

# Manual de Operación Operation Manual



## **ZGR SOLAR CTR 1250/1500** **Inversor central trifásico** **3 – phase central inverter**



## INDEX

1	PRECAUTIONS .....	3
1.1	General precautions .....	3
1.2	Storage precautions .....	4
1.3	Environmental precautions .....	4
1.4	Precautions during the transport of the material .....	5
1.5	Precautions on receiving the unit .....	7
2	GENERAL DESCRIPTION .....	8
2.1	Introduction .....	8
2.2	Main characteristics .....	9
2.3	Internal architecture of ZGR SOLAR CTR 1250/1500 .....	9
2.4	Construction of ZGR SOLAR CTR 1250/1500 .....	9
2.5	Installation recommendations .....	10
3	COMMUNICATIONS .....	11
3.1	Ethernet (local access) .....	11
3.2	Web HTTP (remote access) .....	11
4	OPERATION OF ZGR SOLAR CTR 1250/1500 .....	12
4.1	Operation modes .....	12
4.1.1	Normal Mode .....	12
4.1.2	Standby Mode .....	12
4.1.3	Failure Mode .....	12
4.2	Switching of Modes .....	12
4.2.1	From normal mode to standby mode .....	12
4.2.2	From standby mode to normal mode .....	12
4.3	Introduction to Switches .....	13
4.4	Inverter Power-on Procedures .....	13
4.5	Turning On/OFF Inverter .....	13
4.6	Inverter power-off procedures .....	14
4.7	Emergency Power Off Procedures .....	14
5	MONITORIZATION .....	15
5.1	Graphical interface of the monitoring tool .....	15
5.2	Touchscreen Start-up .....	16
5.3	Touchscreen Operation Guide .....	16
5.3.1	Home page .....	16
5.3.2	Parameters page .....	19
5.3.3	Historical information .....	26
5.3.4	Inverter Alarm List .....	28
6	INSTALLATION .....	29
6.1	Receiving the material .....	29
6.1.1	Checking the system .....	29
6.2	Mechanical installation .....	29
6.2.1	Place and installation conditions .....	29
6.2.2	Placing in the operating position .....	30

6.2.3	Ventilation requirements.....	33
6.3	Electrical installation.....	34
6.3.1	Conditions of Power Grid .....	34
6.3.2	Dismantling guards for switches.....	34
6.3.3	Internal wiring terminals .....	35
6.3.4	DC Wiring .....	36
6.3.5	AC Wiring.....	38
6.3.6	System Earthing .....	39
6.3.7	Control Power Supply .....	40
6.3.8	Cable requirements .....	40
6.3.9	Other Protection.....	41
6.3.10	Wiring Specification.....	41
6.3.11	Fixing and Protection of Connection Cable .....	42
6.3.12	Installation Process .....	42
6.3.13	Installation Inspection List.....	43
6.3.14	Trial Run .....	44
6.3.15	Inspection before trial run .....	44
6.3.16	Preparations before start-up.....	45
6.3.17	Start-up Procedures.....	45
6.3.18	Completing trial run .....	45
7	TROUBLESHOOTING .....	46
7.1	Malfunctions of the equipment .....	46
7.2	Recommended spare parts.....	46
8	MAINTENANCE.....	47
8.1	ZGR SOLAR CTR 1250/1500 maintenance.....	47
8.1.1	Auxiliary Power Supply.....	47
8.1.2	Lightning Arrester .....	47
8.1.3	Dust Screen.....	47
8.1.4	Cable .....	48
9	TECHNICAL SPECIFICATIONS .....	49
10	STANDARDS .....	51
11	WARRANTY.....	52

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*The contents of this manual are exact at the time it was printed. However, with the intention of complying with our aim of continuous development and improvement, the manufacturer reserves the right to change the specifications of the product, its operation or the contents of the Operating Manual without prior warning.*

## 1 PRECAUTIONS

### 1.1 General precautions

For your own safety and that of the unit, you must read and understand the instructions contained in this document before starting work.

Keep these instructions in a place accessible to all the personnel who work with the unit so that they can be consulted.

Only expert and duly authorised personnel may operate our units.



**Danger warnings.** When handling or accessing the interior of the **ZGR SOLAR CTR 1250/1500**, please remember that some parts may be live. Pay special attention to soldering points, printed circuits, connecting terminals, relay contacts, etc. Before opening the equipment, disconnect the voltage of all poles (both alternating and direct) and wait at least 5 minutes for the internal condensers to discharge.

**Arbitrary modifications are forbidden.** The unit must not be subjected to any modification regarding its construction or safety without ZIGOR's express consent. Any modification will free ZIGOR of any responsibility for any damage caused as a result of the modification. In particular, all repair work, soldering of printed circuit boards and replacing of components, modules and printed circuit boards, without the express authorisation of ZIGOR, is forbidden. Should spare parts be used, only ZIGOR original parts shall be utilised.

**Use the unit for the purpose for which it was designed.** The system supplied must be used only for the purpose for which it was designed. Any other use is strictly forbidden. ZIGOR cannot accept responsibility for any damage that might result from its use for any other purpose. In such cases, the user shall assume exclusive responsibility for any risk. The use for which the unit was designed is defined in the documentation. The system shall be exposed only to admissible environmental conditions. These are defined in the technical details provided for the equipment.

ZIGOR accepts no responsibility for any inadequate, negligent or incorrect installation of the equipment.



#### **WARNING**

*This supply equipment contains a lethal voltage. Comply with the instructions set out in this manual to avoid any risk of electrical shock.*

Please follow the indications set out below to operate under conditions of complete safety:

- The System must be checked once the installation has been completed by a qualified technician and before being put into operation. Should these indications not be adhered to, the warranty shall be considered null and void.
- All electric installations should conform to local electric installation standards.
- These units do not contain parts usable for other purposes by the user.
- Do not power up the device before a technician has checked it.
- Given the risk of electric shock or burns, do not try to open the device.
- The unit does not contain any user repairable or replaceable elements. In the case of any malfunction or problems operating the unit, please contact ZIGOR.
- Do not place the system near power magnets as this might cause a malfunction.
- Do not block or cover the ventilation grills in the housing.
- The **ZGR SOLAR CTR 1250/1500** is designed in accordance with current Spanish legislation. Check these regulations against those corresponding to the country in which the unit is to be installed and against the most restrictive regulations of the electricity supplier.
- All user controls are accessible from the exterior.
- Work inside the cabinet should be undertaken only by qualified personnel who are familiar with the safety measures to be applied and the specific technical characteristics of the unit.
- Even though all the safety systems are in place, before touching any working parts, you must check that they are not live.
- This system has been designed for industrial use and not for domestic-commercial use.
- If any liquid is spilt accidentally on the System, disconnect this and consult **ZIGOR** personnel.
- During assembly work, start-up or maintenance, wear goggles to avoid any damage to your eyes due to accidental electric arcing and long-sleeved clothes to prevent electric shock.
- Please use electric wire and cable as specified. In case electric wire and cable with insufficient capacity

are used or they are wired incorrectly, damage to equipment, fire or electric shock may happen.

- Use only insulated tools.
- The unit must be protected against rain and excess humidity and installed in a clean atmosphere, without inflammable liquids, gases or oxidising substances.
- During the work of inverters or upon completion of work, inverter parts may still be hot and should not be touched. Please use electric wire and cable as specified. In case electric wire and cable with insufficient capacity are used or they are wired incorrectly, damage to equipment, fire or electric shock may happen.
- Avoid stepping on, twisting and dragging the cables. Damage to cables will cause electric shock, short circuit and fire.
- Please shut down power and stop running in case of unusual situation such as burning smell, abnormal sound, abnormal heating and smoke. Contact the Company immediately to prevent electric shock, fire and other danger from happening.
- Please do not touch any component irrelevant to maintenance to avoid accidents.
- Those with cardiac pacemakers should remain a safe distance from inverters as inverters generate magnetic field during work, which influences the normal operation of pacemakers.
- Inverters should be installed in a horizontal location. If tipped over or dropped down from installation site, damage to inverters or failures may be caused.
- Please do not place combustibles and explosives near the inverters. Inverters produce heat during work and may cause fire or explosion of surrounding combustibles and explosives.
- Please do not cover the inverters with blankets, cloth or other fabric during operation, otherwise heat generated by the inverters may cause fire.
- Please have fire extinguishers installed in the site of inverters.
- Should you have any problems with the contents of this manual, you must ask **ZIGOR** for assistance.

## 1.2 Storage precautions

The store where the material is kept must protect the material from the elements, risk of flooding or contact with water.

The material shall be protected from any risk of overheating due to exposure to direct sunlight or through windows.

To avoid any risk of mechanical shock, do not stack the packages. These must be placed in accordance with the silkscreen printed details on the boxes used for packaging.

If not installed upon delivery, the inverter must be stored indoor to prevent ingress or exposure to direct sunlight. Temperature requirement for transportation and storage: -40°C to +70 °C. Relative humidity requirement for transportation and storage: 20% RH to 95% RH.



### **WARNING**

*Any failure to respect these precautions may render the product warranty null and void.*

## 1.3 Environmental precautions

**ZIGOR** has been committed to the design and manufacture of environmentally friendly products and we shall keep reducing and eliminating hazardous substances in the product through continuous research. Hazardous substances contained in the following parts or applications are due to confinement in the current level of technology, with no reliable replacement or mature solution available:

- Lead in solder material
- Lead in copper
- Lead in transistor package glass
- Lead in electronic ceramics of ceramic capacitors, lead in copper terminal/wire of gold-film capacitors
- Lead in resistive glass
- Lead in the glass of display, mercury in the backlight
- Lead and PBDE in insulation detector

Remarks on the environment friendly lifespan: Environment friendly lifespan of the product (marked on the body) indicates the duration, under normal use condition and conforming to the safety precautions; from the date of manufacture to the last day that hazardous substances or elements contained will pose any severe damage to the environment, human body and property.



**Dispose of the packaging in an ecological way:** ZIGOR, based on the exceptions detailed in the First Additional Provision of Law 11/1997 on commercial or industrial packaging, informs that the final holder of the waste of used containers and packaging, as responsible for them, you must deliver them in appropriate conditions for reuse, to an authorized recuperator, recycler or re-valuer.

The subsets of the system are recyclable products and cannot be treated as household / municipal waste at the end of its useful life.

To preserve the environment, manage them in accordance with current environmental regulations and requirements in each country or community. In case of doubt, consult the manufacturer.



**Correct product disposal:** This electrical-electronic device (AEE) is marked with the symbol of compliance with the European Directive 2012/19 / EU (WEEE) regarding used electrical and electronic equipment (Waste electrical and electronic equipment WEEE, RD 110/2015).

The Directive provides the general framework valid throughout the European Union for the removal and reuse of waste from EEE.

To dispose of this product and ensure its proper management, follow the current local environmental legislation and regulations. In this way it will contribute to conserve the environment.

The wheeled bin crossed out on the product, in the documentation or on its packaging, means that the electrical-electronic devices and batteries must be collected separately at the end of their life cycle.

Before the deposit of the RAEE in their collection facilities, the batteries must be removed and deposited separately from the rest of the RAEE for proper management, according to the current local legislation and environmental regulations.

Never dispose of with household waste. In this way it will help preserve the environment.

These symbols are valid in the European Union and in those places where separate collection systems are available.



**Correct disposal of batteries:** Used batteries are reusable consumer products and a recycling process must be carried out.

Used batteries that do not go through the recycling process must be disposed of according to the instructions regarding special waste, in accordance with the regulations and environmental requirements in force in each country or community. This requirement applies in the European Union and in those places where separate collection systems are available.

In case of doubt, consult the manufacturer.




In this way it will contribute to conserve the environment.

## 1.4 Precautions during the transport of the material

As an individual set of equipment, ZGR SOLAR CTR 1250/1500 inverter has been integrated internally and cannot be dismantled. It requires vertical handling of the complete equipment and tilting or laying down are prohibited. In addition, please pay attention to safety protections during handling.

Inverters should be handled with packaging for better protection during the transportation process. Detailed product parameters and shipping requirements are marked on the outside of the inverter packaging, which should be followed. Marks and symbols on the inverter packaging are shown in Table 1-1.



SYMBOL	DESCRIPTION
	This Side Up. Laying down, tilting or inverting inverter are prohibited.
	Handle with Care. Avoid harsh collision and friction during transportation, which might damage the inverter.
	Moisture Proof. Avoid rain ingress or moisture.

**Table 1-1 Description of Symbols on Packaging**

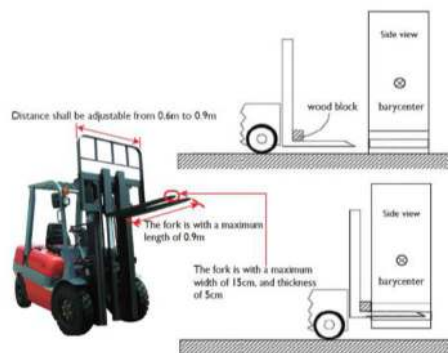
While moving the inverter, pay attention to the weight of inverter and make sure the handling equipment has sufficient bearing capacity. Arrange supporting or lifting points rationally.

Forklift is the standard way of transportation. The center of gravity of the complete package should be between the two forks of the forklift. Due to the size of inverter, the line of sight of the forklift operator may be blocked; hence assistance from a second person is required.

When moving the package with crane, bearing frame lifting points should be used.

Handling without packaging is usually for positioning to the final installation location. Unpacked ZGR SOLAR CTR 1250/1500 systems must be handled with a pallet truck or forklift truck. Handling of the unit with any other means could cause damage and invalidate the warranty. The system must not be placed on their side or upside down. Any handling of ZGR SOLAR CTR 1250/1500 equipment is subject to this standard.

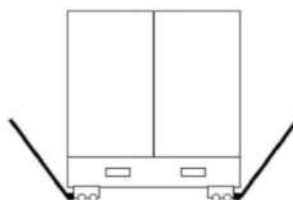
- Handling with forklift: use an appropriate forklift which can bear the corresponding weight with prongs being minimum 0.9 m in length and maximum 15 cm in width or 5 cm in thickness. Prongs should be adjustable from 0.4 m to 0.9 m (Fig. 1-1):



**Fig. 1-1 Correct way to handle the unit with forklift**

**NOTE:** Pay attention to protect the equipment when using a forklift.

- Confirm that the forklift is capable of bearing the weight of the load to be handled ;
- As shown in Fig. 3-2, use wood panels at corners of the prongs to protect the equipment ;
- Spincycle : As shown in Fig. 1-2, if you use a spincycle, you must put it under the back and forth base. When using a spincycle, its diameter must not be less than 5 cm, the length is not less than 0.9 m, and the distance is not more than 0.4 m. The spincycle strength must be sufficient to support inverter weight.



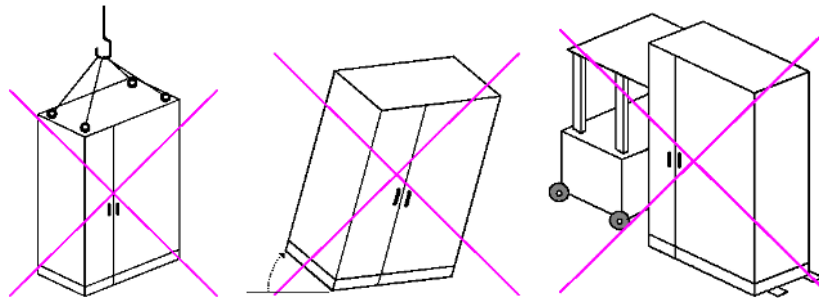
**Fig. 1-2 Correct way to handle the unit with Spincycle**



**NOTE:** the spincycle strength must be sufficient to support inverter weight.

Handling with straps, hooks, belts or similar devices may cause damage to the equipment, not included in the warranty.

Improper handling (Fig. 1-3)



**Fig. 1-3 Examples of improper handling**

While moving the inverter, pay attention to the weight of inverter and make sure the handling equipment has sufficient bearing capacity. Arrange supporting or lifting points rationally.

Forklift is the standard way of transportation. The center of gravity of the complete package should be between the two forks of the forklift. Due to the size of inverter, the line of sight of the forklift operator may be blocked, hence assistance from a second person is required.

When moving the package with crane, bearing frame lifting points should be used.

### 1.5 Precautions on receiving the unit

Visually check that the warehouse location is adequate by checking its characteristics (clean, free of leaks with good ventilation); the floor must be level and have sufficient load resistance for the equipment.

#### Checking the material

On receiving the material, a visual inspection should be made in order to detect any anomalies that may have occurred during transport.

List and check all the items indicated on the delivery note. Should any component be missing, notify the forwarding agent within the established deadline.

Extract all parts from the packaging and examine the unit for any damage caused during transport.

Report any damage to the forwarding agent and ZIGOR.

Check that the material delivered corresponds to the delivery note. Check the manufacturer's label placed at the rear or on one side of the unit.

Responsibility for the loss or damage of Products shall transfer to the Customer from the moment ZIGOR, places these at his disposal in the place indicated by the Customer.

*From then on, the customer will have 24 hours to make any claim under guarantee for any anomaly in the amount or quality of the products received, providing details of the material received in bad condition after reporting this circumstance on the forwarding agent's delivery note on reception.*

*Should the customer not report any defect within 24 hours, it will be understood that he has accepted delivery of the unit.*

## 2 GENERAL DESCRIPTION

### 2.1 Introduction

Grid-tied PV power generation system consists of solar cell modules, combiner box, DC distribution unit, grid tied inverter and power distribution system (Fig. 2-1). Solar power is converted into DC power by PV cell modules, and DC power is serial parallel connected after passing combiner box and DC distribution unit.

DC power is then converted by grid tied inverter into AC power for grid transmission. Without grid tied photovoltaic inverter, power generated by panels cannot feed into the grid for grid transmission, therefore, Grid tied photovoltaic inverter is a critical device in the solar power generation system and its performance has an immediate impact on the power generation efficiency. **ZGR SOLAR CTR 1250/1500** is a power station type grid tied photovoltaic inverter. Composition of grid tied PV power generation system is shown in Fig. 2-1.



Fig. 2-1 Grid-tied PV Power Generation System composition

**ZGR SOLAR CTR 1250/1500** inverters have been specially designed to improve performance and reduce volume in medium-large solar plants. Three-phase ZIGOR SOLAR CTR3 inverters from 1250 to 1500 kW stand out for their high efficiency.

Likewise, the range of inverters **ZGR SOLAR CTR 1250/1500** offers high reliability and guarantee of operation. It should be noted that with these inverters a power density has been achieved per unit of unbeatable volume, making possible a significant reduction in the space required for medium-large solar plant investors.

Another important feature is its automatic reactive regulation and its communication tools between them and the centralized supervision and control system. All its parameters are configurable locally and also remotely. **ZGR SOLAR CTR 1250/1500** inverters are adapted to European regulations for compliance with the requirements for response to voltage dips without disconnection.

The **ZGR SOLAR CTR 1250/1500** is a powerful electronic unit specially designed according the requirements of the customer to ensure the power quality and to guarantee supply to load under demanding conditions of use.

System components that inverter is adaptive to are shown in Table 2-1:

NAME		SPECIFICATION
PV array		Monocrystalline silicon, polycrystalline silicon, amorphous silicon, hull cell, etc.
Three-phase power grid		TT, TN-C, TN-S, TN-C-S, IT
Other (optional)	accessories	Environment detector, PV array combiner box, AC distribution cabinet, Data collector, etc.

Table 2-1 List of System Components

## 2.2 Main characteristics

- High-frequency double-conversion pulse width modulation (SVPWM) technology.
- Complete digital control (DSP) technology.
- Using long-life film capacitor as DC bus capacitor to enhance system reliability.
- Intelligent fan control to save electric energy effectively and increase output.
- Wide voltage range to extend the duration of power generation and increase output.
- Auto startup mode requiring no manual intervention.
- Intelligent maximum power point tracking (MPPT) technology to ensure PV array transferring energy to power grid at maximum power 24/7 and improve power generation efficiency.
- Zero voltage/high voltage ride through.
- Comprehensive protection function.
- Big LCD screen and user-friendly HMI design enabling convenient monitoring of various operational parameters
- Various communication protocols including Ethernet/RS485 (Ethernet as optional).
- Reactive power adjustable with power factor ranging from 0.9 leading to 0.9 lagging.
- Considerate heat dissipation design and protection design including air duct isolation in front/back cabins, physical isolation of circuit board and protective coating to improve system reliability.

## 2.3 Internal architecture of ZGR SOLAR CTR 1250/1500

The main circuit schematics of **ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter is shown in Fig. 2-2. DC power generated by PV array is converted into high frequency three-phase chopping voltage through the three-phase bridge converter, and then converted into three-phase sinusoidal voltage and connected to the power grid.

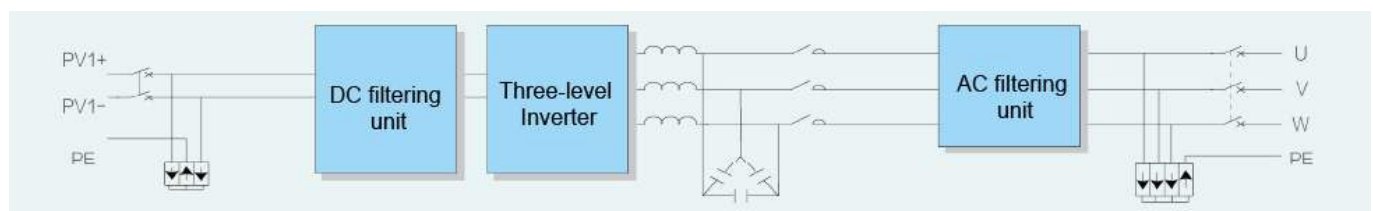


Fig. 2-2 Schematic of ZGR SOLAR CTR 1250/1500

## 2.4 Construction of ZGR SOLAR CTR 1250/1500

Inverter cabinet main components are visible externally (HMI, filter screen, door lock and etc.).

- HMI, including 7" resistive touch screen, LED indicator, panel buttons, emergency stop button. Refer to Chapter 6 for detailed operation.
- Filter screen, located on the inside of two front doors as the front air inlet of inverter.
- Door lock, can be locked up with key to prevent tampering.

All equipments are built in steel frames with removable panels.

All the electrical connections of the equipment are in the lower part of the front of the equipment opening the doors.

Refrigeration is obtained by means of forced ventilation. The air circulates through vents located in the front, back and top of the equipment. These areas should be left free of any object so that air can circulate freely inside and outside the equipment.

Below is shown the general view of the all equipments of **ZGR SOLAR CTR 1250/1500** (Fig. 2-3):



**Fig. 2-3 Front view of the complete system of ZGR SOLAR CTR 1250/1500**

- Control panel, including 7" resistive touch screen, LED indicator, panel buttons, and emergency stop button. Refer to section 5 for detailed operation.
- Filter screen, located on the inside of two front doors as the front air inlet of inverter.
- Door lock, can be locked up with key to prevent tampering.

## 2.5 Installation recommendations

A complete grid-tied photovoltaic power generation system must include the product configuration as listed in Table 2-2.

NO.	DESCRIPTION	REMARK
A	Environment detector	It measures the meteorological conditions at the PV power station, including wind speed, wind direction, irradiation, temperature, etc. It also uploads measurements to the data collector and host computer for real time monitoring of environment information.
B	Combiner box	It reduces connecting lines between PV modules and inverter to facilitate access of inverters in a later stage, ensuring system safety and shortening system installation time greatly.
C	AC distribution cabinet	It is configured with breakers on the grid side, lightning arrester, power meter, utility interface, AC voltage ammeter and etc., which improves system reliability and safety.
D	Data collector	The device is used for monitoring single or multiple inverters. It adopts standard data communication interface that supports RS485 interface, USB, network communication and etc., and enables monitoring of hundreds of inverters.

**Table 2-2 Product Configuration of Grid-tied photovoltaic Power Generation System**

**Remark:** As the maximum voltage of the product is 1500VDC on the DC side and 550VAC on the AC output side(GSM 1500:600VAC), any contact of the live parts may be dangerous.

### 3 COMMUNICATIONS

The **ZGR SOLAR CTR 1250/1500** provides a series of services for their interaction and monitoring. The access to these services could be local or remote.

#### 3.1 Ethernet (local access)

It is possible to access locally through the Ethernet port, using a crossover cable, if it is connected directly to a PC-type node; or a normal one, in the case of doing it through an interconnection element as a "switch".

In the PC, the network parameters have to be configured (IP address and mask) according to the ones established in the inverter, taking into account that each node has a unique IP address.

The graphical interface which the user will enter has all its functionalities described in the section 5.1 of the present document.

#### 3.2 Web HTTP (remote access)

The **ZGR SOLAR CTR 1250/1500** equipment can be remotely monitored through the web server through the Ethernet port (RJ45).

To use this type of communication, the equipment must be connected to the internet network and must have a valid IP address. The computer used to monitor the equipment must be connected to the network and have a web browser. The configuration of the monitoring tool is explained in more detail in section 5.1 of this document.

The graphic interface to which the user will access as well as all its functionalities are described in section 5.2 of this document.

Consult our customer service ([sac@zigor.com](mailto:sac@zigor.com)) for more information.

## 4 OPERATION OF ZGR SOLAR CTR 1250/1500

### 4.1 Operation modes



#### **WARNING**

*Dangerous voltage exists behind protective covers. Components behind protective covers that can only be opened with tools are not intended for users to operate. Only qualified maintenance personnel are allowed to open such protective covers.*

The start-up of the **ZGR SOLAR CTR 1250/1500** is linked to the guarantee that **ZIGOR** gives about the equipment. Consult with **ZIGOR** the warranty conditions with commissioning by the **ZIGOR** customer service department. Any attempt to operate the **ZGR SOLAR CTR 1250/1500** devices will be considered as a start-up.

**NOTE:** User must use the equipment as per the methods specified in the specification. Any other methods may result in impairments to equipment protection.

The inverter can be operated in normal mode, standby mode and failure mode.

#### 4.1.1 Normal Mode

Where there is sufficient sunshine, input voltage of PV array is within the rated DC voltage range, three-phase AC output voltage is within the operating voltage range, inverter converts DC power to AC power and transmit to grid.

#### 4.1.2 Standby Mode

Under standby mode, the monitoring part of the system works normally and the inverter's main power section is turned off.

#### 4.1.3 Failure Mode

The system is in failure mode only when there is abnormal input/output situation or severe fault in the system.



#### **WARNING**

*The system is still in high voltage under this mode. Pay attention during maintenance!*

### 4.2 Switching of Modes

Switching of modes refers to the switching between normal mode and standby mode.

#### 4.2.1 From normal mode to standby mode

Under any of the following conditions, inverter automatically switches from normal mode to standby mode, requiring no human intervention:

- Input DC voltage exceeds rated DC voltage range
- Grid voltage and frequency is abnormal
- Inverter breakdown

#### 4.2.2 From standby mode to normal mode

Under the following two conditions, inverter automatically switches from standby mode to normal mode, requiring no human intervention:

- Input voltage is within rated DC voltage range
- Grid voltage and frequency are within normal working range

### 4.3 Introduction to Switches



#### **WARNING**

*Dangerous voltage exists behind protective covers. Components behind protective covers that can only be opened with tools are not intended for users to operate. Only authorized maintenance engineers are allowed to open such protective covers.*

After unlocking, rotate the lock handle 90 degrees counterclockwise to open the front door of inverter and the following power switches of inverter can be seen, including:

- PV tributary input switches QPV1 to QPV12;
- AC output switch QAC;
- Power switch KB1 for internal power supply;
- Power switch KB2 for internal control;
- Fuse holders: F1 to F4, among which, F1 and F2 are DC auxiliary power supply fuses, F3 and F4 are internal power supply fuses.

**NOTE:** All switches must be disconnected before connecting external power supply.

### 4.4 Inverter Power-on Procedures

Before power-on, make sure that inverter has been installed to specification and commissioned by engineers. In addition, all external switches should be disconnected.

Operating procedures are as follows:

- Connect AC auxiliary power supply cable according to the requirements in the label “AC Auxiliary Power Supply Wiring”;
- Confirm DC power distribution switch QPVn (n being 1 to the relevant number of switch) is disconnected, AC output switch QAC and auxiliary power supply switches KB1 and KB2 are disconnected;
- Confirm polarity of DC is correct, PV open circuit voltage is less than 1500V and AC phase sequence is correct; voltage range is within (-10% to +15%) of system voltage. System voltage here refers to the voltage indicated on the equipment nameplate;
- Close auxiliary power supply switch KB1, close switch KB2 and the control system starts to work;
- Close AC switch QAC; close tributary switch for DC power distribution cabinet;
- In about 1 minute, the sound of grid contactors auto-closing will be heard, which indicates that inverter is connected to grid successfully and “Grid-tied Power Generation” appears on LCD screen;

**NOTE:** input switch QPV, AC output switch QAC are in closed when the handle is in the upper position and in disconnected the handle is in the lower position.

### 4.5 Turning On/OFF Inverter

The inverter turns on automatically in the morning when there is sufficient sunshine and turns off automatically in the afternoon when the sunshine is insufficient to supply enough energy. Turning on and turning off are automatic process requiring no human intervention.



#### **CAUTION**

*The equipment may generate noise during operation. Please pay attention to hearing protection if you are close to operating equipment.*



**WARNING**

*Maintenance can only start until 10 minutes after system is powered off and all input/output switches are disconnected.*

## 4.6 Inverter power-off procedures

**WARNING**

*After inverter is completely powered off, the PV array side of PV input switches and the grid side of AC output switches remain energized.*

Turning on and turning off of inverter is done automatically and if inverter needs to be powered off during operation, the following suggested steps may be taken.

- Press system EPO switch.
- Disconnect AC output switch QAC.
- Disconnect QPV input switch.
- Disconnect switches KB1, KB2.

**NOTE:** It is normal for inverter to trigger alarm during power-off and power-off procedures may continue.

## 4.7 Emergency Power Off Procedures

Emergency Power Off (EPO) switch in the upper right corner of touchscreen is for powering off inverter in case of emergency (such as fire, flood). When EPO is pressed, inverter module output is turned off and power transmission to the grid is cutoff immediately. At this time, PV input port and AC output port of inverter remain energized.

## 5 MONITORIZATION

The **ZGR SOLAR CTR 1250/1500** provides a web tool for monitoring purposes along with the touch control panel. An internet web browser is needed for accessing the web monitoring tool and the visual interface is and the same user interface is shown in local and in remote mode, without the need to install any type of software or desktop application.

### 5.1 Graphical interface of the monitoring tool

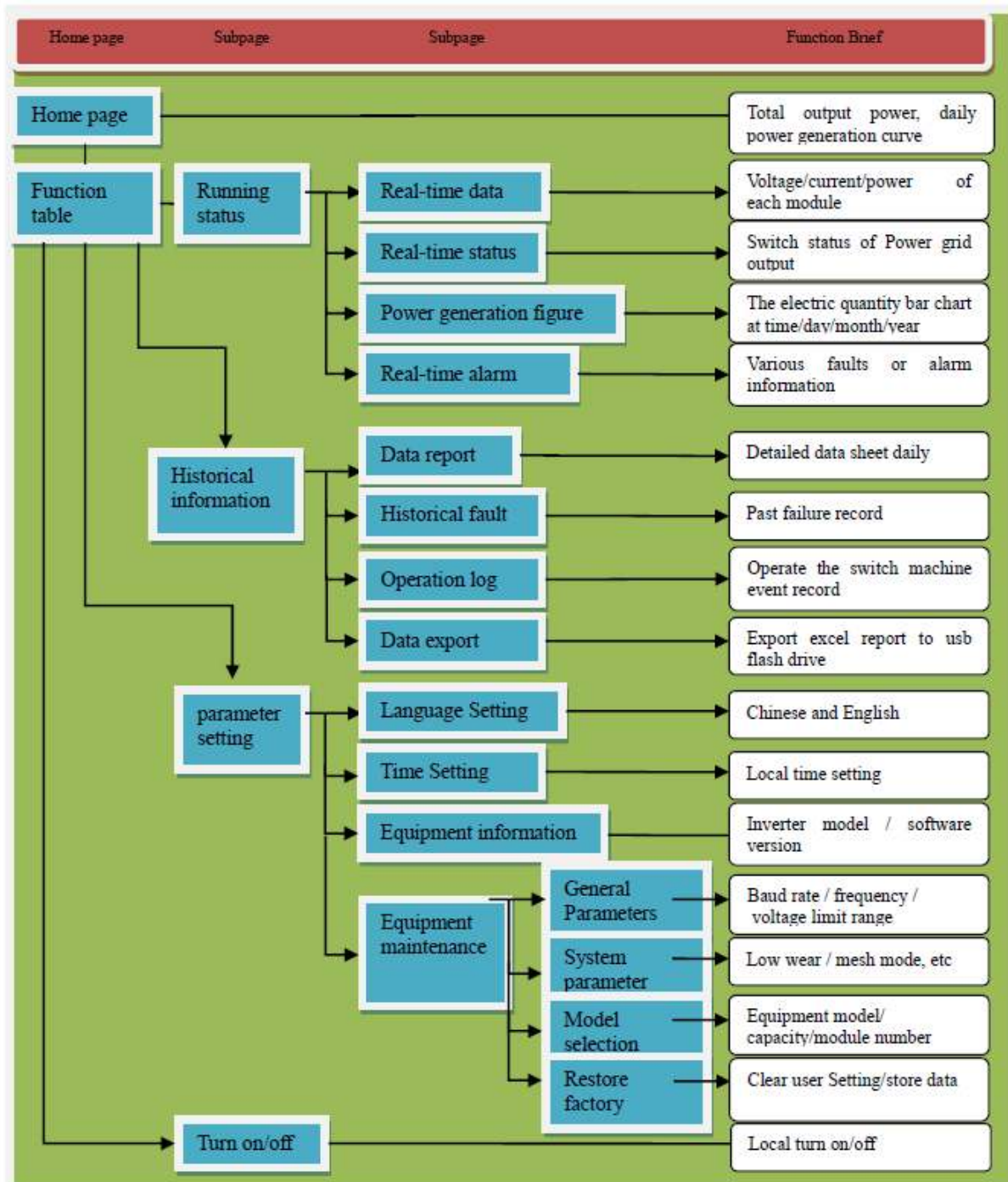


Fig. 5-1 Logic diagram of touchscreen interface

## 5.2 Touchscreen Start-up



Fig. 5-2 Touchscreen Start-up

Close the auxiliary power switch K1, and then close the control power switch K2 (Fig. 5-2).

## 5.3 Touchscreen Operation Guide

Turn on the system and in the start up screen “Press Touchscreen to enter Startup Properties Window”, press the dialogue box and in “System Parameters” may decide if you want change the password or not.

Default password is 1234.

### 5.3.1 Home page

The graphical interface automatically enters the startup properties window. The main page interface contains input parameters, output parameters, information such as operating status and power generation, the current time and date are also displayed.

Press “Functions” section (Fig. 5-3).

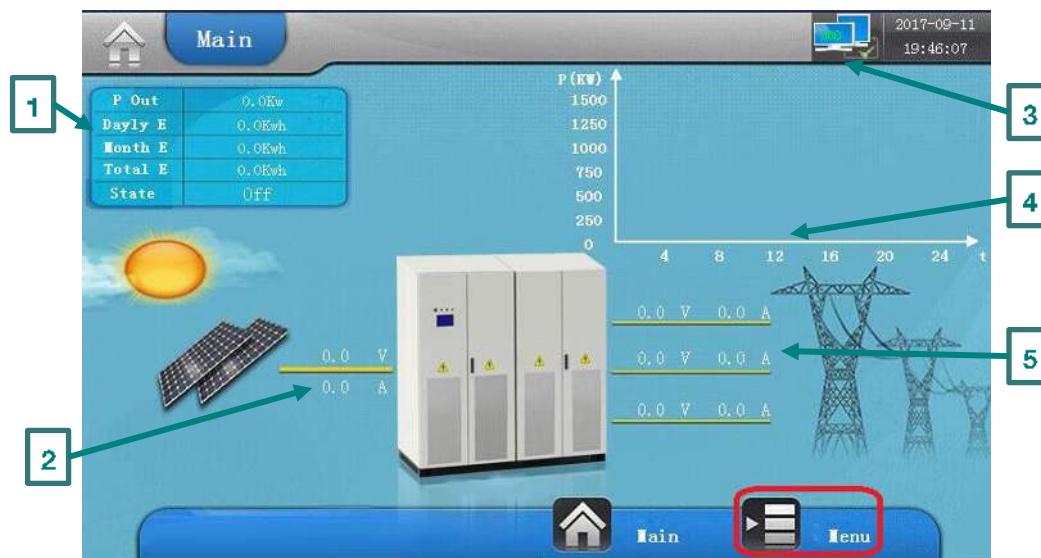


Fig. 5-3 Home page

In the Home page the user can see:

1. Output power and working status;
2. DC voltage and current;
3. Man-machine interface and
4. Inverter communication status
5. Histogram of power generation;
6. Three-phase line voltage and current.



Communication between touchscreen and DSP is not established. Please check line sequence of RS232 and eliminate line interference.



Communication between touchscreen and DSP OK.

On the main page, click “ON/OFF” (Fig. 5-4) and then “Shutdown confirmation” to complete shutdown.



Fig. 5-4 On/Off

On the main page, click “Data” (1) or click the inverter icon (2). This will get the user access to operational status data observations (Fig. 5-5).



Fig. 5-5 Data page

The user has the following options:

- **Real-time data:** Click “RT data” to display the exchange data. Click “M1” to view module 1 data or “M2” to view module 2 data. Click “DC” to see DC data.



Fig. 5-6 Home/RT data page

- **Real-time status:** This page allows viewing the status of the grid output switch, emergency shutdown, input open and so on.



Fig. 5-7 Home/Status page

- **Energy generated:** This page allows you to view the hourly/ daily / monthly / yearly / total energy histogram.



Fig. 5-8 Home/Energy page

- **Real-time alarms:** To view current fault or alarm information.





Fig. 5-9 Home/Current log page

### 5.3.2 Parameters page

Press "Set Parameters" (Fig. 5-10).



Fig. 5-10 Parameters page

Press the red box zone to input password and then press Enter. Initial password is 1234.



Fig. 5-11 Parameters/Password page

- **Language:** The screen shown on the left is popped up. Click on the flag icon that represents the language. The interface can choose Chinese, English, and Russian as the control interface language.



Fig. 5-12 Parameters/Language page

- **Time setting:** Click on "Time". HMI: machine time; DSP: inverter time. Do not operate if time is correct.



Fig. 5-13 Parameters/Time page

Enter the given data in the data field. Click on the red box in the "Date" column, a new window will pop up the page as shown in Fig. 5-14 to enter the value of the year, month and day. Click "OK" to finish.

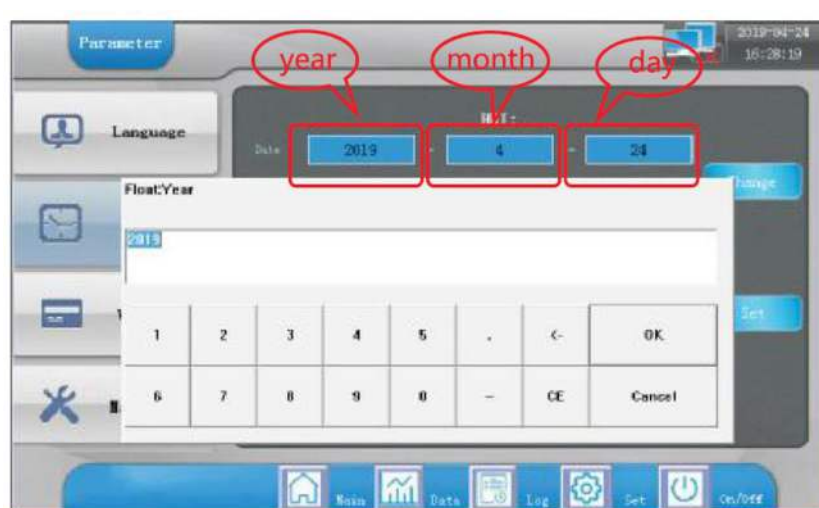


Fig. 5-14 Setting the Date



To set the Time proceed as before explained (Fig. 5-15).

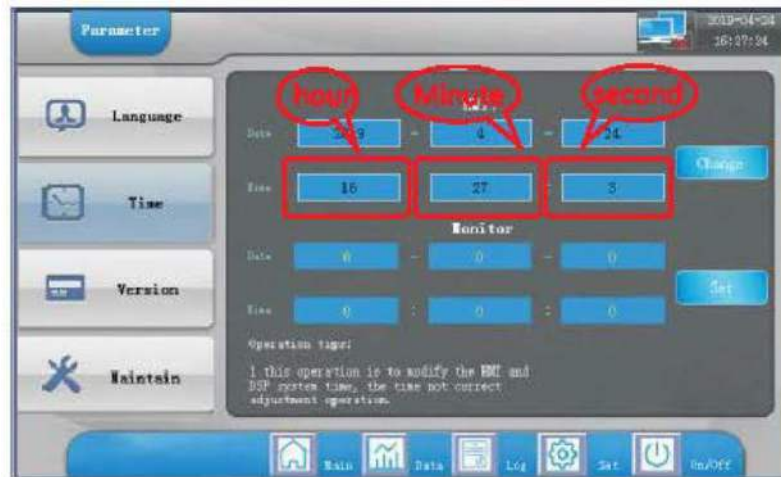


Fig. 5-15 Setting the Time

- **Message:** In this page equipment information is shown. Displaying software version information, unchangeable by user.



Fig. 5-16 Parameter/Equipment information page

- **Maintain:** The user can restore factory setting; Press “Authorization Timing” to set a count down time for reentering password. “Control Password Setting” is to set lower level monitoring control password, not operable at the moment. “Restart System”, not operable at the moment. “Ex Factory Date Setting”, not operable at the moment.

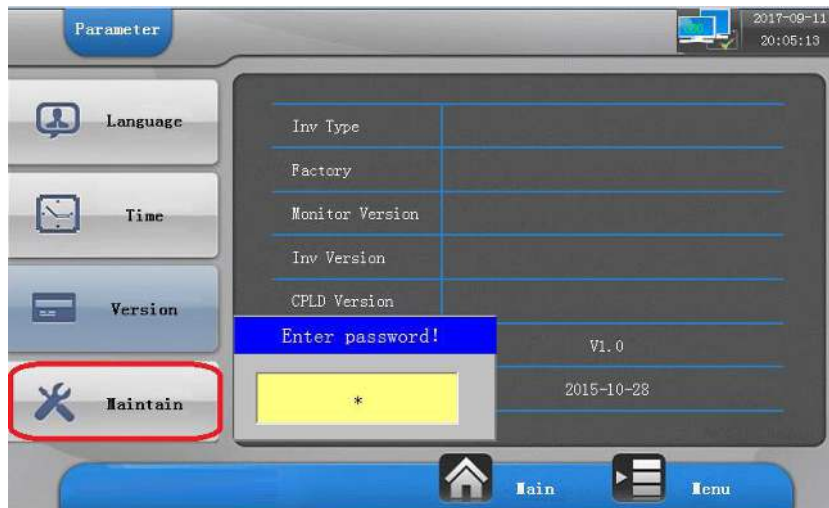


Fig. 5-17 Parameters/Maintain page

Press “Equipment Maintenance” and system prompts to input password (1234). Input the password correctly and press “Enter”. “General Parameters” and “System Parameters” are important branch sub screens as shown below:

- **General parameters:** Click any setting parameter location. The input password box will pop up. Set the password.



Fig. 5-18 Parameters/General page

- **System parameters:** The available values and ranges are in Table 5-1.



Fig. 5-19 Parameters/System parameters page

USER SETTING	VALUE AND RANGE	DEFAULT	REMARK
Set equipment address	1-243	1	
Set serial port baud rate	1200/2400/4800/9600/19200	9600	
#1 active power percentage	1~100%	100	
#2 active power percentage	1~100%	100	
#3 active power percentage	1~100%	0	
#4 active power percentage	1~100%	0	
Grid-tied power upper limit	100~20000 (W/s)	5000	
Grid frequency range upper limit	0,2 Hz; 0,3 Hz; 0,4 Hz; 0,5 Hz	5 Hz	Maximum frequency of normal operation.
Grid frequency range lower limit	-0,5 Hz; -1 Hz ; -1,5 Hz ; -2 Hz	-5 Hz	Minimum frequency of normal operation.
Voltage protection upper limit	+15%; +10%; +20%; +30%	+15%	Maximum working voltage.
Voltage protection lower limit	-15%; -10%; -20%; -30%	-15%	Minimum working voltage.
Capacity setting	100 /125 /250 /500 /630 /750 / 1000/1250/1500 kw	1250	
Grid to restore scheduled turning-on	Not allowed; allowed	Allowed	
Grid to restore connection method	Automatic restore; Scheduled	Automatic restore	
Output frequency level	50 Hz ; 60 Hz	50 Hz	

Output reactive mode setting	1: not adjustable; 2: adjustable by power factor; 3: reactive power adjustable; 4: night SVG mode	Adjustable by power factor	Set the inverter reactive power mode. Only by setting this mode can the inverter generate reactive power.
Output power factor setting	90 - 100 (0,90-1) ; 65446 - 65437 (-0,90—0,99)	100	Set power factor here. Please set “Output reactive mode setting” to “power factor adjustable”
Output reactive power setting	1 ~ 550	1	Please set “Output reactive mode setting” to “reactive power adjustable” or “night SVG mode” and then set the % of reactive current as per user request.
Output active power setting	25 ~ 1250 kw	1250	Can control the inverter output active power range.
Time for insulation inspection	0~10s	0	0: voltage inspection method; 1-9: resistance inspection method; 10: insulation inspection off
Low voltage ride through enabled	No; Yes	Yes	
Grid connecting method of inverter	Reversible; Irreversible	Reversible	Irreversible only for cases without grid-connection permit and power generation is for internal use only
No. of MPPT	1,2,4	1	
Operating mode of inverter	Normal mode,Auto-running mode, Adjusting mode	Normal mode	
Output voltage level setting	315/360/400/550V/600	550	Set output voltage level according to the specification requirement of inverter
LVRT enabled	Prohibit; enabled	Enabled	Set the inverter's low-voltage crossing ability. Low-voltage crossing refers to the fact that the inverter continues to operate when the ac voltage drops to a certain voltage.
Fan start mode	0 -1	1	0 : Automatic mode, start and stop according to temperature; 1 : Automatically start when connected to the network.

Table 5-1 System parameters

- **Type:** Click the corresponding selection area. After model selection, please set “Output Active Power Setting” in “System Parameters”.



Fig. 5-20 Parameters/Type page



Fig. 5-21 Parameters/Type page 1500K model page



Fig. 5-22 Parameters/Type page number of model page

- **Recovery:** This page changes the control password, Operation authority time, Restore factory parameter setting, Clear storage data, etc.



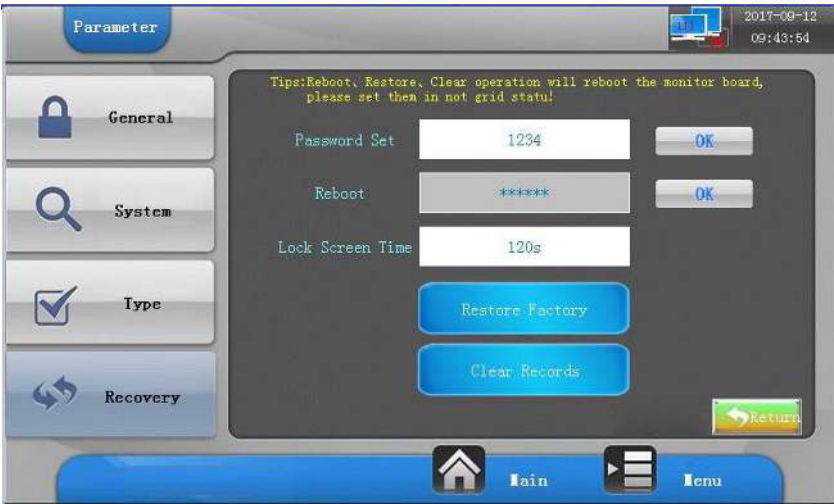


Fig. 5-23 Parameters/Recovery page

5.3.3 Historical information

Press the “Historical Information” icon in the red box on “Functions” screen.



Fig. 5-24 History page

- **Operation log:** this is a view of daily phenomenon data sheet.



Fig. 5-25 History/Action page

- **Historical faults:** This page allows to view past fault records.



Fig. 5-26 History/Fault page

- **Data Report:**



Fig. 5-27 History/List page

- **Data export:** Insert a USB flash drive into the USB port of board card, Press the “Operation Log” icon in the lower right to export operation log.csv which contains system turning on/off records; Press the “Historical Faults” icon in the lower right to export MCGS\_ALARM.csv which contains historical alarm records; Press the “Data Report” icon in the lower right to export dataset.csv which contains information on energy generated/power/voltage and current by phase. .csv is in Excel format and can be opened with double click.



Fig. 5-28 History/Export page



### 5.3.4 Inverter Alarm List

The following Table is the full list of all inverter alarms that can be displayed in “Present Records” and “Historical Records” (Table 5-2):

ALARM	DESCRIPTION
Bus short-circuit	Short circuit happens in bus
Bus over-voltage	Bus voltage higher than specified value
Inverter drive cable fault	Cable of inverter in fault
IGBT overcurrent	Hardware detects IGBT current higher than specified value
Contactors open	Open fault on contactor
Contactors short-circuit	Short circuit happens
Grid over-voltage	Effective grid voltage higher than specified value
Grid under-voltage	Effective grid voltage lower than specified value
Grid frequency fault	Grid frequency high than specified value
Grid phase sequence fault	A, B, C input phase sequence incorrect
Inverter fault	Inverter fault happens
Silo protection	Output silo happens in inverter
Auxiliary power supply fault	Fault happens in auxiliary power supply
Emergency Power Off	EPO button pressed
Inverter over-temperature	High temperature detected in inverter
Inverter room fan breakdown	Fan breakdown in inverter room or ventilation units
Insulation resistance fault	Input insulation resistance lower than specified value
AC fan fault	AC fan fault
Smoke detector alarm	Smoke detector sends an alarm
Residual current fault	Residual current higher than specified value

**Table 5-2 Possible events list**

## 6 INSTALLATION

### 6.1 Receiving the material

Extract all the packaging material and visually examine the unit and accessories for possible damage during transport. Notify the seller about any damage.

List and check all the items indicated on the delivery note. Check that the material delivered corresponds to the delivery note. To do this, check the manufacturer's data plate situated on the front or inside the door of the equipment.

*No claims will be accepted if, 24 hours following the delivery of the goods, no notification of reception of material in bad conditions has been received and if this circumstance is not notified to the forwarding agent on the corresponding delivery note at the time of delivery.*

If you need to move the **ZGR SOLAR CTR 1250/1500**, use a forklift truck or pallet truck, bearing in mind that this is heavy equipment. **NEVER USE A CRANE AND LIFTING RINGS** to move the equipment as its great weight does not allow it.



#### WARNING

*Ensure that the weight of the unit is within the maximum load limits (kg) of the tools used in order to handle it and the supports used to secure it in place. Review weight details in the specifications of the **ZGR SOLAR CTR 1250/1500**.*

**Remark:** Before moving the inverter cabinet to the desired location, it is suggested that DC input and AC main power cable be laid. As these cables are relatively big in diameter, once inverter cabinet is installed, it is difficult to lay cables.

#### 6.1.1 Checking the system

The **ZGR SOLAR CTR 1250/1500** is made up of the following elements:

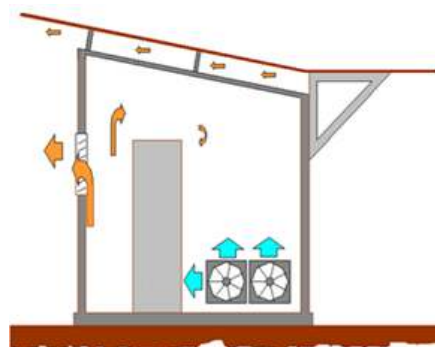
- Inverter cabinet,
- manual and miscellaneous diagrams,
- other options requested by the client may also be included.

### 6.2 Mechanical installation

#### 6.2.1 Place and installation conditions

Before moving the inverter cabinet to the desired location, it is suggested that DC input and AC main power cable be laid. As these cables are relatively big in diameter, once inverter cabinet is installed, it is difficult to lay cables.

The **ZGR SOLAR CTR 1250/1500** system must be installed in a place where there is no obstruction of the ventilation airflow for which it has been designed (Fig. 6-1).



**Fig. 6-1 Recommended ventilation**

Due to its IP21 protection, the unit cannot be installed outdoors. In order to ensure the maximum service life of the equipment, install it in a clean, dry and cool location.

The place chosen for the installation must meet the following characteristics:

- Protection against dust.
- Protection against excessive humidity and heat sources.
- Protection against atmospheric agents.
- Optimum atmospheric operating temperature between -25°C and +55°C.
- Easy connections.
- Sufficient space to work with the system and accessible for wiring.
- Sufficient air changes to disperse the heat produced. The room should have good ventilation and free of corrosive gas around.
- Proximity to magnetic fields and high-power lamps must be avoided.
- Place the system on a horizontal, stable surface free of vibrations and of sufficient strength to bear the load of the unit.
- Prevent the system from being exposed to sunlight, rain or dampness.
- Do not expose to gases or corrosive products.
- Do not obstruct the vents as this would prevent the heat produced by the unit from being dissipated correctly.
- Current fire prevention regulations must be met.
- There should be enough space reserved on the installation site for operating the screen.
- Enough distance should be kept to all surroundings to ensure ventilation, heat dissipation, installation and maintenance, as well as safe evacuation.
- Have the equipment installed away from residential area as far as possible, as it generates certain noise during operation.



#### WARNING

*Professional installation required.*

*The inverter may be powered on only upon agreement from the commissioning engineer.*

*Installation of the inverter should follow the steps described in the manual and should be performed by qualified engineer(s).*

### 6.2.2 Placing in the operating position

Check that the area where the **ZGR SOLAR CTR 1250/1500** is to be placed is capable of supporting the weight of the equipment (see section 9).

If the control power supply of inverter comes from low-voltage distribution or optional heater is installed, please make sure that the power distribution room is capable of supplying 4KW.

As an individual set of equipment, **ZGR SOLAR CTR 1250/1500** inverter has been integrated internally and cannot be dismantled. It requires vertical handling of the complete equipment and tilting or laying down are prohibited. In addition, please pay attention to safety protections during handling.



#### WARNING

*The inverter requires vertical handling as a complete set of equipment.*

- *Treat the inverter as a complete set of equipment and dismantling is prohibited.*
- *Vertical handling only. Tilting or laying down are prohibited.*

The system has a number of electrical connections which must be accessible at all times on the front. Therefore when deciding on the site for the system, large free space must be sufficient to allow personnel to enter with the doors completely open.

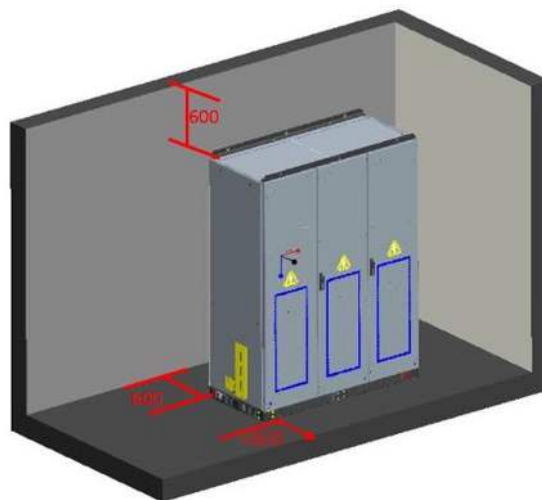
When the unit has been placed in position, ensure that the legs are fully locked so that the equipment is immobilised and stable. Position the system in a horizontal and balanced place, free of vibrations and prepared to withstand the weight of the equipment.

There are display panel and operation buttons on the front door of **ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter displaying basic operation status and warning messages. Air inlet is in the front of inverter and air outlet on the top. As there is no air inlet or outlet on both sides of the inverter, there is no specific space requirement for both sides. To facilitate daily maintenance and repairs, in addition to meeting local safety regulations, there should be enough space in front and after the cabinet.

**ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter should be installed on a level ground. During installation, a proper distance to the walls and other equipment should be kept, meeting the requirements for the narrowest maintenance access, evacuation route and ventilation.

There should be a space of 800 mm in front of the installation site of **ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter, a space of more than 600 mm behind, and a space of 600 mm above, to facilitate installation, heat dissipation and maintenance. For equipment installed side-by-side in a row, maintenance access on both sides should be spared.

Heat dissipation and maintenance have been fully considered in the design of installation space, nevertheless is recommendable to comply with the above requirements (Fig. 6-2):



**Fig. 6-2 ZGR SOLAR CTR 1250/1500 space requirements**

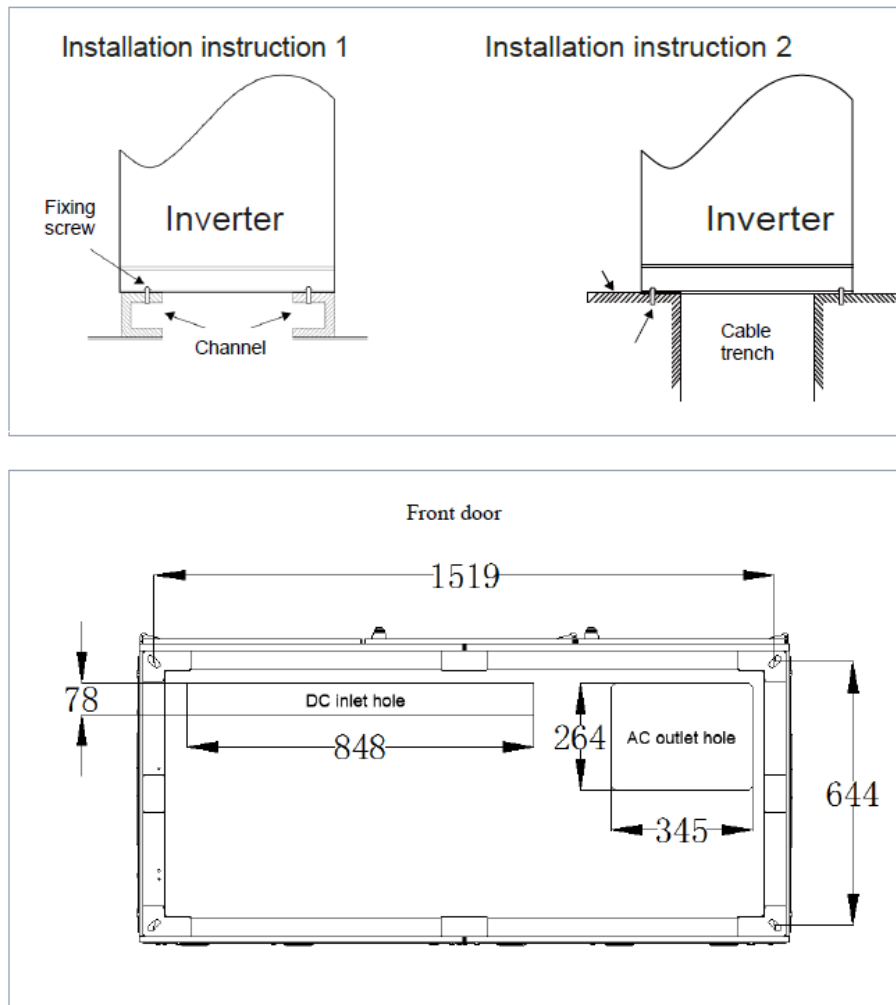
Inverter should only be installed on concrete foundation or other non-combustible surface. Make sure there is sound earthing in the switching room, and earthing resistance in dry environment should be less than  $4\Omega$ .

The bottom of **ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter should be reliably connected to the foundation, and the foundation drawing for each model of **ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter is shown below (Fig. 6-3). User may arrange the relevant position of inverter according to the foundation drawing.

There are positioning holes at the bottom of the inverter, used for fixing the inverter to the supporting channels at the bottom. Positioning holes for each model are shown in the drawings below, which should be drilled in advance when fabricating channels.

**ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter is equipped with a base at the bottom and the sectional view of base for each model is shown in the following drawings (in mm). Cooling air may come in from the front and the bottom, and cables are led in from the bottom. The two holes on the front of inverter are wiring inlet and outlet holes for DC and AC.

**NOTE:** It is not recommended to fix the inverter through welding. The inverter should be fixed to channels or ground.



**Fig. 6-3 ZGR SOLAR CTR 1250/1500 anchoring**

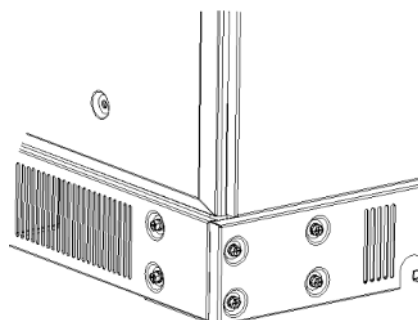
**ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter is equipped with lower panels on the front, back, left and right side, which are packed at the bottom in the packing case. Before installation, please make sure to take out all lower panels and install them after inverter is fixed to position.

Mounting screws of lower panels are kept together with the User Manual. The holes should be plugged after lower panel installation.



#### **WARNING**

*Check the quantity of lower panels against Packing List. Dust proof pads are provided with the panels, which should not be discarded at installation. The sequence for installing lower panels should be determined according to field condition*



**Fig. 6-4 Installation of Lower Panels**

### 6.2.3 Ventilation requirements

**ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter generates heat during operation. If overheated, electrical performance of the equipment may be impacted, or even the equipment damaged. Therefore, heat dissipation should be fully considered when designing the inverter room to ensure smooth and efficient running of the equipment. Exhaust fans should be installed in inverter room to facilitate air ventilation indoor and outdoor. Every **ZGR SOLAR CTR 1250/1500** inverter requires an air volume of 10000 m<sup>3</sup>/h.

Inverters are for indoor purpose and should be installed in such environment that is clean and ventilated, with temperature condition meeting product specification. Inverters are forced-air cooled, that is, cool air enters the inverter through inlets at the bottom and on the front of the cabinet door and hot air discharges from outlets on the top. Please do not block ventilation holes.

To meet the ventilation requirements and the installation environment requirements of **ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverters, they should not be installed in environment with poor ventilation and low air flow. Ventilation fences or fans may be added to enhance ventilation and there should be sufficient fresh air supply at the air inlet. Air quality should be ensured. If it contains too much suspended particles in the air, auxiliary measures should be taken to improve air quality (for instance, installing filters at the air inlet fence).

To ensure the efficient and reliable operation of the equipment, ambient temperature of the equipment should be controlled within the acceptable range, therefore proper ventilation equipment should be provided for heat dissipation. Ventilation facility should be provided in the inverter room to extract waste heat from the equipment and satisfy ambient temperature requirements. It can be realized by installing air exhausting devices (e.g. fans, ventilation ducts and etc.).

To ensure pressure equalization, exhaust fans may be added at the outlet of ventilation ducts. Orientation of air outlets should be determined according to the actual situation of local wind direction.

The size of ventilation ducts should be designed by professionals on the basis of air volume.

**ZGR SOLAR CTR 1250/1500** PV inverters are air-cooled and the internal heat is discharged from the cabinet through air outlets on the top of inverter cabinet. It is a good practice to exhaust the heat by connecting ducts at air outlets. Air ducts for a single inverter is shown in Fig. 6-5.

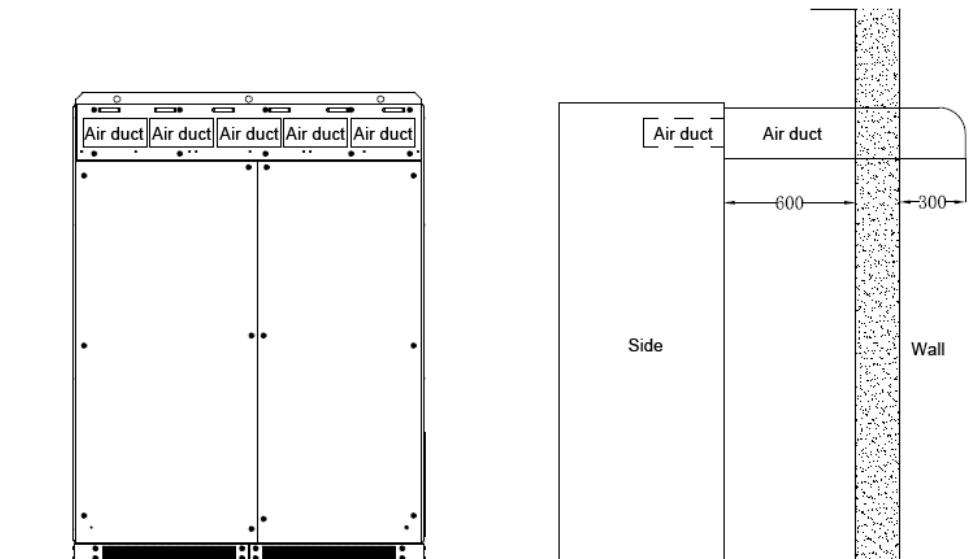
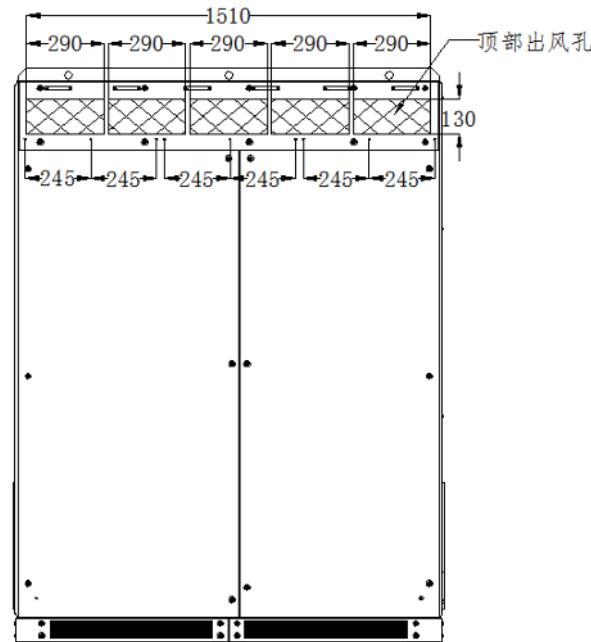


Fig. 6-5 Additional Air Duct to Inverter

Air needed by the inverter is inhaled through the bottom inlet and the screens on the front door. Hot air is discharged through the two air outlets on the top of inverter. Sectional view of air outlets on each model of **ZGR SOLAR CTR 1250/1500** inverter is shown in the following drawings (in mm) (Fig. 6-6).



**Fig. 6-6 Location of Air Outlets and Installation Holes for Air Ducts**

If air ducts are used for cooling, the requirements for adding air ducts to inverter are as following:

- Cabinet ventilation should not be reduced because of adding air ducts
- The interface between ducts and inverter cabinet should be properly sealed
- Outlets of air ducts should be tilting down (rain-proof)
- Wire mesh should be added at air duct outlets (to prevent mice and birds from entering)
- Installation ground should have a solid foundation with sufficient load-bearing capacity.

In addition to air duct cooling, user may install air conditioning where conditions permit. The full-load loss of a single **ZGR SOLAR CTR 1250/1500** PV inverter may be calculated according to the parameters, and user may work out corresponding air conditioning capacity according to inverter loss under enclosed environment.

## 6.3 Electrical installation

### 6.3.1 Conditions of Power Grid

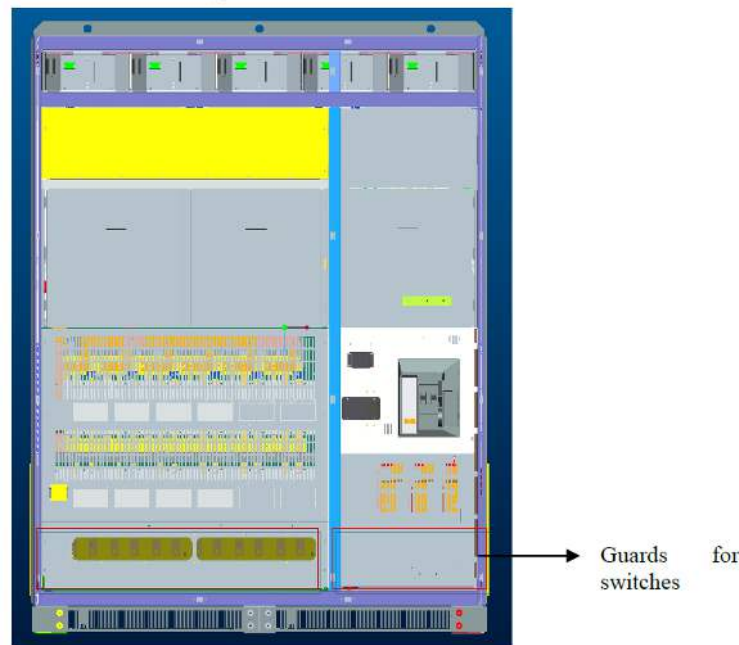
If no other prescriptions exist, inverters conforming to the standard should operate properly under the following conditions of power grid:

- Harmonic voltage in utility power grid should not exceed the limit prescribed in GB/T14549.
- Three-phase voltage imbalance in the AC output end of inverter should not exceed the limit prescribed in the GB/T15543, with the allowable value being 2% and no more than 4% in short term.
- Deviation allowed for grid voltage should conform to GB/T12325. Deviation allowed for three-phase voltage of 10KV and below should be  $\pm 7\%$  of the nominal voltage, and deviation allowed for single-phase voltage of 230V should be  $+7\%/-10\%$  of the nominal voltage.
- Deviation allowed for grid frequency should conform to GB/T15945, i.e., being  $\pm 0.5\text{Hz}$ .

### 6.3.2 Dismantling guards for switches

Open the front door as shown Fig. 6-7.





**Fig. 6-7 ZGR SOLAR CTR 1250/1500 connections**

Remove the four screws in the lower guards with screwdriver and remove the guards for wiring operation.

**NOTE:** Put the front guard and screws at a secure location, so as to fix front guard back to its original location when installation is completed.

Use connections as short and as large as possible to minimize electrical losses. Also make sure that the cables are not under tension before handling them.

Plan in advance the placement of the equipment and provide for the necessary space for the system and to allow air flow that allows adequate ventilation of the system.



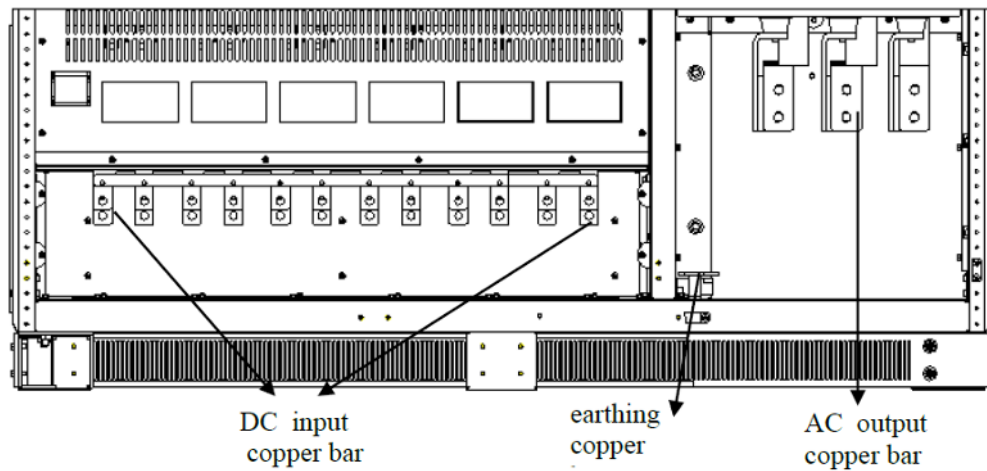
#### **WARNING**

*Before connecting the **ZGR SOLAR CTR 1250/1500**, make sure that the installation power line is disconnected and the batteries disconnected. Check that the corresponding external switches are open and place the necessary attention signals to avoid accidental maneuvers.*

*Should the ground connection procedures not be followed adequately, there may be electrical discharges, danger for personnel or the risk of fire.*

### **6.3.3 Internal wiring terminals**

GSM1250 grid-tied photovoltaic inverter is wired from the bottom, with all wiring terminals located below the cabinet. Remove the protective cover to see the power wiring terminals. Different copper bars and terminal blocks are available according to the type of inverter, including DC input copper bar, AC output copper bar, earthing copper bar and 485 terminal block for communication with PC. The internal terminal blocks are shown in Fig. 6-8.



**Fig. 6-8 Schematics of ZGR SOLAR CTR3 1500 Terminal Blocks**

DC positive input terminal: connect to the positive pole of PV array through the combiner box or the DC cabinet, marked as PV+.

DC negative input terminal: connect to the negative pole of PV array through the combiner box or the DC cabinet, marked as PV-.

AC output terminal: connect to L1, L2 and L3 of the three-phase grid respectively through copper bars marked as U, V and W after the three-phase AC circuit breaker.

Earthing terminal: inverter is earthed through earthing terminal to prevent leakage of the enclosure.

**Remark:** Standard input circuit breaker on the PV tributary has a current rating of 200A, please degrade according to the elevation and temperature of use and ensure each switch input current not exceeding the value of the circuit breaker.

Cable size provided in this table is for reference only, the actual choice should be based on the working environment/temperature of the cable, method of laying, cooling conditions and etc.



#### **IMPORTANT**

All external cables enter the equipment through holes in the bottom and are then connected to the appropriate locations. Power cable for ZGR SOLAR CTR3 1500 grid-tied photovoltaic inverter should be wired using set screws and other parts. Set screws are installed at corresponding terminals upon equipment delivery.



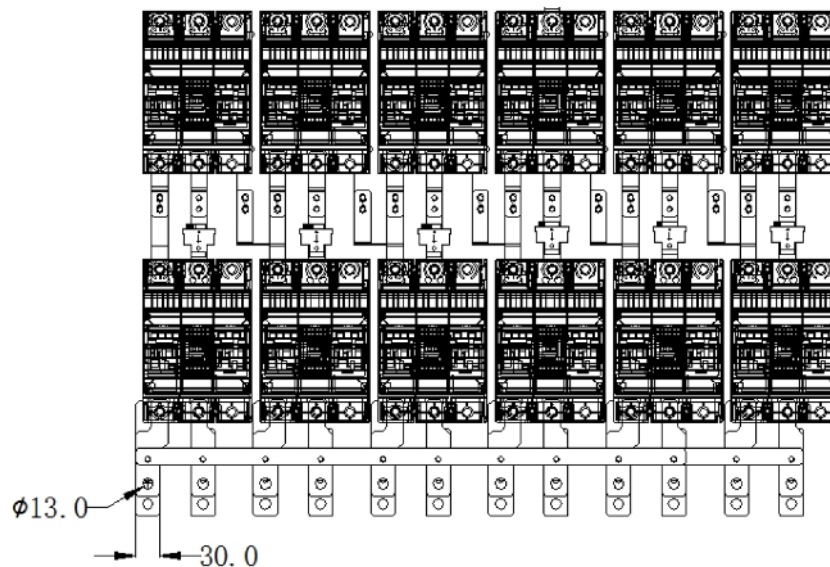
#### **WARNING**

Incorrect wiring sequence may cause fire. Please take note of the connection sequence of wiring parts.

### **6.3.4 DC Wiring**

PV array is connected to the DC side of **ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter after being converged by the combiner box. The open-circuit voltage on the positive and negative poles of the PV array should not exceed 1500 V. For a single **ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter, PV array power can be configured up to 1250 KW.

Ten to twelve wiring copper bars are reserved for user on the DC side of a single **ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter. When connecting, user needs to connect input wire at minimum 70 mm<sup>2</sup> and the copper bars are shown in Fig. 6-9. Refer to pictures of internal terminals for other models.



**Fig. 6-9 ZGR SOLAR CTR3 1500 DC Wiring Copper Bars**



**WARNING**

*Danger: To avoid personal injury and equipment damage, wiring must be carried out when system is not energized.*

- DC switch is disconnected.
- Measure with a multimeter if copper bars on the DC side are charged



**IMPORTANT**

*DC input polarity should not be reversed. After initial wiring or maintenance, DC polarity must be checked with a multimeter with DC switch disconnected.*



**WARNING**

*Danger: When measure DC voltage with a multimeter, the range of multimeter must be reaching DC1500V.*



**IMPORTANT**

*DC input voltage limit. Make sure that DC input voltage does not exceed 1500 Vdc. 1) Any DC input voltage exceeding this limit may cause damage to the inverter. 2) Damage and loss to equipment caused in such a case are not covered by the warranty.*

Wiring procedures are as follows:

- Disconnect power distribution breaker on the DC side of the upper level to make sure wiring on the DC side is not energized.
- Confirm the positive/negative poles with a multimeter.
- Peel off insulation at cable end. The length of peeling should be the depth of crimping hole plus about 5 mm.
- Crimp OT and the wiring copper terminal.
  - Insert bare copper core into the crimping hole of copper terminal.
  - Crimp the copper terminal with crimper. The terminal should be crimped twice.
- Install insulation tube.

- Choose an insulation tube that matches the size of cable, the length of tube should be about 50mm.
- Slip insulation tube over the copper terminal to cover completely the crimping hole.
- Shrink the insulation tube with a hot air blower.
- Connect the PV+ cable to combiner box or the positive pole of the PV array.
  - Choose screws that match the copper terminal (supplied with the inverter)
  - Press copper terminal on the DC copper bar, which can be fastened with screws supplied together with the copper bar. The sequence for installation is (from outside to inside) screws, flat gasket, copper terminal, busbar, flat gasket, spring washer and screw cap.
  - Fasten the screws with screwdriver or wrench.
- Connect the PV-terminal of inverter to combiner box or the negative pole of the PV array.
- Make sure the wiring is fastened.

**Remark:** Set screws and other spare parts used for wiring have been installed on corresponding terminals upon equipment delivery.

**NOTE:** Check the material of external terminal joints. If it is a connection between copper and aluminum, special copper and aluminum connector should be used. Do not connect directly!

**NOTE:** The crimping surface of wiring cable should be smooth with good contact.

### 6.3.5 AC Wiring

**ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter is AC 550 V / AC 600 V and  $50 \pm 0,5$  Hz on the AC side. Before installing power supply for grid-tied inverter, permission from local power authority should be obtained.

Two wiring bolts are reserved for user on the AC side of every **ZGR SOLAR CTR 1250/1500**, and user needs to connect 6 input wires with each wire being at least 185 mm<sup>2</sup>. The wiring copper bar is shown in Fig. 6-10 and for other models refer to the drawings of internal wiring terminals in the chapter.

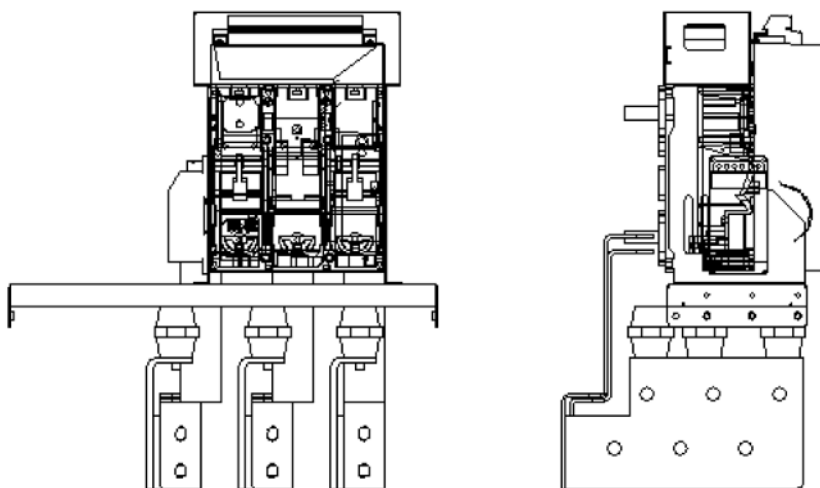


Fig. 6-10 ZGR SOLAR CTR3 1500 AC Wiring Copper bar



To avoid personal injury and equipment damage, wiring must be carried out when system is not energized.

- AC breaker is disconnected.
- Measure with a multimeter if copper bars on the AC side are charged

The AC side of inverter should be connected to grid as following:

- Disconnect breaker on AC side and make sure with a multimeter that terminal blocks are not energized.
- Confirm the phase sequence of AC connection cable.
- Peel off insulation at cable end. The length of peeling should be the depth of crimping hole plus about 5mm.
- Crimp OT and the wiring copper terminal.
  - Insert bare copper core into the crimping hole of copper terminal.
  - Crimp the copper terminal with crimper. The terminal should be crimped twice.
- Install insulation tube.
  - Choose an insulation tube that matches the size of cable, the length of tube should be about 50mm.
  - Slip insulation tube over the copper terminal to cover completely the crimping hole.
  - Shrink the insulation tube with a hot-air blower.
- Connect phase U cable to L1 (phase A) of the power grid. Choose screws that match the wiring copper terminal. Press copper terminal on AC copper bar, which can be fastened with screws supplied together with the copper bar. Refer to the drawing of screws installation for the sequence of installation (from outside to inside). Fasten the screws with screwdriver or wrench.
- Connect phase V of AC output to L2 (phase B) of the grid and phase W of AC output to L3 (phase C) of the grid as per the above-mentioned method.

#### NOTE:

- Choose screws with adequate length that slightly protrude from the installation holes. If screw is too long, equipment insulation performance may be impacted or even short circuit may happen. It is recommended to use the screws supplied with the equipment.
  - Check if there is insulation tube stuck in the joint between copper terminal and copper bar. If so, the insulation tube should be removed timely, or poor contact may happen and even damage to the equipment.
- Output voltage is 550 Vac (600 Vac) in three-phase three-wire.
  - To distinguish the phase sequence, the three-phase AC output cables (L1, L2, L3, N) should be covered with yellow, green, red and black insulation tube respectively.
  - Make sure the wiring is fastened.



#### **WARNING**

Make sure AC phase sequence is correct. The correct phase sequence from U,V to W must be followed for wiring.

### 6.3.6 System Earthing

Copper earthing bars of **ZGR SOLAR CTR 1250/1500** PV inverter should be connected reliably using earthing cable and the specification of cable should follow suggestions in the table. Copper earthing bars have already been reliably connected to the enclosure of inverter in the cabinet. During PE connection, PE copper earthing bars should be connected to the equipotential bonding devices at the installation site or in the control room, with good contact. The diameter of earthing cable should be at least 35mm<sup>2</sup> and resistance not more than 4Ω. Copper earthing bar of **ZGR SOLAR CTR 1250/1500** inverter is shown in Fig. 6-11 below.

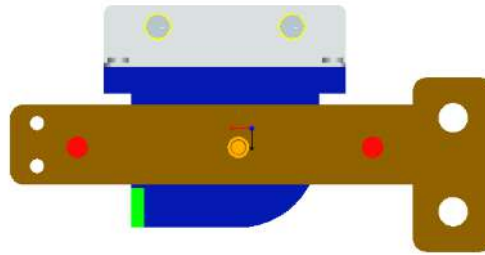


Fig. 6-11 Copper Earthing Bar of ZGR SOLAR CTR3 1500 Inverter



#### WARNING

The inverter must be reliably earthed.

### 6.3.7 Control Power Supply

**ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter requires connection to an external DC power supply as the input side and connection to external AC power grid circuit as the output side. For redundancy, control power for **ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter is taken from the PV side and AC side.

**NOTE:** Recommendations for fuse replacement. For F1/F2, DC1500Vdc/2A quick fuse is recommended; for F3/F4, 600Vac/1.5A slow fuse is recommended.

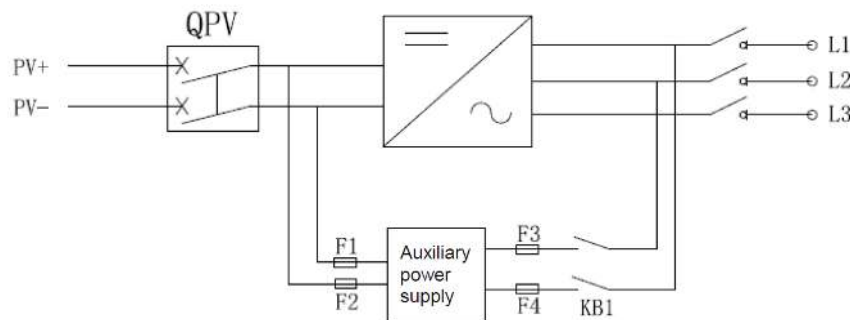


Fig. 6-12 Schematics of Auxiliary Power Supply

Auxiliary power supply redundant power, when single auxiliary break down, do not affect the operation, please continue to contact customer service maintenance.

*User must choose an appropriate auxiliary power supply mode according to the actual situation. User can determine the auxiliary power supply mode after consulting KSTAR, so relevant equipment can be configured in the factory.*

### 6.3.8 Cable requirements

According to the capacity configuration requirements of a single **ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter, it is recommended that the current flowing through wire of 1 mm<sup>2</sup> should not exceed 3 A, and wire of the same specifications and same type should be chosen for wires on the same side. ZIGOR has listed reference requirements for a variety of connection cables. User may design the relevant cables according to the following table. When designing cables, instructions in this section and local wiring regulations should be followed, taking into account of environmental conditions (Table 6-1 and Table 6-2).



MODEL CAPACITY	AC OUTPUT (PER PHASE)	EARTHING WIRE	POS./NEG. DC INPUT (PER POLE)
1250KW	185mm <sup>2</sup> ×6	≥85mm <sup>2</sup>	10 input lines with each line ≥90mm <sup>2</sup>
1500KW	1500KW	1500KW	1500KW

**Table 6-1 Specification of Power Cable for ZGR SOLAR CTR 1250/1500 Grid-tied photovoltaic Inverter**

PURPOSE OF CABLE	SIZE REQUIREMENT (mm <sup>2</sup> )
Communication	Cat 5e

**Table 6-2 Specification of Communication Cable for ZGR SOLAR CTR 1250/1500**



**WARNING**

Before the wiring operation, make sure that the mains input and the PV input switches are both disconnected with warning tags attached to prevent others from operating.



**WARNING**

Power cables need to be wired through the trench or metal duct to avoid mechanical damage to the cable or RF interference to surrounding equipment.

Standard input circuit breaker on the PV tributary has a current rating of 200 A, please degrade according to the elevation and temperature of use and ensure each switch input current not exceeding the value of the circuit breaker.

Cable size provided in this table is for reference only, the actual choice should be based on the working environment/temperature of the cable, method of laying, cooling conditions and etc.

**NOTE:** All external cables enter the equipment through holes in the bottom and are then connected to the appropriate locations.

Power cable for **ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter should be wired using set screw and other parts. Set screws are installed at corresponding terminals upon equipment delivery.



**WARNING**

Incorrect wiring sequence may cause fire. Please take note of the connection sequence of wiring parts.

### 6.3.9 Other Protection

**ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter has a protection level of IP21, and is suitable for installation in a dry and clean power station environment. In the meantime, pay attention to prevent roof leakage from damaging the inverter.

According to EMC requirements and noise level, inverters should be installed in an industrial environment. When wiring is completed, the sliding bars at the wiring inlet/outlet should be pushed to the corresponding position and remaining gaps should be sealed with polyurethane foam to prevent rats.

**NOTE:** **ZGR SOLAR CTR 1250/1500** inverters should avoid direct sunlight; otherwise, the higher temperature may affect power generation output.

### 6.3.10 Wiring Specification

Cable used in the system are divided into power cable, supply cable and data cable. Communication cable should be placed away from power cable and cables should intersect vertically. The length of communication cable should be kept shortest and away from power cable. Power cable, supply cable and data cable should be placed into different trenches to avoid electromagnetic interference due to long distance parallel wiring of power cable and other cables.

The distance between power cable, supply cable and data cable should be more than 300mm. When the wires are intersecting, they should form an angle of 90 degrees and the distance in between may be reduced appropriately.

The relationship between minimum space distance and the length of parallel shielded data cable and power cable are shown in Table 6-3.

LENGTH OF CABLES IN PARALLEL (m)	MINIMUM SPACE DISTANCE (m)
200	0.3
300	0.5
500	1.2

**Table 6-3 7 Distance between Signal Wire and Power Cable**

Data cable should be kept as close to ground surface or supporting structure as possible, such as support beam, steel trench and metal guide.

### 6.3.11 Fixing and Protection of Connection Cable

#### 6.3.11.1 Fixing of cable

To avoid poor contact due to loose copper wiring terminals, or heat or fire due to the increase of contact resistance, screws should meet the torque requirements listed in Table 6-4.

SCREW SIZE	M4	M5	M6	M8	M10	M12	M14	M16
TORQUE (N·M)	2	3.2	7	16	34	46	58	68

**Table 6-4 Screw Torque Requirements**

#### 6.3.11.2 Cable Protection

Cable protection includes communication cable protection and power cable protection, which is detailed as following:

Protection of communication cable: due to the size, communication cable can be easily broken or drop off from the terminals during engineering work. Therefore, it is suggested that it should be connected after the power circuit is done. Communication cable should be wired through cable trench, where there is no cable trench; it should be fixed with cable ties. Communication cable should be kept away from heat-generating elements and cables with strong electric field.

Protection of power cable: strong current persist in power cable, therefore the insulation should not be damaged during installation and wiring, otherwise short circuit may be caused. Power cable should also be fixed.

### 6.3.12 Installation Process

The general installation process of **ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter is shown in Fig. 6-13, and the installation instruction is shown in Table 6-5.

INSTALLATION PROCEDURES	INSTALLATION INSTRUCTION	REFERENCE
Installation preparation	Preparatory work to be done before the installation of inverter: whether product, parts, installation tools and spare parts are	3.2 Installation Preparation

	complete	
Mechanical installation	Mechanical installation includes: moving the inverter and positioning the inverter	3.3 Mechanical Installation
Electrical connection	Electrical connection includes: open the front door and remove the guards for switches, wiring on the DC side, AC earthing, connecting communication cable, wiring on connection side	3.4 Electrical Connection
Installation inspection	Inspection includes: mechanical inspection, electrical inspection and etc.	3.9 Installation Inspection List
Trial run	Trial run includes: inspection before trial run, preparations before start-up, start-up procedures and completion of trial run	3.10 Trial Run

Table 6-5 Installation Process

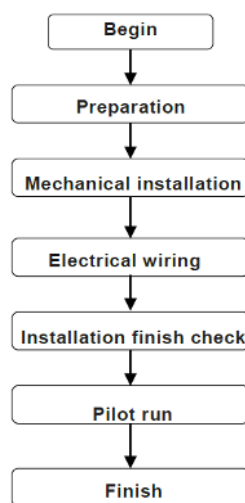


Fig. 6-13 Installation Process

**NOTE:** Prior to starting up the equipment, make sure there are no installation tools or other things left inside the equipment or places that may impact normal operation of the equipment. Tools should be timely organized after using, and after installation or maintenance, check if there is anything left.

### 6.3.13 Installation Inspection List

Before the inverter is put into operation, installation inspection should be done by at least two personnel subject to the items listed in Table 6-6 below, so as to ensure the correctness of installation.

MECHANICAL INSPECTION ITEMS
<input type="checkbox"/> No deformation and damage on inverter
<input type="checkbox"/> Inverter is fastened at the bottom with stable and reliable support
<input type="checkbox"/> There is sufficient space around the inverter
<input type="checkbox"/> Temperature, humidity and ventilation of where inverter is located meet the requirements
<input type="checkbox"/> Cooling air flows smoothly
<input type="checkbox"/> Cabinet sealing is intact and reliable
ELECTRICAL INSPECTION ITEMS
<input type="checkbox"/> Inverter is securely earthed
<input type="checkbox"/> Grid voltage is consistent with the rated input voltage of inverter unit
<input type="checkbox"/> Phase sequence of grid connection is correct and fastening torque is consistent with the requirements

<input type="checkbox"/>	Polarity of DC input wiring is correct and fastening torque is consistent with the requirements
<input type="checkbox"/>	Communication cable is wired correctly and a safe distance is kept away from other cables
<input type="checkbox"/>	Cable no. is marked correctly and clearly
<input type="checkbox"/>	Insulation shield is intact and reliable. Warning signs and tags are clear and firm
<b>OTHER INSPECTION ITEMS</b>	
<input type="checkbox"/>	All undesired live parts are bundled with insulation tape
<input type="checkbox"/>	There are no tools, parts, conductive dusts due to drilling or other foreign bodies left inside the cabinet
<input type="checkbox"/>	There is no condensation or frozen condition inside the cabinet

Table 6-6 Installation Inspection List

### 6.3.14 Trial Run

The installation condition of the equipment should be thoroughly checked before the trial run. In particular, check if DC or AC voltage meets the requirements of inverter and if polarity and phase sequence are correct.

Make sure system connection meets the requirements of relevant specifications, and the system is securely earthed. Earthing resistance is of vital significance to the safety of the whole system; therefore it must be checked before the pilot run to make sure earthing resistance meets the requirements.

**NOTE:** Make sure all switches on the AC side and DC side are disconnected before the trial run.

### 6.3.15 Inspection before trial run

#### Check PV Array

Check PV array on site before connecting to grid, making sure the open circuit voltage of each row meets requirements. Make sure the weather condition is suitable as voltage changes with the change of PV panel temperature. Record the working condition of PV array with U-I curve recorder and conduct trial run when PV array output is stabilized.

- Record site environment parameters (voltage, temperature and irradiation)
- Measure cable resistance (between junction box and inverter) with an ohmmeter of megohm range. Record the measurements accurately.

#### Check inverter

A number of inspections need to be done before powering on the inverter:

- Check installation and wiring of inverter as per 3.7 Installation Inspection List.
- Make sure DC and AC breakers are disconnected.
- Check if inverter enclosure is earthed properly.

#### Check grid voltage

- Check if the three phases of inverter and those of grid are connected in the correct sequence.
- Check whether phase voltage and line voltage are within the predetermined range, record the voltage measurements.
- If possible, measure THD (total harmonic distortion) of phase and check the curve. If distortion is severe, inverter may not be operational.

**If grid voltage variation is too big, transmission ratio of inverter must be adjusted.**

#### Check DC side voltage

DC side should connect the inverter via the combiner box.

- Make sure PV input polarity is correct.
- Measure and record each PV (open circuit) voltage. All voltage measurements should be almost the same and not exceeding the maximum DC voltage.

**WARNING**

*Voltage on DC should not exceed 1500V. Too high DC voltage might damage the inverter.*

If voltage variation (under stable weather condition) exceeds 3%, there might be line fault on the site (variation in the number of modules in certain rows), cable damage or loose wiring.

### 6.3.16 Preparations before start-up

Make preparations for start-up after checking all items and making sure they all meet the requirement.

- Reconfirm grid voltage is consistent with what is shown on the inverter nameplate.
- Make sure there is nobody operating the internal and external circuits of inverter.
- Install guards for switches dismantled for wiring back to their original position.

### 6.3.17 Start-up Procedures

For the initial start-up of **ZGR SOLAR CTR 1250/1500** grid-tied photovoltaic inverter, the procedures are as follows:

- Switch breaker QAC on AC side of the inverter to “ON”.
- Close auxiliary power supply switch KB1 or KB3 and close switch KB2.
- Auto-initialization of power inverter circuit and LCD control panel takes about one minute.
- Check information displayed on LCD screen. When “Please close QPV DC switch” appears, do it.
- In about 1 minute, the sound of grid contactors auto-closing will be heard, which indicates that inverter is connected to grid successfully and “Grid-tied Power Generation” appears on LCD screen.

**NOTE:** During standby at night, the screen will be in sleep status and display can be resumed with a touch on the screen.

### 6.3.18 Completing trial run

- Carry out the following steps after grid-tied operation:
- Check whether abnormal situation exists on the inverter, such as excessive noise, excessive heat, strange odor or smoke.
- Measure if grid-tied voltage and current are stable.
- Operate the touchscreen to check if it functions properly and accurately. By now, the trial run of inverter is completed and daily operation and maintenance should start.

**NOTE:** Once put into normal operation, the inverter requires no human intervention. The cabinet doors should be opened only for maintenance and troubleshooting. Doors should be closed and locked during normal operation, with keys kept by a special person assigned. Doors should be opened by professionals only.

## 7 TROUBLESHOOTING

### 7.1 Malfunctions of the equipment

**ZIGOR** recommends that, in case of any anomaly, strange noise or supposed malfunction, the equipment should be shut down and ZIGOR customer service should be contacted.

The **ZGR SOLAR CTR 1250/1500** system has a specific section of active system events, in the Events menu (section 5.3.4). This screen provides valuable information about the event or events that is generating the fault. The name of each event indicates the type of system error.

Given the complexity of the equipment, when a serious error occurs and causes the equipment to stop, **ZIGOR** customer service should be contacted to assist you step-by-step to your resolution by providing the information requested.

For more information, contact: [www.zigor.com](http://www.zigor.com)  
[sac@zigor.com](mailto:sac@zigor.com)

### 7.2 Recommended spare parts

You can ask **ZIGOR** for a list of recommended spare parts for the client systems so that a large percentage of malfunctions can be quickly and simply repaired.



## 8 MAINTENANCE

### 8.1 ZGR SOLAR CTR 1250/1500 maintenance

You can ask for an offer to **ZIGOR** in order to perform a basic maintenance of this equipment, so that it can prolong the life of the system.

In order to guarantee the correct operation of the **ZGR SOLAR CTR 1250/1500**, it is necessary to carry out a number of maintenance tasks. These tasks enable resolving defects before breakdowns occur and to ensure correct operation of active and passive safety devices.

The frequency of maintenance tasks is dependent upon the location and the atmospheric conditions. The air quality (temperature, dust in suspension, etc.) has a great influence on the amount of maintenance work to be done in order to maintain the functionalities of the equipment within an acceptable level of uncertainty. That is, for example, if the air contains a great amount of dust in suspension, the maintenance work must be carried out more frequently than the standard frequency indicated.

The recommended maintenance tasks in accordance with frequency are as follows:

#### 8.1.1 Auxiliary Power Supply

Auxiliary operating power supply should be provided to enable inverter functioning properly. Auxiliary operating power taking is depicted in the relevant schematics in section 6.3. In case LCD display in the front panel of the inverter is off or fan fault exists, please proceed with simple inspection and maintenance as per the following:

- Firstly check if front-end input power is OK, that is, the lower input voltage to KB1 is OK. If the input voltage is abnormal, check if the lower input of AC output switch QAC is OK.
- If the terminal voltage of KB1 is normal, check if fuses F3/F4 in the fuse holder are OK.
- If all the above is normal, check boards and lines accordingly and contact professionals of the Company for resolution on site.
- If AC circuit breaker itself breaks down, repair is needed then.

#### 8.1.2 Lightning Arrester

Dedicated lightning arresters are provided inside the GSM1250 grid-tied inverter on the DC side and the AC side to prevent surge damage to the equipment.

Lightning arresters must be maintained according to the following requirements:

- User should establish lightning protection measures and management system, and assign special personnel for the job.
- There is alarm signal contact on the lightning arrester modules. In case lightning arrester module is damaged, relevant alarm information can be found on the LCD screen, for which actions need to be taken on time.
- Check (monitor) working condition of lightning arrester on a regular basis. Check on time after thunderstorm. It is strictly prohibited to continue using aged lightning protection modules that are not repaired.
- If indication window of a certain lightning protection module turns red, it means that the corresponding module is aged or damaged, and should be pulled out immediately for replacement or repair.



Disconnect power supply before installing or dismantling lightning arrester. Operation on live parts is

#### 8.1.3 Dust Screen

There is a dust screen in the front door of inverter cabinet, which is used for preventing dust from getting into the cabinet (Fig. 8-1). The dust screen should also satisfy the requirements of air supply, therefore it needs to be cleaned or replaced according to the dust situation on site and local weather condition.



**Fig. 8-1 Dust Screen**

Procedures for replacement:

- Open the front door of inverter cabinet to see dust screen in the back.
- Remove set screws and then remove the dust screen.
- Install a new one and fastening the set screws.

**NOTE:** In order to ensure proper operation of the inverter, the dust screen should be cleaned on a regular basis.

#### 8.1.4 Cable

Check the reliability of inverter AC/DC input/output cable connections on a regular basis. Temperature measurement of ports should be done periodically with thermos scanner when 80% load is reached for rated power. Connection temperature should not exceed 50 degrees, otherwise it should be considered unusual and the equipment needs to be stopped and checked.

## 9 TECHNICAL SPECIFICATIONS

Model	ZGR SOLAR CTR 1250	ZGR SOLAR CTR 1500
ELECTRICAL CHARACTERISTICS		
Power	1250 kW	1500 kW
Nominal input voltage	3 x 550 V	3 x 600 V
Nominal Frequency	50/60 Hz	
Power factor	1 (0.9 leading to 0.9 lagging adjustable)	
Maximun AC Output Current (per Phase)	1312 A	1443 A
Total Current Harm. Distortion	< 3 % THD at nominal power	
MPPT voltage range	800 -1300 V	900 – 1300 V
Max. voltage open circuit	1500 V	
Stand-by losses	< 50 W	
Max input DC current	1750 A	1870 A
Peak efficiency	99 %	
European efficiency	98,7 %	
PROTECTIONS		
AC leakage current fault protection	Yes	
Ground fault protection	Yes	
LVRT	Yes	
Anti-islanding	Yes	
AC -DC overvoltage protection	Yes	
AC surge protection	Yes	
DC reverse- polarity protection	Yes	
GENERAL CHARACTERISTICS		
AC – DC isolator	Integrated in the equipment	
Supervision – Autodiagnosis	Yes	
Cooling	Forced ventilation	
Control panel	Graphical interface	
Communication protocols	Modbus RTU	
ENVIRONMENTAL AND MECHANICAL CHARACTERISTICS		
Operating temperature	-40°C a +60°C	
Storage temperature	— 40 °C ~ + 70 °C	
Power limiting temperature	> 55 °C	> 50 °C
Degree of environmental protection	IP21	
Noise level	< 65 dB	
Weight approx.	1300 kg	
Operating altitude	< 3000 m without losing power	
Relative Humidity	0 a 95 % without condensing	

<b>Dimensions (WxHxD)</b>	1600 x 750 x 2100 mm
<b>Weight</b>	1300Kg
<b>STANDARDS</b>	
<b>Technical requirements and test methods for grid tied photovoltaic inverters below 400V</b>	CNCA/CTS0004-2009A
<b>Technical requirements of PV system grid connection</b>	GB/T19939-2005
<b>Technical specification of grid Tied photovoltaic inverter</b>	NB/T32004-2013
<b>General safety requirements for the operating area of inverter</b>	UI1741-1999
<b>EMC requirements of inverter</b>	EN61000-6-2 EN61000-6-4
<b>Safety requirements of inverter</b>	UL : UL1741 CSA : CSA C22.2 NO.107.1 CE : IEC/EN62109-1 ; IEC/EN62109-2
<b>Method to determine inverter performance and test requirements</b>	IEC61727-2004/GB/T19939-2005

\*These specifications can change without notice.

## 10 STANDARDS

**ZGR SOLAR CTR 1250/1500** models comply with the following European standards:

- Technical requirements and test methods for grid tied photovoltaic inverters below 400V (CNEC/CTS0004-2009A)
- Technical requirements of PV system grid connection (GB/T19939-2005)
- Technical specification of grid, Tied photovoltaic inverter (NB/T32004-2013)
- General safety requirements for the operating area of inverter (UI1741-1999)
- EMC requirements of inverter (EN61000-6-2, EN61000-6-4)
- Safety requirements of inverter:
  - UL : UL1741
  - CSA : CSA C22.2 NO.107.1
  - CE : IEC/EN62109-1 ; IEC/EN62109-2
- Method to determine inverter performance and test requirements (IEC61727-2004/GB/T19939-2005)



## 11 WARRANTY

Unless otherwise agreed, **ZIGOR** guarantees that **ZGR SOLAR CTR 1250/1500** units leave the factory in perfect working order and free of any defects for a period of 12 months to be counted as of the date of sale of the apparatus, shown in the delivery note and/or invoice.

**ZIGOR** will guarantee to the Buyer, the proper functioning against manufacturing and/or workmanship defects. This Warranty includes, whenever the circumstances of good use on the equipment, replace, repair (workmanship included) or refund the purchase price as paid by the customer within the above specified period according to the type of defect and are only and exclusive remedies guaranteed under this Limited Warranty.

The replacement of spare parts, if required, will be made with other new or repaired parts and the replaced ones will become property of **ZIGOR**.

Unless otherwise agreed, it's not included any assistance and / or displacement. If demanded by the buyer, he'll be held responsible for it.

The customer will be free of charge provided the cause of equipment failure due to defective material thereof, without being affected by the exclusion of warranty causes described in the next section. In any other circumstances be charged the amount of economic displacement.

The following situations will cancel the guarantee of the product:

- Faults due to improper handling of the product, according to the operating instructions, misuse, default grid or by storm.
- Improper use of the equipment according to the Operating Manual and without respecting the original characteristics of the equipment.
- Installation in a place/ environment that does not meet the requirements indicated in the Operating annual referring to the Installation Conditions.
- When the customer not clearly proves the systematic realization of regular maintenance operations described in the Operating Manual.
- Equipment deterioration due to external agents (water, dirt, animals, etc.)
- Damages caused by accident, theft, fire, inadmissible atmospheric conditions, external agents (animals, insects, etc.) or natural disasters.
- In case of any intervention and/or repair by an unauthorised Technical Service.
- The use of equipment or accessories, not sell and/or installed by **ZIGOR** or their Authorised Technical Service.
- Environmental Operating Conditions out of range.

When the unit is equipped with lead-acid batteries, it must be considered the following precautions:

Those elements are fully charged before shipment. They can be stored for up 2 years provided that they are charged at minimum intervals of 6 months during their storage.

The installation of elements inside the unit by personnel other than those authorised by **ZIGOR**, shall render the warranty null and void. **ZIGOR** will not accept responsibility for the repair of equipment if any of the seals installed for internal checks is broken.

The validity of this guarantee is limited to the proper use of the equipment according to the Operating Manual and while respected the original characteristics of the equipment.

The Spanish Standardisation and Certification Association (AENOR) certifies that the "Quality Assurance" and "Environmental Management Systems" adopted by **ZIGOR CORPORACIÓN, S.A.** for the design, development, production and after sales service for electronic equipment for the conversion of direct and alternating current as well as electronic projections, communications systems, telemanagement applications and electrical and electronic turnkey projects, is an agreement with the requirements of the Spanish Standards **UNE-EN ISO 9001:2008** and **UNE-EN ISO 14001:2004** respectively.









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*Consulte a nossa web para contatar com a rede de degações comerciais*