



Owner's Manual

Original Instructions

Intelligent Converter

Intelligent Converter

Models:

GIE-ADC12K5E

Thank you for choosing Intelligent Converter. Please read this Owner's Manual carefully before operation and retain it for future reference.

If you have lost the Owner's Manual, please contact the local agent or visit www.gree.com or send an email to global@gree.com.cn for the electronic version.

GREE ENERGETIC&ENVIRONMENTAL TECHNOLOGIES CO.LTD OF ZHUHAI

Preface

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS





This manual contains important instructions for Model(s) FULAGDA series that shall be followed during installation and maintenance of the power conversion system.


CAUTION– To reduce the risk of fire, connect only to an AC line circuit provided with 40/45 amperes maximum branch-circuit overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA 70.

CAUTION–“Risk of electric shock, Do not remove cover. No user serviceable parts inside. Refer servicing to service personnel.”

"Risk of electric shock - Both ac and dc voltage sources are terminated inside this equipment. Each circuit must be individually disconnected before servicing"

For correct installation and operation, please read this manual carefully.

	This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.
	This mark indicates procedures which, if improperly performed, might lead to the death or serious injury of the user.
	This mark indicates procedures which, if improperly performed, might possibly result in personal harm to the user, or damage to property.
	NOTICE is used to address practices not related to personal injury.

	
(1)	Please read this manual before operation.
(2)	There is a risk of electric shock, and make sure the unit can be earthed properly.
(3)	After power outage, wait for at least 5 minutes before proceeding any other work.
(4)	Pay attention to the hot surface to avoid being scalded.
(5)	Do not mix the product with domestic wastes.

The National Electrical Code, ANSI/NFPA 70 wiring methods is to be used.

The DC and AC output circuits are isolated from the enclosure and that system grounding, if required by Section 250 of the National Electrical Code, ANSI/NFPA 70, is the responsibility of the installer.

This appliance can't be used by children under 18 years old and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge. Children shall not play with the appliance. All installation operations of the equipment must be carried out by trained professional electrical technicians who must wear personal protective equipment.

Overcurrent protection for the AC and DC circuit(PV input and DC output) is to be provided by the installer.

DISPOSAL: Do not dispose this product as unsorted municipal waste. Collection of such waste separately for special treatment is necessary.

CAUTION

If the pictures provided herein differ from actual product, the actual product prevails.

Converter connection with a grid needs a permission from local grid company. The user should apply for grid connection to the local grid company. After the application is approved, the user may install an electric meter to enjoy national or local subsidies. For details on local policies, consult local grid company.

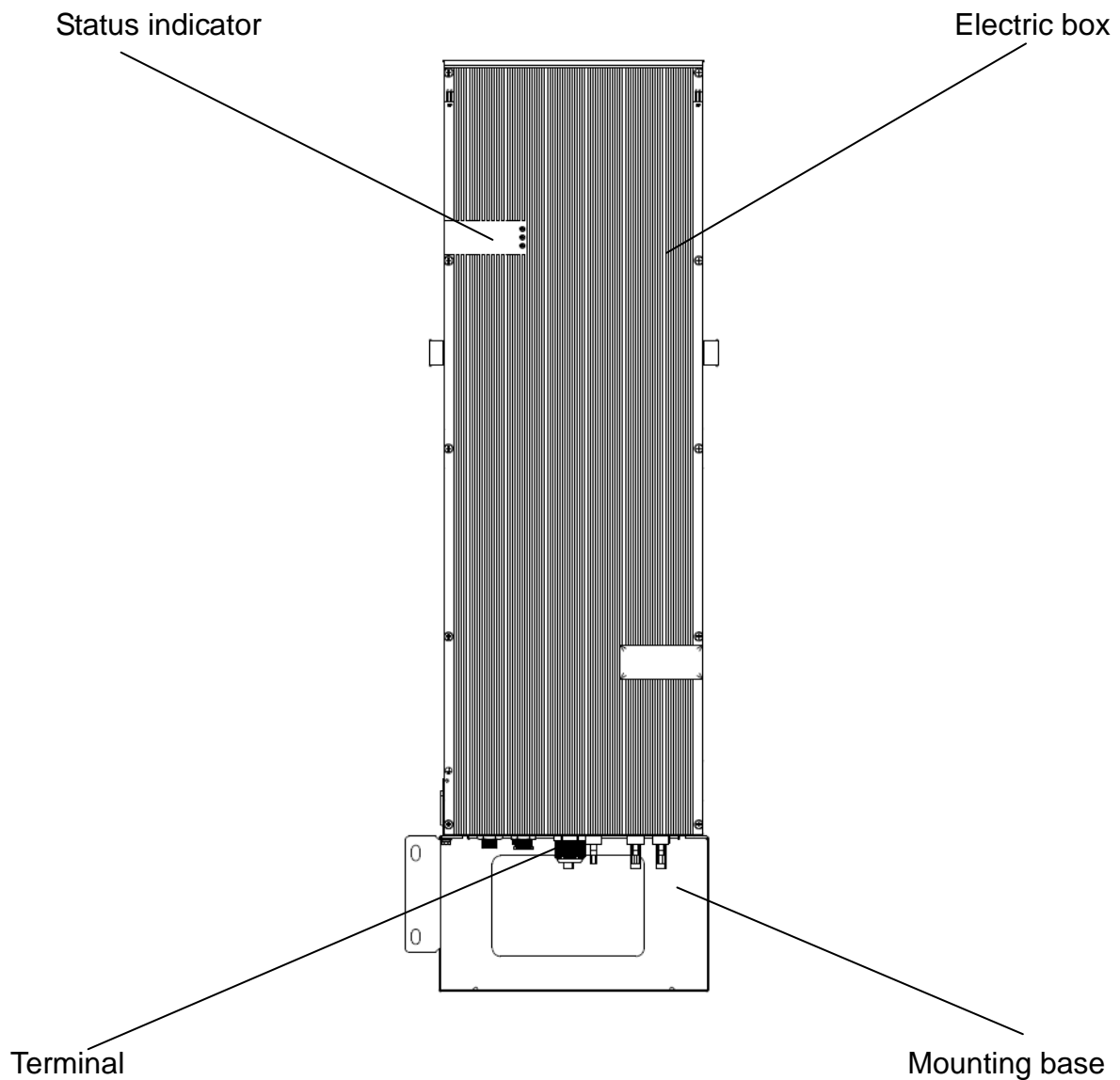
If the user does not follow the method the manufacturer specifies to use the converter, the converter protection measure may fail.

The converter must be maintained or repaired by professional personnel. In case of any damage, contact local maintenance center of GREE.

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1. Components and Accessories



2. Packing List

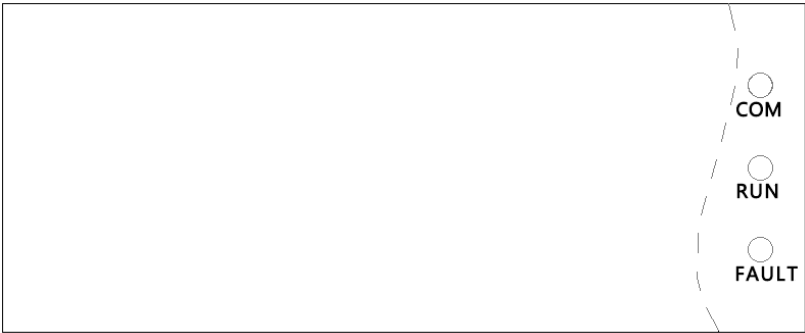
Main unit	Converter	1 set	
Printout	Manual	1 copy	
Printout	Warranty card	1 copy	
Printout	Certificate	1 copy	
Printout	Barcode	1 copy	
Printout	Installation confirmation receipt	1 copy	
Printout	Packing list	1 copy	
Screws	M6X23	4 sets	For installing mounting base

3. Operation Method

Power on the converter.

1. Ensure that the DC input, AC output and communication terminal of the converter are connected as required.
2. Turn on the AC and DC protection switches.
3. After system self-check, the converter enters the grid connected state.

4. Indicators and Meanings



COM: Yellow communication indicator. Indicates device IP addresses. They are coded and displayed following the Morse code and display interval in the table below. IP addresses are displayed as 00 to 99 cyclically.

RUN: Green running indicator. It is not on in initial mode. After the converter is connected to a grid and runs, this indicator flashes at an interval of 120 ms. In normal mode, this indicator is steady on. In fault mode, this indicator is off.

FAULT: Red fault indicator. In non-fault mode, this indicator is off. If the converter does not receive CAN data within 30 seconds, it reports a communication fault, and this indicator is steady on. In case of a fault, this indicator flashes according to the Morse code and display interval in the table below based on fault types. Error code range: 00~99.

Note: The following table lists the Morse code and display interval.

Tens digit Morse code	Interval	Digit Morse code	Interval
5s	1s	5s	2s

Morse Coding Method

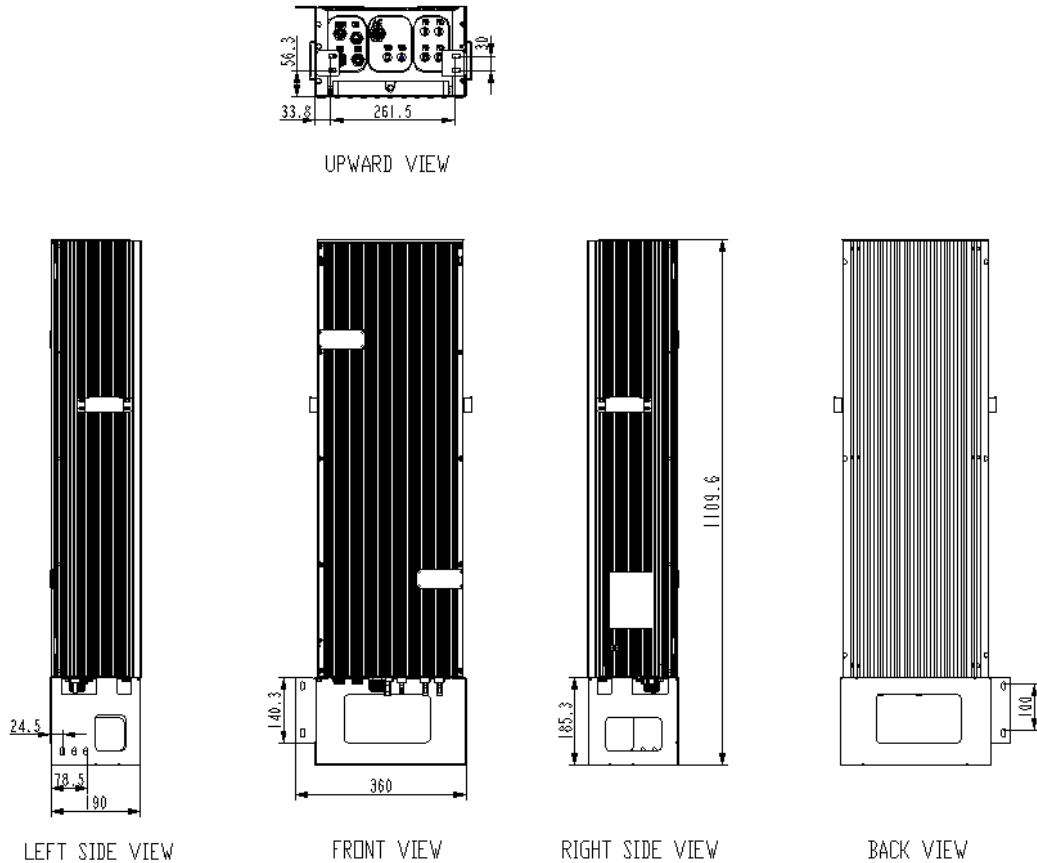
"." indicates a short flash, and "_" indicates a long flash.	
Digit	Code
0	----
1	·----
2	··---
3	···--
4	····-
5	·····
6	---···
7	---···
8	----·
9	-----·

5. Size and Holes

Maximum size: 307 mm X 204.5 mm X 1109 mm (D X W X H)

Weight: 45 kg

Hole sizes are shown in the following figure:



6. Transport, Storage and Installation

Transport

Load and unload the converter with caution to avoid deformation, break or other problems.

Storage

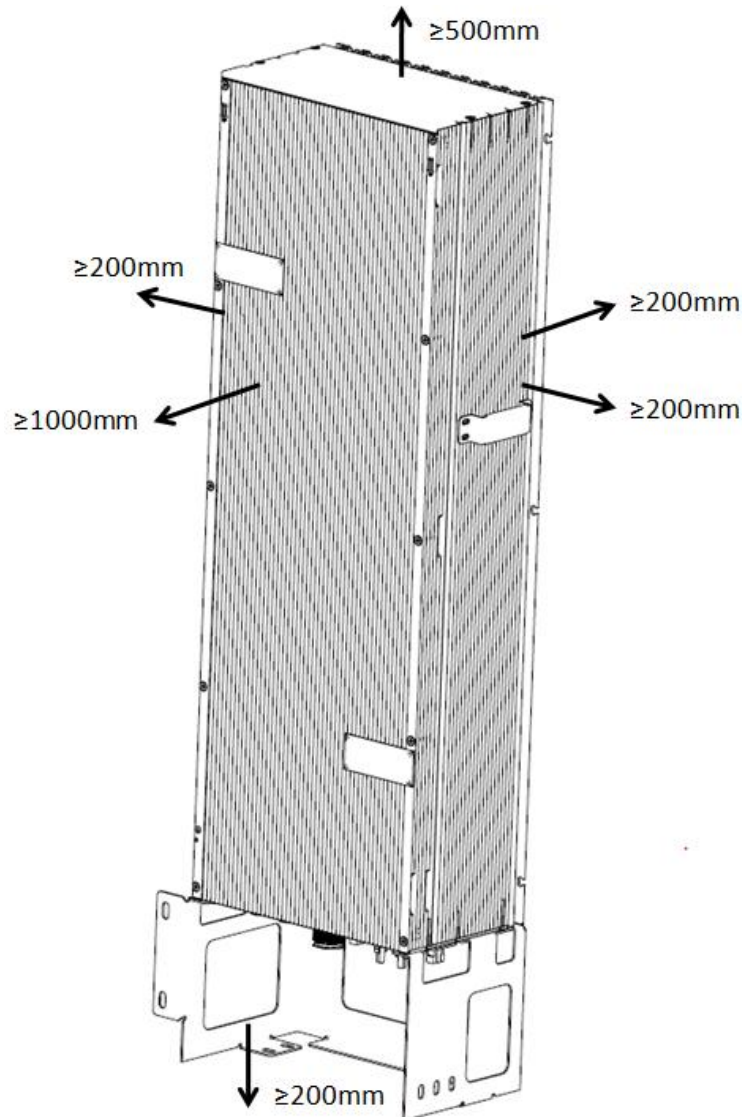
If the converter is not put into use immediately, store it following the requirements below:

1. Put the machine and accessories back into the box, seal the box with tape, and put the box in a clean and dry place to avoid dust and vapor entering the box.
2. Ensure that the storage place is free of hazardous gases, flammables/explosives, and corrosives. Keep the temperature in the range from -25°C to 60°C and relative humidity in the range from 0 to 95%.
3. After a long-term storage, invite a professional to test the converter before using it.

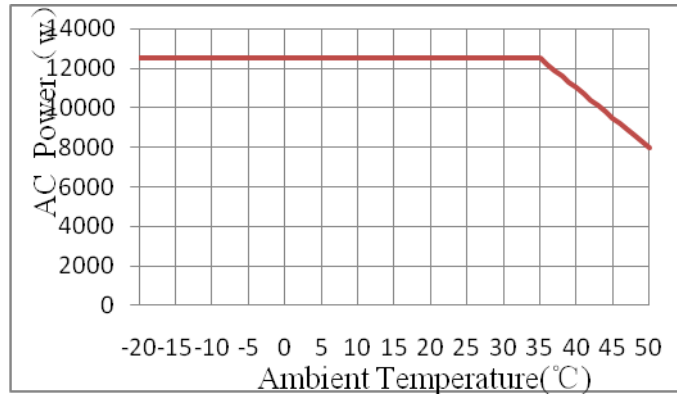
Installation

Installation precautions

1. Ensure that the installation position is firm enough to support the weight of the converter and force generated by external vibration.
2. Ensure that the installation position and height of the converter facilitate wiring, operation, and maintenance.



3. Do not install the converter on flammable wall or in space containing flammable gases and materials.
4. Keep the converter vertically installed to facilitate heat dissipation. Do not lay the converter horizontally, tilt or upside down.
5. The converter is rated IP54 and suitable for indoor and outdoor installation.
6. The installation altitude should not exceed 2000 m, with ambient temperature in the range of -25°C ~ 50°C . When the ambient temperature exceeds 35°C , the output power of the converter is reduced.

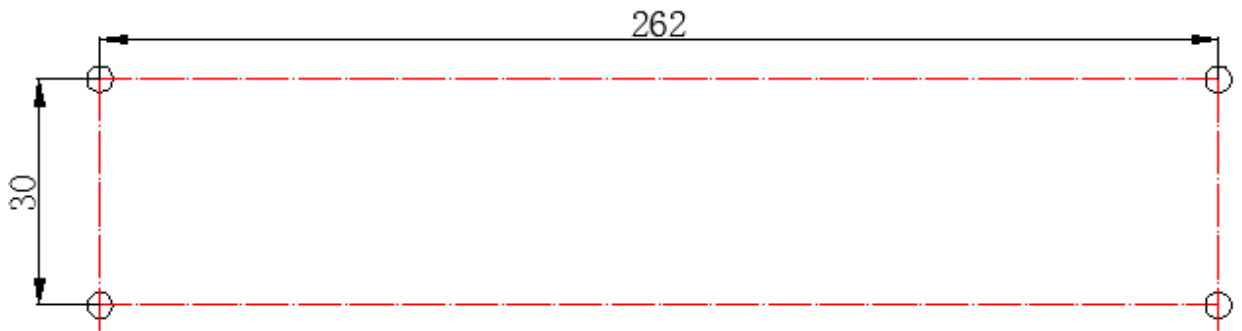


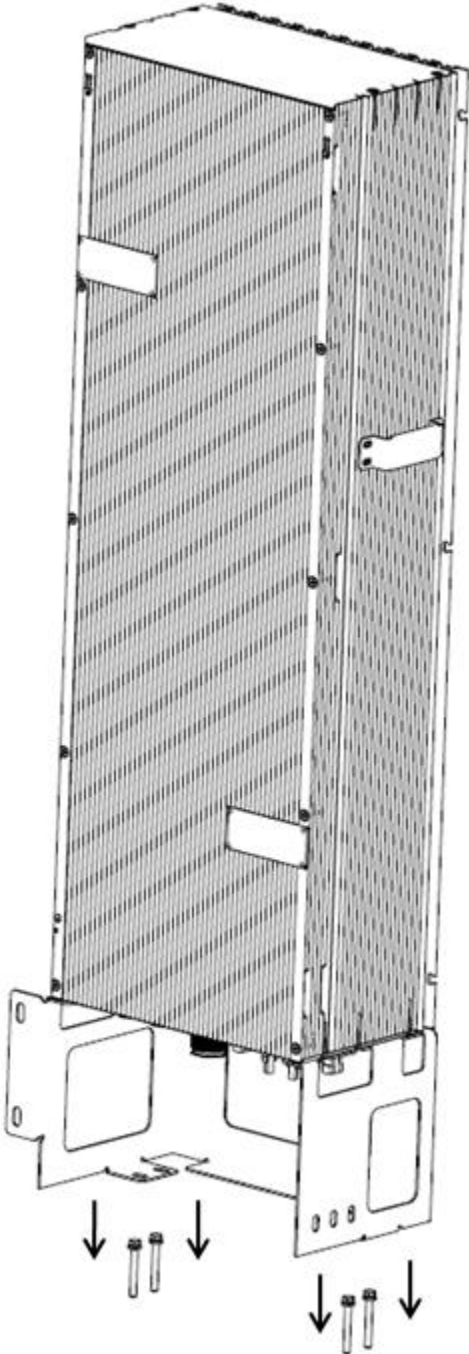
- 7. The relative humidity of the installation place should not exceed 95%; otherwise, vapor may corrode the converter and cause damage to internal components.
- 8. It is of vital importance to ensure good ventilation of the converter. Do not install the converter in a sealed box; otherwise, the converter fails to work properly or is damaged.
- 9. Exposure to sunlight, rain or snow directly affects the service life of converter. If such impacts are unavoidable, properly cover the converter to ensure optimal running state.

Installation(Upright)

If the converter installed on the flat roof, 4 bulgy bolts are needed M8*60.The user can use other suitable bulgy bolt in different specification.

Installation hole sizes(MM)





Bolt specifications

Screw Position	Specification	Screw Qty.	Torque
Mounting base bottom	M8*60	4	20N.m

The DC and AC output circuits are isolated from the enclosure and that system grounding, if required by Section 250 of the National Electrical Code, ANSI/NFPA 70, is the responsibility of the installer.
This unit is intended for operation in an environment having a maximum ambient temperature of 50 degrees C.

7. Wiring

Warning

1. All wiring steps must comply with electric standards of a country or region where the installation takes place.
2. Follow these rules: rules related to input power grid; safety instructions related to PV strings.
3. Converter connection with a grid must be licensed by local electric power department before qualified electric technicians implement wiring. Before the converter is connected to a grid, confirm that grid voltage and frequency are within the output range of the converter; otherwise, contact local grid company.
4. Remember that the converter uses bidirectional power supply mode. Technicians must take protective measures before wiring.
5. Cables must be connected firmly with intact appearance, proper insulation and proper specifications.
6. Do not add any load between the converter and a circuit breaker.
7. Though the PV input of the converter has been embedded with a protector, the converter must be equipped with proper DC circuit breakers or other external protectors.

CAUTION—Configure two-channel PV input for the converter. The maximum current of each channel is 14A. You are advised to select two 14A 1000VDC circuit breakers (complying with UL standard requirements) as external protectors. That is, each channel is allocated a protector.

Total circuit breaker capacity(A)	Recommended conductive wire(Sectional area mm ² quantity)
14x2	2.0x4

The current protection value recommended for each PV input is calculated based on the connection mode where 260W PV panels are connected in a way that 22 panels are connected in series to form a string and two strings are connected in parallel.

In other cases, the current of DC circuit breakers needs to be determined according to PV panel specifications and string methods selected for engineering installation. For details, consult related manufacturers.

8. Though the AC output of the converter has been embedded with a protector, the converter must be equipped with proper AC circuit breakers or other external protectors.

CAUTION—The maximum current for the AC output is 40A. You are advised to select a 40A 208V~240V AC circuit breaker (complying with UL standard requirements) as an external protector.

Total circuit breaker capacity(A)	Min. sectional area of grounding wire(mm ²)	Recommended conductive wire(Sectional area mm ² quantity)
40	6.0	6.0×4

The current protection value recommended for the AC output is the maximum value calculated based on the rated current. In other cases, the current is determined based on actual need.

9. **CAUTION**—The maximum current for the DC output is 25A. You are advised to select a 25A 1000VDC circuit breaker (complying with UL standard requirements) as an external protector.

Total circuit breaker capacity(A)	Min. sectional area of grounding wire(mm ²)	Recommended conductive wire(Sectional area mm ² quantity)
25	4.0	4.0×2

The current protection value recommended for the DC output is the maximum value calculated based on the rated current. In other cases, the current is determined based on actual need.

10. You are advised to use an external metal pipe protecting the communication cable connected to COM ports.

Installation Precautions:

Improper operation or failure to operate the converter as instructed may cause danger to users and result in major hardware damage, even property loss or personal injury. Please read this manual carefully before operation and observe the following safety instructions strictly.

Before operation, disconnect the converter from a grid, and avoid touching any terminal or conductor connected with the grid and PV input circuit. Any contact between the converter and grid may cause fire or electric shock.

Static discharge of internal components may result in irrevocable damage to the converter. When operating the converter, please strictly observe the ESD protection specifications.

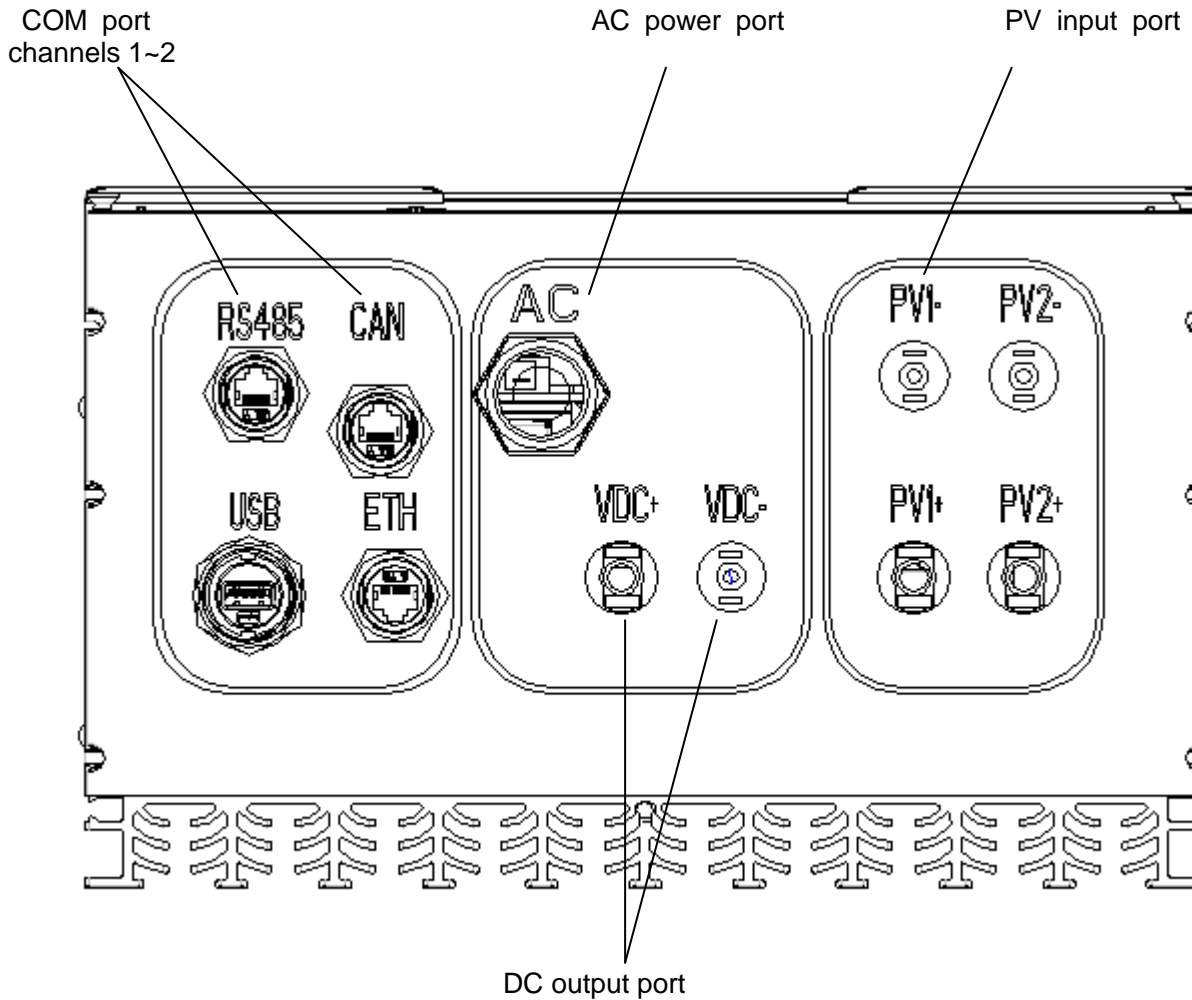
Electric shock and fire may cause a risk of leakage. Before PV and grid connection, ensure that the converter has been safely grounded.

To ensure that the converter can be safely disconnected when loaded, configure independent circuit breakers for each converter as their protectors.

Any operation on the converter must be carried out by qualified electric technicians.

The converter may be maintained only by professionals; PV input port channels 1~2. All safety instructions and precautions in the installation guide must be followed.

7.1 Converter Terminals



PV input ports:

PV1+ and PV1-: PV input port channel 1, connected according to positive and negative polarities, voltage: < 1000V DC

PV2+ and PV2-: PV input port channel 2, connected according to positive and negative polarities, voltage: < 1000V DC

VDC power output port:

VDC+ and VDC-: VDC power output port, connected according to positive and negative polarities, voltage: DC400V~780V

AC power port:

AC: AC port, three-phase AC power input and output, identified L1, L2, and L3. Power supplies support 208V, 240V, which can be selected by configuration.

COM ports:

RS485: Implements data exchange between the converter and energy monitors via Modbus-RTU. This port is optional.

CAN: CAN communication port, used for data exchange between multiple converters. This port is optional.

ETH: Ethernet communication port, used for data exchange between the converter and energy information management system G-IEMS. This port is optional.

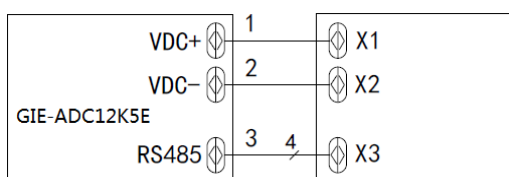
USB: USB disk port, used for commissioning the converter.

Converter Terminal Specifications

Terminal Type	Converter Terminal Socket			Match	Optional Wire Terminal Plug	
	Silkscreen Name	Code	Model		Code	Name
DC	PV1- PV2- VDC-	44040024	Mould case connector 2270040-2	Match	4404002401	Mould case connector 2-1971914-1
	PV1+ PV2+ VDC+	4404002403	Mould case connector 2270039-2		4404002402	Mould case connector 2-1971915-1
Communication	RS485 CAN ETH	430009060002	Socket RCP-5SPFFH-SCM70 01 (Waterproof RJ45)		430009060005	Socket RCP-00BMMS-SL M7001 (Waterproof RJ45 wire end)
	USB	430009060004	USB socket (SPAUA-20PMFP-CA P)		430009060004	USB socket cover (SPAUA-20PMFP -CAP)

7.2 Converter Output DC Bus Terminals

Terminal Type	Converter Terminal Socket			Match	Optional Wire Terminal Plug	
	Silkscreen Name	Code	Model		Code	Name
DC	VDC-	44040024	Mould case connector 2270040-2	Match	4404002401	Mould case connector 2-1971914-1
		4202018903	Terminal 1971858-4		4202018902	Terminal 1971857-4
	VDC+	4404002403	Mould case connector 2270039-2	Match	4404002402	Mould case connector 2-1971915-1
		4202018902	Terminal 1971857-4		4202018903	Terminal 1971858-4
Communication	RS485	430009060002	Socket RCP-5SPFFH-SCM7 001 (Waterproof RJ45)	Match	430009060005	Socket RCP-00BMMS-SL M7001 (Waterproof RJ45 wire end)



Output DC bus terminal DC electric device terminal

Circuit	Tightening torque (N•m)	Wire size(AWG)	Wire type	Wire Temperature rating
DC output	--	10AWG	Copper	90degC

The following table lists specifications of optional wires:

No.	End A (Converter Terminal)		Recommended Wire		End B (Electric Device Terminal)	
	Markings	Terminal	Color	Specification	Markings	Terminal
1	VDC+	Terminal 1971858-4 (Mould case connector 2-1971915-1)	Red	UL1032/AWG10	X1	Terminal 1971858-4 (Mould case connector 2-1971915-1)
2	VDC-	Terminal 1971857-4 (Mould case connector 2-1971914-1)	Black	UL1032/AWG10	X2	Terminal 1971857-4 (Mould case connector 2-1971914-1)
3	RS485	CK-8C8P connector-4 CK-8C8P connector-3 CK-8C8P connector-2 CK-8C8P connector-1	/	UL2464/AWG26	X3	CK-8C8P connector-4 CK-8C8P connector-3 CK-8C8P connector-2 CK-8C8P connector-1

Note: The RS485 cables connected with the DC electric devices are optional.

Communication wire assembly method:

1. Turn the protective cover counterclockwise to remove it.
2. If the COM port is unused, install back the protective cover to the converter.



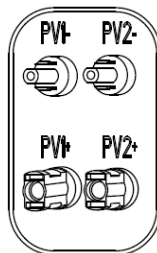
7.3 Converter PV Input Cable Connection

Warning

The positive and negative polarities of the PV string should not be grounded; otherwise, the converter will suffer a permanent damage.

In this PV power generation system, all unenergized metal parts and device cases should be grounded.

Terminals and cables must be matched.



PV Input Terminals

Terminal Type	Converter Terminal Socket			Match	Wire Terminal Plug	
	Silkscreen Name	Code	Model		Code	Name
DC	PV1- PV2-	44040024	Mould case connector 2270040-2	Match	4404002401	Mould case connector 2-1971914-1
		4202018903	Terminal 1971858-4		4202018902	Terminal 1971857-4
	PV1+ PV2+	4404002403	Mould case connector 2270039-2	Match	4404002402	Mould case connector 2-1971915-1
		4202018902	Terminal 1971857-4		4202018903	Terminal 1971858-4

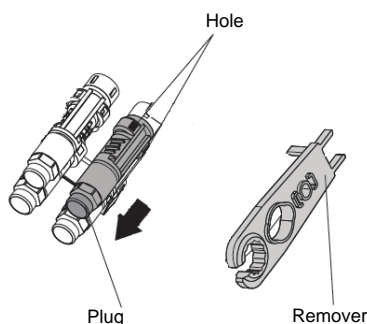
Recommended diameter of DC input cable: 5mm²/AWG10

Circuit	Tightening torque (N•m)	Wire size(AWG)	Wire type	Wire Temperature rating
PV Input	--	10AWG	Copper	90degC

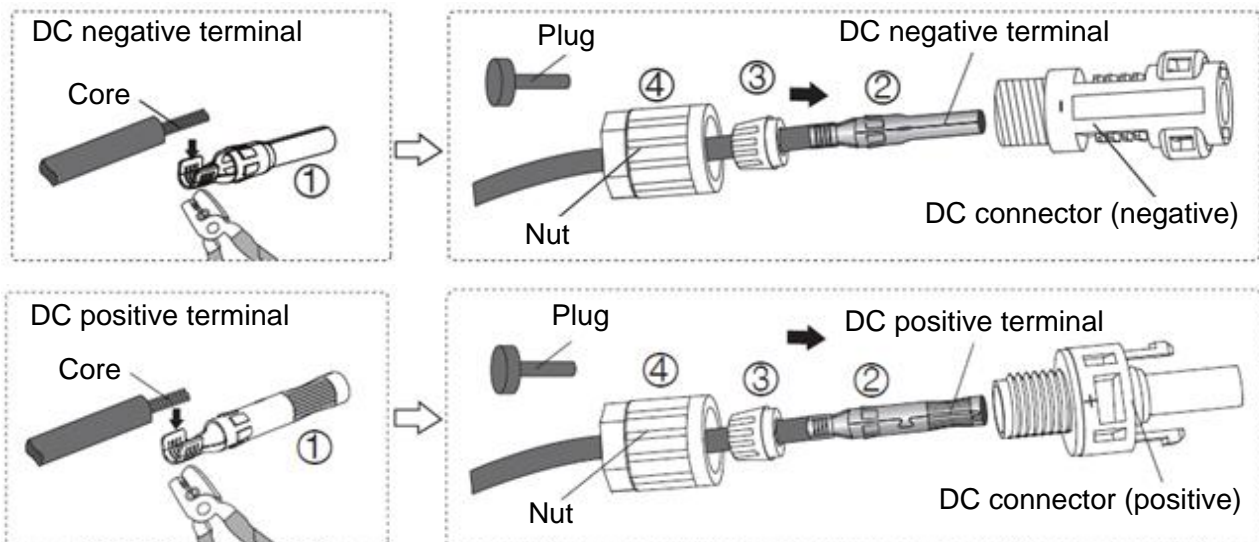
PV connectors are used for the connection.

DC Input Cable Assembly

1. Remove the DC connectors from the converter bottom, namely, the PV1+ and PV1- DC connector, PV2+ and PV2- DC connector. Specific operation is shown in the following figure. Insert a remover into the hole to pull a connector downward.

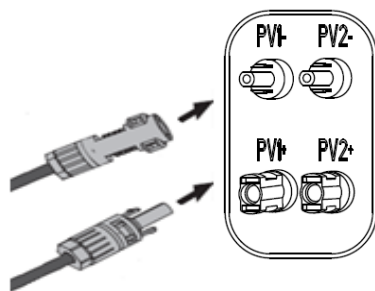


2. Loosen the nut on the DC connector, and take out the plug.
3. Peel 10 mm insulation layer from the DC cable.
4. Use a crimp to press the exposed cable core (about 10 mm) to the DC terminal (as shown in ①). Note that the shapes of the positive and negative metal terminals are different.
5. Penetrate the cable through the nut (as shown in ④ and ③). Since positive and negative terminals have different shapes, DC connectors vary accordingly. For details, see the following figures.
6. Install ② and ③ components into the DC connector in the direction of the arrow, and pull the cable outward gently to confirm that the terminal has been fixed into the connector.
7. Tighten the nut (as shown in ④), and pull the cable outward to confirm the connection again.



PV Terminal Connection with Converter

Insert PV input cables equipped with connectors into the PV- and PV+ terminals at the bottom of the converter accordingly.



PV Panel Installation Requirements

One converter can be configured with four PV inputs concurrently, provided that the PV panel configurations of the four inputs are consistent, including quantity, type, open circuit voltage, short circuit current, installation angle, and direction.

1. Connect multiple PV panels in serial mode, and ensure the sum of the open circuit voltage of the panels under proper light conditions does not exceed 1000VDC.
2. Connect the PV panels to the converter accordingly: connect positive to PV1+/PV2+ and negative to PV1-/PV2-.

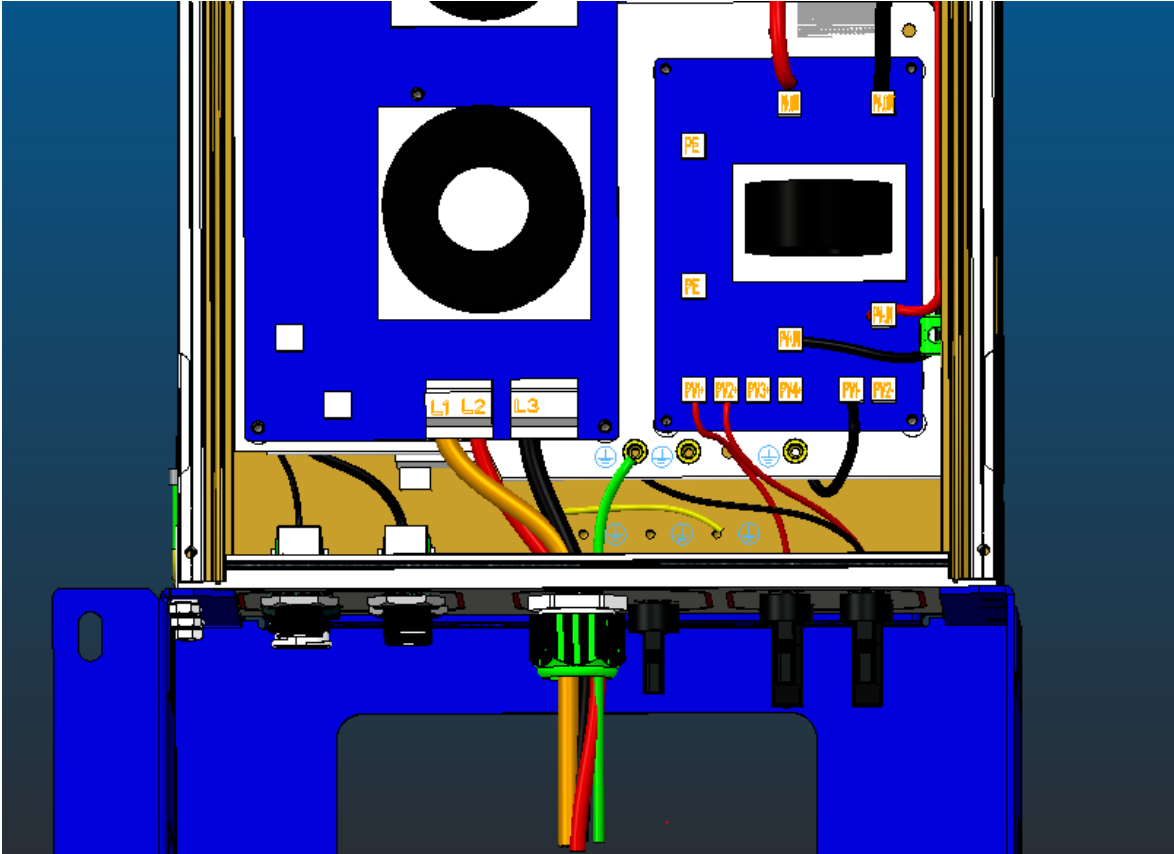
7.4 Converter AC Wiring

Converter and Grid Connection Method

Rated current: 40A, wire diameter: 8mm²/8AWG.

1. Loosen the nut on the AC output connector.
2. Penetrate the AC output cable through the nut and connector to the board.
3. The Tightening torque, allowable wire size, and type, for the Field-Wiring Terminals are provided below.

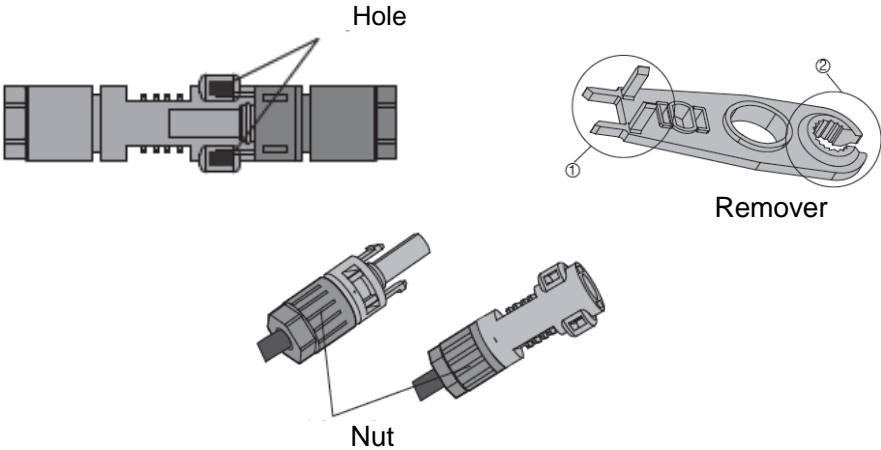
Circuit	Tightening torque (N•m)	Wire size(AWG)	Wire type	Wire Temperature rating
Grid	4.5	8 AWG	Copper	90degC



8. Remover Operation Method

If the converter needs disassembly or maintenance, insert a remover (as shown in ①) into a hole to remove the connector.

If a DC connector needs disassembly, use a remover (as shown in ②) to tighten or loosen a nut.



Keep the remover safe for use in future.

9. Inspection and Test Operation

Before test operation, check the following items:



- 1. Converter position facilitates operation and maintenance.
- 2. The converter is firmly installed.

3. Ventilation is proper.
4. No foreign object is left on the converter.
5. The converter is correctly connected with accessories.
6. Cables are correctly selected and distributed, and well protected.
7. The AC circuit breakers and PV string are properly selected.
8. The converter is reliably grounded.
9. Unused terminals at the bottom of the converter are sealed.
10. The rated power of the PV string does not exceed that of the converter. Before startup, the PV string voltage does not exceed 1000VDC.

Test Operation

1. Ensure that preceding items meet the requirements.
2. Close the AC circuit breakers.
3. Assume that there is sufficient light and grid conditions meet requirements, initialize the PV array so that it starts to supply power. When the converter changes to running state, it works properly.

10. Product Models and Technical Specifications

 G-IEMS	Intelligent Converter GIE-ADC12K5E
Max. PV Input Voltage(OC)	1000VDC
Isc PV	39A
Max. continuous input current	2*14A
Max. PV Input Power	14kW
MPPT Range	400V—780V
Max. DC continuous output current	25A
Rated DC output Current	25A
DC output Voltage	400V—780V
Rated AC Voltage	208 / 240Vac 3~ + PE
Rated Frequency	60Hz
Rated AC Power	12.5kW
Rated AC Current	35A*3 / 30A*3
Power factor	-0.8~0.8
Ambient Temperature	-20°C—50°C
Ingress Protection	TYPE 3
Certifications	UL 1741 IEEE 1547
Note: The product can work in different modes by configuring Grid voltage.	
	
Manufacturer: GREE Energetic & Environmental Technologies Co., Ltd. of Zhuhai	Made in China

Implementation standards: UL 1741 and IEEE 1547.

In case of any change in performance parameters, the data on the nameplate prevails.

ELECTRICAL RATING

Other ratings	
Max. output fault current (A) / duration (ms)	151.2A rms / 406.8 peak /1.348 ms
Max. utility backfeed current to PV array (A)	0
Line Synchronization Characteristics /In-rush current	Method 2
Limits of accuracy of voltage measurement	1 %
Limits of accuracy of frequency measurement	+/- 0.1 Hz
Limits of accuracy of time measurement	+/- 0.1 % at nominal trip time
Maximum Air Ambient (°C)	50
Enclosure Ratings	UL Type 3
Shipping temperature range	-20 ° C to +60 ° C
Operating Temperature range	-20 to +50

INTERCONNECTION INTEGRITY TEST CATEGORIES:	
C62.42.2 Ring Wave Surge Category	B
C62.42.2 Combination Wave Surge Category	B
C37.90.1 RF Immunity - compliance	Yes
C37.90.2 Communication circuit - compliance	Yes

Utility interconnection voltage trip limits and trip times	208 V		240 V	
	Magnitude	Max Time	Magnitude	Max Time
Overvoltage/Fast (120%)	249.6V	0.16 Sec	288.0V	0.16 Sec
Overvoltage/Slow (110%)	228.8V	1 Sec	264.0V	1 Sec
Undervoltage/Slow (88%)	183.0V	2 Sec	211.2V	2 Sec
Undervoltage/Fast (50%)	104.0V	0.16 Sec	120.0V	0.16 Sec
Utility interconnection frequency trip limits and trip times				
High	60.5Hz	0.16 Sec	60.5Hz	0.16 Sec
Low	59.3Hz	0.16 Sec	59.3Hz	0.16 Sec

11. PV System Installation Project

A PV system installation project consists of PV rack and PV cell component installation, cable laying, and power distribution device installation. You are advised to follow the steps below.

PV racks and components must be accepted by the buyer and a professional supervision unit before they can be installed. During construction, avoid any sharp object scratching the aluminum surface or galvanized layer of the racks.

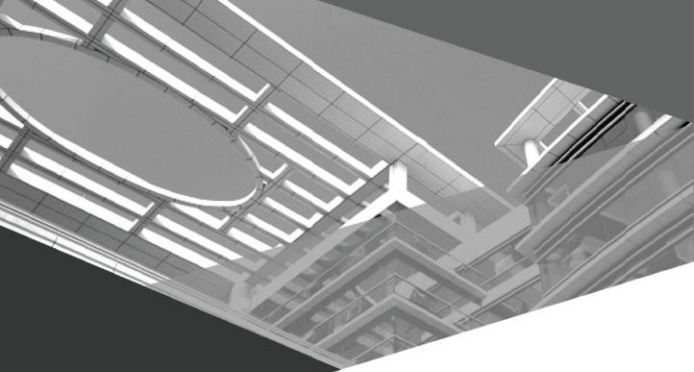
The installation procedure must be carried out in order. The conversion bracket (for connecting with the roof board), main joist, and auxiliary joist (if required) are placed separately and lifted in a unified manner. Material amount of each row is calculated based on the number of PV components in corresponding row, including amount of bolts and other accessories. Fix the conversion bracket onto the roof board at the vertical lock side, fix the main joist and auxiliary joist (if required) onto the bracket, and then connect different parts using bolts. The bolts are tightened manually first, and then fixed using a mechanic or electric wrench. Meanwhile, use a nylon line to inspect and adjust its straightness. Clear off package wastes on site after the installation is complete.

PV cell components cannot be used until they are accepted by the responsible department of the buyer. During transport, load and unload the converter with caution to avoid collision. The PV components are placed on the joists. Pressure must be proper enough so that the PV components and brackets can resist against wind and vibration and that glass is kept undamaged. The PV components must be laid neatly, with the wiring boxes on the upper surface.

Cables are laid from far to near. If transport distance is short, cables are rolled with a shaft generally. The cable lead-out end should be located on the upper part of the shaft. Ground friction must be minimized during traction. Before the laying, install cable trays. Each cable must be pulled straight without any twisting or knotting. Cables must be encased in steel tubes before they can pass through roads. Tube openings must be deburred to avoid the cables being cut if they are dragged.

Cable diameter and models must be confirmed area by area based on the drawing. Before the laying, use an ohmmeter to measure the insulation resistance and check whether the resistance is within the stipulated range. In the position where cables get out of the PV components, add HDPE plastic tubes to protect the cables.

Disclaimer-The power data provided by the Intelligent Converter is for reference only. If you need to conduct electricity trading, please refer to the data provided by the local electric power company's approved meter equipment.



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