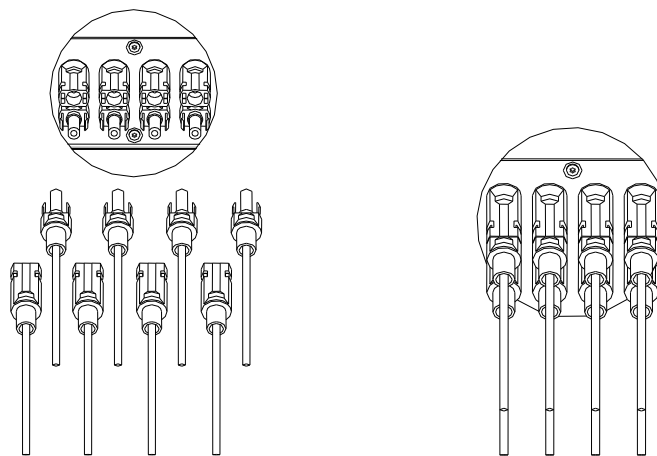
Fig.5.22

3 Check the assembled DC connectors for correct polarity and connect them to the inverter.

4 The maximum string currents are varying from different inverter types.

Type	Max. current
CPSPV7000ETL ~ CPSPV10000ETL	15A
CPSPV 12000ETL	17A
CPSPV 18000ETL	23A
CPSPV20000ETL	26A

5 In order to seal the inverter, all unneeded DC inputs must be closed with sealing plugs:
Cable requirements:

Model	Diameter(mm)	Area(mm²)	AWG
CPSPV7000ETL	2.05	3.332	12
CPSPV8000ETL	2.05	3.332	12
CPSPV9000ETL	2.05	3.332	12
CPSPV10000ETL	2.05	3.332	12

CPSPV12000ETL	2.05	3.332	12
CPSPV18000ETL	2.05	3.332	12
CPSPV20000ETL	2.05	3.332	12

5.4.4 Grounding

AC Grounding

The CPS Mini Central inverter must be connected to the AC grounding conductor of the power distribution grid via the ground terminal (PE).

PV Grounding

The grounding conductor in the framework of the PV array must be connected to the PV grounding conductor and the DC grounding conductor. The cross-section of the grounding conductor corresponds to the cross-section of the largest conductor in the DC system.

DC Grounding Conductor

A DC grounding conductor may be required by the Authority Having Jurisdiction (AHJ). Use the terminal block for the PV grounding conductor and DC grounding conductor.

Ground kit

If PV modules of the PV system require POSITIVE or NEGATIVE to connect to GROUND, the output of inverter should connect to grid with an isolating transformer. The connection method is below:
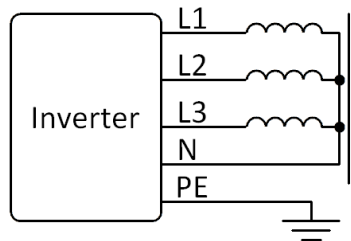
N of transformer should not be connected to PE.

5.5 Grid Type

5.5.1 Common grid type

Based on the local GRID standards, it may select different connection types. In the following you will find an overview of the most common type of grid structure.
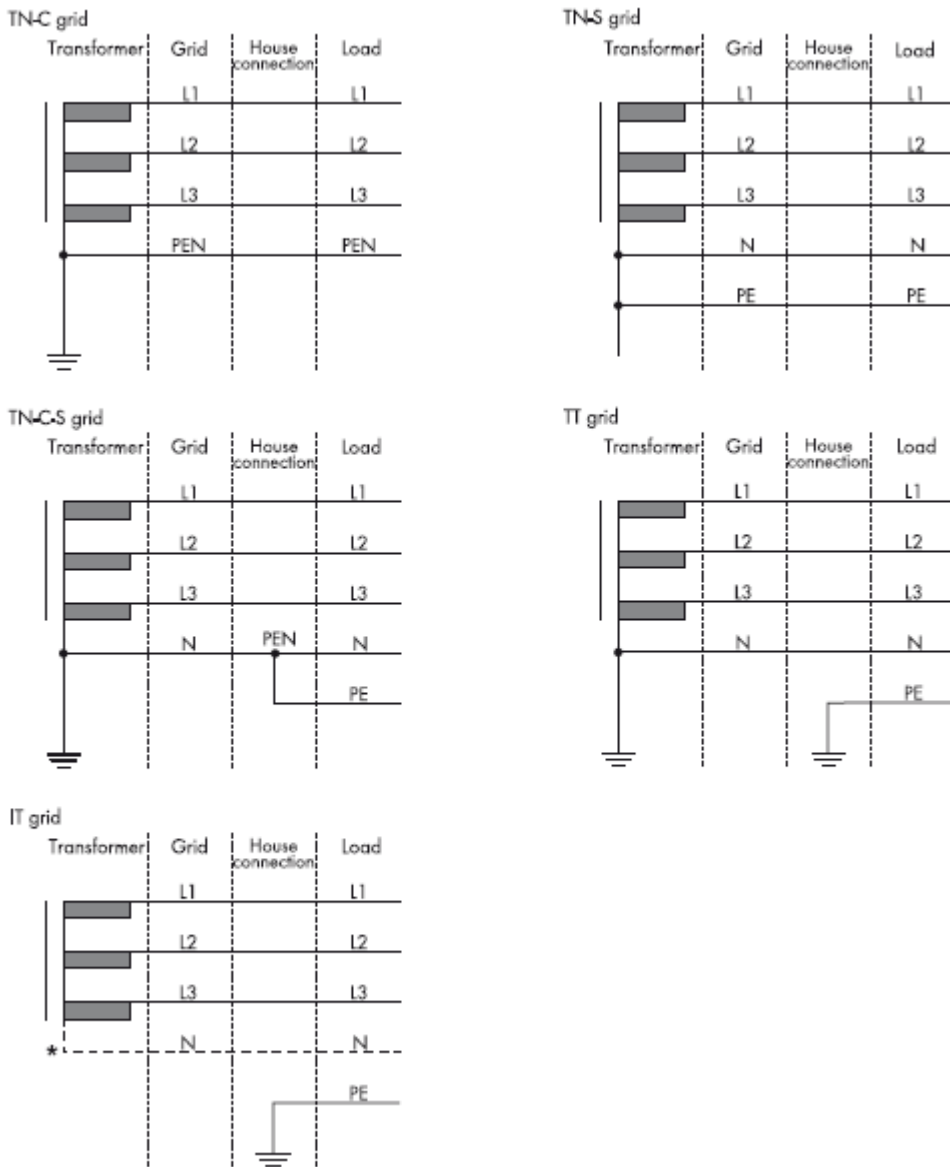
> **Information**
>
> If the output of inverter was connected to grid with an isolation transformer, and the inverter display PV Isolation Low error during when you start-up the inverter, please set the parameter "Enable Neutral" via CyberPower software 'Solar Power Setup', or connect the Neutral of inverter output to PE.

5.5.2 Compatibility Table

Inverter / Grid type	TN-C grid	TN-S grid	TN-C-S grid	TT grid	IT grid
CPSPV7000ETL	yes (N and PE of inverter both should connect to PEN of grid.)	yes	yes	yes, if $U_{N-PE} < 30V$	no
CPSPV8000ETL	yes (N and PE of inverter both should connect to PEN of grid.)	yes	yes	yes, if $U_{N-PE} < 30V$	no
CPSPV9000ETL	yes (N and PE of inverter both should connect to PEN of grid.)	yes	yes	yes, if $U_{N-PE} < 30V$	no
CPSPV10000ETL	yes (N and PE of inverter both should connect to PEN of grid.)	yes	yes	yes, if $U_{N-PE} < 30V$	no
CPSPV12000ETL	yes (N and PE of inverter both should connect to PEN of grid.)	yes	yes	yes, if $U_{N-PE} < 30V$	no
CPSPV18000ETL	yes (N and PE of inverter both should connect to PEN of grid.)	yes	yes	yes, if $U_{N-PE} < 30V$	no
CPSPV20000ETL	yes (N and PE of inverter both should connect to PEN of grid.)	yes	yes	yes, if $U_{N-PE} < 30V$	no

6 Commissioning

6.1 Commission the Inverter

1) Remove all covers from the PV array.
2) Check the PV and AC voltage.
3) Plug in the PV input.
4) Turn the DC Disconnect to position "I".
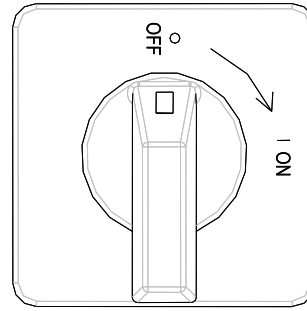
Fig.5.26

5) If the inverter is connected with PV panel arrays and the input voltage is higher than 300Vdc, while the AC grid is not connected yet, LCD will display messages in order as below:
   - Company info ➡ Basic info ➡ State info
   - The LCD will display " AC V outrange "at State info and the LED turns red.
   - Please check all information on the LCD, operate by knocks you will see the different parameters.
   - Single knock to Light the backlight ➡ State info (single knock) Input info ➡ (single knock) Output info
6) Turn on the AC breaker between inverter and grid, the system will operate automatically.
7) Under normal operating conditions, the LCD displays 'Power: xx.xx Kw' at State info, this is the power feed into grid. The LED turns green.
8) Check the time and date of inverter as follow:
   Single knock to Light the backlight ➡ State info (Thrice knock) ➡ Inverter info (single knock) ➡ System Time(double knock), if they are not correct, please set them, refer to Fig 6.3.15 or 6.4.3 text line.
9) Finish commissioning.

6.2 Operation Modes

Normal Mode

In this mode, the inverter works normally and LED turns green.
- Whenever the DC voltage is higher than 350Vdc, inverter converts power to grid as generated by the PV panels;
- Whenever the DC voltage is lower than 300Vdc, the inverter will work in waiting state and attempt to connect the grid. In waiting state the inverter consumes just enough power generated by the PV panel to monitor the internal system.

Notes: The inverter starts up automatically when DC power from the PV panel is sufficient.

Fault Mode

The internal intelligent controller can continuously monitor and adjust the system state. If inverter finds any unexpected conditions such as system fault and inverter fault, the fault information will be displayed on the LCD. In fault mode the LED turns red.

Notes: a) Detailed fault information refers to Chapter 9.1 ERROR messages displayed on LCD.

b) When PV Isolation error occurred in SAA safety standard, the buzzer will give an alarm every fifteen seconds.

Shutdown Mode

Inverters automatically stop running during periods of little or no sunlight. In shutdown mode the inverters take no power from the grid and panel, and the LCD and LED turns off.

Notes: If the PV string DC voltage is too low, the inverter will also turn to Shutdown Mode.

Derating mode

When AC frequency is higher than 50.3Hz(settable), the inverter will derate its output power according to the rule. When user set the output limit command to the inverter, the inverter will also limit the output according to the setting.

In this derating mode, the LCD will show "DERATING".

6.3 Initial Settings and LCD Display

In the lower right corner of inverter there is the LCD display. We can check inverter running state, historical generation data, etc, on the LCD screen. Items displayed can be changed by knock; you can also change some inverter parameters by knock.

6.3.1 Initial Settings

If it is the first time the inverter starts up after installation, LCD will quickly switch to and stay at the grid code setting interface that is the first setting interface of initial settings. Only the inverter is completed all initial settings, it will work and display normally. Otherwise, LCD will always stay at the 'Please select' interface.

Grid code (Country) setting

Please finish the grid code setting according to the following steps:

1) When at the first interface 'Please Set Cert:' the option is 'VDE0126-1-1' in default. By single knock, grid codes will vary from one to another, for example, 'VDE0126-1-1/A1', as Fig 6.3.1 and Fig 6.3.2
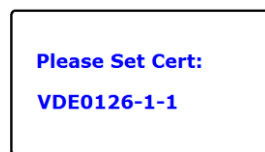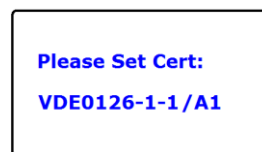
<table>
<tr><td>Please Set Cert:

VDE0126-1-1</td><td>Please Set Cert:

VDE0126-1-1/A1</td></tr>
<tr><td align="center">Fig 6.3.1</td><td align="center">Fig 6.3.2</td></tr>
</table>

Note: If you have ordered the inverter with specific grid code settings, the parameters have been preset in factory and you don't need to operate this step any more.

2) There are four grid codes to select:

1	VDE0126-1-1
2	VDE0126-1-1/A1
3	VDE0126 Taiwan
4	PEA Thailand

Note: if you can't find the grid code you want, please contact CyberPower Systems, Inc.

3) When it comes to the grid code you want, double knock to enter, as Fig 6.3.3.

Set Cert OK

Fig 6.3.3

Language setting

The second setting interface is language setting. Please finish the language setting according to the following steps:

1) When at the language interface 'Set Language:' the option is 'English' in default. By single knock, languages will vary from one to another, for example, 'Francaise', as Fig 6.3.4 and Fig 6.3.5

Set Language
English

Regler Langue
Francaise

Fig 6.3.4   Fig 6.3.5

2) There are 3 languages to select:

1	English
2	French
3	Chinese

3) When it comes to the language you want, double knock to enter, as Fig 6.3.6.

Set OK !
Current Language
English

Fig 6.3.6

System time setting

The last setting interface is system time setting. Please finish the system time setting according to the following steps:

1) When at the system time interface, the time setting will start from the following sequence: Year -> Month -> Date -> Hour -> Minute. By single knock, the setting will increase 1 unit, for example, increasing 1 year, as Fig 6.3.7 and Fig 6.3.8

Set Time
Time: 2013-02-20
13:05:00

Set Time
Time: 2014-02-20
13:05:00
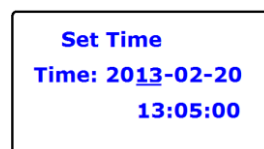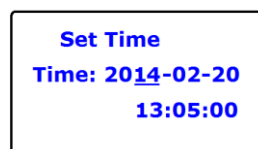
Fig 6.3.7   Fig 6.3.8

Note: System time will be set to current time in factory. Maybe you only need to adjust the Hour due to different time zone in your country.

2) By double knock, the setting will decrease 1 unit, for example, decreasing 1 year, as Fig 6.3.9 and Fig

6.3.10.

Set Time	Set Time
Time: 2014-02-20	Time: 2013-02-20
13:05:00	13:05:00
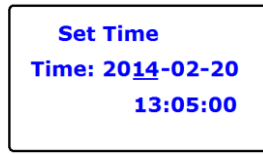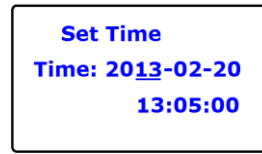
| Fig 6.3.9 | Fig 6.3.10 |

3) When finish the current sequence, thrice knock to enter and then go to next sequence, as Fig 6.3.11 and Fig 6.3.12.

Set Time	Set Time
Time: 2014-02-20	Time: 2014-02-20
13:05:00	13:05:00
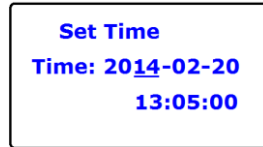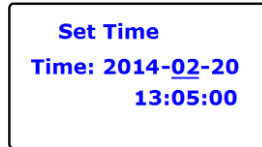
| Fig 6.3.11 | Fig 6.3.12 |

4) When finish the Minute sequence, thrice knock to enter, as Fig 6.3.13 and Fig 6.3.14.

Set Time	Set Time
Time: 2014-02-20	Time: 2014-02-20
13:05:00	13:05:00
	Set Time OK
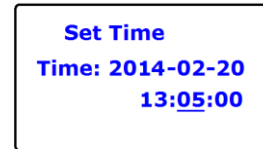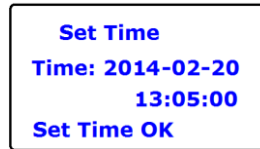
| Fig 6.3.13 | Fig 6.3.14 |

5) Then, thrice knock again to finish settings, as Fig 6.3.15. Few seconds later, system will restart and the initial settings are completed.

Set Time
Time: 2014-02-20
13:05:00
Set Finished

Fig 6.3.15

6.3.2 Power on Display

Power on display

After power on for several seconds, LCD screen will display the figure of inverter, company name, inverter's power rating, etc.

CyberPower
CPSPV20000ETL

Fig 6.3.5 inverter's power rating

After 3 seconds, it will switch to the next interface. See Fig6.3.6 for reference.

Fig6.3.6 Serial number, model name and version

Here is explanation of items on Fig6.3.6:
● First line: Serial number of this inverter.
● Second line: model name of this inverter.
● Main Ver: firmware version of control board.
● Comm Ver: firmware version of communication board.

After displaying information of the third interface for 3 seconds, the background light will turn off.

LCD Display when backlight off

After the power on information is displayed automatically and the backlight turns off, the LCD display will switch to the following Interface 1. There are 4 interfaces, which can be displayed in turn by single knock.

Interface 1: Running state. The first line displays inverter's state description, for example, in faulty state it will display ERROR and followed with faulty codes, which is convenient to compare with error code list in manual. The second line displays inverter's states name; and the third line displays energy generated today, and the fourth line displays the total energy generated since installation.
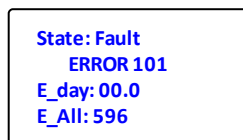
Fig6.3.7 Interface 1: Running state
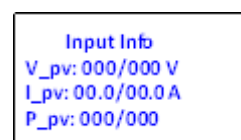
Fig6.3.8 Interface 2: Input information

Interface 2: Input information.
This interface displays parameters of PV input, including input voltage, current, and power of each MPP tracker.
● V-pv: input voltage of MPPT1 and MPPT2
● I-pv: input current of MPPT1 and MPPT2
● P-pv: input power of MPPT1 and MPPT2

Interface 3: Output information. See Fig6.3.9 for reference.
This interface displays output information of inverter, including output voltage of each phase, output current of each phase, and output power of each phase.
● V: output voltage of each phase
● I: output current of each phase

- P: output power of each phase


```
Output Info
V: 000/000/000
I: 00.0/00.0/00.0
P: 000/000/000
```



```
Max: 10.5KWh
```
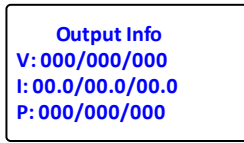
Fig6.3.9 Interface 3: Output information   Fig6.3.10 Interface 4: 24 hour's generation curve
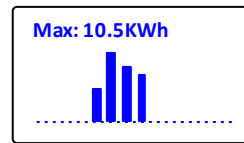
Interface 4: 24 hour's generation curve. See Fig6.3.10 for reference.

This interface shows the generated power of every hour this day.

- Max: maximum power of today
- Power curve: today's power curve

6.3.2.3 Connecting messages

When inverter started to connect to grid, the following message will appear on LCD screen. See Fig6.3.11 for reference.


```
State: Waiting
    Connect in 030S
E_day: 32.0
E_All: 238.6
```
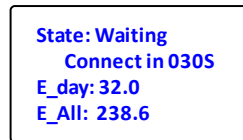
Fig6.3.11 Connect to gird interface

6.3.2.4 LCD Lock and unlock

LCD display will be locked while there is no any operation in two minutes. You need knock four times to unlock LCD. See Fig6.3.12 for reference.


```
State  : Normal
Power  :  11.15
E_today    89.0
      LOCK
```
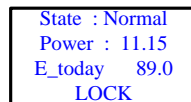
Fig6.3.12 Lock LCD display

6.3.3 Operate by knock

Knock type and definition

The inverter can support four kinds of knock: single knock, double knock, thrice knock, Knock four times. Each kind of knock has different function. Refer to specified definition in Table 6.1.

Table 6.1 Knock definition list

Knock type	Definition
Single knock	Down
Double knock	Enter
Thrice knock	Esc
Knock four times	Unlock LCD

Light backlight and single knock to check running information

Before light the backlight, the four types of knock functions are the same, which is just lighting the backlight. Note that the background lighting will automatically turn off if there is no knock detected in 10 seconds.

During cloudy days or in the area of low light, it's inconvenient for users to check inverter running information such as state, input data, output data, energy generated. In this case user can light the backlight and check those data by single knock, a single knock will switch LCD screen to a following interface. The interface display on LCD screen will circle as follow: Fir6.3.7 -> Fir6.3.8 -> Fig6.3.9 -> Fig 6.3.10 -> Fig6.3.11, and then again Fig6.3.7.

6.3.4 Data checking and parameters setting

First level menu

It is a little bit different to enter the first level menu, note that using thrice knock to enter first level menu instead of double knock. Fig 6.3.13 is the interface of first level menu.
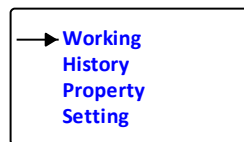
Fig 6.3.13 First level menu

In current interface, a single knock will switch the index to next item, double knock will enter the corresponding second level menu.

Second level menu

In first level menu, double knock will lead to next level menu.

The followings are second level menu interfaces for each first level menu items, shown in Fig 6.3.14.

In second level menu, a single knock will switch the index to next item; a double knock will enter the corresponding third level menu. And a thrice knock will back to first level menu.
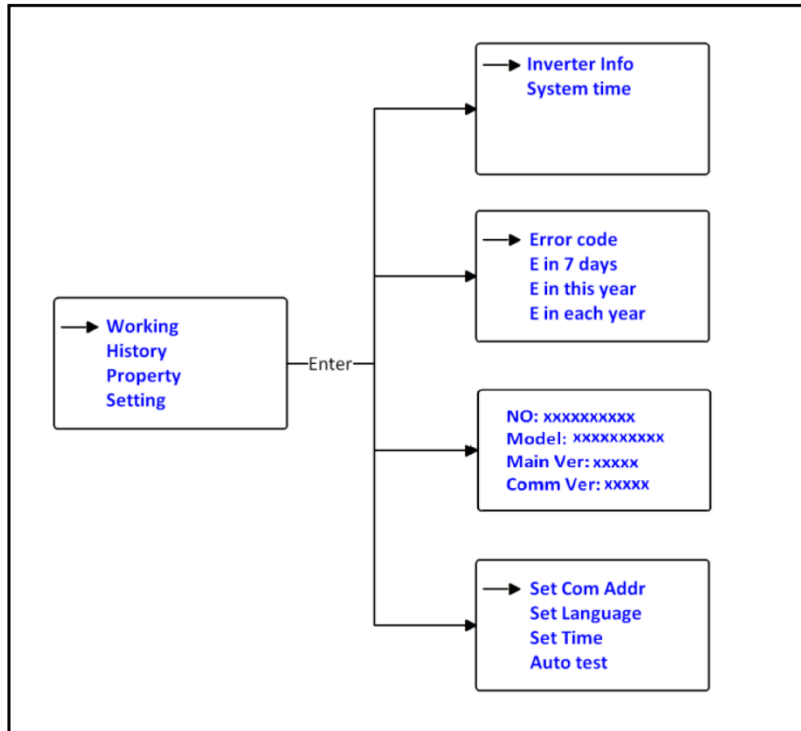
Fig 6.3.14 Second level menu for each first level menu items

Third level menu and explanation

Working information

The followings are third level menu interfaces for each second level menu items of working information, shown in

The followings are third level menu interfaces for each second level menu items of working information, shown in Fig6.3.15
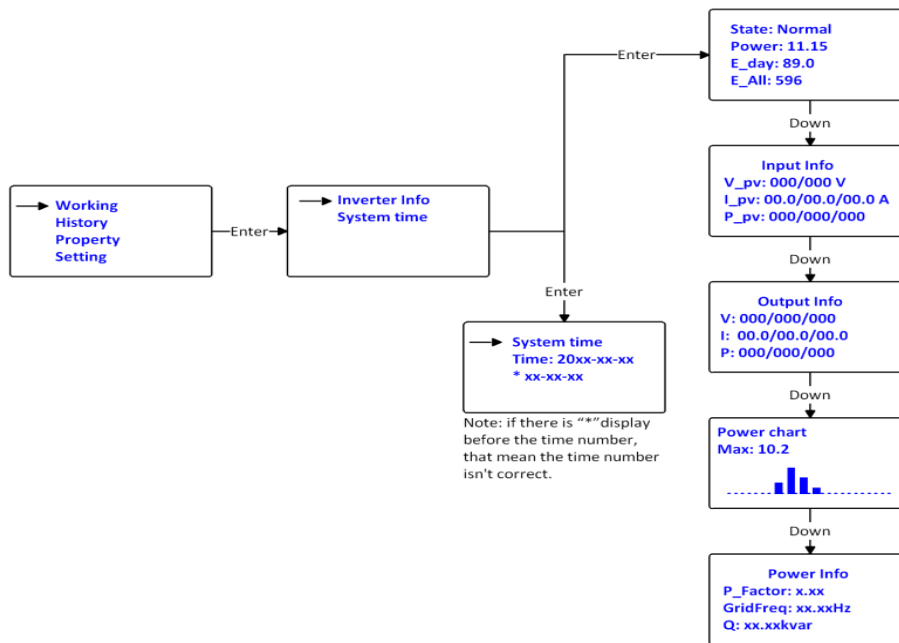

Fig 6.3.15 Third level menu interface of working information

Explanations of each item in third level menu interface of working information:

State information:

Table 6.2 Working information sub-items explanation

Second level menu	Third level items	Item explanation
Inverter info	State: Normal	Inverter running state
	Power: xxx.xx	AC gross output power
	E_day	Energy produced today
	E_all	Energy produced since installation
	Input info	Inverter input parameters
	V_pv: xxx/xxx	PV input voltage for each MPP tracker
	I_pv: xx.x/xx.x	PV input current for each MPP tracker
	P_pv: xxx/xxx	PV input power for each MPP tracker
	Output info	Inverter output parameters
	V: xxx.xxx.xxx	AC output voltage for each phase
	I: xx.x/xx.x/xx.x	AC output current for each phase
	P: xxx/xxx/xxx	AC output power for each phase

Second level menu	Third level items	Item explanation
	Power chart	Histogram of generation power
	Maxrve	Maximum output power of inverter
	Power info	Generation power information of inverter
	P_Factor	Power factor
	Q	Reactive power
	GridFreq	Utility grid frequency

Historical information

Fig 6.3.16 is the third level menu interfaces for each second level menu items of historical information.
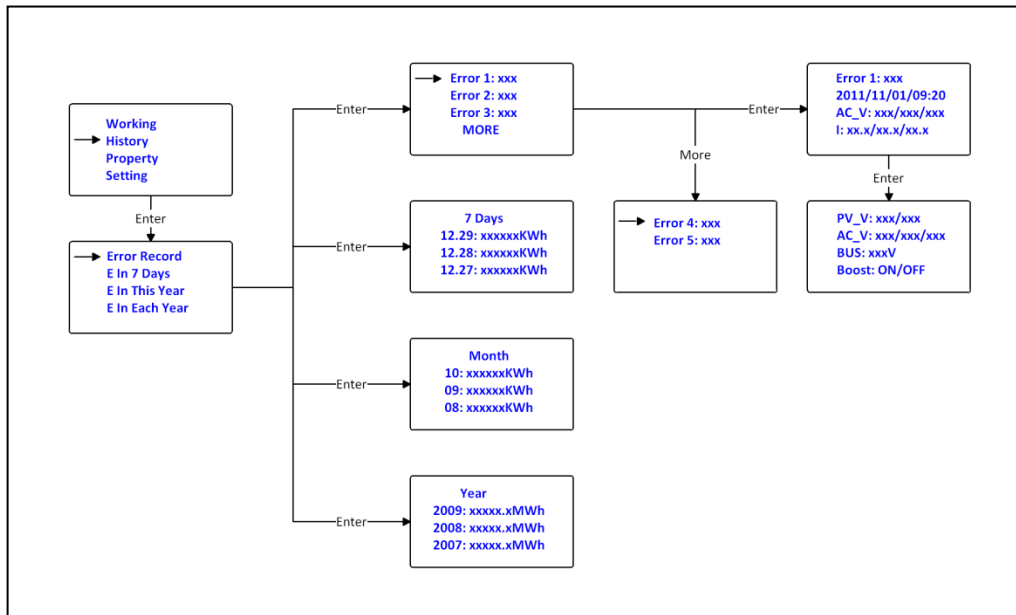

Fig 6.3.16 Third level menu interface of historical information

Explanation of each item in third level menu interface of working information:
State information:

Table 6.3 Historical information sub-items explanation

Second level menu	Third level items	Item explanation
Error Record	Error1: xxx	Five latest error records
	Error2: xxx	
	Error3: xxx	
	Error4: xxx	
	Error5: xxx	
	More	More error record

Second level menu	Third level items	Item explanation
E in 7 Days	7 Days	Title indicates this is latest 7 days running data
	MM:DD: xxxx.x Kwh	Format is Month:Date, xxxx.x is energy generated in that day.
E in Each Month	Month	Title indicates this is every month's running data in this year.
	MM: xxxx.x Kwh	xxxx.x is energy generated in that month.
E in Each Year	Year	Title indicates this is latest 10 years running data.
	20XX: xxxx.x Mwh	xxxx.x is energy generated in the corresponding year.

Property information

Fig 6.3.17 is the second level menu interfaces of property
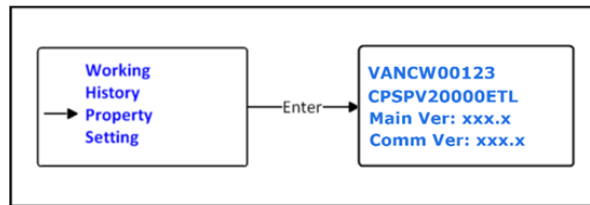
Fig 6.3.17 Property information

Explanation of each item in third level menu interface of working information:

State information:

First level menu	Second level items	Item explanation
Property	VANCW2000123	Serial number of this inverter.
	CPSPV20000ETL	Model name of this inverter.
	Main Ver:xxx.x	Firmware version of Control Board
	Comm Ver:xxx.x	Firmware version of Communication Board

Parameters set

Fig 6.3.18 is the setting information in second level menu.
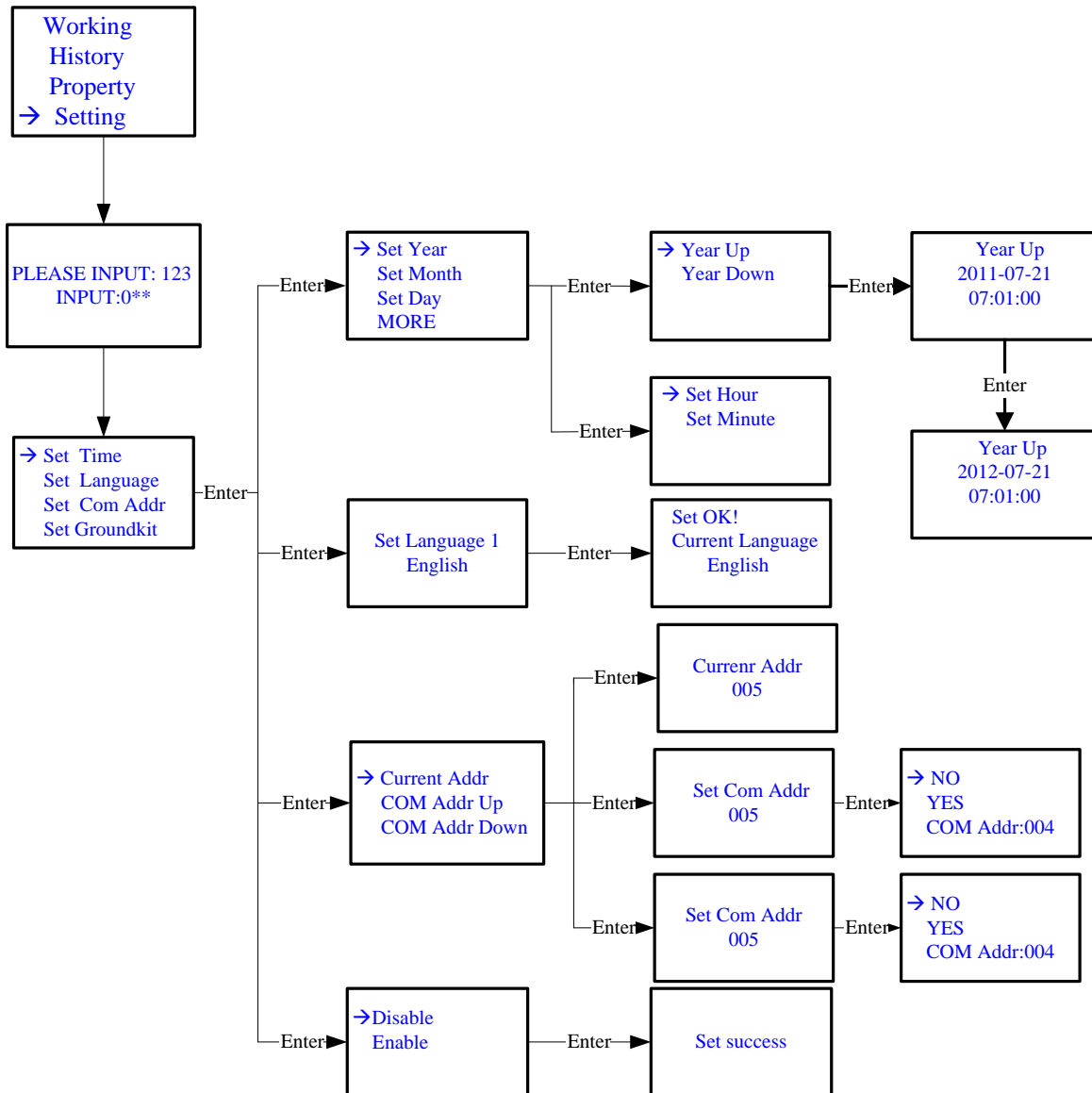
Fig 6.3.18 setting second level menu and its sub-menus

Set inverter's COM address

When communicating with monitoring software or device, the software or device may regard inverter's COM address as communication address (Also may use inverter's serial number as communication address).The COM address could be assigned. The second level menu "Set COM Addr" of setting is to set inverter's COM address.

Setting steps:

Input password->Setting->Set COM addr->Set Manual, "Current Addr" is the current address of inverter."COM Addr Up"add address. "COM Addr Up" decrease address .Single knock to change value of fixed address, double knock enter next manual. Choose "YES"to save changes, and LCD screen will display "Set Addr OK! Current Addr XXX".

Set language

To change inverter's displaying language, please select Setting->Set language, then LCD screen will display current language type, single knock to change current language, double knock will save changes and displays "Set Language OK! Current Language English" see Fig 6.3.6 for reference.

Please note in order to prevent disoperation, system language won't be change in second level menu "Set language", but it will be only if user saves save the choice by double knock and LCD displays "Set OK!"

The inverter provides three languages: English, French and Chinese. The number on Set language interface is sequence number of these three languages, the sequence number and its corresponding language are shown in Table6.5.

Table6.5 sequence number of languages

Language	Sequence Number
English	0
French	1
Chinese	2

Set inverter time

Inverter provides a system clock; user must set the system time after installation, as the historical statistic data for a period were based on the clock. User can set the following time parameters: year, month, day, hour, minute.

Set year: Setting->Set time->Set year->Year up or Year down->knock to change year. Thrice knock to exit and save changes.

Set month: Setting->Set time->Set month->Month up or Month down->knock to change month. Thrice knock to exit and save changes.

Set date: Setting->Set time->Set date->Date up or Date down->knock to change date. Thrice knock to exit and save changes.

Set hour: Setting->Set time->Set hour->Hour up or Hour down->knock to change Hour. Thrice knock to exit and save changes.

Set minute: Setting->Set time->Set minute->minute up or minute down->knock to change minute. Thrice knock to exit and save changes.

6.4 Double MPPT of the CPS Mini Central

The CPS Mini Central includes dual input section to process two strings with independent MPPT, high speed and precise MPPT algorithm for real-time power tracking and energy harvesting, as well as transformerless operation for high performance, the max conversion efficiency is up to 98%. The wide input voltage range makes the inverter suitable to low power operation as well as the high power operation.

As the weather influence and the location of two MPPT PV arrays different, the power of the MPPT A inputs is different from the power inputs of the MPPT B at the same time, the CPS Mini Central works at a non-symmetrical input state. But the MPPT algorithm of the inverter makes it tracking the maximum power point of every MPPT channel to improve the energy utilization of the PV arrays.


IV&PV characteristics mpp
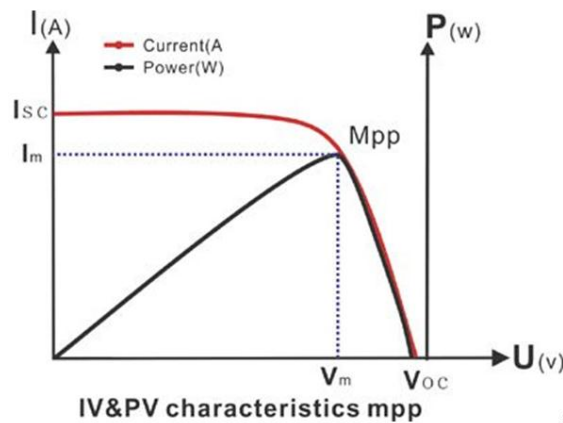
6.5 Communication

6.5.1 Using 'Solar Power Setup' to set the information of the inverter or update firmware

About the software of 'Solar Power Setup' and the usage of it please download from the web: www.cpsww.com.tw

The connecting diagram as follow:
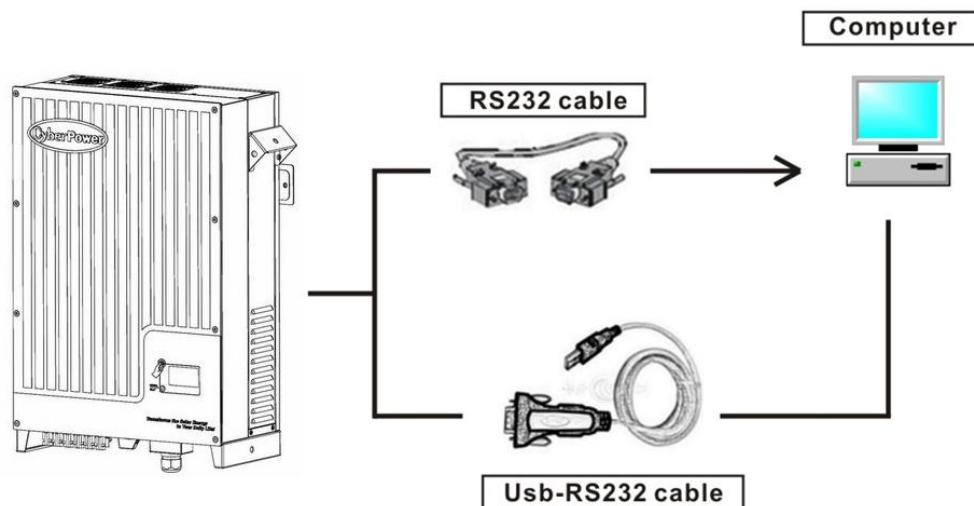
| **Information**	If you want to update firmware online, please disconnect AC breaker of the inverter first.

6.5.2 Monitor the inverters

The inverter provides RS232/RS485 interface to communicate with remote PC or logger. User can monitor the inverter state via the following types of communication systems.

- Monitor the inverters through RS232 interface with "Solar Power Supervisor"
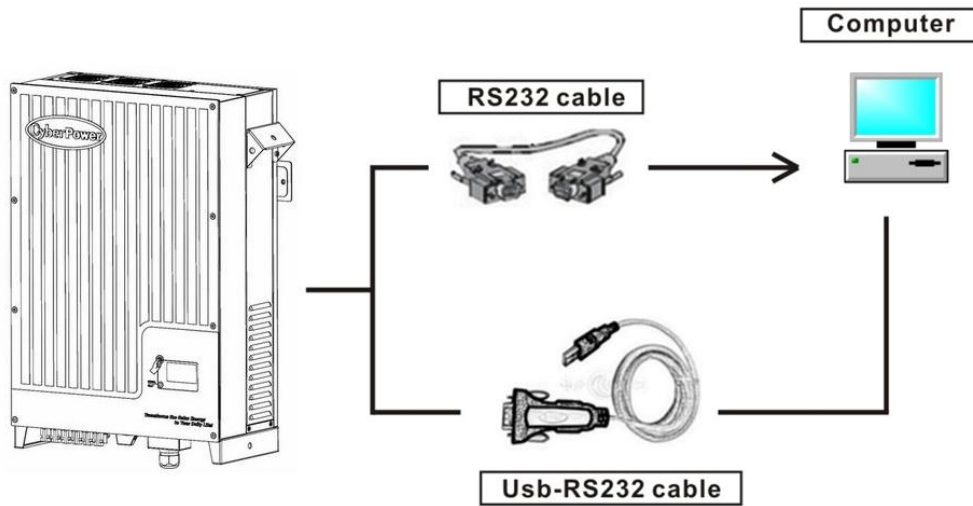
- Monitor the inverters through RS485 interface with "Solar Power Monitoring"
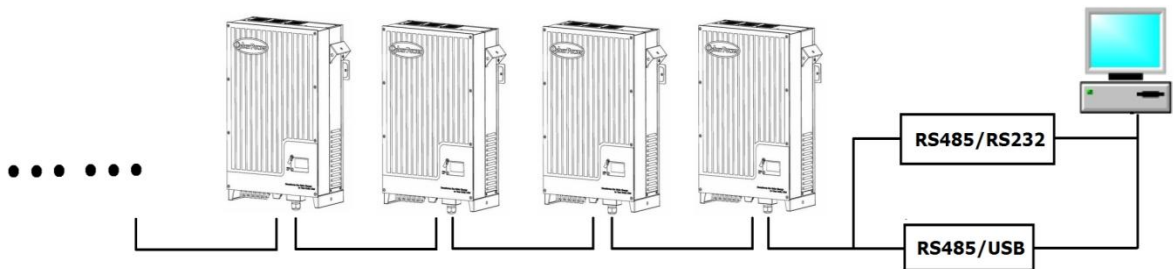
- CPS Mini Central series inverters are compatible with Solar-Log 200/500/1000.
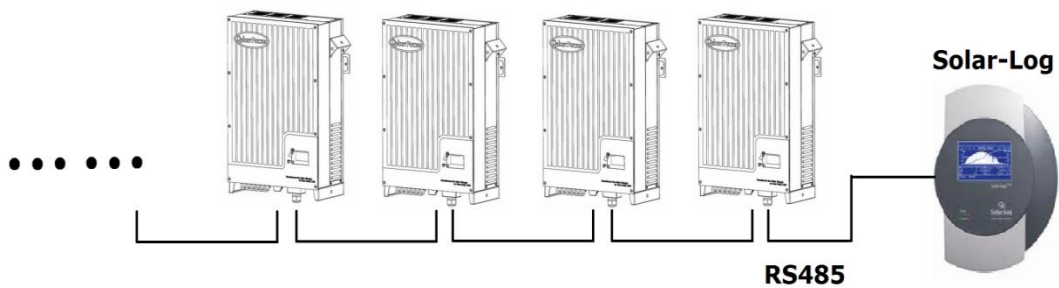
- CPS Mini Central series inverters are compatible with Meteocontrol WEB'log series.
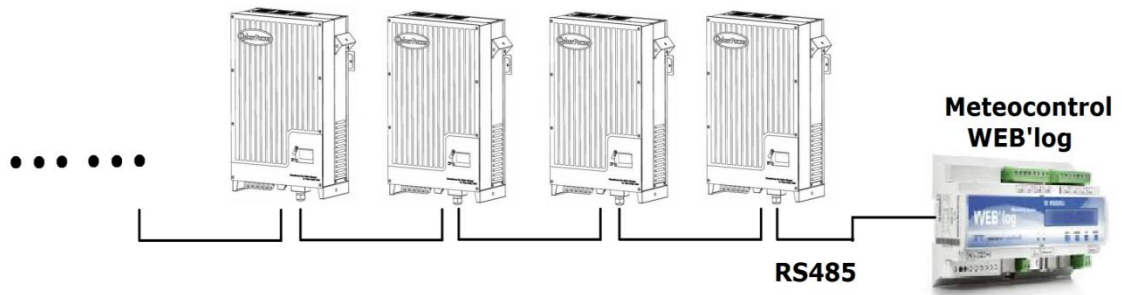
6.5.3 RS485 cable connection

1. To pull the RS485 cable through the RJ45 components.

2. The RS485 cable is composed by eight wires with different color, cut off outside envelope to show the eight wires. Then make sure the end of each wire straight, and put them to the crystal connector.

3. The connection between crystal connectors and RS485 cbale is one-to-one correspondence, one pin of crystal connector to one specific color wire, as shown in the following table and picture.
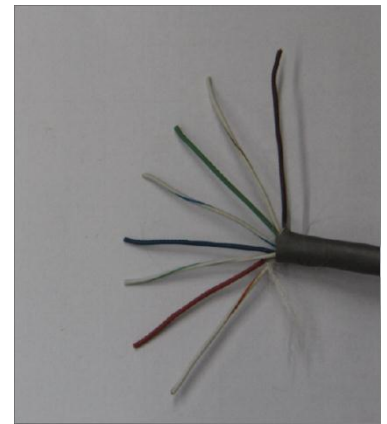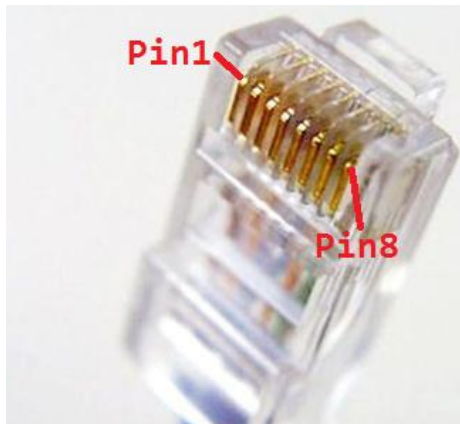
Definitions of RJ45 plug pins as follows:

Pin1------- NC	PIN 1 ---> 8
Pin2------- NC	RJ45 SOCKET
Pin3------- B/TRX-	
Pin4------- A/TRX+	
Pin5------- NC	PIN 8 ---> 1
Pin6------- NC	RJ45 PLUG
Pin7------- NC	
Pin8------- NC	

Pins of crystal connector	Color of each RS485 cable
1	Orange and white
2	Orange
3	Green and white
4	Blue
5	Blue and white
6	Green
7	Brown and white
8	Brown

4. To insert the eight wires to corresponding slots of the crystal connector, and then press them together by the tool.

5. Before you connect the RJ45 crystal connector to the inverter, we are recommending you use the professional tool to check whether the cable is well fixed and working.

6. Please open the RJ45 protection cover and connect the RJ45 crystal connector in the inverter port.

7 Start-Up and shut down the inverter

7.1 Start-Up the inverter

1. Turn on the AC grid breaker;
2. Turn on the DC switch of the inverter, and the inverter will start automatically when the input voltage is higher than 300V.

7.2 Shut down the Inverter

1. Turn off the AC grid breaker;
2. Turn off the DC switch of the inverter.
3. Check the inverter operating state.
4. Until the display of LCD goes out, the inverter is shut down.

8 Maintenance and Cleaning

Once the output power is derating because of too high warming, some tips can help you solve such problems:

- The air grills or cooling fans are clogged. To clean the air grills and cooling fans please refer to 8.1 Cleaning Fans and Grills.
- One or two cooling fans failed. To exchange the cooling fans please refer to 8.2 Exchanging Fans.
- Ventilation of installation location is poor. Choose appropriate installation location before mounting.

8.1 Cleaning Fans and Grills

Maintain fans and grills every half a year to reduce the power derating caused by excessive heat.

If fans or grills are just covered by soft dust particles, using tools such as vacuum cleaner to clean the fans. And if user has no such tools or there are obstructions in fans, grills or the cooling area of inverter, you need to clean the fans and grills after they are took apart from the inverter.

1. Please disconnect the DC and AC connection.
   - Turn off the DC switch.
   - Disconnect the DC terminal. (You might need some tool to disconnect the male and female terminals)
   - Disconnect the AC terminal.
2. Remove the protecting plants at the bottom of inverter.
   Remove the inverter from mounting bracket, and place inverter horizontally on clean and dry place.
3. Screw off the screws to open the cover with suitable tool, then fans will be seen, as figures below:
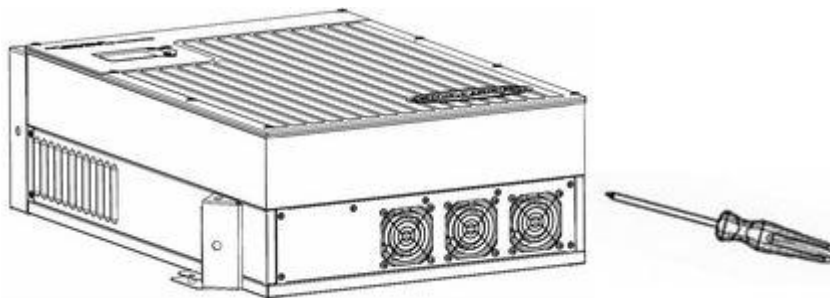

Fig 8.1.5

4. Pull out the white connectors with some tinny tools.
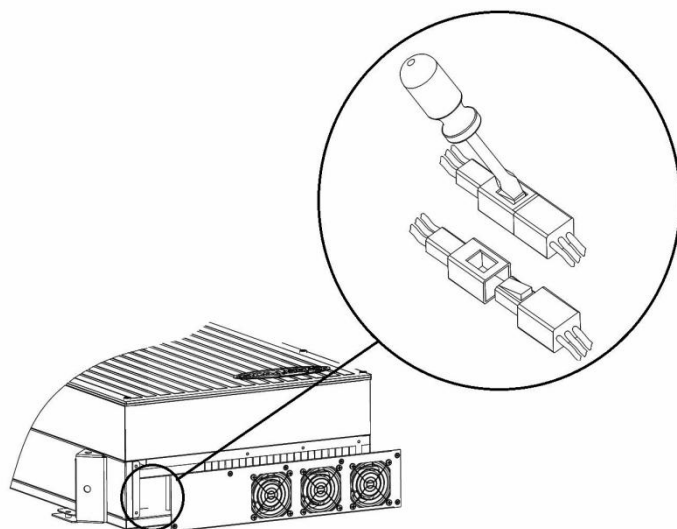
Fig 8.1.6

5. Take away the fans from the cover and clean them thoroughly.
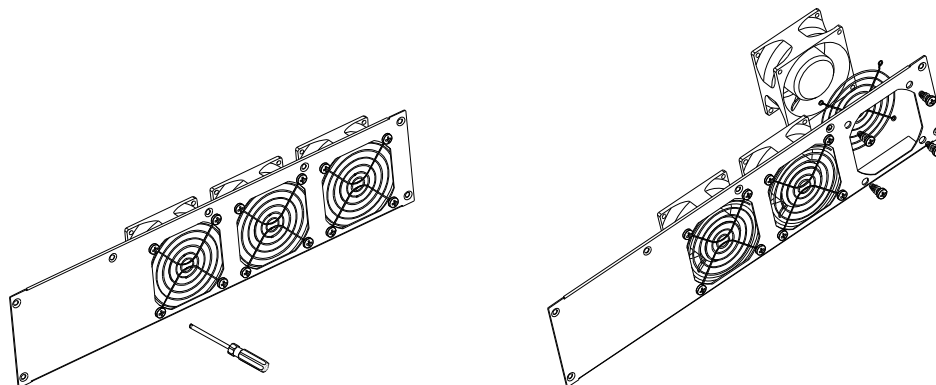
Fig 8.1.7

6. When finishing cleaning, put back the fans in reverse order.

8.2 Exchange Fan

Sometimes the heat dissipation error occurred because the cooling fans failed, under such situation, you need to exchange the cooling fans.

The procedure is similar to 8.1 Cleaning Cooling Fan and Grill (Step 1 ~ 6), step 7 should be exchanging the fans and assembling the inverter in reverse order.

9 Trouble shooting

Our quality control program assures that every inverter is manufactured to accurate specifications and is thoroughly tested before leaving our factory. If you have difficulty in the operation of your inverter, please read through the following information to correct the problem.

9.1 Error Messages displayed on LCD

An error message will be displayed on the LCD screen when a fault occurs. The faults consist of system fault and inverter fault.

You may be advised to contact CyberPower in some situation, please provide the following information.

Information concerning the inverter:
- Serial number
- Model number
- Error message on LCD
- Short description of the problem
- Grid voltage
- DC input voltage
- Can you reproduce the failure? If yes, how?
- Has this problem occurred in the past?
- What was the ambient condition when the problem occurred?

Information concerning the PV panels:
- Manufacturer name and model number of the PV panel
- Output power of the panel
- Voc of the panel
- Vmp of the panel
- Imp of the panel
- Number of panels in each string

If it is necessary to replace the unit, please ship it in the original box.

9.1.1 System fault

System fault (system faults are mainly caused by system instead of inverter, please check the items as instructed below before replacing inverter).

Error message	Description	Suggestion
AC V Outrange	Utility grid voltage is out of permissible range.	1. Check grid voltage. 2. Check AC wiring, especially the ground wire. 3. If the error message still exists despite the grid voltage being within the tolerable range, contact CyberPower.
AC F Outrange	Utility grid frequency out of permissible range.	1. Check AC wiring and grid frequency. 2. If the error message is displayed despite the grid frequency being within the tolerable range, contact CyberPower
PV Isolation Low	Insulation problem.	1. Check if panel enclosure ground properly. 2. Check if inverter ground properly. 3. Check if the DC breaker gets wet. 4. Check the impedance of PV (+) & PV (-) between ground (must be more than 1 MΩ). If the error message is displayed despite the above checking passed, contact CyberPower.
Residual I High	Leakage current too high.	1.Restart invert 2. If error message still exists, contact CyberPower.
Output High DCI	Output current DC offset too high.	1. Restart inverter. 2. If error message still exists, contact CyberPower.
PV Voltage High	The DC input voltage is exceeding the maximum tolerable value.	1. Disconnect the DC wire immediately. 2. Check the voltage of each PV string with multi-meter. 3. If the voltage of PV string is lower than 980V, contact CyberPower.
Auto Test Failed	Auto test didn't pass.	Restart inverter, repeat Auto Test, if problem still exist, contact CyberPower.
Over Temperature	NTC OPEN or the temperature of heatsink is too high.	If the ambient temperature of inverter is lower than 60°C, restart invert, if error message still exists, contact CyberPower.

9.1.2 Inverter warning

| Warning code	Meanings	Suggestion
Warning100	For CPSPV7000ETL – CPSPV12000ETL : Problem with fan 1 or fan 2. For CPSPV7000ETL / CPSPV20000ETL: Problem with fan 1, fan 2, fan 3 or fan 4.	1. Check whether there is anything above fans, clear them; 2. Turn off dc switch, rotate fan blade with screwdriver, then restart inverter. 3. If Warning still exist, Contact CyberPower.
Warning103	Fail to read EEPROM.	Restart the inverter. If the warning still exist, please contact CyberPower customer service to replace the COM board.
Warning 105	Fail to write EEPROM.	Restart the inverter. If the warning still exist, please contact CyberPower customer service to replace the COM board.

9.1.3 Inverter fault

Error code	Meanings	Suggestion
Error: 101	Communication board has not received data from control board for 10 seconds. Electromagnetic Interference cause communication problem.	1. Restart inverter by cutting off DC supply, and Error message will disappear. 2. If the error 101 is often displayed, the environment Electromagnetic Interference is too strong. Contact CyberPower.
Error: 103	EEPROM fault.	Restart inverter, if problem still exist, Contact CyberPower.
Error: 117	Relay fault.	Restart inverter, if problem still exist, Contact CyberPower.
Error: 119	GFCI fault.	Restart inverter, if problem still exist, Contact CyberPower.
Error: 121	Control board has not received data from Communication board for 5S.	Restart inverter, if problem still exist, Contact CyberPower.

10 Decommissioning

10.1 Dismantling the Inverter

1. Disconnect the inverter as described in section 7.
2. Remove all connection cables from the inverter.

> **⚠ ⚠ CAUTION**
>
> Danger of burn injuries due to hot enclosure parts!
> Wait 20 minutes before disassembling until the housing has cooled down.
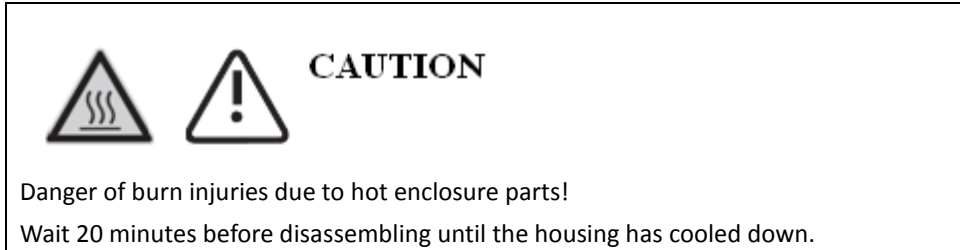
3. Screw off all projecting cable glands.
4. Lift the inverter off the bracket and unscrew the bracket screws.

10.2 Packing the Inverter

If possible, always pack the inverter in its original carton and secure it with tension belts. If it is no longer available, you can also use an equivalent carton. The box must be capable of being closed completely and made to support both the weight and the size of the inverter.

10.3 Disposing of the Inverter

Do not dispose of faulty inverters or accessories together with household waste. Please accordance with the disposal regulations for electronic waste which apply at the installation site at that time. Ensure that the old unit and, where applicable, any accessories are disposed of in a proper manner.

11 Specification

11.1 Specification of CyberPower Mini Central Series

	CPSPV7000ETL	CPSPV8000ETL	CPSPV9000ETL
Input (DC)			
Max. DC power	7300 W	8350 W	9500 W
Max. input voltage	1000 V	1000 V	1000 V
MPP voltage range / Rated input voltage	300...800 V / 600 V	300...800 V / 600 V	320...800 V / 600 V
Min. input voltage / initial input voltage	300/350 V	300/350 V	300/350 V
Max. input current	15/15 A	15/15 A	15/15 A
Number of MPP input / strings per MPP input	2 / 2	2 / 2	2 / 2
Output (AC)			
Rated AC power	7000 W	8000 W	9000 W
Max apparent AC power	7000 VA	8000 VA	9000 VA
Max. output current	11.7 A	13.3 A	15.0 A
Nominal AC voltage	3/N/PE, 220/380 V, 230/400 V, 240/415 V		
Rated frequency	50 Hz, 60 Hz		
Cos phi	0.8 over-excited … 0.8 under-excited		
Feed-in phases	3		
Efficiency			
Max efficiency	98 %	98 %	98 %
Euro-eta	97.5 %	97.5 %	97.5 %
MPPT efficiency	99.5 %	99.5 %	99.5 %
General Data			
Dimensions(W/H/D)	490/740/235 mm		
Weight	41kg		
Ambient temperature	−25 °C ... +60 °C		
Noise emission	≤ 55 dB(A)		
Night consumption	<0.5 W		
Topology	Transformer-less		
Cooling concept	Smart cooling		
Protection Class	IP65		

Relative humidity	0...95 % (non-condensing)		
Features			
DC connection	H4/MC4(opt)	H4/MC4(opt)	H4/MC4(opt)
AC connection	Screw terminal	Screw terminal	Screw terminal
Display	LCD	LCD	LCD
RS232/RS485	yes/yes	yes/yes	yes/yes
Warranty: 5/10 years	yes /opt	yes /opt	yes /opt
Certificates	CE, VDE 0126-1-1, IEC 62109, EN61000-6-2 / EN61000-6-3 / EN61000-3-2 / EN61000-3-3 / EN61000-3-11 / EN61000-3-12		

	CPSPV-10000ETL	CPSPV-12000ETL	CPSPV-18000ETL	CPSPV-20000ETL
Input (DC)				
Max. DC power	10500 W	12500 W	18700 W	20800 W
Max. input voltage	1000 V	1000 V	1000 V	1000 V
MPP voltage range / Rated input voltage	400...800 V / 600 V	400...800 V / 600 V	400...800 V / 600 V	400...800 V / 600 V
Min. input voltage / initial input voltage	300/350 V	300/350 V	300/350 V	300/350 V
Max. input current	15/15 A	17/17 A	23/23 A	26/26 A
Number of MPP input / strings per MPP input	2 / 2	2 / 2	2 / 2	2 / 2
Output (AC)				
Rated AC power	10000 W	12000 W	18000 W	20000 W
Max apparent AC power	10000 VA	12000 VA	18000 VA	20000 VA
Max. output current	16.0 A	19.0 A	28.6 A	32.0 A
Nominal AC voltage	3/N/PE, 220/380 V, 230/400 V, 240/415 V			
Rated frequency	50 Hz, 60 Hz			
Cos phi	0.8 over-excited … 0.8 under-excited			
Feed-in phases	3			
Efficiency				
Max efficiency	98 %	98 %	98 %	98 %
Euro-eta	97.5 %	97.5 %	97.5 %	97.5 %
MPPT efficiency	99.5 %	99.5 %	99.5 %	99.5 %
General Data				
Dimensions(W/H/D)	490/740/235 mm		570/740/235 mm	

| Weight	41kg		60kg	
Ambient temperature	–25 °C ... +60 °C			
Noise emission	≤ 55 dB(A)			
Night consumption	<0.5 W			
Topology	Transformer-less			
Cooling concept	Smart cooling			
Protection Class	IP65			
Relative humidity	0...95 % (non-condensing)			
Features				
DC connection	H4/MC4(opt)	H4/MC4(opt)	H4/MC4(opt)	H4/MC4(opt)
AC connection	Screw terminal	Screw terminal	Screw terminal	Screw terminal
Display	LCD	LCD	LCD	LCD
RS232/RS485	yes/yes	yes/yes	yes/yes	yes/yes
Warranty: 5/10 years	yes /opt	yes /opt	yes /opt	yes /opt
Certificates	CE, VDE 0126-1-1, IEC 62109, EN61000-6-2 / EN61000-6-3 / EN61000-3-2 / EN61000-3-3 / EN61000-3-11 / EN61000-3-12			

11.2 Torque Values

Enclosure lid screws	1.3Nm(10.8 1bf.in)
Shell and RS232 screws	0.7Nm(6.2 1bf.in)
AC terminal	1.8Nm(16.0 1bf.in)
AC connector 1 & 2	1.0Nm(9 1bf.in)
M6 socket head cap screws for securing the enclosure at the bracket	2Nm(18 1bf.in)
Additional ground screws	2Nm(18 1bf.in)
Fans screws	1Nm(9.0 1bf.in)

12 PV system installation

Installation with multiple inverters on a three phase system:
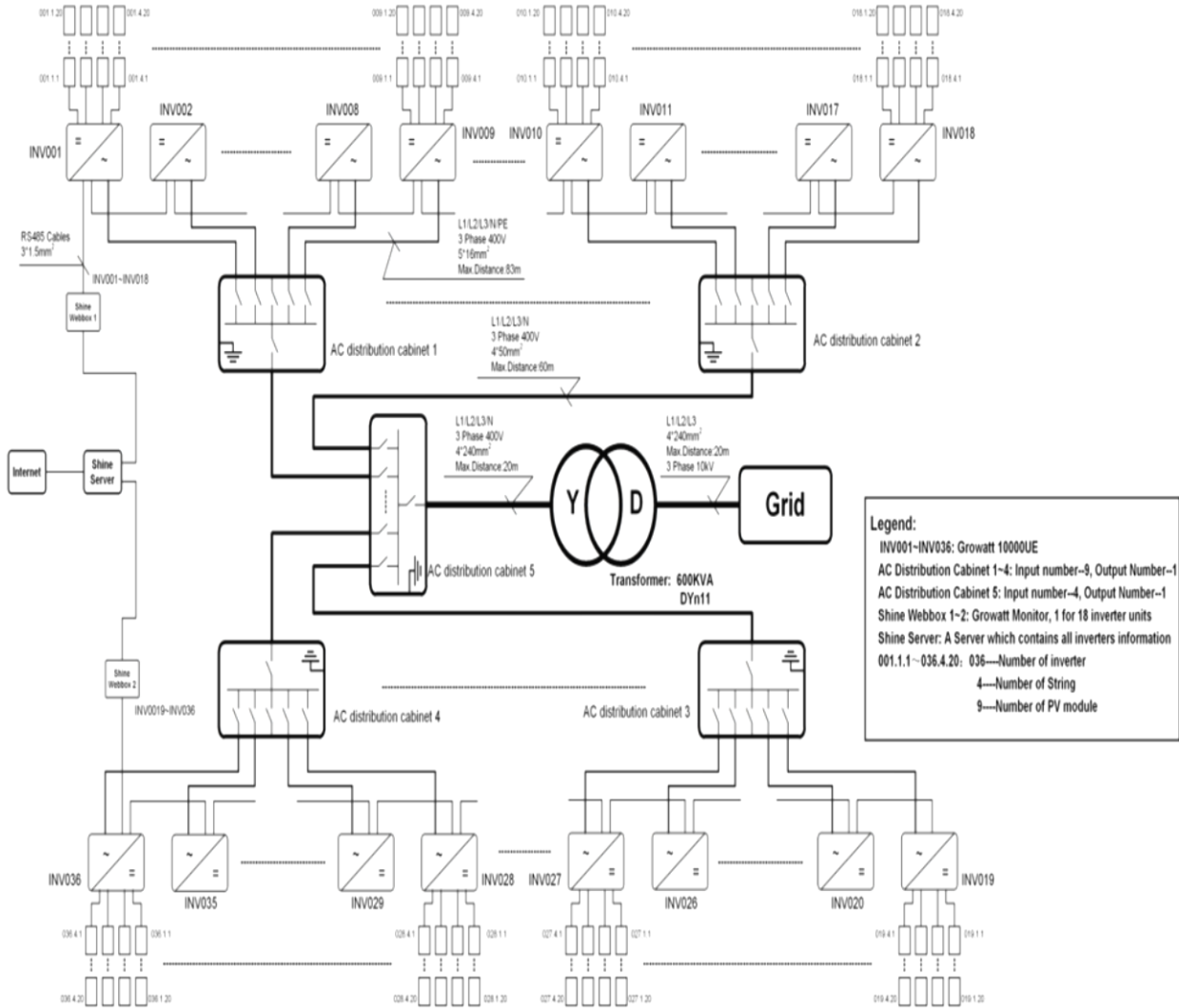
13 Certificates

CPS Mini Central series inverters are designed to use worldwide, hence the inverters meet different safety standards of variety countries and regions.

Model	Certificates
CPSPV7000ETL	IEC 62109, VDE0126-1-1, VDE0126-1-1/A1, CE
CPSPV8000ETL	IEC 62109, VDE0126-1-1, VDE0126-1-1/A1, CE
CPSPV9000ETL	IEC 62109, VDE0126-1-1, VDE0126-1-1/A1, CE
CPSPV10000ETL	IEC 62109, VDE0126-1-1, VDE0126-1-1/A1, CE
CPSPV12000ETL	IEC 62109, VDE0126-1-1, VDE0126-1-1/A1, CE
CPSPV18000ETL	IEC 62109, VDE0126-1-1, VDE0126-1-1/A1, CE
CPSPV20000ETL	IEC 62109, VDE0126-1-1, VDE0126-1-1/A1, CE

14 Contact

If you have technical problems concerning our products, contact your installer or CyberPower. During inquiring, please provide below information:

1. Inverter type
2. Modules information
3. Communication method
4. Serial number of Inverters
5. Error code of Inverters
6. Display of inverter

CyberPower Systems, Inc.

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E-mail: service@cpsww.com.tw