always ON

Operation Manual

ZGR SOLAR STR 120/150

Three-phase string solar inverter

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INDEX

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 STR 120/150 Inverter**, 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 inverter 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 inverter 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 Inverter 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.
- 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 inverter 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 STR 120/150** 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.
- 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.
- 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.

- Ensure that the DC voltage does NOT exceed 1000 V, higher input voltages can cause permanent damage to the equipment or major damage.
- It must be covered by an element that protects the equipment from the effects of sunlight, otherwise there is a risk of High Voltage due to sun exposure.
- Do not pull out the PV connectors when the inverter is running.
- Wait at least 5 minutes for the internal capacitors to discharge. Ensure that there is no voltage or current before pulling any connector.
- Should you have any problems with the contents of this manual, you must ask **ZIGOR** for assistance.

1.2 Storage precautions

Proper storage is required if the inverter is not installed immediately.The store where the inverters are kept must protect the material from the elements, risk of flooding or contact with water.

Store the inverter in the original packing case.

The storage temperature must be always between -40° C and +70° C, and the storage relative humidity must be always between 0 and 95 %, non-condensing.

In case of stacking storage, the number of stacking layers should never exceed the limit marked on the outer side of the packing case.

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

The packing case should be upright.

If the inverter has been stored more than half a year, the qualified personnel should thoroughly check and test it before using.

WARNING

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

1.3 Environmental precautions

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.

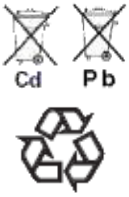
To dispose of this product and ensure its proper management, follow the current local environmental legislation and regulations. In this way it will contribute to conserve the environment.

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 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

ZGR SOLAR STR 120/150, a transformerless three-phase PV grid-connected inverter, is an integral component in the PV power system.

The inverter is designed to convert the direct current power generated from the PV modules into grid-compatible AC current and feeds the AC current to the utility grid (Fig. 2-1 and Table 2-1)

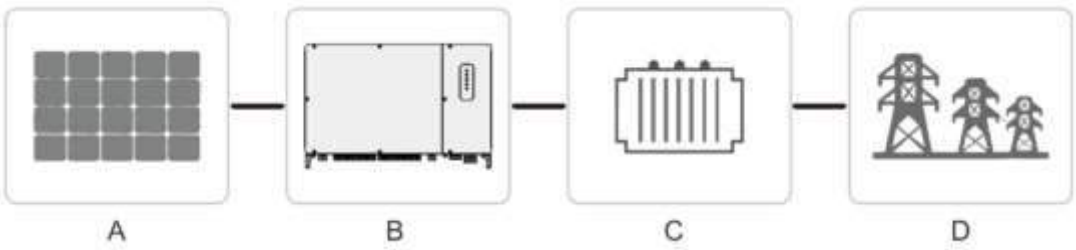


Fig. 2-1 Inverter application in PV power system

WARNING

Inverter cannot connect the PV strings whose positive and negative terminals need to be grounded.

Do not connect any local load between the inverter and the AC circuit breaker.

ITEM	DESCRIPTION	NOTE
A	PV strings	Monocrystalline silicon, polycrystalline silicon and thin- film without grounding.
B	Inverter	**ZGR SOLAR STR 120/150**
C	Transformer	Boost the low voltage from inverter to grid-compatible medium voltage.
D	Utility grid	W+N+PE,3W+PE

Table 2-1 Inverter application in PV power system

String inverters **ZGR SOLAR STR 120/150** are easy-to-use devices that have been designed to meet the needs of all solar power plants connected to the grid (Fig. 2-2).

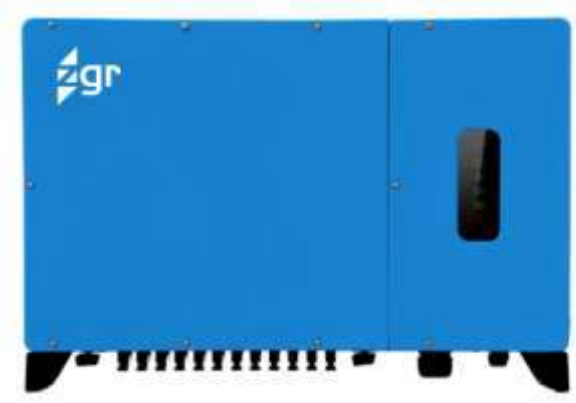


Fig. 2-2 ZGR SOLAR STR 120/150 solar inverter

2.2 Main characteristics

- MPPT algorithm to maximize the energy generated in the inverter
- Direct grid connection
- Various modes of connection of solar panels
- Communications RS485 for monitoring and remote control
- High efficiency, greater than 98%
- Reduced harmonic distortion, THD <3%
- Anti-island protection with automatic disconnection
- Protection against:
    - Reverse - polarity
    - Short-circuits
    - Overvoltages
    - Isolation faults
- Compact and lightweight design, easy installation

2.3 ZGR SOLAR STR 120/150 construction

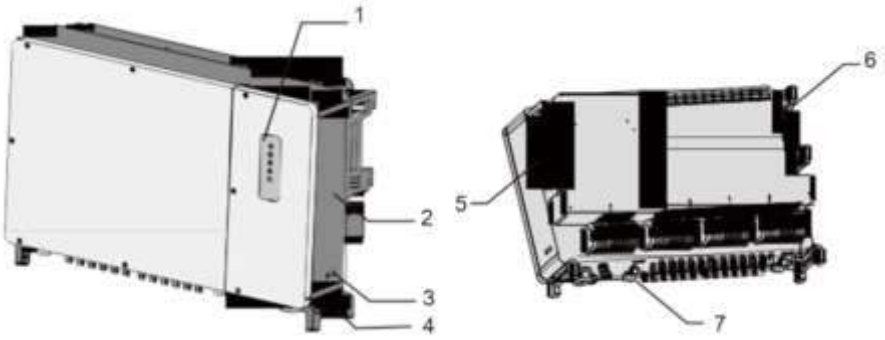


Fig. 2-3 ZGR SOLAR STR 120 appearance

No	NAME	DESCRIPTION
1	LED indicator panel	HMI interface to indicate the present working state of the inverter.
2	Labels	Nameplate.
3	Additional grounding terminals	Use at least one of them to ground the inverter.
4	Bottom handles	Used to move the inverter.
5	Side handles	Used to move the inverter.
6	Mounting ears	Used to hang the inverter onto the mounting-bracket.
7	Wiring area	DC switches, AC terminals, DC terminals, and communication terminals.

Table 2-2 Parts of the ZGR SOLAR STR 120 inverter

Five LEDs are set on the board of the inverter, as shown in

Fig. 2-4 LED board

LED lamp	Color	LED state	Meaning
	Green	Always on	Normal grid-connected operation.
		Flicker in cycle	There is power of DC or AC, but there is no grid-connected operation.
		Offff	AC and DC are both disconnected with power.
	Blue	Flicker for once	Communication for once.
		Off	No signal.

	Blue	Always on	Bluetooth communication is connected.
		Flicker	Bluetooth communication is not connected.
ISO	Yellow	Always on	Low insulation resistance
		Off	Normal insulation resistance
	Red	Slow flicker	Low-level alarm
		Fast flicker	Middle-level alarm
		Always on	High-level alarm
	Green	Always on	In maintenance
		Off	No abnormal state

Table 2-3 LED Lamp description

2.4 Internal architecture of ZGR SOLAR STR 120/150

The simplified scheme of the internal architecture of **ZGR SOLAR STR 120/150** is show in Fig. 2-5. The MPPT is utilized for DC input to ensure the maximum power from the PV array at different PV input conditions. The inversion circuit converts the DC power into AC power and feeds the AC power into the utility grid through the AC terminal. The protection circuit is equipped to ensure the safe operation of the device and personal safety.

The installation and connection of the **ZGR SOLAR STR 120/150** to the electrical network must be subject to current local regulations and may require the installation of suitable electrical consumption measurement devices.

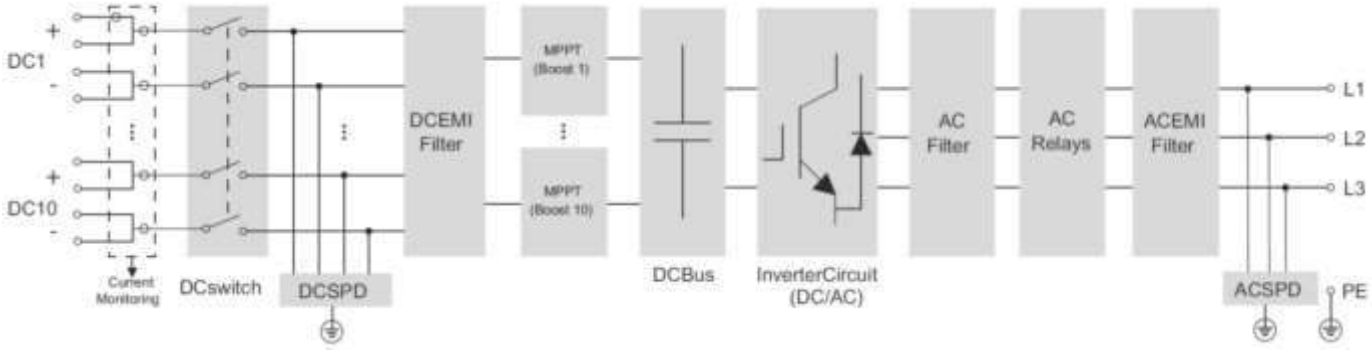


Fig. 2-5 Simplified scheme of ZGR SOLAR STR 120/150 inverter

The DC switch is used to disconnect the DC current safely whenever necessary. The **ZGR SOLAR STR 120/150** is equipped with four DC switches; each DC switch controls its corresponding DC terminals.

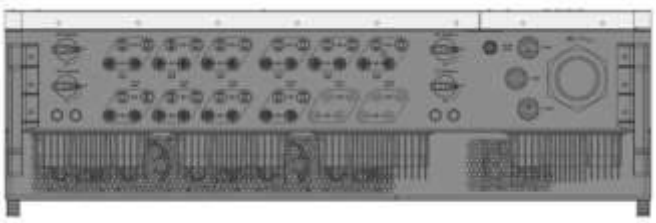


Fig. 2-6 DC switch

NOTE: Turn the DC switches to the ON position before restarting the inverter.

3 ZGR SOLAR STR 120/150 OPERATION

The inverter is equipped with the following functions:

Conversion function

The inverter converts the DC current into grid-compatible AC current and feeds the AC current into the grid.

Data storage

The inverter logs running information, error records, etc.

Parameter configuration

The inverter provides various settable parameters. Users can set parameters to meet the requirements and optimize the performance.

Communication interface

The inverter is designed with standard RS485 communication interfaces. The standard RS485 communication interfaces are used to establish communication connection with monitoring devices and upload monitoring data by using communication cables.

After communication connection is established, users can view inverter information or set inverter parameters.

Protection function

The protective functions are integrated in the inverter, including anti-island protection, LVRT/ZVRT, DC reversed polarity protection, AC short circuit protection, leakage current protection, DC overvoltage/overcurrent protection, etc.

ZGR SOLAR STR 120/150 can operate in various modes and has a control panel and a series of indicator lights where can checked the status of the inverter quickly and visually.

4 INSTALLATION

4.1 Receiving the material

The inverter is thoroughly tested and strictly inspected before delivery. Damage may still occur during shipping. Conduct a thorough inspection after receiving the device. Check the packing for any visible damage.

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.

The inverter may be damaged during transport. Therefore, inspect the equipment before installation. If any damage is detected, contact the transport company or **ZIGOR** directly.

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 STR 120/150**.*

The nameplate can be found on both the inverter and the packing case. It provides information on type of inverter, important specifications, marks of certification institutions, and serial number which are available and identified by ZIGOR.

4.1.1 Inspection before Commissioning

Check the following items before starting the inverter:

- The inverter DC switch and external circuit breaker are disconnected.
- The inverter should be accessible for operation, maintenance and service.
- Nothing is left on the top of the inverter.
- The inverter is correctly connected to the external devices, and the cables are routed in a safe place or protected against mechanical damage.
- The selection of the AC circuit breaker is in accordance with this manual and all applicable local standards.
- All unused terminals at the bottom of the inverter are properly sealed.
- Warning signs and labels are suitably affixed and durable.

4.2 Mechanical installation

4.2.1 Safety during mounting

DANGER

Make sure there is no electrical connection before installation.

In order to avoid electric shock or other injury, be sure there is no electricity or plumbing installations before drilling holes.

CAUTION

Risk of injury due to improper handling.

- *Always follow the instructions when moving and positioning the inverter.*
- *Improper operation may cause injuries, serious wounds, or bruise. System performance loss due to poor ventilation!*
- *Keep the heat sinks uncovered to ensure heat dissipation performance.*

4.2.2 Place and installation conditions

Select an optimal mounting location for safe operation, long service life, and outstanding performance.

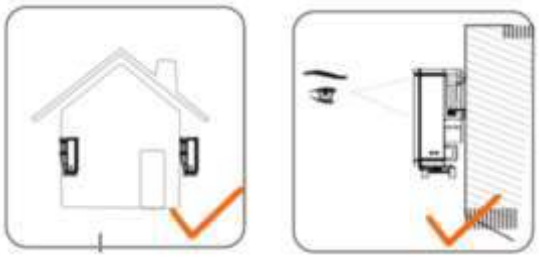


Fig. 4-1 Recommendations of mounting location

The inverter can be installed outdoors and indoors as it has resistance level of IP66 (Fig. 4-1). Some basic installation requirements are as follows:

- The installation environment is free of inflammable or explosive materials.
- The location should be not accessible to children.
- It is the best to install it in the place where it is away from the living area due to some noise produced during its operation (< 60 dB).
- Assure that the LED signalling can be observed conveniently installation place.
- Assure that the ambient temperature is of -25°C ~ +60°C, and the maximum relative humidity is -100 RH (non-condensing).
- Prevent the inverter from direct exposure to sun, rain and snow.
- Clean and dry installation environment is required.
- The location is protected against dust and dirtiness.
- Easy connections.
- Sufficient space to work with the inverter.
- Proximity to magnetic fields and high-power lamps must be avoided.
- Do not obstruct the vents as this would prevent the heat produced by the unit from being dissipated correctly.
- Keep good ventilation so as to reduce heat accumulation.
- Current fire prevention regulations must be met.
- Select suitable location to install the inverter, where is not so easy for pedestrian to touch, but consider easy installation and easy maintenance as well.
- Sufficient air changes to disperse the heat produced.
- Do not expose the Inverter to gases or corrosive products.
- The maximum load bearing capacity ≥ 4 times of inverter weight (Fig. 4-2).

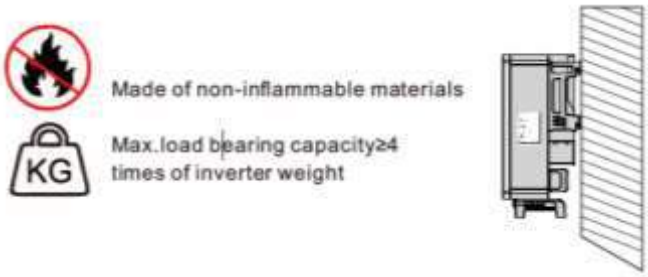


Fig. 4-2 Wall mounting

WARNING

Do not install it on flammable objects or near the place to store flammable materials. Don't install it near potential explosion area.

WARNING

Certain parts of the equipment can reach high temperatures, avoid contact with it.

4.2.3 Placing in the operating position

Check that the area where the **ZGR SOLAR STR 120/150** is to be placed is capable of supporting the weight of the equipment (see section 7).

The **ZGR SOLAR STR 120/150** must be placed in vertical position (Fig. 4-3). Forward installation or upside down installation is prohibited.

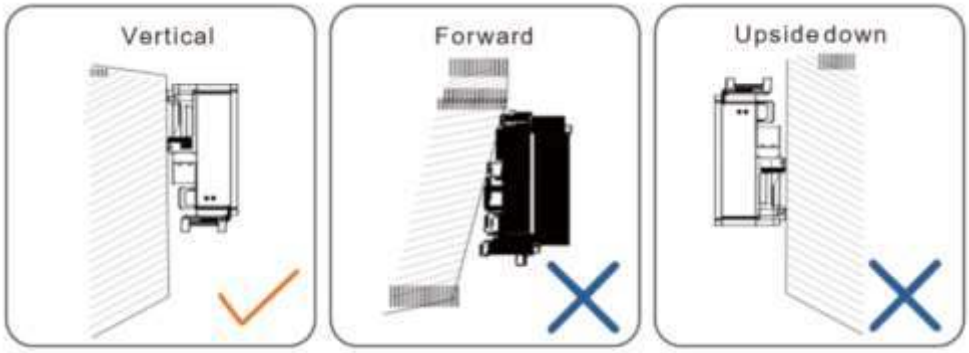


Fig. 4-3 ZGR SOLAR STR 120/150 installation angle requirements

Reserve enough clearance around the inverter to ensure sufficient space for heat dissipation. The fans are maintained on the left and right sides of the inverter, and a larger clearance is required.

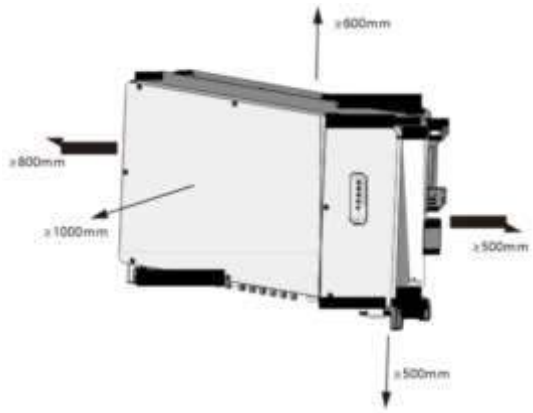


Fig. 4-4 Clearance around the ZGR SOLAR STR 120/150

In case of multiple inverters, reserve specific clearance between the inverters (Fig. 4-5).

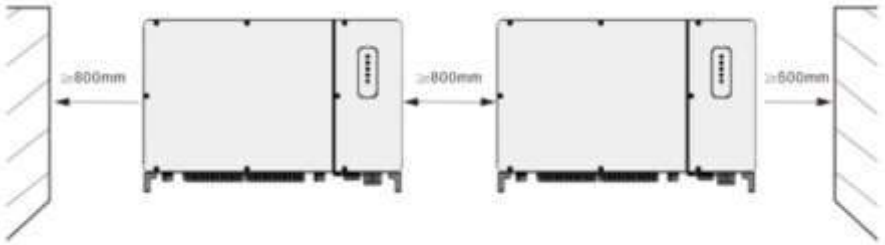


Fig. 4-5 Clearance around multiple inverters

In case of back-to-back installation, reserve specific clearance between the two inverters (Fig. 4-6).

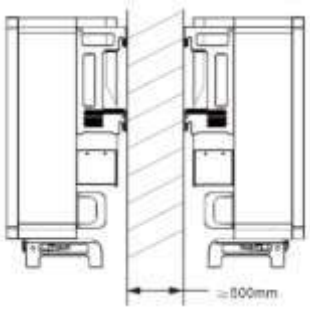


Fig. 4-6 Clearance between the two inverters back-to-back

Install the inverter at an appropriate height for ease of viewing LED indicators and operating switches.

4.3 Moving the ZGR SOLAR STR 120/150

Move the inverter to the specified position before installation. The inverter can be moved manually or via a hoist.

4.3.1 Hoisting Transport

1) Anchor two M10 thread lifting rings to the hangers of the inverter (Fig. 4-7).

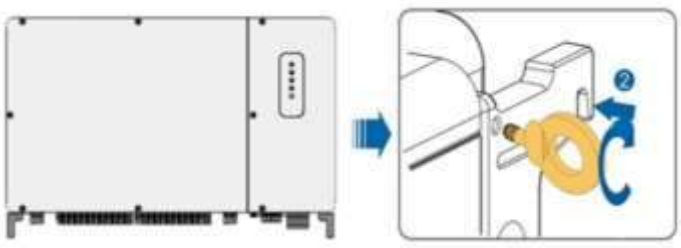


Fig. 4-7 Thread lifting rings

2) Lead the sling through the two lifting rings and fasten the tie-down strap.

3) Hoist the inverter, and stop to check for safety when the inverter is 100 mm above the ground (Fig. 4-8). Continue hoisting the device to the destination after ensuring the safety.

Fig. 4-8 Hoist the inverter

4) Remove the lifting rings and reassemble the sealing screws released before (Fig. 4-7).

WARNING

Keep the inverter balanced throughout the hoisting process and avoid collisions with walls or other objects. Stop hoisting in the event of severe weather, such as heavy rain, thick fog, or strong wind.

NOTE: The lifting rings and the sling are not within the delivery scope.

4.3.2 Mounting-bracket installation

The procedure to install the **ZGR SOLAR STR 120/150** on Mounting-bracket is as follows:

The dimensions of the assembled mounting-bracket are as follows:

Fig. 4-9 Dimensions of mounting-bracket

The tools recommended are (Table 4-1):

ITEM	SPECIFICATION
Phillips screwdriver/ electric screw driver	M4, M6
Marker	-
Level	-
Hammer drill	Drill bit: φ 12
Socket wrench	Including 16mm socket
Wrench	Opening: 16 mm

Table 4-1 Recommended tools

The spare parts (Table 4-2):

ITEM	QUANTITY	SPECIFICATION	SOURCE
Grub screw	2	M4 x 10	Delivery scope
Marker	2	M6 * 35	Delivery scope
Bolt assembly	4	M10	Delivery scope

Table 4-2 Recommended spare parts

Follow these steps to mount the inverter:

1) Assemble the mounting-bracket by using the connecting bar (Fig. 4-10).

Fig. 4-10 Connecting bar

2) Level the assembled mounting-bracket by using the level, and mark the positions for drilling holes on the PV bracket. Drill the holes by using a hammer drill (Fig. 4-11).

Fig. 4-11 Level the assembled mounting-bracket and mark the positions for drilling holes

3) Secure the mounting-bracket with bolts (Fig. 4-12 and Table 4-3).

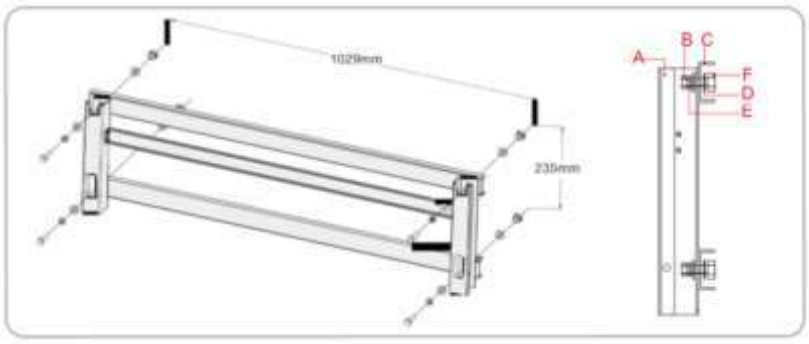


Fig. 4-12 Fastening sequence

ITEM	COMPONENTS	DESCRIPTION
A	Mounting-bracket	-
B	Full threaded bolt	M10*35
C	Metal bracket	-
D	Flat washer	-

E	Spring washer	-
F	Hex nuts	M10

Table 4-3 Fastening sequence

4) Take out the inverter from the packing case.

5) Hoist the inverter to the installation position when necessary (refer to 4.3.1). If the installation position is not high enough, skip performing this step.

6) Hang the inverter to the mounting-bracket and ensure that the mounting ears perfectly engage with the mounting-bracket (Fig. 4-13).

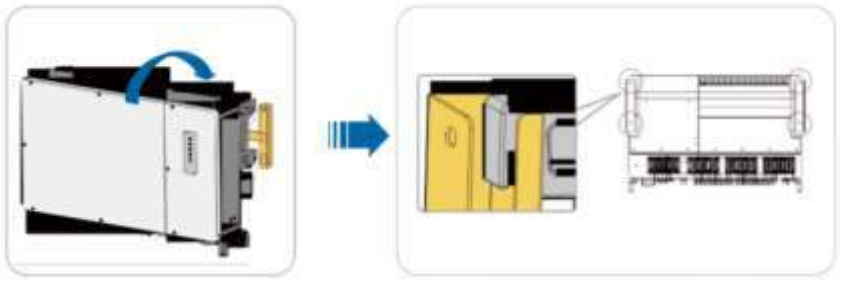


Fig. 4-13 Hang the inverter

7) Fix the inverter with two M6×35 screws (Fig. 4-14).

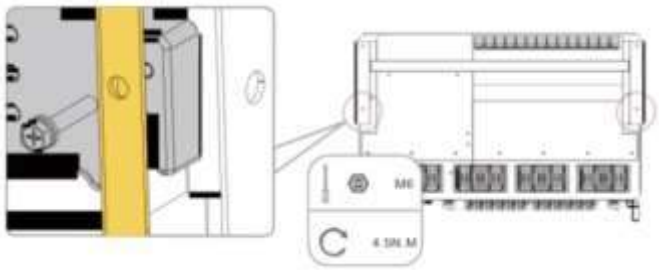


Fig. 4-14 Fix the invertir

4.3.3 Wall-mounting installation

The procedure to install the **ZGR SOLAR STR 120/150** on Mounting-bracket is as follows:

The tools recommended are (Table 4-1):

ITEM	SPECIFICATION
Phillips screwdriver/ electric screw driver	M4, M6
Marker	-
Level	-
Hammer drill	Drill bit (Select according to expansion bolt specifications)
Socket wrench	Including 16mm socket
Wrench	Opening: 16 mm

Table 4-4 Recommended tools

The spare parts (Table 4-2):

ITEM	QUANTITY	SPECIFICATION	SOURCE
Grub screw	2	M4 x 10	Delivery scope
	2	M6 x 35	Delivery scope
Expansion bolts	4	M10 x 95 (recommended)	Self-prepared

Table 4-5 Recommended spare parts

Follow these steps to mount the inverter:

1) Assemble the mounting-bracket by using the connecting bar (Fig. 4-10).

Fig. 4-15 Connecting bar

2) Level the assembled mounting-bracket by using the level, and mark the positions for drilling holes on the installation site. (Fig. 4-11).

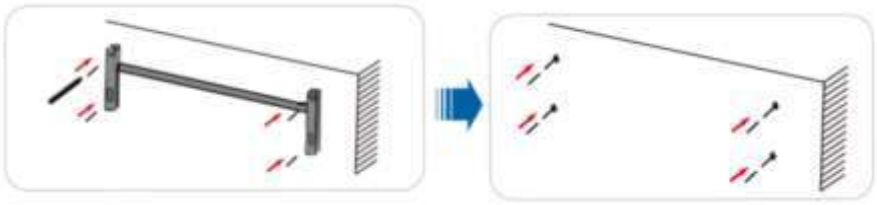


Fig. 4-16 Level the assembled mounting-bracket and mark the positions for drilling holes

3) Insert the expansion bolts into the holes and secure them with a rubber hammer. Fasten the nut with a wrench to expand the bolt. Remove the nut, spring washer, and flat washer, and store them properly (Fig. 4-12).

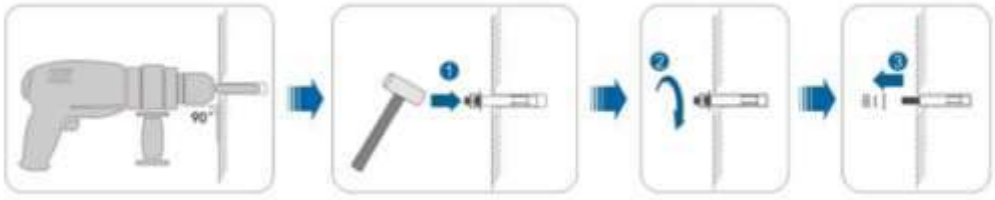


Fig. 4-17 Insert the expansion bolts

4) Fix the mounting-bracket with the expansion bolts (Fig. 4-18 and Table 4-3).

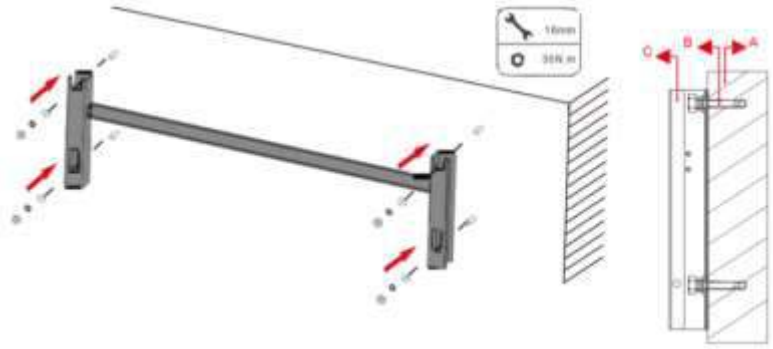


Fig. 4-18 Fix the mounting-bracket

ITEM	DESIGNATION	DESCRIPTION
A	Wall	-
B	Expansion bolt	Fastening the bolt in the sequence of nut, spring washer, slat washer
C	Mounting bracket	-

Table 4-6 Fix the mounting-bracket

5) Take out the inverter from the packing case.

6) Hoist the inverter to the installation position when necessary (refer to 4.3.1). If the installation position is not high enough, skip performing this step.

7) Hang the inverter to the mounting-bracket and ensure that the mounting ears perfectly engage with the mounting-bracket (Fig. 4-13).

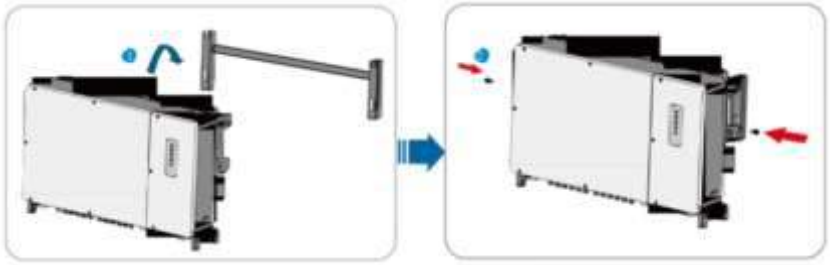


Fig. 4-19 Hang the inverter

8) Fix the inverter with screws (Fig. 4-14).

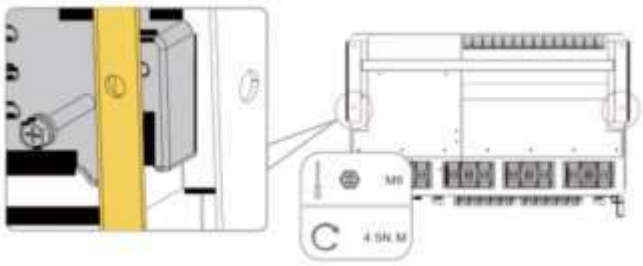


Fig. 4-20 Fix the inverter

4.4 Electrical installation

4.4.1 Safety instructions

Prior to any electrical connections, keep in mind that the inverter has dual power supplies. It is mandatory for the qualified personnel to wear personal protective equipments (PPE) during the electrical work.

DANGER

Danger to life due to a high voltage inside the inverter!

- *The PV string will generate lethal high voltage when exposed to sunlight.*
- *Before starting electrical connections, disconnect the DC and AC circuit breakers and prevent them from inadvertent reconnection.*
- *Ensure that all cables are voltage free before performing cable connection.*

WARNING

- *Any improper operations during cable connection can cause device damage or personal injury.*
- *Only qualified personnel can perform cable connection.*
- *All cables must be undamaged, firmly attached, properly insulated and adequately dimensioned.*

NOTICE

Comply with the safety instructions related to the PV strings and the regulations related to the utility grid.

- *All electrical connections must be in accordance with local and national standards.*
- *Only with the permission of the utility grid, the inverter can be connected to the utility grid.*

4.4.2 Terminal description

Wiring terminals are at the bottom of the inverter, as shown in the Fig. 4-21 and in Table 4-7.

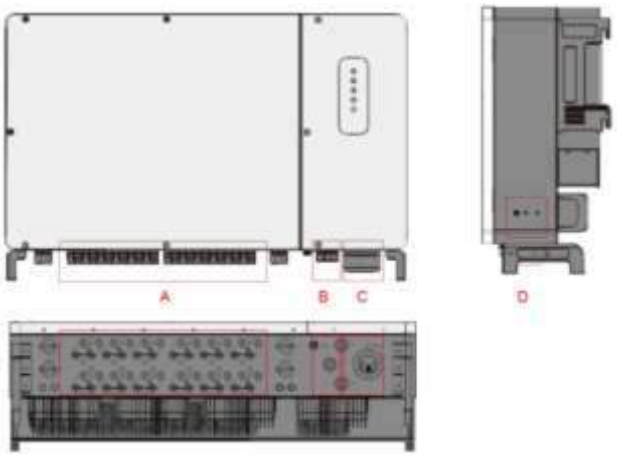


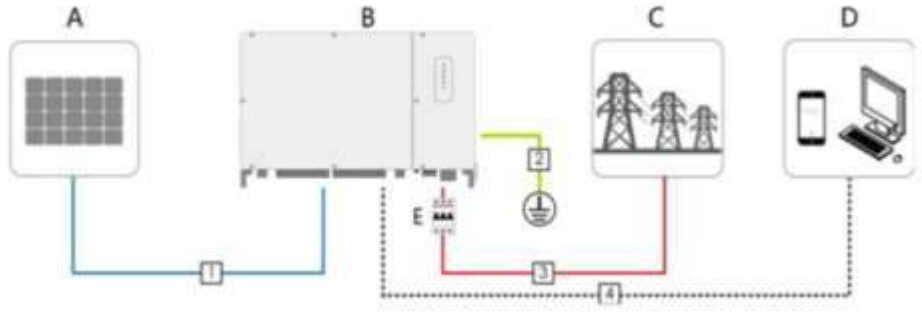
Fig. 4-21 ZGR SOLAR STR 120/150 wiring terminals

ITEM	TERMINAL	MARK	NOTE
A	PV terminals	+/-	20, PV connector
B	Communication terminal	COM1	RS485 communication.
		COM2	
		COM3	
C	AC wiring terminal	AC	Used for AC output cable connection.
D	Additional grounding terminal	⏚	Two grounds shall be connected.

Table 4-7 ZGR SOLAR STR 120/150 wiring terminals

4.4.3 Electrical connection

Electrical connection in the PV system includes additional grounding connection, AC connection, and PV string connection (Fig. 4-22).



ITEM	DESIGNATION
A	PV string
B	Inverter
C	Grid
D	Monitoring device
E	AC circuit

Fig. 4-22 ZGR SOLAR STR 120/150 wiring

The external connections available in the **ZGR SOLAR STR 120/150** are (Table 4-8 and Table 4-9):

No	CABLE	TYPE	SPECIFICATION	
			CABLE DIAMETER (mm)	CROSS SECTIONAL AREA (mm^2)
1	DC cable	PV cable complying with 1500V standard	6~9	4~6
2	Additional Grounding cable	Outdoor singlecore copper wire cable	-	The same as that of the PE wire in the AC cable
3	AC cable	Four (or five)-core copper or aluminum cable*	38~56	L1,L2,L3,PE wire:70~95
4	Communication cable	Shielded twisted pair	5~8	1~1,5

Table 4-8 Cable requirements

*A copper to aluminum adapter terminal is required when an aluminum cable is used. For details, refer to "5.6.3 Aluminium Cable Requirements".

PE WIRE CROSS SECTION	NOTE
S/2 (S: Phase wire cross-section S)	The specifications are valid only when the phase wire and PE wire use the same material. If otherwise, ensure that the cross section of the PE wire produces a conductance equivalent to that of the wire specified in the table.

Table 4-9 PE wire requirements

4.4.3.1 Grounding requirements

WARNING

Since the inverter is a transformerless inverter, neither the negative pole nor the positive pole of the PV string can be grounded. Otherwise, the inverter will not operate normally.

Connect the additional grounding terminal to the protective grounding point before AC cable connection, PV cable connection, and communication cable connection.

The ground connection of this additional grounding terminal cannot replace the connection of the PE terminal of the AC cable. Make sure those terminals are both grounded reliably.

All non-current carrying metal parts and device enclosures in the PV power system should be grounded, for example, brackets of PV modules and inverter enclosure.

When there is only one inverter in the PV system, connect the additional grounding cable to a nearby grounding point.

When there are multiple inverters in the PV system, connect grounding points of all inverters and the PV array frames to the equipotential cable (according to the onsite conditions) to implement an equipotential connection.

4.4.4 Electrical connection

1) Prepare the cable and terminal (Fig. 4-23).

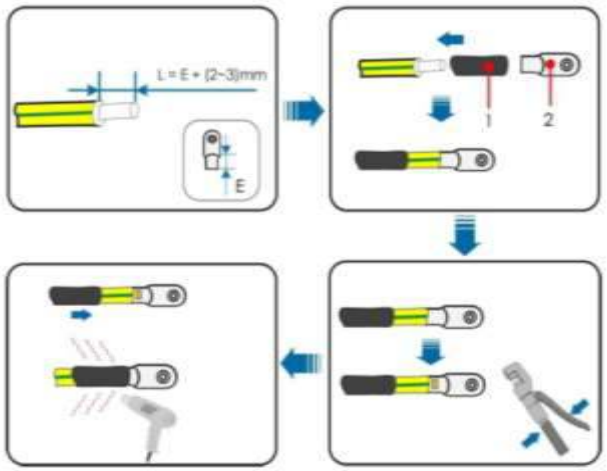


Fig. 4-23 Cable and terminal preparation

2) Remove the screw on the grounding terminal and fasten the cable with a screwdriver (Fig. 4-24).

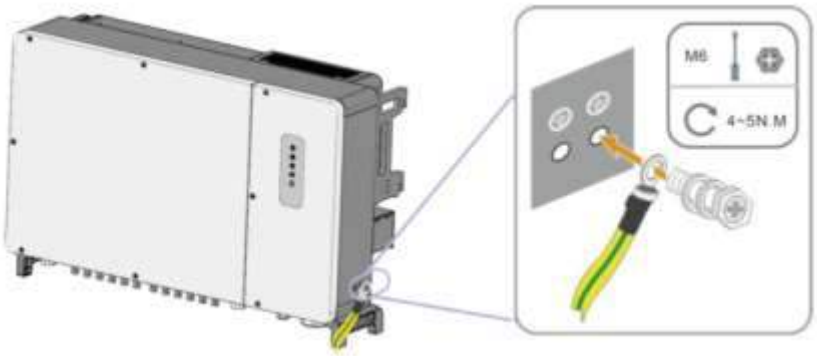


Fig. 4-24 Remove the screw on the grounding terminal

3) Apply paint to the grounding terminal to ensure corrosion resistance.

NOTE: The grounding screws have been anchored to the side of the inverter before delivery, and do not need to be prepared.

There are two grounding terminals. Use at least one of them to ground the inverter.

1) Release two screws on the front cover of the wiring compartment with supplied Allen wrench.
2) Open the wiring compartment (Fig. 4-25).

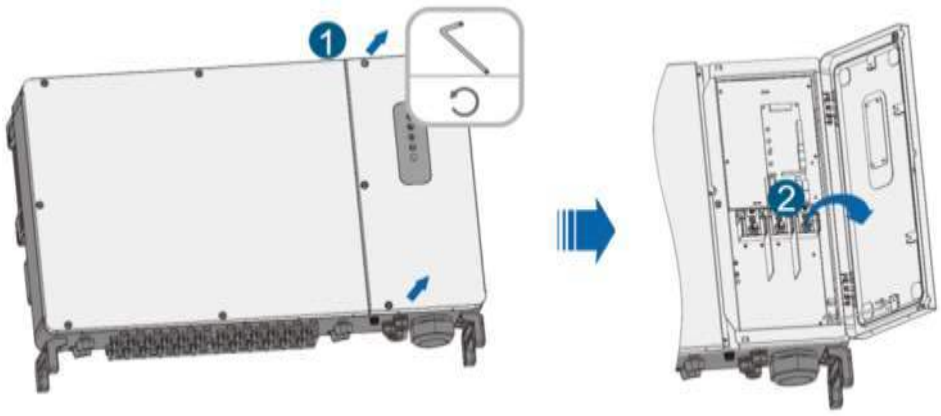


Fig. 4-25 Open the wiring compartment

3) Keep the wiring compartment opened during wiring through the limit lever attached to the cover (Fig. 4-26).

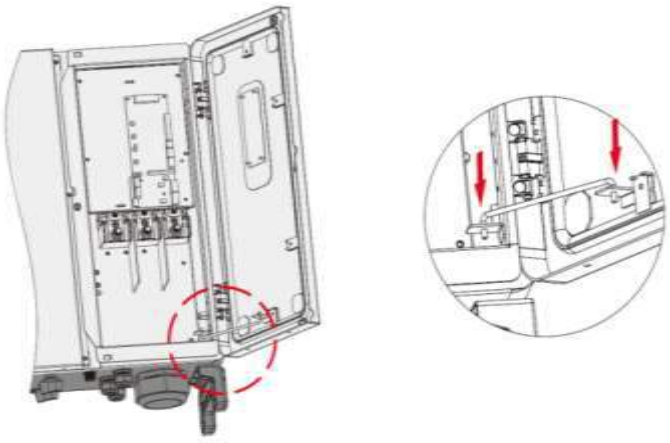


Fig. 4-26 Limit lever

4) Close the wiring compartment in reverse order after completing wiring operations.

4.4.5 AC connection

Before connecting the inverter to the grid, ensure the grid voltage and frequency comply with requirements, for which, refer to Technical Specifications on section 7. Otherwise, contact the electric power company for help.

WARNING

Connect the inverter to the grid only after getting an approval from the local electric power company.

4.4.5.1 AC Circuit Breaker

An independent three-pole circuit breaker is installed on the output side of the inverter to ensure safe disconnection from the grid (Table 4-10).

INVERTER	RECOMMENDED RATED VOLTAGE	RECOMMENDED RATED CURRENT
ZGR SOLAR STR 120	400 V	250 A
ZGR SOLAR STR 150	500 V	250 A

Table 4-10 AC specifications

If multiple inverters need to share a circuit breaker, the circuit breaker should be selected according to the capacity.

NOTICE

Never connect a load between the inverter and the circuit breaker.

4.4.5.2 Multiple Inverters in parallel Connection

If multiple inverters are connected in parallel to the grid, ensure that the total number of parallel inverters does not exceed 28. Otherwise, please contact ZIGOR for technical scheme.

4.4.5.3 MV transformer

The MV transformer used together with the inverter should meet the following requirements:

1) The transformer may be a distribution transformer, and it must be designed for the typical cyclical loads of a PV system (load in the day and no load at night).
2) The transformer may be of the liquid-immersed type or dry type, and shield winding is not necessary.
3) The line-to-line voltage on the LV side of the transformer should endure the output voltage of inverter. When the transformer is connected to the IT grid, toground withstanding voltage of the LV winding of the transformer, the AC cables, and the secondary equipment (including the relay protection device, detection & measuring device, and other related auxiliary devices) should not be lower than 1,100V.
4) The line-to-line voltage on the HV side of transformer should comply with local power grid voltage.
5) A transformer with a tap changer on the HV side is recommended in order to keep consistent with the grid voltage.
6) At an ambient temperature of 45℃, the transformer can run in 1.1 times of load for long time.
7) Transformer with a short-circuit impedance 6% (permissible tolerance: ±10%) is recommended.
8) The voltage drop of system cable is no more than 3%.
9) The DC component that the transformer can withstand is 1% of the fundamental current at rated power.
10) For thermal rating, the load curve of the transformer and environment conditions should be taken into account.
11) The apparent power of the inverter should never exceed the power of the transformer. The maximum AC current of all inverters connected in parallel must be taken into account. If more than 28 inverters are connected to the grid, contact ZIGOR.
12) The transformer must be protected against overloading and short circuit.
13) The transformer is an important part of grid-connected PV generation system. The fault tolerance capacity of the transformer should be taken into account at all times. The fault include: system short circuit, grounding fault, voltage drop, etc.
14) Take ambient temperature, relative humidity, altitude, air quality, and other environmental conditions into account when selecting and installing the transformer.
15) When the anti-PID function is enabled, observe the following items:
    - If the LV side winding is in Y shape, neutral point grounding is prohibited.

- Surge protective devices (SPD) for the AC combiner box and on the LV side of the transformer are recommended to be connected in the "3+1" manner, as shown in the figure below (Fig. 4-27). The Min. continuous operating voltages of M1-M4 are 750 Vac.
- The LV side winding of the transformer, AC cables, and secondary devices (- including protective relay, detection and measurement instruments, and related auxiliary devices) must withstand the voltage to ground of at least 906V.

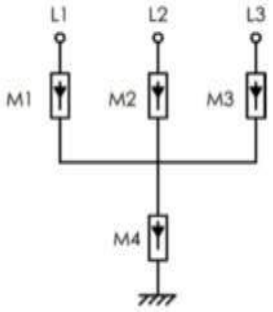


Fig. 4-27 LV side winding of the transformer

4.4.5.4 Requirements for OT/DT Terminal

The factory default standard SC-75 terminal, if customers need to use OT/DT terminal, they need to purchase according to the following requirements.

- Specification:M10;
- Dimensions:a ≤ 28 mm / b ≤ 10,5 mm / c ≤ 16 mm (Fig. 4-28)

Fig. 4-28 Dimmensions of terminal

4.4.5.5 Aluminium Cable Requirements

If an aluminium cable is selected, use a copper to aluminium adapter terminal to avoid direct contact between the copper bar and the aluminium cable (Fig. 4-29).

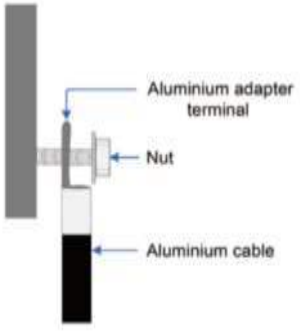


Fig. 4-29 Aluminium cable terminal connection sequence

NOTICE

Ensure that the selected terminal can directly contact with the copper bar.
If there are any problems, contact the manufacturer of terminal.
Direct contact between the copper bar and the aluminium cable will cause electrochemical corrosion and impair the reliability of electrical connection.

4.4.5.6 Connection procedure

NOTICE

In this manual, description is given by using five-core cable as an example.
The wiring method of the four-core cable is the same.

1) Open the wiring compartment.
2) Disconnect the AC-side circuit breaker and prevent it from inadvertent reconnection.
3) Loosen the swivel nut of the AC waterproof connector and select a seal according to the cable outer diameter (Fig. 4-30). Lead the cable through the swivel nut, seal, and wiring terminal successively.

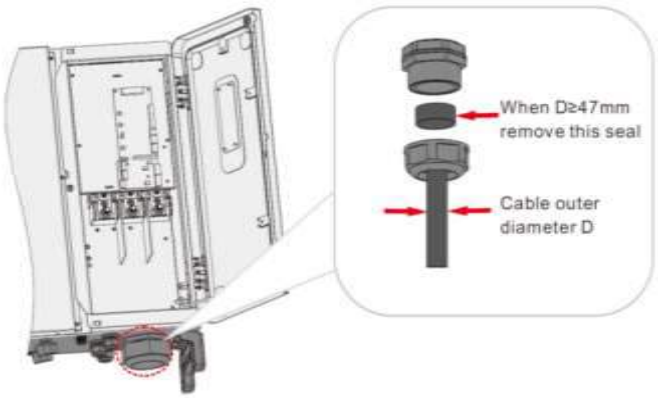


Fig. 4-30 AC waterproof connector

4) Strip the protection layer and insulation layer by specific length, as described in the figure below (Fig. 4-31).

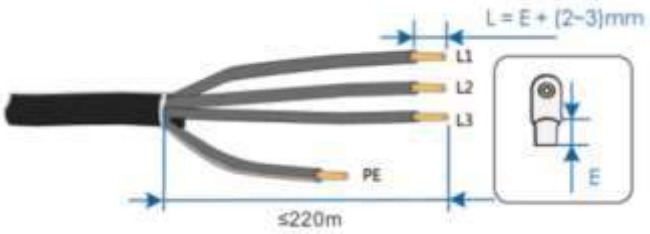


Fig. 4-31 Strip the protection layer

5) Make the cable and crimp terminal (Fig. 4-32).

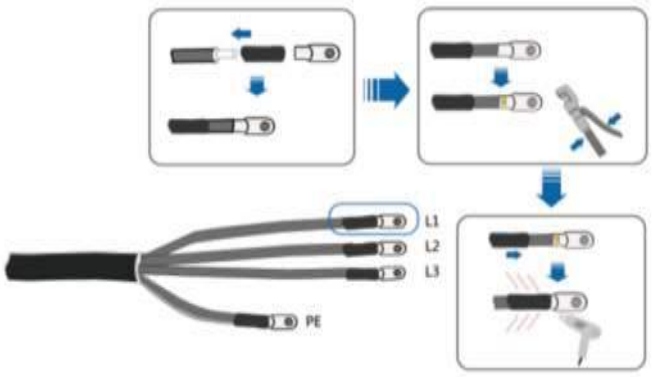


Fig. 4-32 Cable and crimp

6) Secure the wires to corresponding terminals (Fig. 4-33).

NOTICE

Note the terminal positions of PE wire and N wire. If a phase wire is connected to the PE terminal or N terminal, unrecoverable damage may be caused to the inverter.

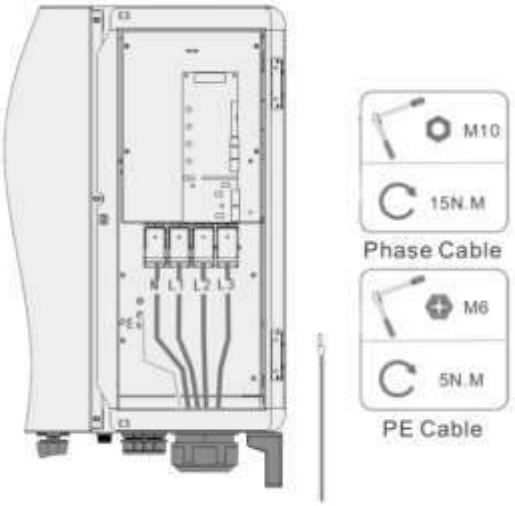


Fig. 4-33 Secure the wires

Ensure that the depth L of the socket used is not less than 20 mm (Fig. 4-34).

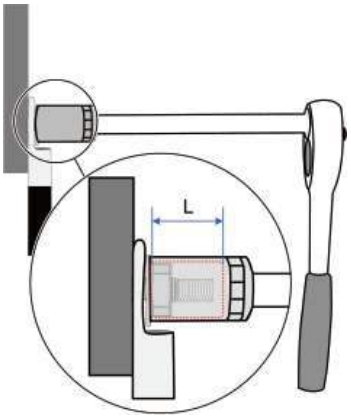


Fig. 4-34 Ensure the depth

7) Gently pull the cable backwards to ensure firm connection, and fasten the swivel nut clockwise (Fig. 4-35).

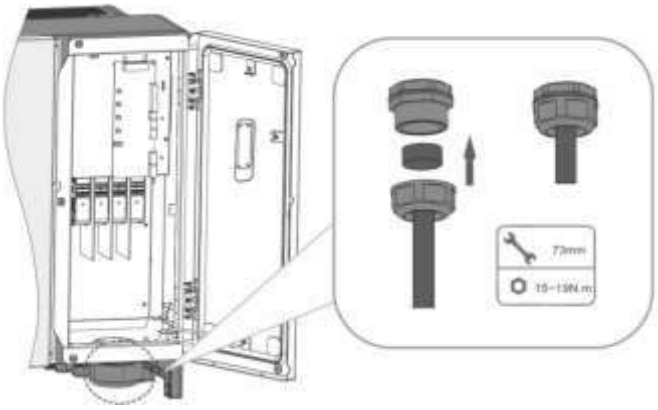


Fig. 4-35 Pull the cable and fasten

4.4.6 DC connection

DANGER

Electric shock!
The PV array will generate lethal high voltage once exposed to sunlight.

WARNING

Make sure the PV array is well insulated to ground before connecting it to the inverter.

NOTICE

There is a risk of inverter damage! The following requirements should be met. Failure to do so will void guarantee and warranty claims.

- *Make sure the maximum voltage of each string is always less than 1500V.*
- *Make sure the maximum short circuit current on the DC side is within the permissible range.*

4.4.6.1 PV Input Configuration

As shown in the Fig. 4-36, the inverter is provided with multiple PV inputs: PV inputs 1~10; and each PV input is designed with an MPP tracker.

Each PV input operates independently and has its own MPPT. In this way, string structures of each PV input may differ from each other, including PV module type, number of PV modules in each string, angle of tilt, and installation orientation.

Each PV input area includes two DC inputs DC1 and DC2. For the best use of DC power, DC1 and DC2 should be the same in PV string structure, including the type, number, tilt, and orientation of the PV modules (Table 4-10).

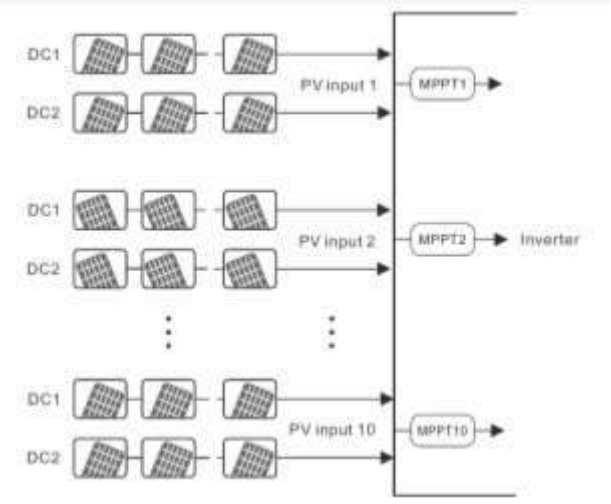


Fig. 4-36 PV Input

No	DEFINITION	MAX. CURRENT FOR INPUT CONNECTOR
ZGR SOLAR STR 120/150	1100 V	32 A

Table 4-11 PV Input specifications

4.4.6.2 Connection procedure

ZIGOR provides corresponding plug connectors in the scope of delivery for quick connection of PV inputs.

DC cables should be connected to the inverter via PV connectors which are included in the scope of delivery.

NOTE: To ensure IP66 protection, use only the supplied connector or the connector with the same ingress of protection.

DANGER

High voltage may be present in the inverter!

- *Ensure all cables are voltage-free before performing electrical operations.*
- *Do not connect the AC circuit breaker before finishing electrical connection*

NOTICE

Use the UTX DC terminal within the scope of delivery. Damage to the device due to the use of incompatible terminal shall not be covered by the warranty.

1) Strip the insulation from each DC cable by 7 mm (Fig. 4-37).

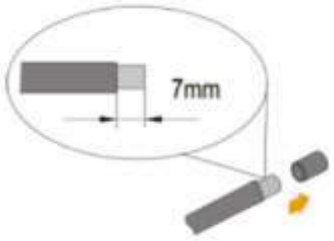


Fig. 4-37 Strip the insulation

2) Assemble the cable ends with the crimping pliers (Fig. 4-38).

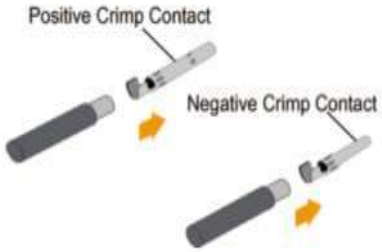


Fig. 4-38 Assemble the cable ends

3) Lead the cable through cable gland, and insert into the insulator until it snaps into place. Gently pull the cable backward to ensure firm connection (Fig. 4-39). Tighten the cable gland and the insulator (torque 2,5 N.m to 3 N.m).

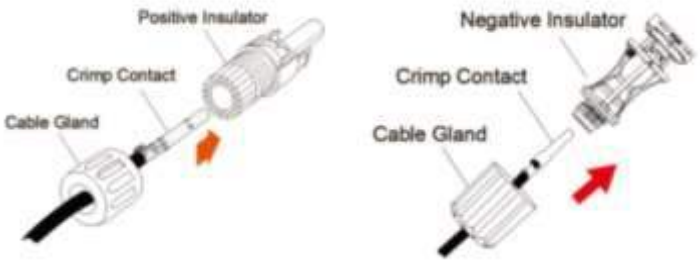


Fig. 4-39 Lead the cable through cable gland

4) Check for polarity correctness.

NOTICE

The inverter will not function properly if any PV polarity is reversed

4.4.6.3 Installing the PV Connectors

1) Rotate all the DC switches to "OFF" position (Fig. 4-40).

Fig. 4-40 Rotate all the DC switches

NOTE: Skip performing step1 when the actual device is not equipped with DC switches.

2) Check the cable connection of the PV string for polarity correctness and ensure that the open circuit voltage in any case does not exceed the inverter input limit of 1100V (Fig. 4-41).

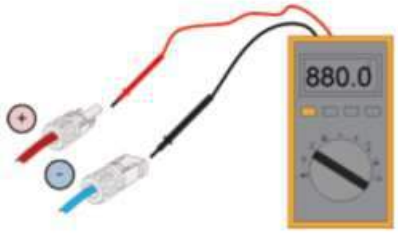
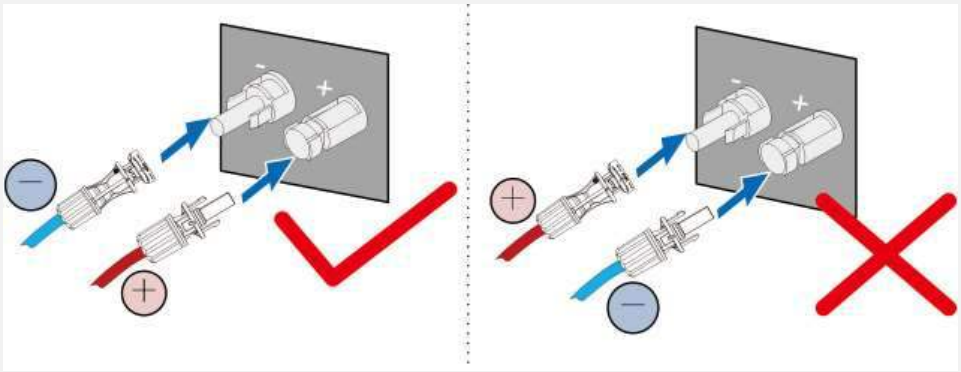


Fig. 4-41 Check the cable connection

3) Connect the PV connectors to corresponding terminals until there is an audible click.

NOTICE

Check the positive and negative polarity of the PV strings, and connect the PV connectors to corresponding terminals only after ensuring polarity correctness.



Arc or contactor over temperature may occur if the PV connectors are not firmly in place, and ZIGOR shall not be held liable for any damage caused.

4) Follow the foregoing steps to connect PV connectors of other PV strings.

5) Seal the unused PV terminals with the terminal caps.

4.5 RS 485 communications connections

The following figure shows the position of the communication wiring board in the inverter as well as the terminals equipped for the wiring board (Fig. 4-42).

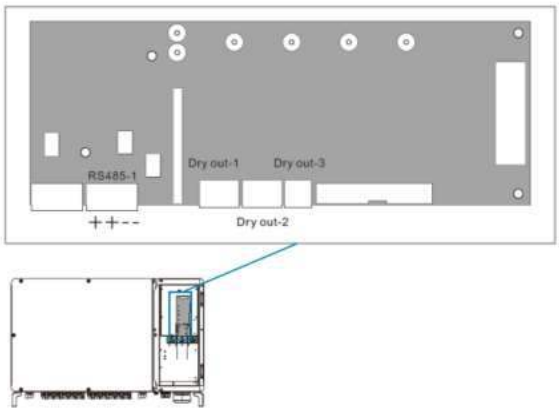


Fig. 4-42 Communication wiring board

4.5.1 Single-inverter communication system

In case of a single inverter, communication cable connection requires only one RS485 cable (Fig. 4-43).

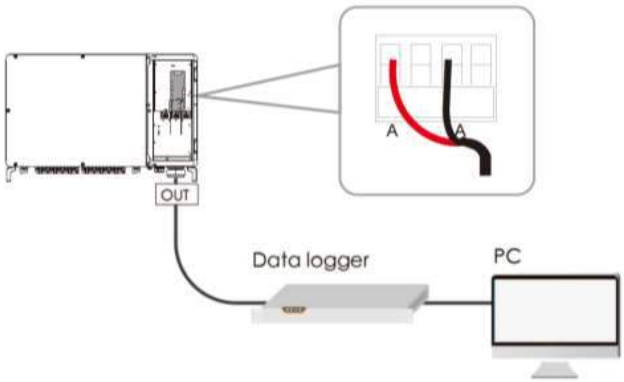


Fig. 4-43 Single inverter communication cable connection

4.5.2 Multi-inverter communication system

In case of multiple inverters, all the inverters can be connected via RS485 cables in the daisy chain manner (Fig. 4-44).

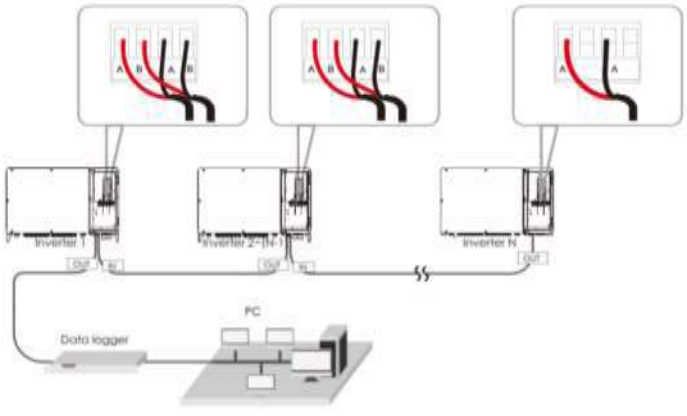


Fig. 4-44 Multiple inverter communication cable connection

4.5.3 Connection procedure (terminal block)

RS485 communication cables should be shielded twisted pair cables Ethernet cables.

There are four RS485 communication terminals COM1, COM2, COM3 on the bottom of the inverter. Please choose according to the actual situation.

1) Strip the protection layer and insulation layer by appropriate length (Fig. 4-45).

Fig. 4-45 Strip the protection layer

2) Loosen the swivel nut of the communication terminal and select an appropriate seal according to cable outer diameter (5 - 8 mm). Lead the cable through the swivel nut and seal successively (Fig. 4-46).

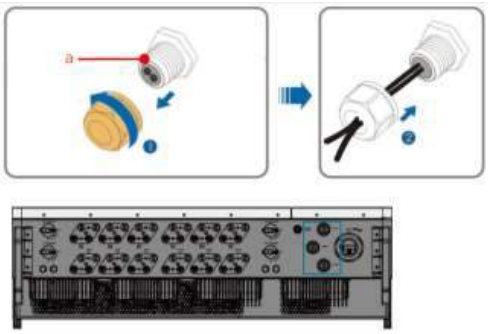


Fig. 4-46 Lead the cable through the swivel nut

3) Secure the cable to the terminal base (Fig. 4-47).

Fig. 4-47 Secure the cable

4) Insert the terminal base into the corresponding terminal (Table 4-12).

No	DEFINITION
1	RS485 A IN, RS485A differential signal +
2	RS485 B IN, RS485B differential signal +
3	RS485 A OUT, RS485A communication signal -
4	RS485 B OUT, RS485B communication signal -

Table 4-12 Terminal definition

5) Pull the cable gently to make sure it is secured, tighten the swivel nut clockwise (Fig. 4-48).

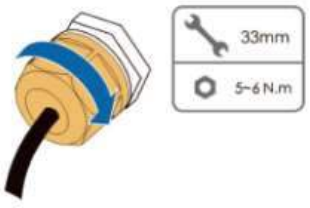


Fig. 4-48 Tighten the swivel nut clockwise

4.5.4 PLC communication connection

With a PLC communication module built inside, the inverter can communicate with the Photovoltaic communication box provided by ZIGOR. For specific wiring method, refer to the photovoltaic communication box user manual.

The photovoltaic communication box is an optional device that can be ordered from ZIGOR.

The photovoltaic communication box conducts data communication by directly using the AC output cable of the inverter and thus saves the trouble to lay and maintain the special communication cables. The RS-485 port of the photovoltaic communication box supports the transparent transmission of the MODBUS-RTU and is completely compatible with the monitoring devices and software of the original RS- 485 communication method.

4.5.5 Closing the wiring compartment

1) Release the limit lever (Fig. 4-49).

Fig. 4-49 Closing wiring compartment

4.6 Inverter Commissioning

If all of the items mentioned above meet the requirements, proceed as follows to start up the inverter for the first time.

1. Rotate the DC switch of the inverter to "ON" position.

   NOTE: Skip performing step1 when the actual device is not equipped with DC switches.
2. Connect the AC switch (if applicable) between the inverter and the grid.
3. Connect the DC switch (if applicable) between the inverter and the PV string.
4. Set initial protection parameters. If the irradiation and grid conditions meet requirements, the inverter will normally operate.
5. Observe the LED indicator to ensure that the inverter operates normally (refer to Tab 2.3).

4.7 Inverter decommissioning

4.7.1 Disconnecting the inverter

1) For maintenance or other service work, the inverter must be switched off. Proceed as follows to disconnect the inverter from the AC and DC power sources. Lethal voltages or damage to the inverter will follow if otherwise.
2) Wait about 5 minutes until the capacitors inside the inverter completely discharge.
3) Rotate the DC switch to the “OFF” position for disconnecting all of the PV string inputs.

   NOTE: Skip performing step 2 when the actual device is not equipped with DC switches.
4) Ensure that the DC cable is current-free via a current clamp.
5) Insert a MC4 wrench into the notch and press the wrench with an appropriate force to remove the DC connector (Fig. 4-50).

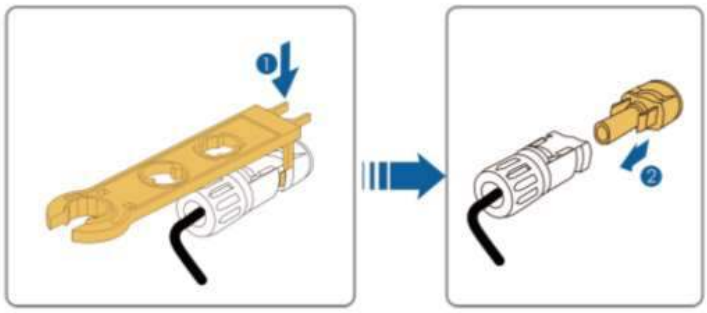


Fig. 4-50 Remove the DC connector

6) Remove the AC junction box, ensure that the AC wiring terminals are voltage-free via a multimeter, and remove the AC wires.
7) Install the MC4 waterproof plugs and AC waterproof cover.

4.7.2 Dismantling the inverter

WARNING

Risk of burn injuries and electric shock!

- *Do not touch any inner live parts until at least 5 minutes after disconnecting the inverter from the utility grid and the PV input.*

1) Refer to 4.4.3 Electrical installation for the inverter disconnection of all cables in reverse steps.
2) Dismantle the inverter referring to 4.2 Mechanical installation in reverse steps.
3) If necessary, remove the wall-mounting bracket from the wall.
4) If the inverter will be reinstalled in the future, please refer to 1.2 Storage precautions for a proper conservation.

4.7.3 Disposal of the inverter

Users take the responsibility for the disposal of the inverter.

NOTICE

Some parts and devices of the inverter, such as the capacitors, may cause environmental pollution.
Do not dispose of the product together with household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site.

5 TROUBLESHOOTING

5.1 Malfunctions of the equipment

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

The **ZGR SOLAR STR 120/150** has a section for possible fails and alarms (Table 5-1and Table 5-2).

ERROR	CODE	DESCRIPTION
AC Voltage Low	F00-1	AC Voltage is too low.
AC Voltage High	F01-1	AC Voltage is too high.
AC Frequency	F02-1	AC frequency is too low.
AC Frequency High	F03-1	AC frequency is too high.
Bus Voltage Low	F04-1	Low Bus voltage is too low.
Bus Voltage High	F05-1	Bus voltage is too high.
Bus Voltage Abnormal	F06-1	Positive voltage or negative voltage is too high or too low on bus.
Insulation Impedance Low	F07-1	PV arrays Insulation impedance is too low.
Input current high	F08-1	PV Input current is too high.
Hardware Current High	F 09-1	Inverter current is too high.
Inverter Current High	F10-1	Inverter current is too high.
Inverter DC Current High	F11-1	Inverter DC current is too high.
Ambient Temperature High	F12-1	Ambient emperature is too high.
Heatsink Temperature High	F13-1	Heatsink temperature is too high.
AC Relay Abnormal	F14-1	AC relay is abnormal.
PV Input Voltage Low	F15-1	One of PV input is idle wheninverter is set on parallel mode.
Remote OFF	F16-1	Status of inverter is on remote off.
SPI Communication Fault	F18-1	Communication fault on control.
Reserved	F19-1	Reserved
Leakage Current High	F20-1	Leakage current is too high.
Self-Checking Failure Of Leakage Current	F21-1	Self -checking Failure of Leakage Current.
Consistency Voltage Fault	F22-1	Inconsistent voltage between primary CPU and secondary CPU.

Consistency Frequency Fault	F23-1	Inconsistent frequency between primary CPU and secondary CPU.
Loss of auxiliary power supply	F25-1	Auxiliary power loss, machine protection.
IGBT Fault	F26-1	IGBT Fault, machine protection.
DSP Communication Lost	F32-1	DSP communication faulty on.

Table 5-1 Error message prompt

ALARM	CODE	DESCRIPTION
Low speed of fan group1	W00-1	Alarm due to low speed of fan group 1.
Low speed of fan group 2	W01-1	Alarm due to low speed of fan group 2.
Low speed of fan group 3	W02-1	Alarm due to low speed of fan group 3.
Zero power	W03-1	Zero power alarm is normal when light is weak and power is very small.
Clock alarm	W16-1	Clock chip failure.
Lightning protector alarm	W21-1	Alarm due to triggering action of lightning protector.

Table 5-2 Alarm information

Moreover, in Table 5-3 are shown the frequent system errors types and the solutions:

ERROR MESSAGE	SOLUTION
Error of low and high grid power voltage; error of low and high grid power frequency (F00-F03-1)	(1) Confirm whether the safety standards selected for the machine are in compliance with local grid requirements. (2) Inspect whether the AC output terminal is connected reliably and measure whether the voltage is normal with a multimeter. (3) Disconnect the PV input, restart the machine, and see if the machine can return to normal. (4) Contact **ZIGOR** if the fault still exists.
Bus voltage is high or low (F04-F05-1)	(1) Please check the setting of input mode. (2) Disconnect PV input and restart the inverter and check whether fault still exists. (3) Contact **ZIGOR** if the fault still exists.
Imbalanced bus-bar voltage (F06-1)	(1) Please check the setting of input mode. (2) Confirm the bus-bar voltage imbalance through the LCD display panel. Restart the machine several times every few minutes to see if the machine can return to normal. (3) Contact **ZIGOR** if the fault still exists.

Insulation resistance Fault (F07-1)	(1) Disconnect PV input, restart the inverter and check whether fault still exists. (2) Please measure impedance of PV+/PV- to ground whether is over than 500 KΩ. (3) Please contact your local distributor if resistance is less than 500 KΩ.
Error of high input current (F08-1)	(1) Inspect whether the input mode is correct. (2) Disconnect the PV input, restart the machine, and see if the machine can return to normal. (3) Contact **ZIGOR** if the fault still exists.
Error of high hardware inversion current (F09-1)	(1) Inspect whether the input mode is correct. (2) Disconnect the PV input, restart the machine several minutes later, and see if the machine can return to normal. (3) Contact **ZIGOR** if the fault still exists.
Error of high inversion current (F10-1)	(1) Inspect whether the input mode is correct. (2) Disconnect the PV input, restart the machine several minutes later, and see if the machine can return to normal. (3) Contact **ZIGOR** if the fault still exists.
Error of high AC amount of inversion current (F11-1)	(1) Disconnect the PV input, restart the machine several minutes later, and see if the machine can return to normal. (2) Contact **ZIGOR** if the fault still exists.
Error of high ambient temperature (F12-1)	(1) Disconnect the PV input, restart the machine several minutes later until the machine is cooled, and see if the machine can return to normal. (2) Inspect whether the ambient temperature exceeds the normal operating temperature range of the machine. (3) Contact **ZIGOR** if the fault still exists.
Error of high radiator temperature (F13-1)	(1) Disconnect the PV input, restart the machine several minutes later until the machine is cooled, and see if the machine can return to normal. (2) Inspect whether the ambient temperature exceeds the normal operating temperature range of the machine. (3) Contact **ZIGOR** if the fault still exists.
Abnormal AC relay (F14-1)	(1) Disconnect the PV input, restart the machine, and see if the machine can return to normal. (2) Contact **ZIGOR** if the fault still exists.

Error of low input voltage (F15-1)	(1) Inspect whether the PV input wiring mode is correct. In parallel mode of the machine, one line of PV is not connected, and machine error is reported. (2) Disconnect the PV input, restart the machine, and see if the machine can return to normal. (3) Contact **ZIGOR** if the fault still exists.
Remote shutdown (F16-1)	The inverter is on remote OFF status, the Inverter can be turned off/on remotely by monitoring software.
SPI communication Fault (F18-1)	(1) Disconnect PV input, restart the inverter and check whether fault still exists. (2) Contact **ZIGOR** if the fault still exists.
SPI communication Fault (F19-1)	(1) Disconnect PV input, restart the inverter and check whether fault still exists. (2) Contact **ZIGOR** if the fault still exists.
Leakage Current High (F20-1)	(1) Disconnect PV input, restart the inverter and check whether fault still exists. (2) Contact **ZIGOR** if the fault still exists.
Leakage Current Self-Checking Failure (F21-1)	(1) Disconnect PV input, restart the inverter and check whether fault still exists. (2) Contact **ZIGOR** if the fault still exists.
Consistency Voltage Fault (F22-1)	(1) Disconnect PV input, restart the inverter and check whether fault still exists. (2) Contact **ZIGOR** if the fault still exists.
Frequency Consistency Fault (F23-1)	(1) Disconnect PV input, restart the inverter and check whether fault still exists. (2) Contact **ZIGOR** if the fault still exists.
Loss of auxiliary power supply (F25-1)	(1) Disconnect PV input, restart the inverter and check whether fault still exists. (2) Contact **ZIGOR** if the fault still exists.
IGBT Fault (F26-1)	(1) Disconnect PV input, restart the inverter and check whether fault still exists. (2) Contact **ZIGOR** if the fault still exists.
DSP communication Lost (F32-1)	(1) Disconnect PV input, restart the inverter and check whether fault still exists. (2) Contact **ZIGOR** if the fault still exists.

Table 5-3 Troubleshooting

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

sac@zigor.com

6 MAINTENANCE

6.1 ZGR SOLAR STR 120/150 maintenance

DANGER

Risk of inverter damage or personal injury due to incorrect service!

- *Always keep in mind that the inverter is powered by dual sources: PV strings and utility grid.*

Before any service work, observe the following procedure.

- *Disconnect the AC circuit breaker and then set the DC load-break switch of the inverter to OFF;*
- *Wait at least 10 minutes for inner capacitors to discharge completely;*
- *Verify that there is no voltage or current before pulling any connector.*

WARNING

Keep non-related persons away!
A temporary warning sign or barrier must be posted to keep non-related persons away while performing electrical connection and service work.

NOTICE

Restart the inverter only after removing the fault that impairs safety performance.
As the inverter contains no component parts that can be maintained, never arbitrarily replace any internal components.
For any maintenance need, please contact ZIGOR. Otherwise, ZIGOR shall not be held liable for any damage caused.

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 inverter.

In order to guarantee the correct operation of the **ZGR SOLAR STR 120/150**, 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:

- Monthly:
  - Visual control of correct operation:
    - LEDs indicating correct operation.
    - Electrical values within margins.
    - No active event.
  - Control of the event history, in search of sporadic or repetitive failures.
- 6 monthly:
  - Check on the correct ventilation of the location.
  - Check the temperature and dust of the inverter.
  - Clean the inverter enclosure if necessary.
  - Check if the air inlet and outlet are normal. Clean the air inlet and outlet, if necessary.
  - Cleaning of the equipment's air inlet filters.
  - Removal of foreign bodies both in the air inlet and outlet.

- Visual verification of the status of connecting wires, rusting, damage to insulation, etc.
- Check whether all cables are firmly in place.
- Check whether a cable is damaged, especially the part contacting the metal enclosure.

- Annually:
  - Cleaning and blowing of electronics.
  - Check whether there is fan warning.
  - Check whether there is any abnormal noise when the fan is turning.
  - Clean or replace the fans if necessary.
  - Check whether the cable entry is insufficiently sealed or the gap is excessively large, and reseal the entry when necessary.
  - Checking the tightening and condition of the cables, power and signal.
  - Check for colour changes or deformations due to hot spots.
  - Cleaning control and water filtration of the room where the inverter is located.
  - Verification of inverter security features, which are available to the inverter.
  - Checking the performance of the switches of the installation.
  - Checking the input and output protection of the inverter.

For some of these maintenance tasks, shutdowns and disconnections must be made.

WARNING

Incorrect maintenance can render the warranty null and void.

6.1.1 Cleaning Air Inlet and Outlet

A huge amount of heat is generated in the process of running the inverter. The inverter adopts a controlled forced-air cooling method.

In order to maintain good ventilation, please check to make sure the air inlet and outlet are not blocked.

Clean the air inlet and outlet with soft brush or vacuum cleaner if necessary.

6.1.2 Fan maintenance

DANGER

- *Stop the inverter and disconnect it from all power supplies before maintenance.*
- *Lethal voltage still exists in the inverter. Please wait for at least 5 minutes and then perform maintenance work.*
- *Only qualified electricians can maintain the fans.*

Fans inside the inverter are used to cool the inverter during operation. If the fans do not operate normally, the inverter may not be cooled down and inverter efficiency may decrease. Therefore, it is necessary to clean the dirty fans and replace the broken fans in time.

The operation procedure is as follows:

1) Stop the inverter (see 4.7.1 Disconnecting the Inverter).
2) Loosen the screw on the sealing plate of the fan module (Fig. 6-1).

Fig. 6-1 Fan module

3) Press the hump of the latch hook, unplug the cable connection joint outwards.

4) Pull out the fan module, clean the fans with soft brush or vacuum cleaner, and replace them when necessary (Fig. 6-2).

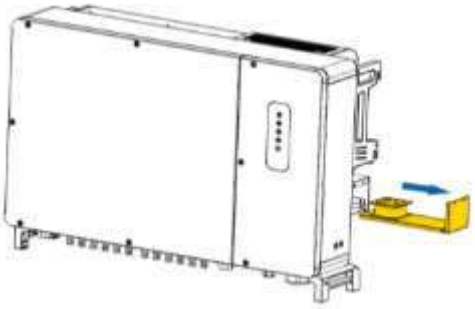


Fig. 6-2 Pull out the fan module

5) Follow the steps above to remove the fan on the other side of the inverter.

6) Reinstall the fan back to the inverter in reverse order and restart the inverter.

7 TECHNICAL SPECIFICATIONS

Equipment	ZGR SOLAR STR 120	ZGR SOLAR STR 150
INPUT (DC)		
Maximum voltage DC	1100 V	
MPPT voltage range	200 – 1000 Vdc	
Full load MPP voltage	550 V ~ 850 V	
Nominal input voltage	620 V	750 V
Star DC voltage	250 V	
Number of MPP	10	12
String per MPPT	2	
Maximum input current per MPPT	26 A	
Max. short-circuit current per MPPT	40 A X 10	40 A X 12
OUTPUT (AC)		
Nominal AC output power	120 kW @25 ºC, 110 kW @40 ºC, 100 kW @50 ºC	136 Kw @45ºC, 150 kW @25 ºC
Max. AC output power	120 kW	150 kW
Nominal AC voltage	400 Vac, 320 – 480 V	500 Vac, 400 – 621 V
AC connection	3W + PE (by default), 3W + N+ PE (configurable)	3W + PE
AC grid frequency range	50/60 Hz ± 5 Hz (adjustable)	
Power factor	0,8 lead / lag	
THDi	< 3 %	
EFFICIENCY		
Maximum efficiency	99 %	
European efficiency	98,5 %	
PROTECTIONS		
DC switch	Yes	
Anti-islanding protection	Yes	
AC Short-circuit	Yes	
DC anti reverse connection	Yes	
String fault Detection	Yes	
AC leakage current fault	Yes	
Insulation detection	Yes	
Grid monitor	Yes	
AMBIENT AND MECHANICAL FEATURES		
Working temperature	-25 ºC to +60 ºC (without condensation)	
Protection level	IP66	
Cooling	Fan cooling	
Input terminal	Amphenol	

Topology	Transformerless	
Altitude	< 3000 m without power loss	
Relative humidity	0 to 100 % without condensation	
Dimensions (HxWxD)	700 x 1055 x 336 mm	
Approx. Weight	96 kg	110 kg
CERTIFICATION & STANDARD		
Standard	EN/IEC 62109-1/2; EN 61000-6-1; EN 61000-6-3; IEC61727; VDE 0126-1-1; UNE 217001:2015 IN & ITC-BT-40 ANEXO I; UNE 217002:2020; RD647/2020+TED749/2020(NTS)	

- The technical specifications may be modified without warning.
- For any other technical requirement or modification of existing characteristics please consult ZIGOR.

8 WARRANTY

Unless otherwise agreed, **ZIGOR** guarantees that **ZGR SOLAR STR 120/150** units leave the factory in perfect working order and free of any defects for a period of 24 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.

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 [redacted]

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Consulte nuestra web para contactar con la red de delegaciones comerciales
Refer to our website in order to contact the commercial branches network
Veuillez consulter notre page web pour contacter nos délégations commerciales
Consulte a nossa web para contatar com a rede de degaçoes comerciais