User Manual

TRI010KTL/TRI012KTL/TRI017KTL/TRI020KTL

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Copyright Declaration

1. Introduction

1.1. Introduction

This manual describes Trannergy solar inverters TRI010KTL/ 012KTL/ 017KTL/ 020KTL. These products are among the most technologically advanced and efficient inverters on the market and are designed to ensure a stable power supply for many years.

The TRI inverter is a transformerless based inverter.

1.2. How to Use this manual

Please read the safety instructions in this manual first. Throughout the manual it is assumed that the reader is familiar with AC and DC installations and knows the rules and regulations for electrical equipment and for connecting it to the utility AC grid. It is especially important to be familiar with the general safety rules for working with electrical equipment.

1.3. Applied Designations (Warning, Caution, Note)

Throughout the manual important information is shown at different levels depending on the character of the information, as shown here:

Safety information important for human safety. Violation of warnings may result in injury to persons or death.

Information important for the protection of property. Violation of this type of information may cause damage and loss of property.

Useful additional information or “Tips and Tricks" on specific subjects.

1.4. Important Safety Information

Read this before installing, operating or maintaining the inverter.

Before installation:

Check for damage to inverter and packaging. If you are in doubt, please contact your supplier before installing the inverter. Check

the voltages of the solar modules and make sure they are within the limits of the Trannergy inverter specifications before connecting them to the inverter.

Installation:

Only trained and authorized personnel familiar with local electrical codes may install the inverter. For optimum safety, please follow the steps described in this manual. Keep in mind that the inverter has two voltage carrying sides, the PV input and the AC grid.

Disconnecting the inverter:

Always disconnect the AC line first! Afterwards disconnect the PV lines. Note that the inverter can still be charged with very high voltages at hazardous levels even when it is disconnected from grid/mains and solar modules. Wait at least 15 min. before proceeding, after having disconnected from grid and PV panels.

operating the inverter:

Before connecting the AC grid to the inverter, make sure that the installation cover is mounted again. The inverter must not be open during operation.

Maintenance and modification:

Only authorized personnel are allowed to repair or modify the inverter. To ensure optimum safety for user and environment, only the original spare parts available from your supplier should be used.

Functional safety parameters:

Unauthorized changes of functional safety parameters may cause injury or accidents to people or inverter. Additionally it will lead to the cancelling of all inverter operating approval certificates. The Trannergy inverters in the TRI range are all designed according to international safety requirements.

If non-original spare parts are used, the compliance with CE guidelines in respect of electrical safety, EMC and machine safety is not guaranteed.

1.5. General Safety Rules for Working on Electrical Equipment

All persons installing, maintaining or servicing inverters should be trained in and have experience with the general safety rules to be observed when working on electrical equipment.

Installation and service personnel should also be familiar with local requirements, rules and regulations as well as safety requirements.

To provide a general guideline for safety precautions, five well-known and widely accepted rules are repeated below. The list should by no means be considered as exhaustive.

The person performing work on electrical equipment is responsible for the safety of persons and property!

Disconnecting

Disconnect all cables supplying voltage to the working place before starting any work. Please note that a lack of voltage is no guarantee that disconnection has been performed.

Protecting against reconnection

Prevent the system from reconnecting by marking, closing or locking off the work area. Unintentional reconnection may result in severe accidents.

Checking that system is voltage free

Ascertain conclusively by means of a voltage tester that the system is voltage free. Check all terminals to ensure that the system is voltage free (on each individual conductor).

Covering adjacent voltage-carrying components and preventing persons from gaining access to them

Cover up all voltage-carrying system components that can harm you while working. Make sure that danger areas are clearly marked.

1.6. System Sizing

When dimensioning a photovoltaic system, it must be ensured that the open circuit voltage of the PV string never exceeds the maximum permissible input voltage of 1000V DC. The PV string open circuit voltage during parallel string operation is 900V. Higher voltages may result in permanent damage to the inverter.

The selection of PV string output should be based on the optimum utilization of the invested capital compared to the expected annual energy yield from the system. This optimization depends on local weather conditions and should be considered in each individual case.

The inverter incorporates an input power limiting device, which automatically keeps the power at levels that are safe for the inverter. The limitation depends mainly on internal and ambient temperatures. The limitation is calculated continuously and always allows the maximum possible amount of energy to be produced.

Please use the tool supplied by Trannergy when dimensioning a photovoltaic system.

2. Technical Description of Inverters

2.1. Mechanical design

Figure 2-1 shows the outline dimensions of TRI010KTL/012KTL/017KTL /020KTL:

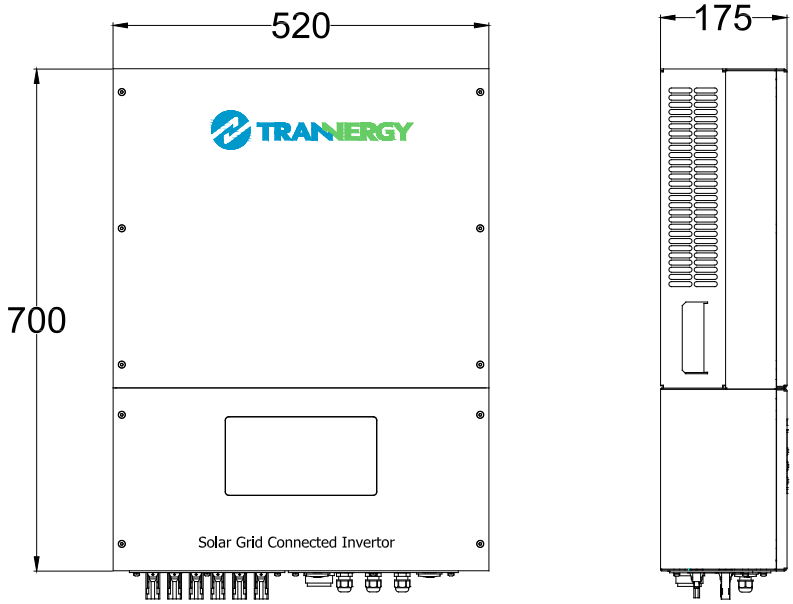


Figure 2-1 Outline dimensions of TRI010KTL/012KTL/017KTL/020KTL

> The AC output terminal is most length part at the bottom of inverter, so take care of the AC output terminals, do not make it stand on the ground or other materials while moving or lifting the inverters otherwise will make terminal damaged.

Figure 2-2 shows the electrical terminals of TRI010KTL:

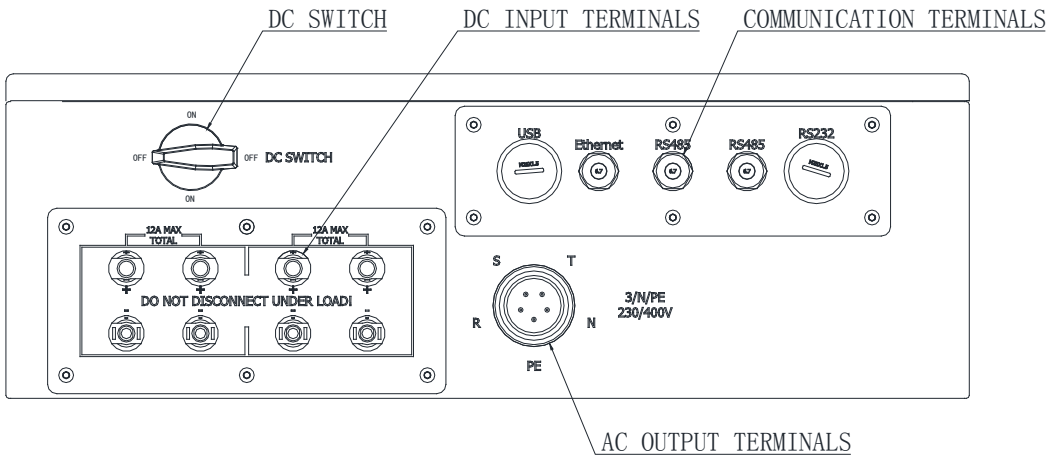


Figure 2-2 Electrical Terminals of TRI010KTL

Figure 2-3 shows the electrical terminals of TRI012KTL:

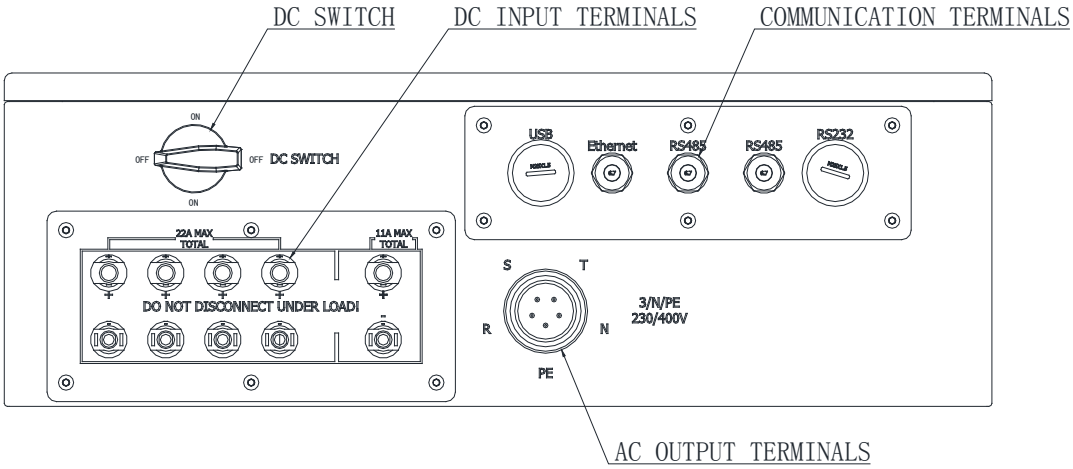


Figure 2-3 Electrical Terminals of TRI012KTL

Figure 2-4 shows the electrical terminals of TRI017KTL/020KTL:

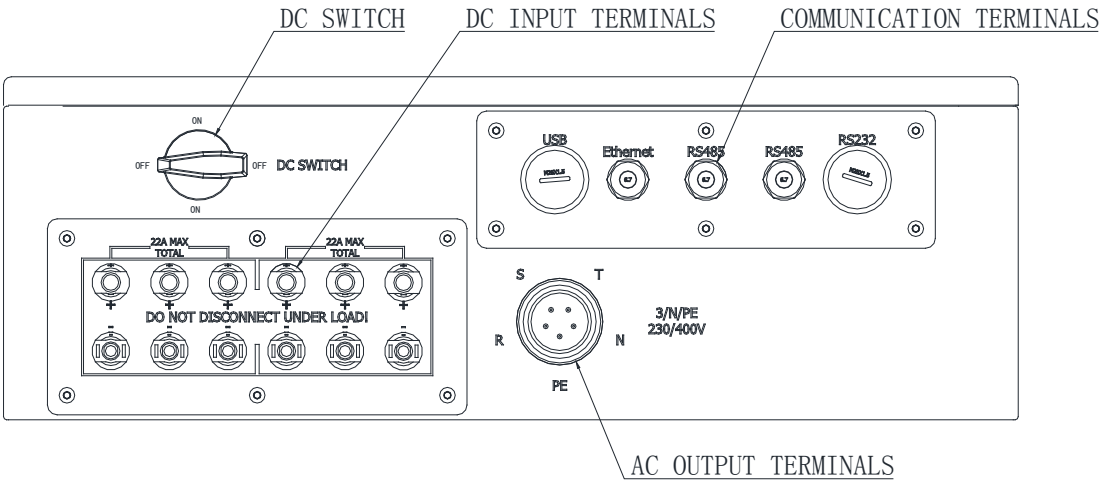


Figure 2-4 Electrical Terminals of TRI017KTL/020KTL

For safety reasons, the use of a DC switch is recommended. Between the PV modules and the power modules may be mandatory in some countries.

2.2. Electrical system design

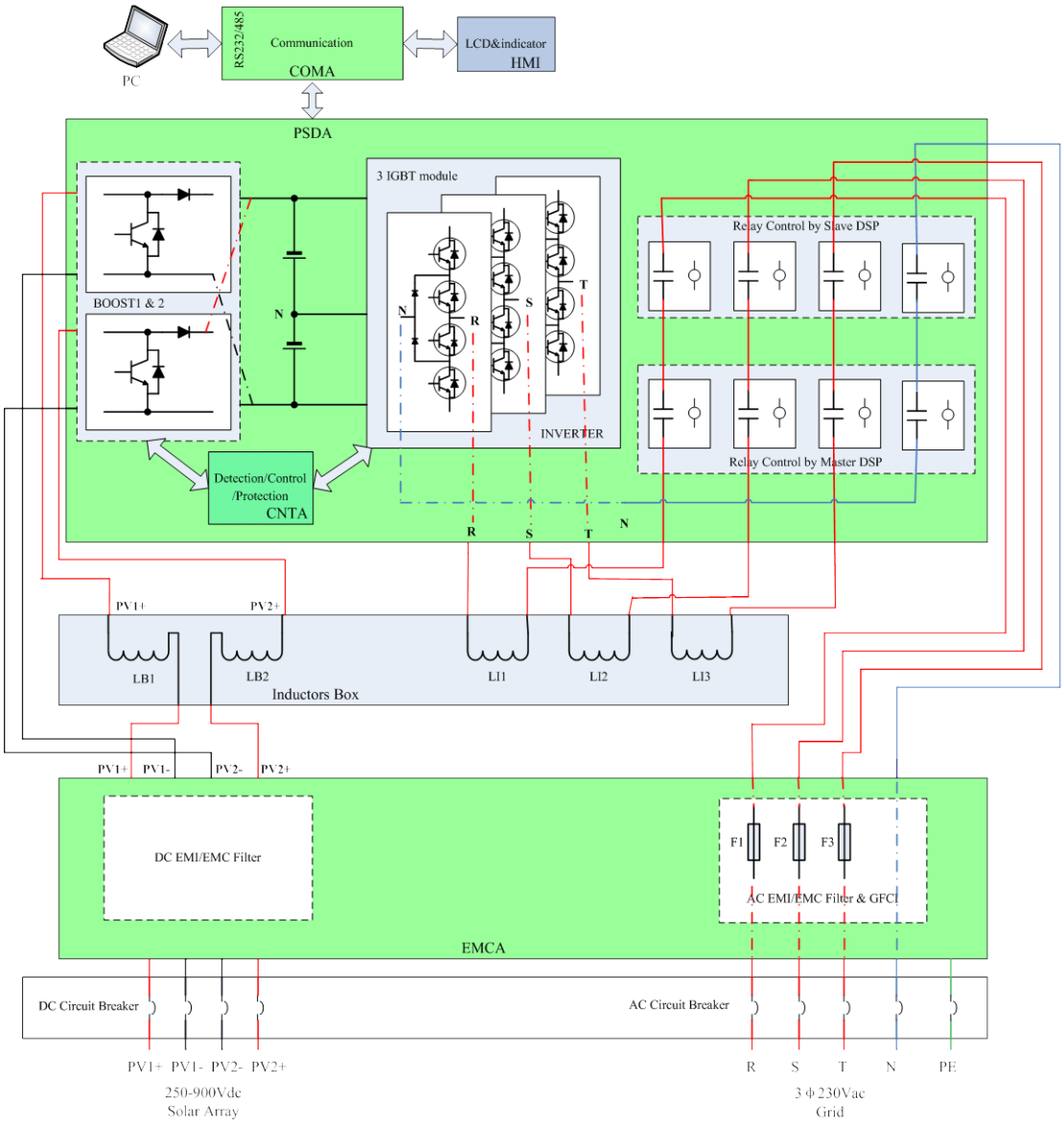


Figure 2-5 wiring diagram of the whole TRI010KTL/012KTL/017KTL/020KTL system

Please refer to chapter 4 for the detail connecting and install methods.

2.3. The illustration of derating and limit the input power

To avoid inverter to be damaged by over temperature or over current.

- Not output power when the temperature of power devices is over 85℃ or the ambient temperature is over 73℃.
- Derate the output power linearly when the temperature of power devices is between 81-85℃ or the ambient temperature is between 65-73℃.

3. Operation mode illustration of the inverter

Our inverter has five operation modes during the whole work process; they are wait, check, normal, fault and flash modes. Its detail illustration is shown by Figure 3-1 below.

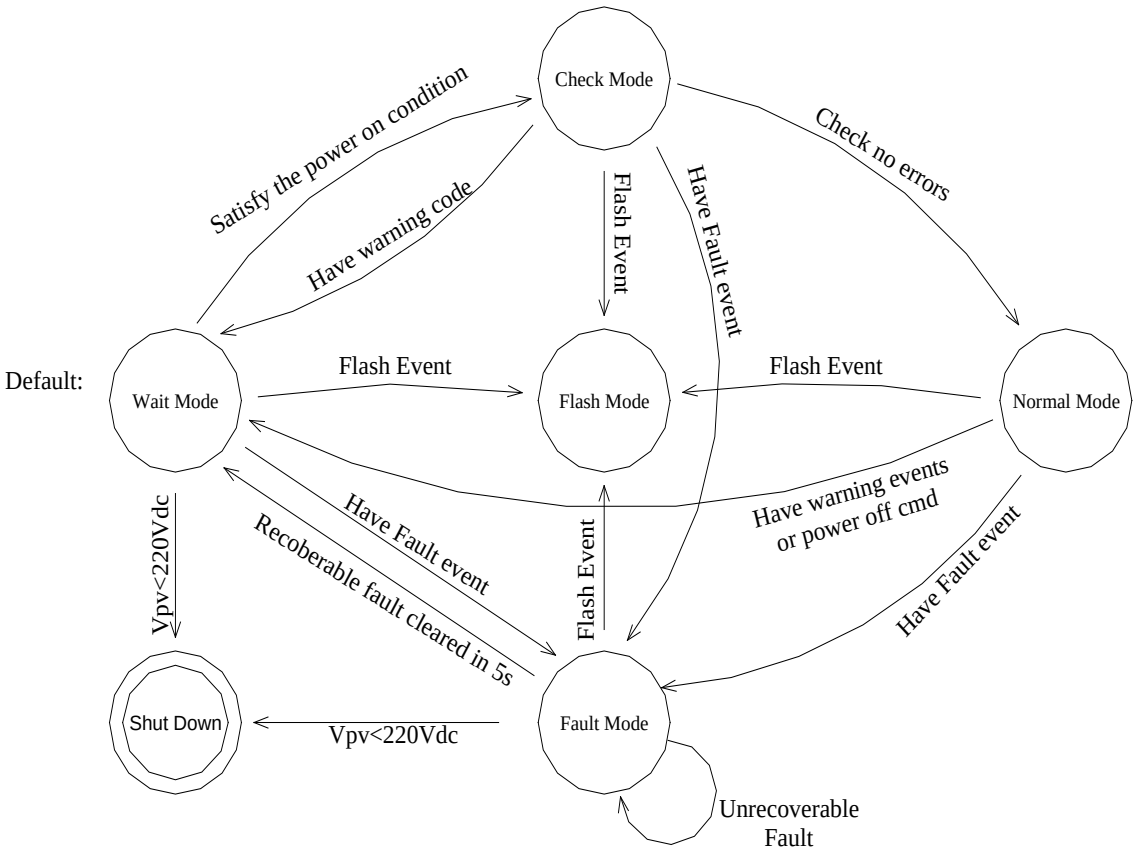


Figure 3-1 State Machine of Inverter working mode

3.1. Wait mode

When the input power by solar panel is not enough to let the power module work, it is at waiting mode. The inverter will wait until the input voltage is above 250Vdc and below 910Vdc, it turn to check mode.

3.2. Check mode

When the inverter is power on, it will check isolation, HCT device, GFCI device, relay, fan, and soft start automatically in order. This can guarantee the inverter work normally and turn to normal operation mode.

3.3. Normal mode

When the conditions above are satisfied, inverter will let the BOOST and inverter module work and turn to normal generating power mode. It will change the solar energy into electrical energy and fed it into grid based on advanced MPPT technology in order to absorb solar energy in maximum extent possible. It will also calculate the generated energy per day/per month/per year automatically, save the number in EEPROM and the number can be read from the HMI.

3.4. Fault mode

When there are fault during the inverter running, it will stop generating power and turn to fault mode and display the fault information on LCD. Before do this, it will store the generated power number into EEPROM automatically. Many not very serious fault will be cleared after 5s automatically and retry to run. If the serious fault generated, it will stay in the fault mode until the technical staff to solve the problem.

3.5. Flash mode

Regardless the inverter running in which mode above, when there is the flash command, it will turn into flash mode and rewrite the firmware in DSP flash.

3.6. Shut down

When the PV input voltage less than 220Vdc, the PV panel can’t provide energy enough, so the inverter shut down automatically. When next day come, with the irradiance increasing, it will run again smoothly if there are no fault occurrence.

4. Installation and startup

4.1. Installation precaution

Warning !

Before installation and maintenance, AC and DC side doesn't carry electricity, but if DC side is just disconnected, capacitance still contains electricity, so please wait for at least 5 minutes to ensure the capacitors completely release the energy and inverter is not electrified.

Note !

Inverters must be installed by qualified person.

Trannergy assures the product guarantee of the TRI series inverters during five years after your purchase, if the installation site does not meet the instructions described in this manual, it is out of warranty. The warranty is limited to the costs of repair and/or replacement of the product by Trannergy only.

Ventilation is very important to cool the inverter. For outdoors application, the inverter requires at least 500mm of clearance among the other units and 300mm of the ground or the roof. See Figure 4-1:

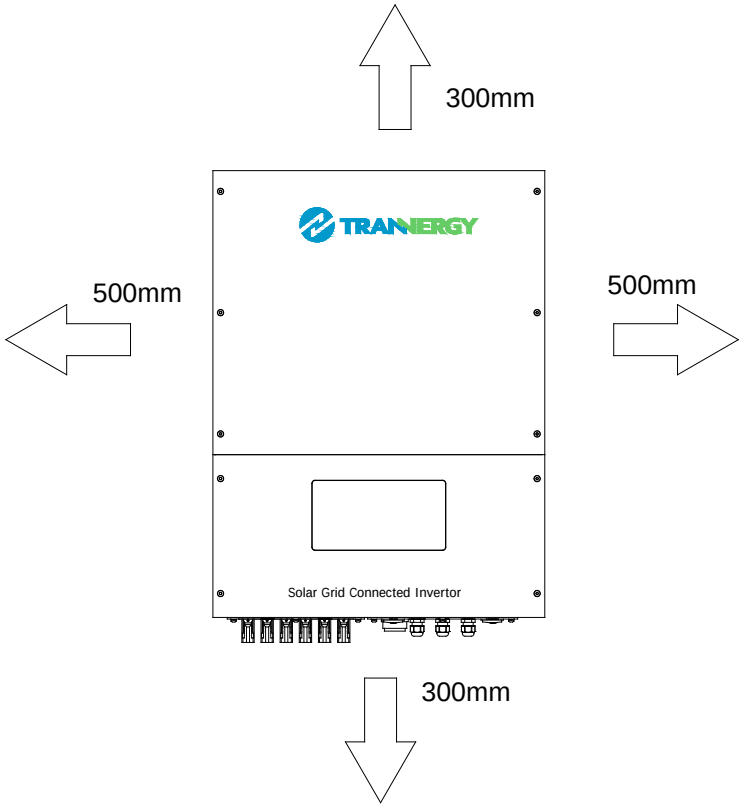


Figure 4-1 Distance required of Invertors

4.2. Install steps

Setp1: Drill six Ø12 holes in the wall according to the dimensions shows in Figure 4-2:

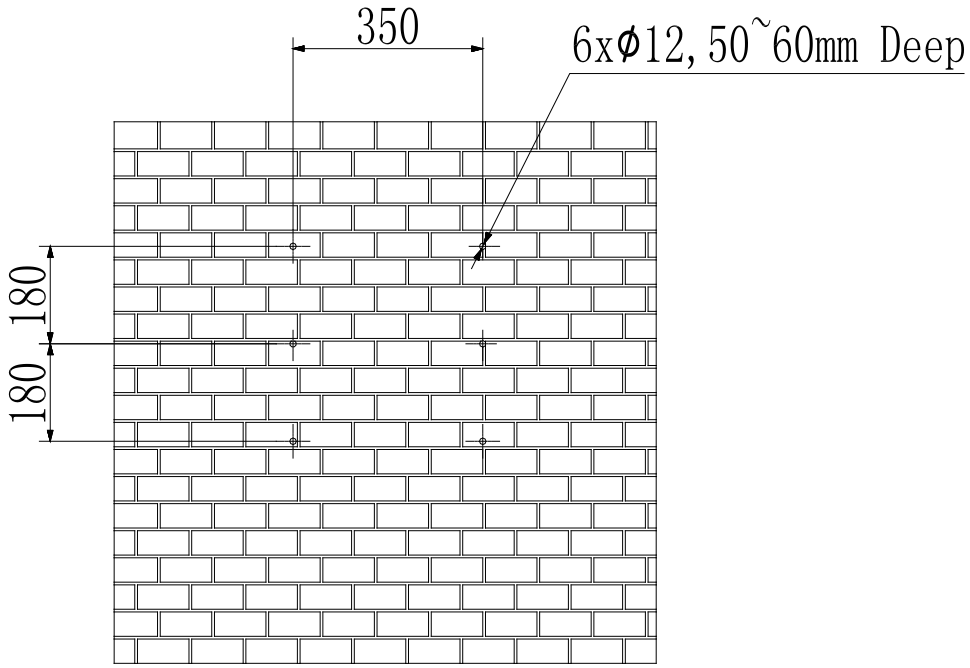


Figure 4-2 Dimensions of drilling holes

Note!

Keep drilling vertical to the wall, and don't shake when drilling to avoid damage to the wall. It need repositioning and drilling holes if the hole with much error.

Step2: Put the expansion pipe showing in Figure 4-3 into the hole vertically, use hammer to tap the pipe into the wall completely.

Figure 4-3 Expansion tube

Step3: Put the mounting panel on the wall and twist the M8x50 screws into the expansion tube to fix the mounting panel.

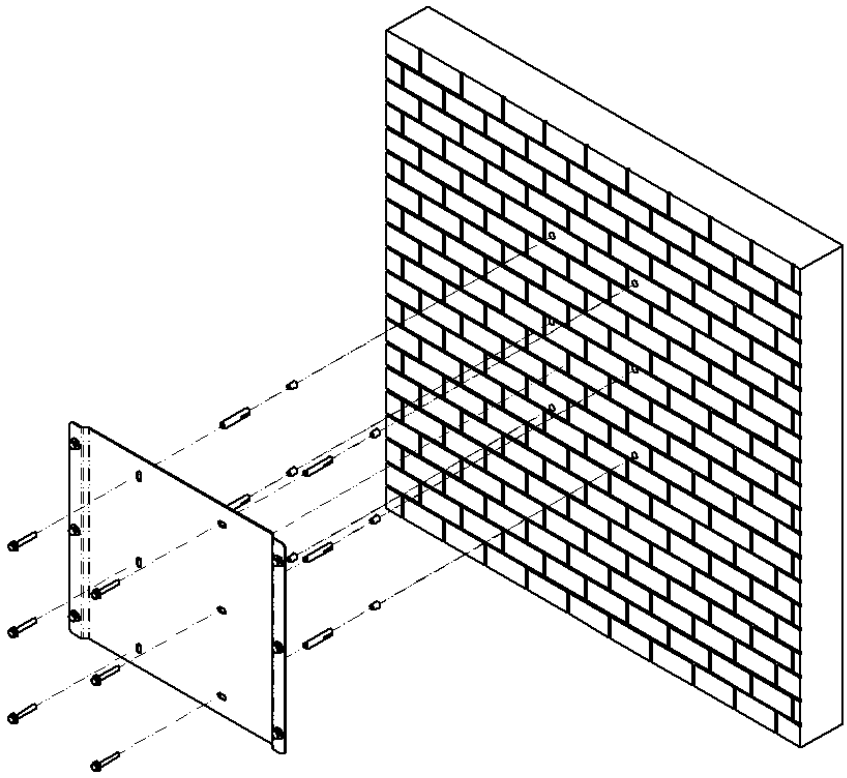


Figure 4-4 Install the mounting panel

Setp4: Hung the inverter on to the mounting panel:

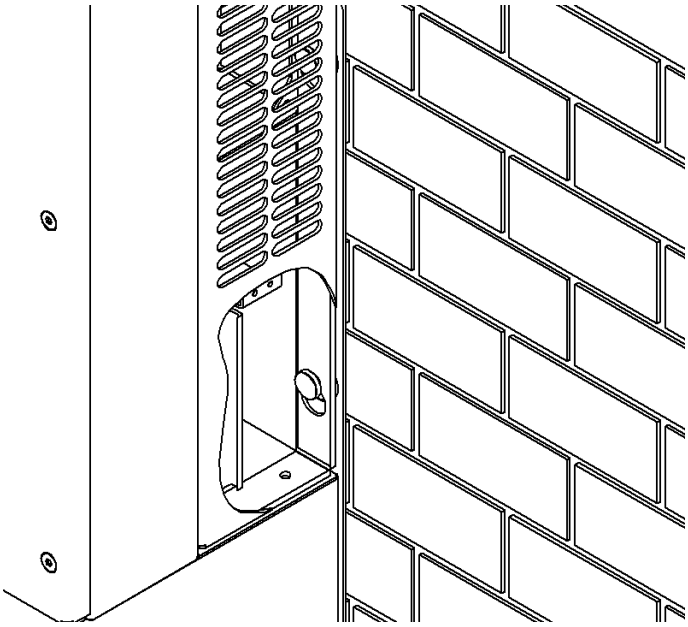


Figure 4-5 Hung the inverter

4.3. Electrical connection

4.3.1. Connection to the grid (AC output)

Attention

Safeguard each inverter with an individual manual AC breaker in order that inverter can be safely disconnected under load when installation & maintenance

Connection Procedure:

Step1: Switch off the AC breaker secure against being switched back on inadvertently.

Step2: strip the cable as the following figure：

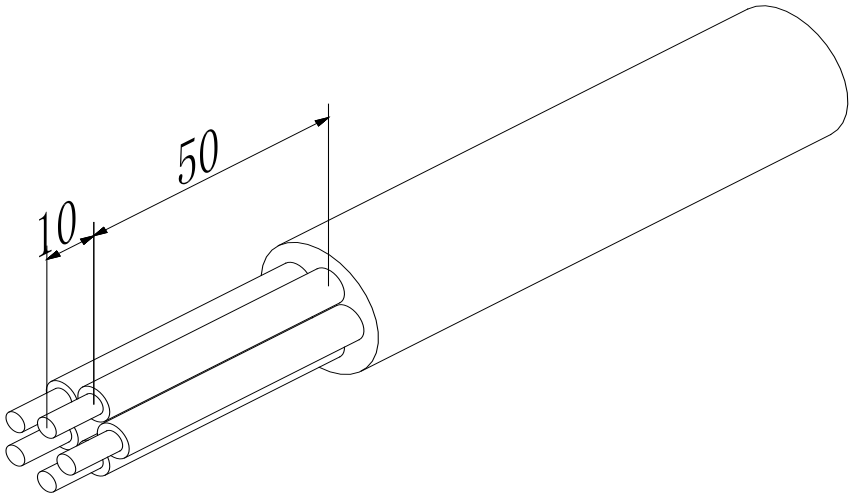


Figure 4-6

Step3: AC female connector includes the following components:

Figure 4-7

Step4: Put the wires through Screw Cap, Adapter Body of the AC female connector:

Figure 4-8

Connect the cables according to the following pictures:

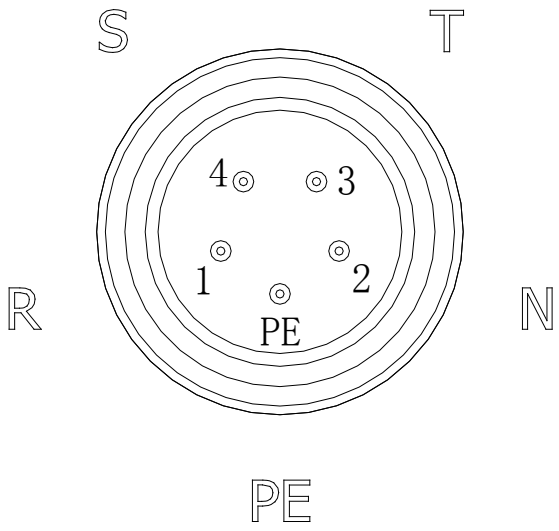


Figure 4-9

Attention!

Please ensure the corresponding relationship between polarities the core cable and the hole of the terminal is correct.

Step5: Screw these components tightly after connecting the wires:

Figure 4-10

Step6: Connect AC female terminal to AC male terminal on inverter and then screw them together.

4.3.2. Connection to PV generator (DC input)

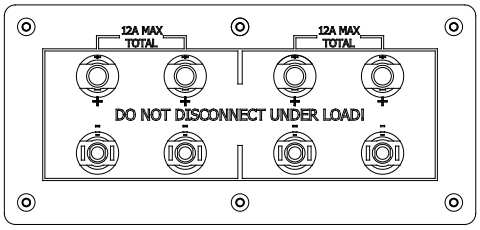
Attention!

Safeguard each inverter with an individual manual DC breaker in order that inverter can be safely disconnected under load when installation & maintenance. The breaker should have certain capacity of over current and over voltage. In addition, before cutting off the DC end connection. Please cut off the AC end connection at first.

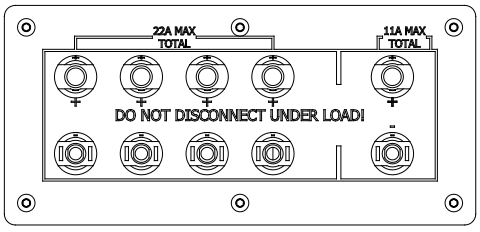
There are two MPPT trackers (A & B route) provided by the TRI010KTL/012KTL/017KTL/020KTL, and each MPPT tracker provides multiple DC input interface. Numbers of DC input interface for each route are shown as below.

	TRI010KTL		TRI012KTL		TRI017KTL		TRI020KTL	
	MPPT (A)	MPPT (B)	MPPT (A)	MPPT (A)	MPPT (B)	MPPT (B)	MPPT (A)	MPPT (B)
Maximum input current	12A	12A	22A	11A	22A	22A	22A	22A
Numbers of DC input connecter	2	2	4	1	3	3	3	3

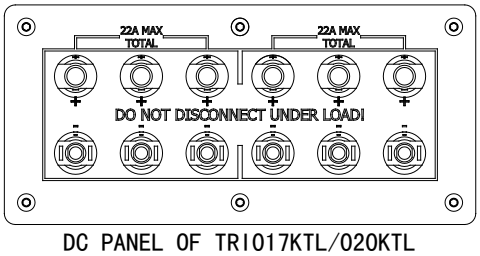
Before connecting PV modules to Trannergy, please make sure the polarity of the DC input connectors is correct.



DC PANEL OF TRI010KTL



DC PANEL OF TRI012KTL



DC PANEL OF TRI017KTL/020KTL

Figure 4-11

Attention!

Connectors must not be connected or disconnected under load!

Helios H4 components come pre-assembled and the caps are loose. And the whole connector will include the male side and female side.

Figure 4-12

Step1: Assembly Instruction for the male side and female side connector:

- Strip cable .276 inches (9/32”) - (7mm) and be careful NOT to nick conductors.

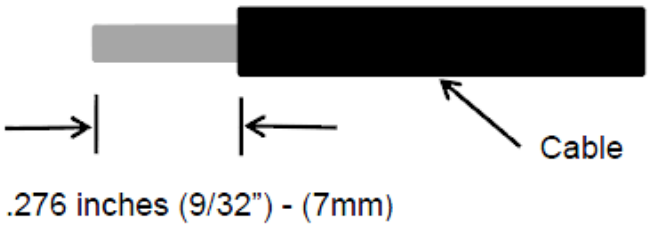


Figure 4-13

- Amphenol specified strip tool can be used in this step. Adjust the striper stopper and put the cable in corresponding notch to strip the length of 7mm. See below figures.

Figure 4-14

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

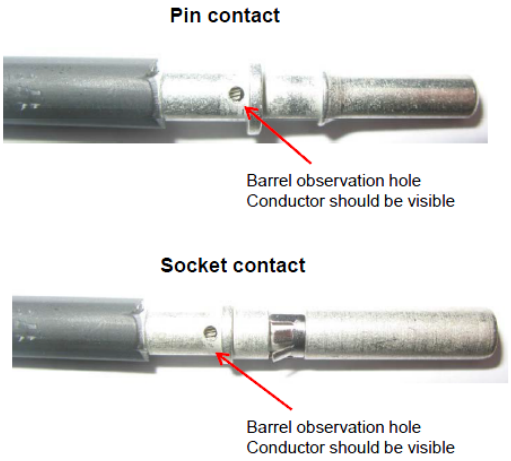


Figure 4-15

- Crimp contact barrel by using the hex crimping die. See below figures

Cable size	Cable pull – out force requirement
2.5 mm²	Min. 310 N (70 Lbs)
4 mm²	Min. 400 N (90 Lbs)
6 mm²	Min. 450 N (100 Lbs)

Figure 4-16

- Amphenol specified crimping tool can be used in this step. Put the contact barrel with striped cable in the corresponding crimping notch and crimp the contact. See below figures.

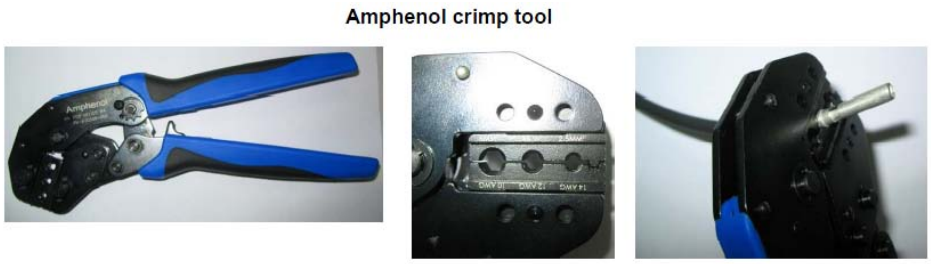


Figure 4-17

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

PV-090508-F – Female side Connector

PV-090508-M – Male side Connector

Figure 4-18

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

Amphenol specified wrench tool can be used in this step. Here 2 wrench tools are used, one is by hand for holding the connector, another is also by hand to wrest the cap down until the tool starts to snap over. See below figures.

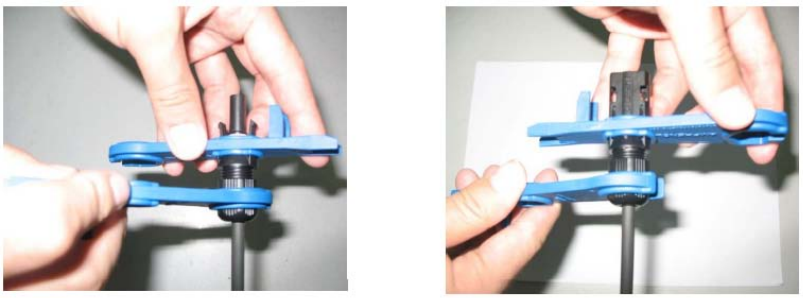


Figure 4-19

Step2: Mate and separate Helios H4 connector:

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

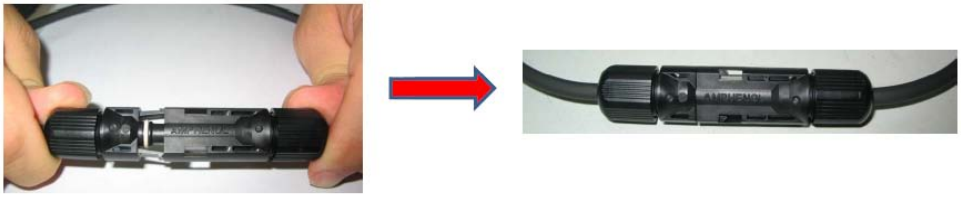


Figure 4-20

- When the separation of connector is necessary, use the Amphenol specified

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

Separated by Ring tool

Separated by Wrench tool

Figure 4-21

DANGER!

DANGER to life due to potential fire or electric shock.

NEVER connect or disconnect the DC connectors under load.

4.4. Test run

Before turn on the inverter, please confirm:

a) Three phase five wires (R/S/T/N/PE) cable correctly connected to the inverter AC side through AC circuit breaker;

b) The DC cable connected correctly to the inverter DC side through DC circuit breaker, please be attention to the cable connected to the two string correctly and it's polarity;

c) The unused terminals are covered.

Turn on the inverter:

Step1: Close the DC and AC circuit breaker;

Step2: If the solar panels provide enough energy, the power module will work and the LCD panel will be lit;

Step3: Then the inverter will turn into self-check mode and the LCD panel will display the remaining time of connect simultaneously;

Step4: After the inverter turn into normal mode, it feed electrical energy into grid, and LCD panel will display the generated electrical energy.

As long as the inverter works, it will automatically track the maximum power point to absorb the maximum energy from solar. When night comes, the irradiance is not strong enough to provide energy, the inverter will power off automatically. When the next day comes, the input voltage reaches the start value, it will start again automatically.

5. Human Machine Interface

5.1. Control and Display Panel

Info provided here mainly includes LED display, LCD display, function keys and display fault etc.

All function including parameter review, setting, and malfunction info etc can be realized at this interface. It is showing as the follow (Figure 5-1).

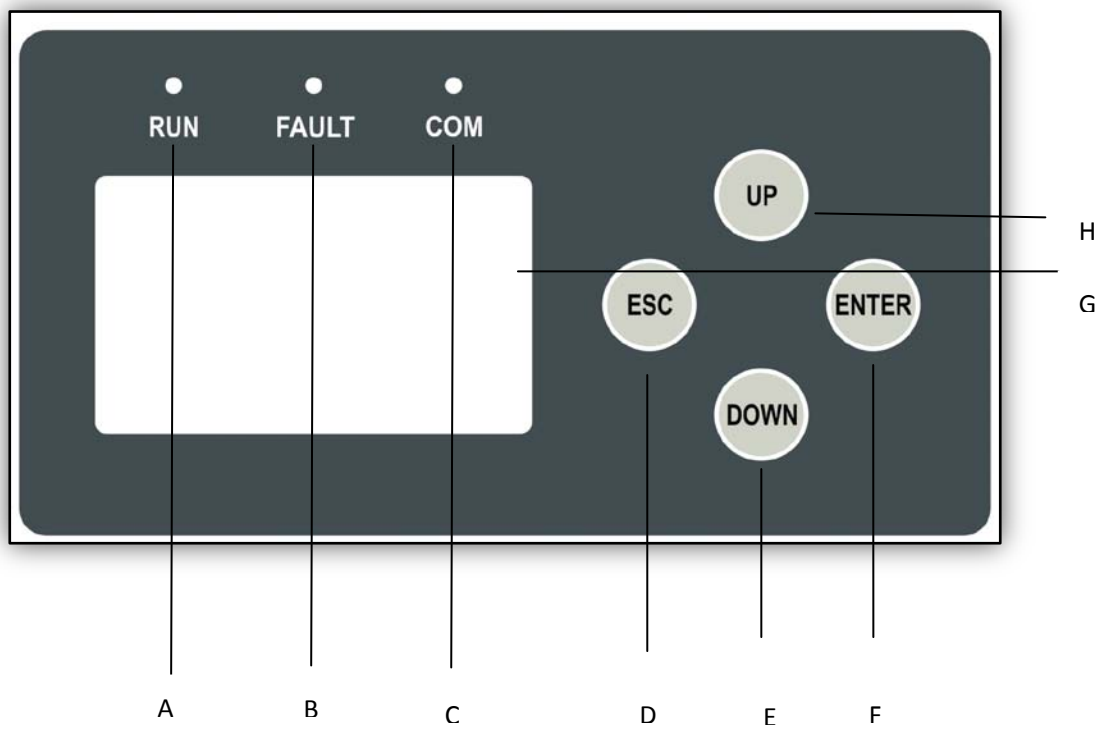


Figure 5-1 Control and Display Panel

Object	Description
A	Working normally (Green LED)
B	Fault (Red LED)
C	Communication (Yellow LED)
D	EXIT (Function key)
E	Down (Function key)
F	OK (Function key)
G	LCD display
H	Up (Function key)

TRI010K/012K/017KTL/020KTL have 3 LEDs, 1 LCD and 4 function keys:

- LEDs
  - Green LED: Working normally.
  - Yellow LED: Communication.
  - Fault LED: Fault.
- LCD

  240×160 MONO LCD.
- Function keys
  - OK Button: confirm the selection.
  - UP Button: move cursor to up selection or increase the values.
  - DOWN Button: move cursor to down or decrease the values.
  - ESC Button: exit current menu into main menu.

5.2. LED Display

TRI010KTL/012KTL/017KTL/020KTL are equipped with three LEDs including "Green", "Yellow" and "Red" which provide information about various operating status.

- Green LED
  - The green LED lighting indicates that inverter is active and working normally. Otherwise, it indicates inverter shuts down or malfunction happens.
  - When the grid shows 380V/50Hz and input voltage generated by PV modules is above 250V, the green LED lights up.
  - Normally, this LED begins to light up in the morning when the sunshine intensity is enough and goes out when it gets dark.
- Yellow LED
  - The yellow LED flashes during inverter communicating with other devices including DLU and PC etc through RS485 and goes out after the communication finishes.
  - The yellow LED keeps on lighting during the software update; otherwise, inverter doesn't communicate with other devices, or burn, update the firmware etc.
- Red LED
  - The red LED indicates that inverter has stopped feeding power into the grid because of fault, and the exact fault information will display on the LCD at the same time.
  - The faults as follows in the table will activate the red LED.

For details, please refer to table as below:

LED	Status	Detailed Message
Green	Waiting	TRI010KTL/012KTL/017KTL/020KTL is working normally.
	Checking	The DC voltage of PV modules is lower than 250V (minimum startup voltage). Inverter is waiting for sufficient power.
	Normal	When DC voltage of PV modules exceeds 250V, Inverter is checking feeding conditions automatically.
Yellow	Communication state	TRI010KTL/012KTL/017KTL/020KTL is communicating with other devices.
	Burning software/ Software upgrade	The firmware is upgraded.
Red	GFCI Failure	The GFCI detection circuit is abnormal.
	AC HCT Failure	The AC output sensor is abnormal.
	Consistent Fault: DC inj. differs for M-S	Different measurements between Master and Slave for DC output current.
	Consistent Fault: Ground I differs for M-S	Different measurements between Master and Slave for GFCI.
	High DC Bus	DC Bus voltage is too High.
	Utility Loss	No grid voltage detected.
	Ground I Fault	GFCI malfunction.
	Over Temperature in Inverter	Internal temperature of inverter is high.
	PV Over Voltage	PV input voltage surpasses the tolerable maximum value.
	Fan Lock	Fan malfunction.
	AC Voltage Out of Range	The measured AC voltage is out of tolerable range.
	Isolation Fault	Isolation resistance of PV to earth is too low.
	DC Injection High	The DC injection to grid is too high.
	Consistent Fault	Different measurements between Master and Slave.
	Consistent Fault： Fac differs for M-S	Different measurements between Master and Slave for grid frequency.
	Consistent Fault： Vac differs for M-S	Different measurements between Master and Slave for grid voltage.
	AC Relay-Check Fail	AC relay malfunction.

	M-S Version Unmatched	Different CPU software version.
	Fac Failure： Fac Out of Range	The master frequency is out of tolerable range.
	EEPROM R/W Fail	EEPROM reading or writing error.
	SPI Failure： Communication Fails between M-S	Communication between microcontrollers fails.

5.3. LCD Display

The LCD display shows parameters of inverters which can be set through function keys. On the top, it always shows working status and Ethernet status, The left area is for displaying parameter info or energy wave; On the right, it always shows power, E-today, E-total; At the bottom of LCD display, time and date will be shown (Figure 5-2 Main Interface 1)

When press “enter” button, it will go into main menu , telling inverter state, energy yield, as well as device and malfunction info, and parameter setting; (Figure 5-2 Main Interface 2)

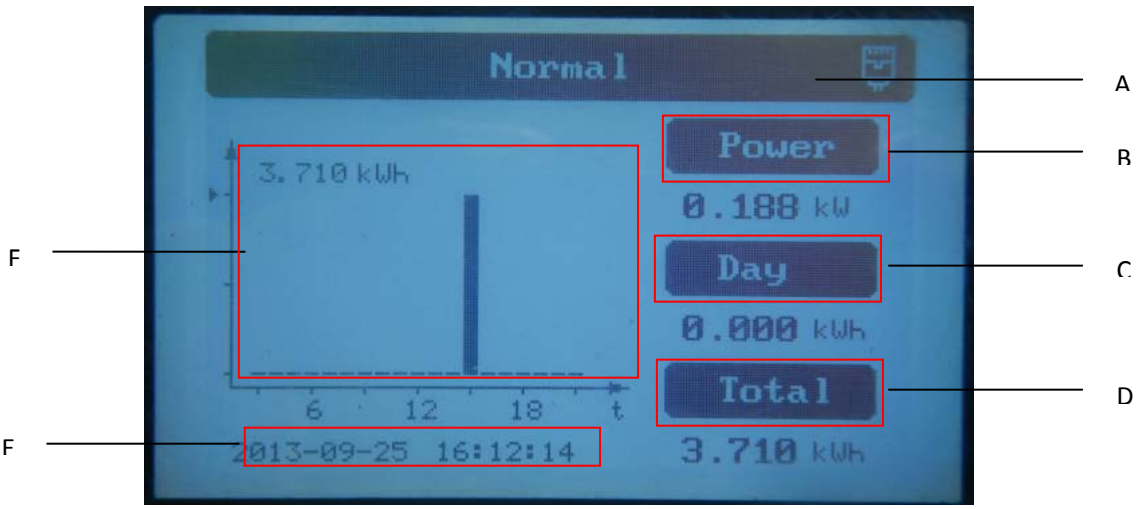


Figure 5-2 Main Interface 1

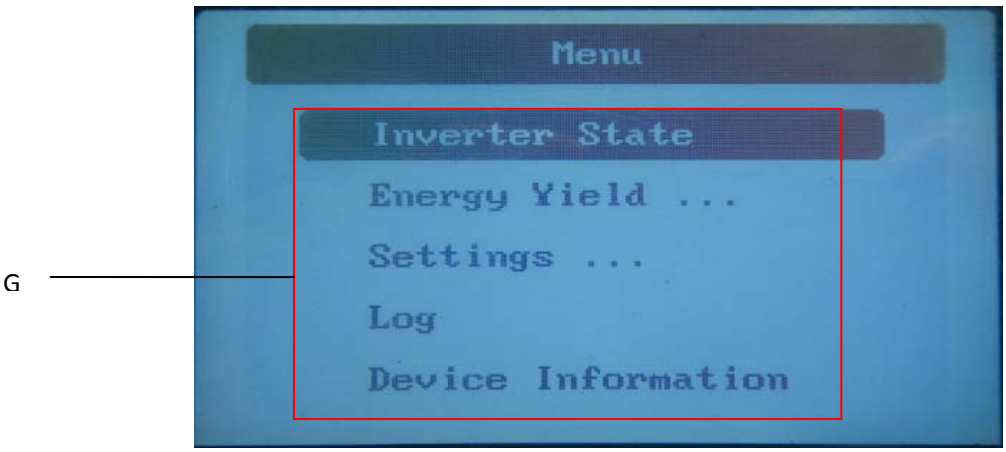


Figure 5-3 Main Interface 2

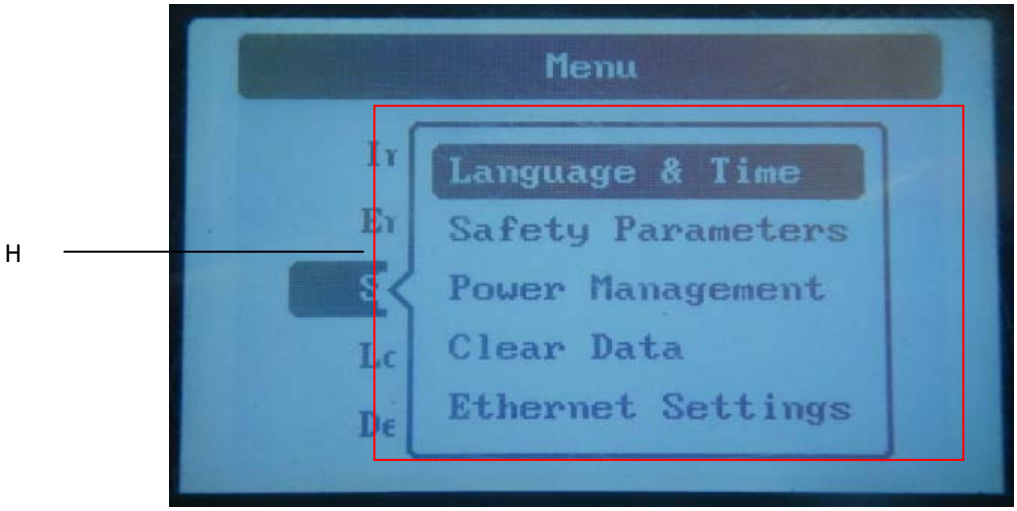


Figure 5-4 Main Interface 3

Object	Description
A	Working status of inverter and Ethernet
B	Real-time power of inverter.
C	Power generated today in kilowatt hours.
D	Total power generated since inverter starting up.
E	Display date & time.
F	Specific parameters, curve display area.
G	Main menu: generated inverter state, energy yield, parameter setting, device & malfunction info.
H	Pull-down menu under main menu.

Contents of menu:

Function	Content
Inverter state	AC Parameter
	DC Parameter
	Frequency
Energy yield	E-Week
	E-Month

	E-Year
Settings	Language and Time
	Safety Parameters
	Power Management
	Clear Data
	Ethernet Settings
Log	Error Information
Device Information	

Fault display

When fault happens, the specific fault information will show in main window on LCD display. At the same time, the red LED lights up and the green LED goes out. The following figure indicates that the fault “No Utility” happened.

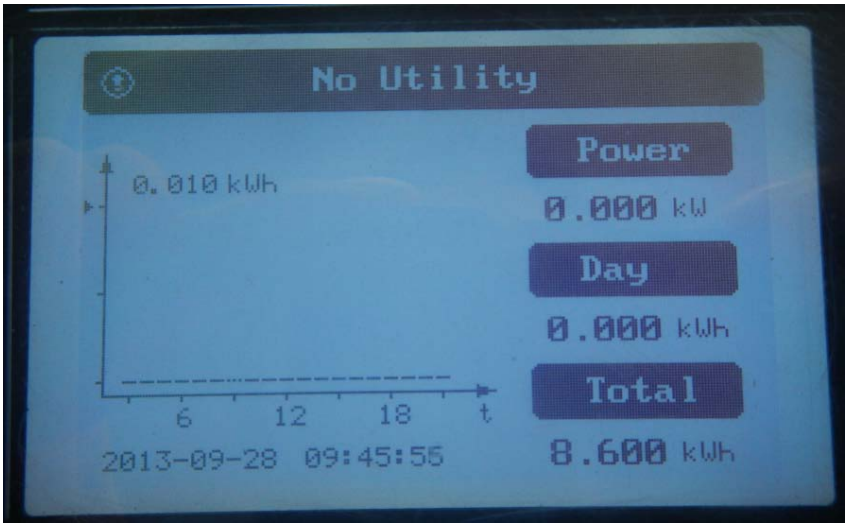


Figure 5-5 Fault Windows

Now if enter into”log”, fault information of the latest 20 pieces can be reviewed.

5.4. Function Keys

There are four function keys, by which users can choose menus on LCD and realize online parameter reviewing & setting etc.

5.4.1. Configure

5.4.1.1. Language and Time

In main menu,Move the cursor to “settings”by pressing the “up” or “down” key; Press the “enter” key, and then you will find a pull-down menu. Please move the cursor to “Date Time” by pressing the “up” or “down” key, and then press “OK”, you can set information of language, date and time.

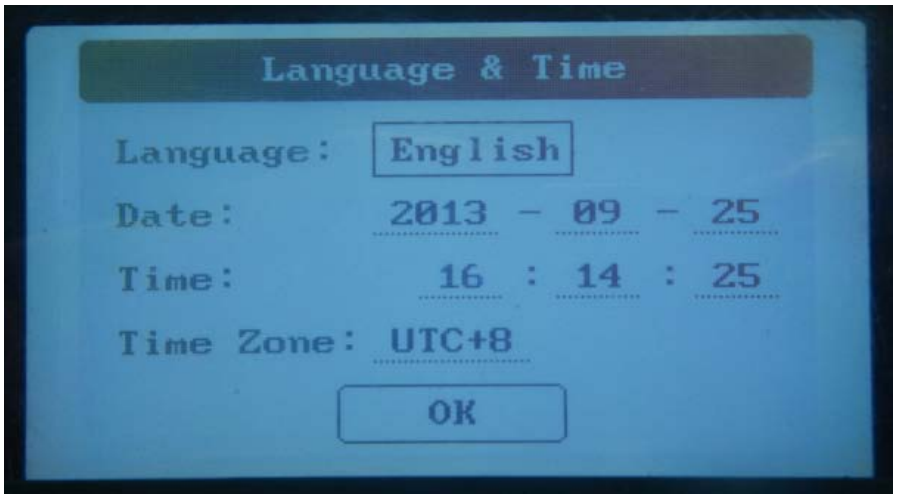


Figure 5-6 Language and Time Setting

Language setting

When the cursor is at the “Language” column, you can choose “Chinese”, “English” or “German” etc, and then press “enter”, you can confirm “Language” setting.

Date setting

When the cursor is at the “Date”, at first you can set the “Year” by pressing the “up” and “down” keys. After finishing setting year, please press the “down” key and move to “Month”, press the “enter” key to confirm setting. set month also by pressing the “up” and “down” keys. Press the “enter” key to finish “Month” setting ,After that, press the “down” key to “Date”, set date also by pressing the “up” and “down” keys. Later, press “enter” and you can finish t “Date” setting.

Time setting

When the cursor is at the “Time”, at first you can set “Hour” by pressing the “enter” key and then pressing the “up” and “down” keys, at last, pressing “enter” key to finish setting; When finishing setting the hour, please press the “down” key to “Minute”, set minute also by pressing the “enter” key and then pressing the “up” and “down” keys. at last, pressing “enter” key to finish setting. And then press the “down” key to “second”, set second also by pressing the “enter” key and then pressing the “up” and “down” keys , at last, pressing “enter” key to finish setting. Finally, please press “OK”.

Notes:

After setting the “Language”, “Date” and “Time”, press the “down” key to “ok”, and then press “enter” to save setting. If pressing “esc” to discard setting.

5.4.1.2. Safety Parameters Setting

pressing the “enter” key, you will find a pull-down menu. Please move the cursor to “Safety Parameters” menu by pressing the “up” or down” key, and then press “enter” key, you will come to the interface for “Safe Parameter”. At this interface, you can choose the last or the next parameter, or increase or decrease the parameters. These parameters contain “Safety”, “Vpv-Start”, “T-start”, “Vac-Min”, “Vac-Max”, “Fac-Min”, “Fac-Max” and so on.

Notes: This operation step requires password (default value: 1001).

Figure 5-7 Password Input Interface

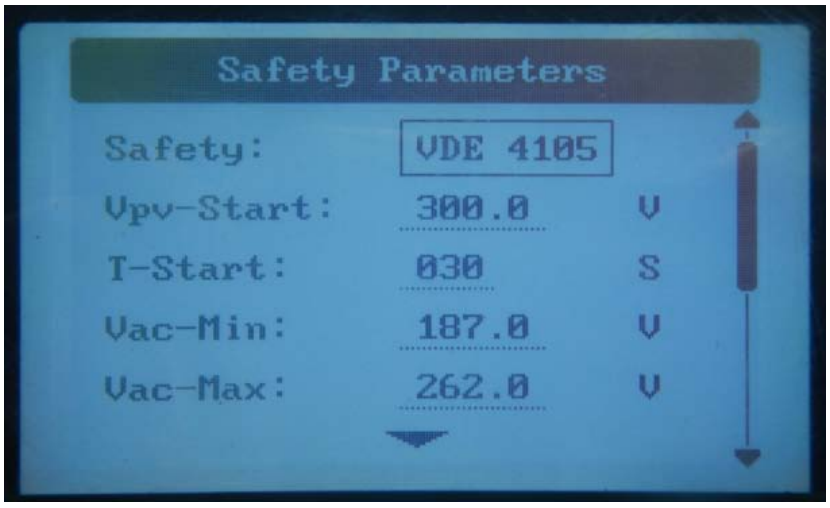


Figure 5-8 Safety Parameters Setting

After that, you can choose “ok”, “Default” to confirm parameter change, restore original data . Press “OK” and exit this interface to enter main menu.

5.4.1.3. Clear Data

when pressing the “enter” key, you will find a pull-down menu. Choose “Clear Data” menu and press “enter” to get into data clearing state. In this menu, press “OK” to clear all the data in the memory, and if press “esc” exit this interface.

Figure 5-9Clear Data Verify Interface

Notes:

1) This operation step requires password (default value: 1001).
2) If this operation is done, all the data in the memory will be cleared, so backup of all the data before clear is recommended.

5.4.1.4. Power Management Setting

when pressing the “enter” key, you will find a pull-down menu. Choose “Power Management” menu and press “enter” to get into Power Management state. In this menu, press “OK” to set power limit and factor type, if choosing “Default”, data set default value.

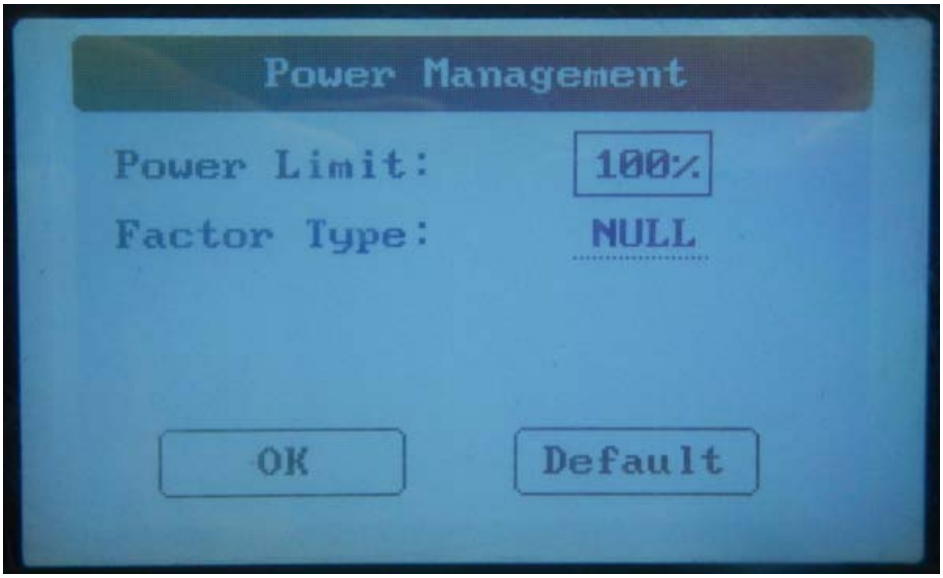


Figure 5-10 Power Management Interface

5.4.1.5. Ethernet Settings

when pressing the "enter" key, you will find a pull-down menu. Choose "Ethernet Settings" menu and press "enter" to get into Ethernet Settings state. In this menu, user have two choice: obtain IP address automatically and fixed IP address. if user choose to obtain IP address automatically, it can can obtain current IP and mask automatically. if user choose to fixed IP address.,it need user input IP and mask .

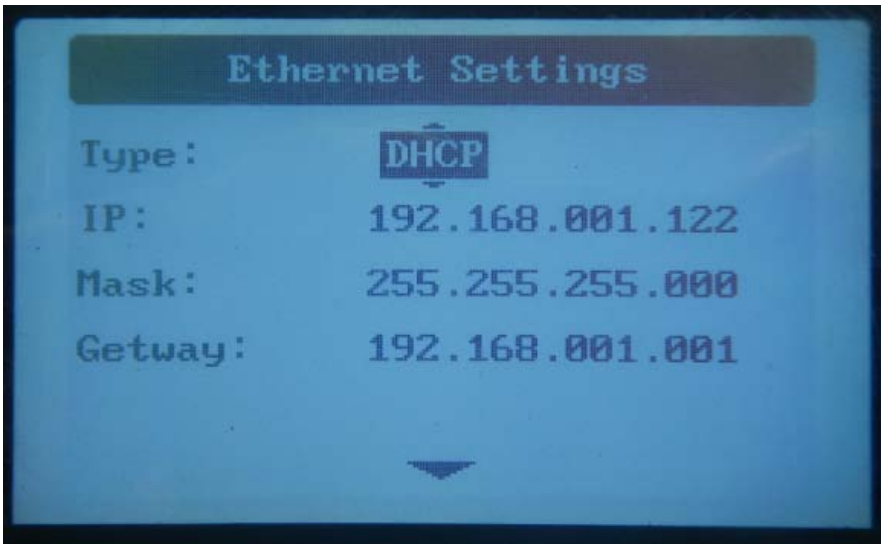


Figure 5-11 Power Management Interface

Notes:

1) This operation step requires password (default value: 1001).

2) Suggesting user to choose IP address automatically

5.4.2. Energy yield

Press the “enter” key, and then you will find a pull-down menu. Please move the cursor to “E-Week” by pressing the “up” or “down” key, then press “enter”, the relevant information will be shown. (E-Week is default status)

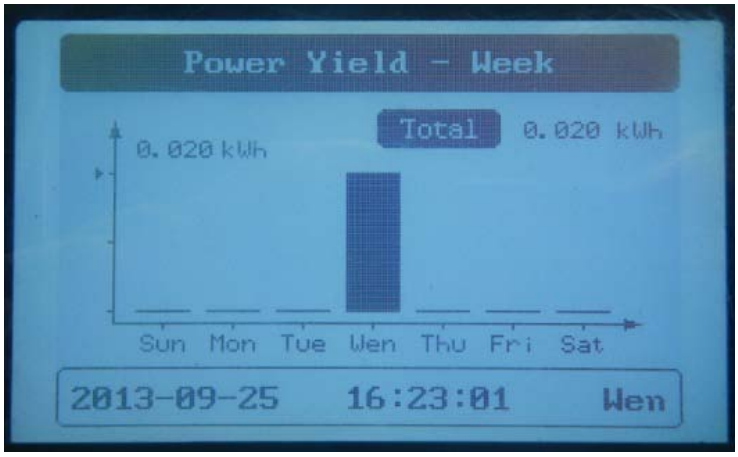


Figure 5-12 week Energy Wave

Using the same operating procedures, you can check “E- Month”, “E-Year”.

5.4.3. Inverter state

Press the “OK” key, and then you will find a pull-down menu. Please move the cursor to “inverter state” by pressing the “up” or “down” key, and then press “enter” key, the related information at AC,DC, frequency and temperature will be shown. If you press “ESC” key, you can exit this interface.

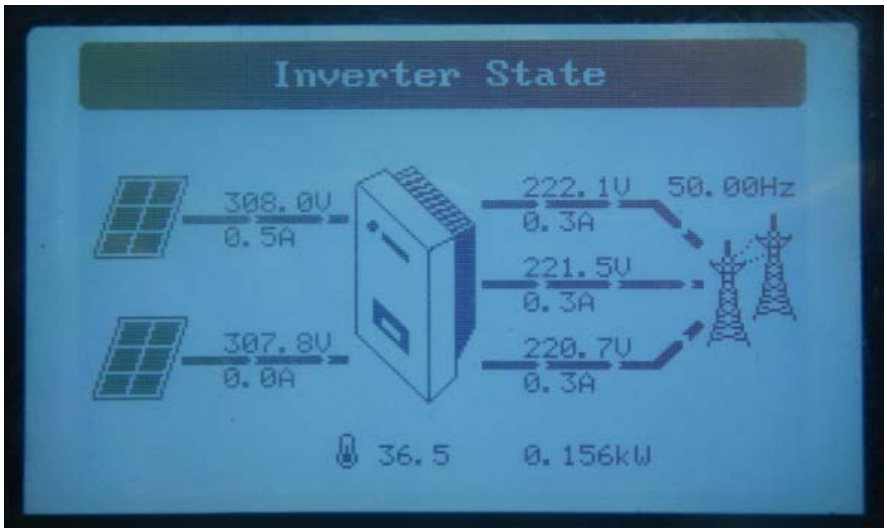


Figure 5-13 Inverter state Interface

5.4.4. Device Information

Press the “enter” key and you will find main menu. Move the cursor to “Device information” by pressing the “up” or “down” key, and then press the “enter” key, you will find the information of “Device Model”, “SN”, “HMI/SW”, “CU/SW” etc. Press the “esc” key exit this interface.

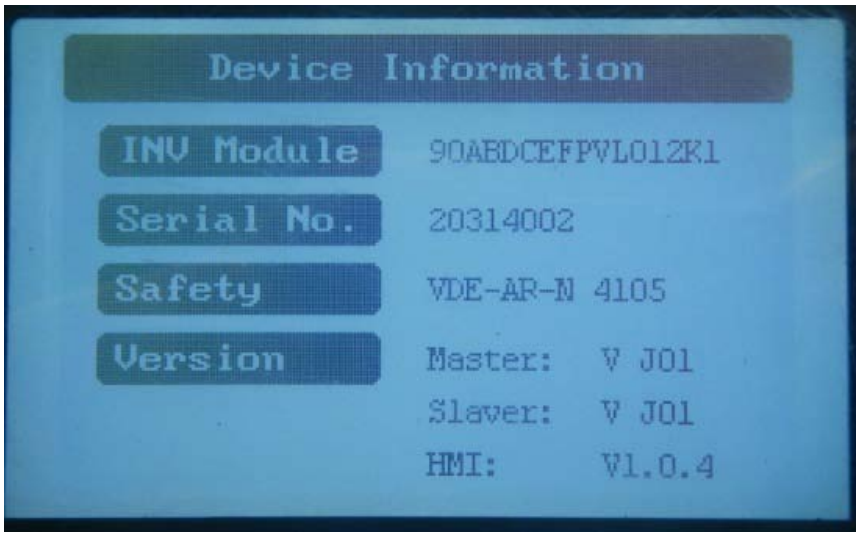


Figure 5-14 Device Information

5.4.5. log Information

Press the “enter” key and you will find main menu. Move the cursor to “Log” by pressing the “up” or “down” key, and then press the “enter” key, you will find the log fault column, including time fault happened and fault info. Press the “esc” key exit this interface. “Log fault” contains Error information of the latest 20 times; if you need more information, please derive from DLU.

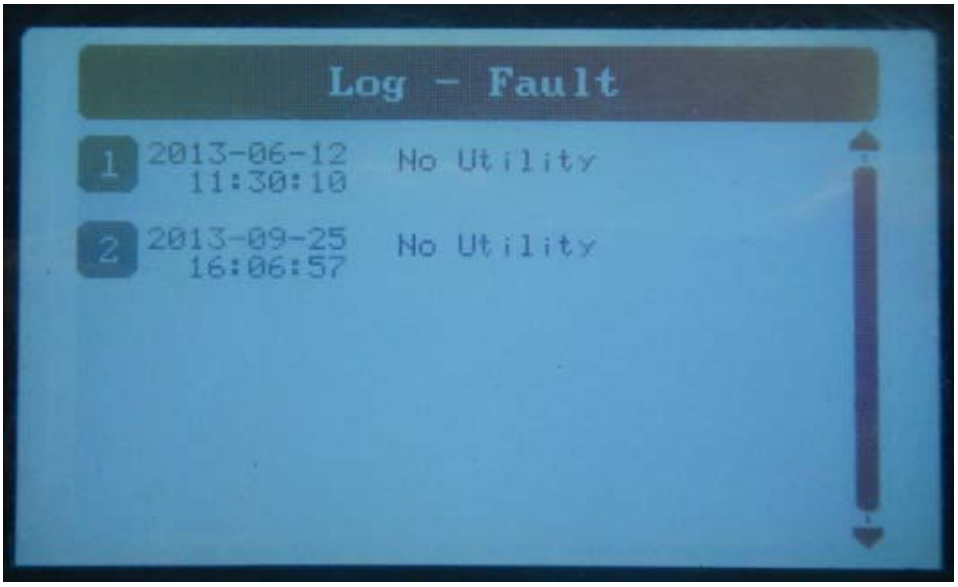


Figure 5-15 Error Messages Interface

5.5. Display of Fault

When inverter cannot work normally and faults haven't been solved, the specific fault information will show in window on the LCD, showing when the fault happened and the error information. At the same time, the red LED lights up and the green LED goes out. The following figure indicates that the fault "No Utility" happened.

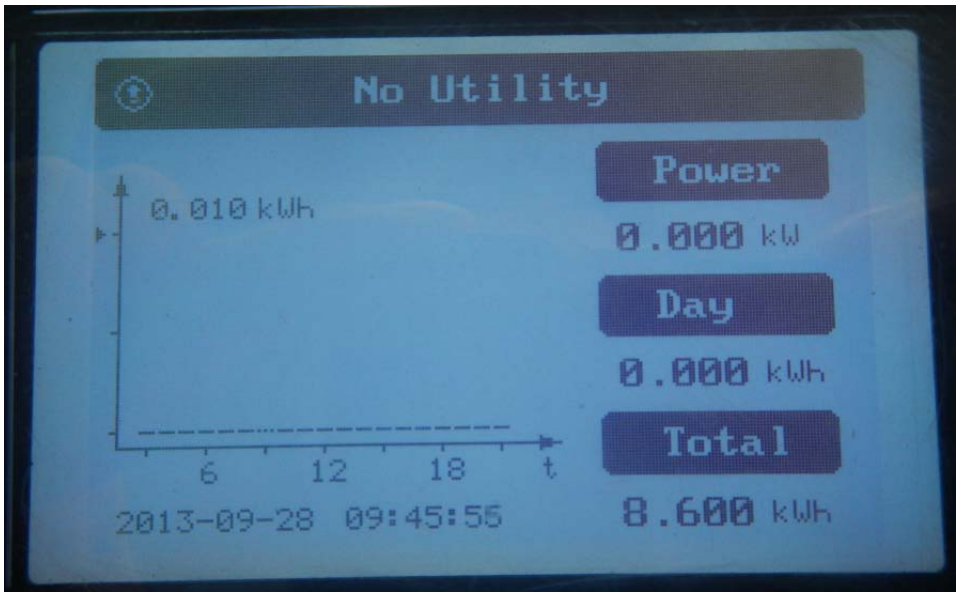


Figure 5-16 Fault Windows

Now if you want to view the fault info, you can find "log" under main menu.

6. Communication and Monitoring

6.1. Communication Interfaces

This product has a communication interface RS-232, RS-485 and wireless (optional). Operating information like output voltage, current, frequency, fault information, etc., can be delivered to PC or hardware storage devices or other monitoring equipment via communication interface.

6.2. Communication

When user want to know the information of the power station and manage the entire power system. We offer below 4 type communications.

6.2.1. RS-232 Communication for Three inverter type

RS-232 is one communication interface. It transmits the data between PC and one TRI series inverter (Figure 6-1). For communication cable, one end is male connector; the other end is female connector. The maximum length of the cable for RS-232 is 10 m.

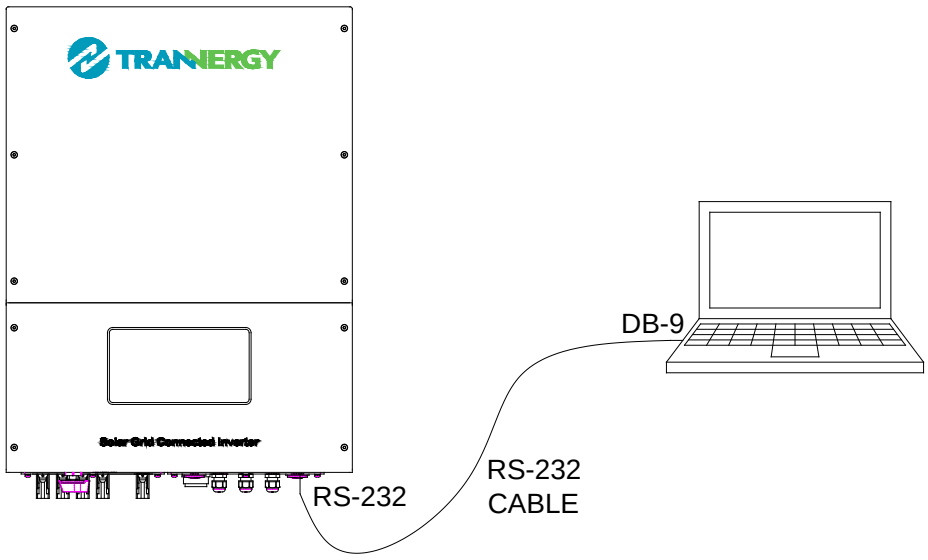
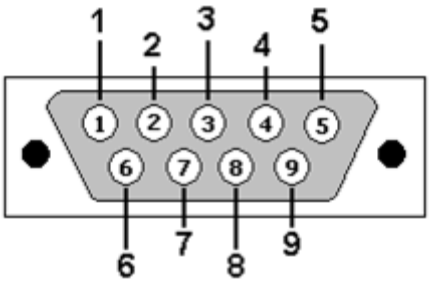


Figure 6-1 RS-232 Communication Diagram

PIN1	NC	
PIN2	TXD	
PIN3	RXD	
PIN4	NC	
PIN5	GND	
PIN6	NC	
PIN7	NC	
PIN8	NC	
PIN9	NC	

Notes:

If your computer doesn't have the DB9 communication interface, you can use RS232-USB cable to achieve this function.

One inverter can only be communicated with one PC at the same time through RS-232 port. Thus this method is generally used for three inverter's communication, for examples, software updating and serviceman's testing.

6.2.2. RS-485 Communication for Several inverters

RS-485 is generally for multi inverters' communication. A DLU can communicate with and up to 32 inverters could communicate at the same time, but wire length should be≤ 1200 m. Connect the system as blow (Figure 6 -2), user can easily monitoring the PV power station.

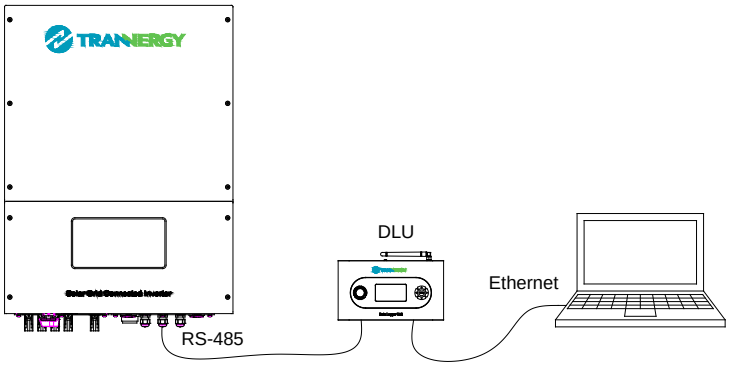
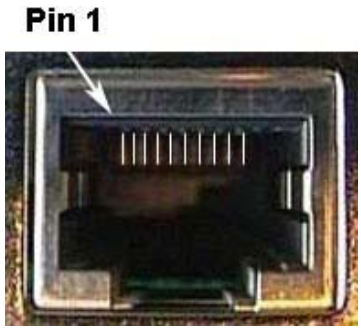


Figure 6-2 RS-485 Communication Diagram

PIN1	TXD_RS-485A	
PIN2	TXD_RS-485B	
PIN3	RXD_RS-485A	
PIN4	GND	
PIN5		
PIN6	RXD_RS-485B	
PIN7	+7V/DC	
PIN8		

Notes:

The wires connection sequence of two ends of a RS-485 cable is the same.

6.2.3. Wireless

TRI010KTL/12KTL/17KTL/020KTL can be communicated with wireless. Trannergy can customize the required special device from customers to realize wireless communication.

6.2.4. USB

USB interface is specially designed for maintenance engineer to realize burning and updating of PCU firmware.

6.3. Monitoring

System monitor PVCS should be configured to realize one PC communicates with multi inverters at the same time. Through PC PVCS could get real time PV plants operating data. Please see Installation Guide of PVCS for more information.

The connected graph of the monitoring system, in which the multipoint communication of the inverters can be realized through RS-485 interface, is shown below (Figure 6-3). The software “PVCS” in the PC can handle real-time monitoring of max 16 DLU at the same time.

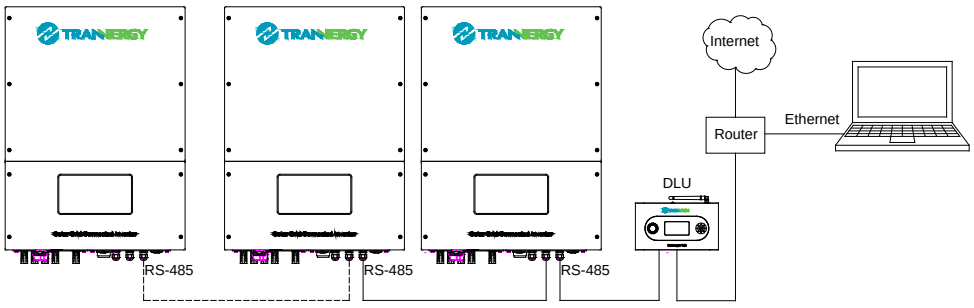


Figure 6-3 Monitoring Topology Diagram

7. Maintenance and Repair

7.1 Routine maintenance

Generally, the inverter needn't to maintain or calibrate, but you need to ensure the heat sink uncovered by the dust or dirty things.

In order to prove the inverter's normal function and long life, you best to clean the inverter and heat sink regularly and ensure there is enough space for air flow around the heat sink. You can use the compressed air, soft cloth or brush to clean the surface of inverter and heat sink. Please don't use water, corrosive chemicals or strong detergent to clean them.

7.2 Notes of maintain or service

When there are faults occurrences, the inverter can disconnect from grid automatically and send out fault or warning information. The simple fault approaches refer to appendix A (FAQ) please.

7.3 Safety for maintain or service

	Before you handle the fault, you must open the DC and AC circuit breaker first and prove others can't close it again without your permission.
	The inverter must only be opened by qualified personnel for repair. The inverter can still be charged with hazardous voltages even when it is disconnected from the PV modules and the grid. Measure the DC bus voltage, which must be lower than 48V, before starting work on the electronic system inside the cabinet.

8. Technical data

MODEL	TRI010KTL	TRI012KTL	TRI017KTL	TRI020KTL
Rated AC power	10000 W	12000 W	17000 W	20000 W
Maximum AC power	10000 W	12000 W	17000 W	20000 W
INPUT				
Maximum input power	10300 W	12400 W	17600 W	20800 W
Maximum DC voltage in an open circuit	900 Vdc	900 Vdc	900 Vdc	900 Vdc
MPPT operating range	250 - 800 Vdc	250 - 800 Vdc	250 - 800 Vdc	250 - 800 Vdc
Maximum input current	12 Adc / 12 Adc	22Adc / 11Adc	22Adc / 22 Adc	22Adc / 22 Adc
Startup voltage	200 Vdc	200 Vdc	200 Vdc	200 Vdc
DC Switch	integrated	integrated	integrated	integrated
Initial feeding voltage	300 Vdc	300 Vdc	300 Vdc	300 Vdc
Number of inputs	2+2	4+1	3+3	3+3
MPPT number	2			
OUTPUT				
Operating voltage	230 Vac			
Number of grid phases	3			
Voltage Range	180 - 270 V			
Maximum power voltage range	200 - 260 Vac			
Frequency range	50 Hz, 60Hz / -5 Hz ... +5 Hz			
Power factor	-0,9 - 0,9 controllable			
Nominal current	14,5 Aac	17,4 Aac	24,6 Aac	29Aac
Maximum current	16 Aac	19.2 Aac	25.8 Aac	30 Aac
DC current injection (max.)	<200 mA			
Current Harmonic Distorsion(THDi)	< 3%			
SYSTEM				
Maximum efficiency	>98,1%	>98,1%	>98,1%	>98,2%
European efficiency	>97,5%	>97,5%	>97,5%	>97,8%
Switching plan	self-commutated, transformerless			
Off-grid protection	Yes			
Night power consumption	< 0,2 W			
Detecting earth leakage	Yes			
Heat dissipation	Convection			
MECHANICAL SPEC.				
Dimensions in mm	520x170x700			
Weight	51 Kg	51 Kg	52 Kg	52 Kg
Protection class	IP65			

Display	LCD 3.5 Inch
Function Key	4
Data interface	RS232 / RS485 / Ethernet / wireless
Thermal protection	Yes
Noise emission	< 50 dB (near silent operation)
Ambient operating temp	-20 °C - +60 °C (> 45 °C derating)
Casing	stainless steel
CERTIFICATIONS	
Safety compliance	VDE AR-N-4105, VDE 0126-1-1+A1, CE, G59/2 UTE C15-712, MEA, PEA

9. Quality assurances

We grant a warranty of 60 months as standard, starting from the date of the purchase invoice marked. We will only perform warranty services when the faulty unit is returned to us together with a copy of the invoice and warranty card which are issued by the dealer to the user. The unit should be returned in its original or equivalent packaging, please preserve the original packing. The costs for new packing and shipment are absorbed by the customer. In addition, the type label on the unit must be fully legible. If these requirements are not fulfilled, we reserve the right to deny warranty services.

Warranty claims are excluded for direct or indirect damages due to:

1) Beyond warranty date;
2) Without warranty card and serial number;
3) Transport damage;
4) Improper use, operation and refitting;
5) Non-observance to the relevant safety instructions and work in the severe environment out of the recommended ones in this manual;
6) Beyond installation and use areas of the relevant international standards;
7) Influence of foreign objects and force majeure (lightning strike, overvoltage, severe weather, fire etc).

10. Contact Information

If you have any further technical questions about our products, please contact us:

Trannergy Co., Ltd.
www.trannergy.com
Add: No.188, Weiwu Road, Jiading District, Shanghai, China, 201802
Tel: +86 21 38953908
Fax: +86 21 38953905
E-mail: info@trannergy.com

Appendix A: FAQ (Frequently asked questions)

Sometimes, the PV system does not work normally; we recommend the following solutions for average troubleshooting. This can help the technician to understand the problem and take a proper action.

	LCD display	Possible actions
Clearable Fault	Isolation Fault	1. Check whether the inverter is earthed and test impedance between PV (+) & (-) and the impedance must exceed 3MΩ; 2. Check whether the AC-side has contacts with earth.
	Ground Current Fault	1. The ground current is too high. 2. After cutting off the AC side connection, unplug the inputs from the PV generator and check the peripheral AC system. 3. After the cause is cleared, re-plug the PV panel and AC connection, and check PV inverter status.
	Grid Fault Fac Over Range Vac Over Range	1. Wait for 5 minutes, if the grid returns to normal, PV inverter automatically restarts. 2. Make sure grid voltage and frequency meet the local specifications.
	Utility Loss	1. Grid is not connected. 2. Check grid connection cables. 3. Check grid usability. 4. If grid is ok and the problem exists still, maybe the fuse in the inverter is open, please call service.
	Over Temperature	1. The internal temperature of inverter is higher than specified normal value. 2. Find a way to reduce the ambient temperature. 3. Or move the inverter to a cooler environment.
	PV over Voltage	1. Check the open PV DC voltage, and see if it is greater than or too close to 900VDC 2. If PV DC voltage is less than 900VDC, and the problem still occurs, please call local service.
Permanent Fault	Consistent Fault	Disconnect PV (+) or PV(-) from the input, restart the inverter.
	Relay-Check Fail	1. Disconnect all PV (+) or PV (-). 2. Wait for a few seconds. 3. After the LCD switches off, reconnect and check again. 4. If the problem remains, please call local service.
	DC INJ High	
	EEPROM R/W Fail	

	SCI Failure	
	AC HCT Fault	
	GFCI Failure	

If the PV DC voltage is higher than 250V, while the inverter still doesn't work, please call the local service.

During periods of little or no sunlight, the inverter may continuously start up and shut down. This is due to insufficient power generated and it is normal working state. If sunlight strengthens or energy increase to support the inverter's startup, while the problems remain, please call service.

Except the frequent problems as above, if you still have any problems which cannot be solved, please contact us and we will offer the best services as we can.

Appendix B: Abbreviation

AC	Alternating Current
DC	Direct Current
DLU	Data Logger Unit
DSP	Digital Signal Processing
EEPROM	Electrically Erasable Programmable Read-Only Memory
EMC	Electro Magnetic Compatibility
EMI	Electro Magnetic Interference
GFCI	Ground Fault Circuit Interrupter
HCT	Hall Current Transformer
HMI	Human Machine Interface
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MPPT	Maximum Power Point Track
PC	Personal Computer
PV	Photovoltaic
PVCS	Photovoltaic Control System
SCI	Serial Communication Interface