

User Manual



TRM025KTL/TRM030KTL/TRM033KTL/TRM035KTL

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1. Introduction

1.1. Introduction

This manual describes Tranergy solar inverters TRM025KTL/030KTL/ 033KTL/035KTL. 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 TRM 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.

	<p><i>Before installation:</i></p> <p>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 Tranergy inverter specifications before connecting them to the inverter.</p> <p><i>Installation:</i></p> <p>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.</p> <p><i>Disconnecting the inverter:</i></p> <p>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</p>
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disconnected from grid/mains and solar modules. Wait at least 20 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 TRM 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 910V. 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 Tranergy when dimensioning a photovoltaic system.

2. Technical Description of Inverters

2.1. Mechanical design

Figure 2-1 shows the outline dimensions of TRM025KTL/030KTL/033KTL /035KTL:

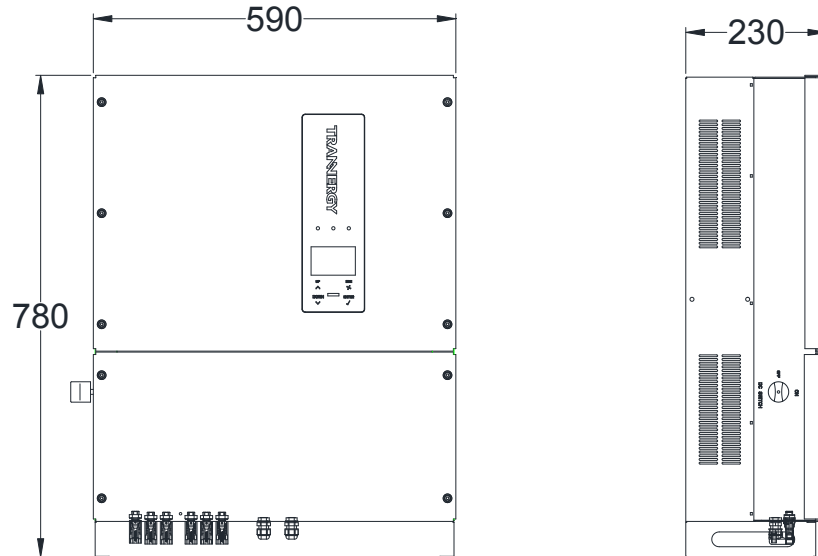


Figure 2-1 Outline dimensions of TRM025KTL/030KTL/033KTL/035KTL



The DC switch is the most length part at the left of inverter, so take care of the DC switch terminal.

Figure 2-2 shows the electrical terminals of TRM Series Inverter:

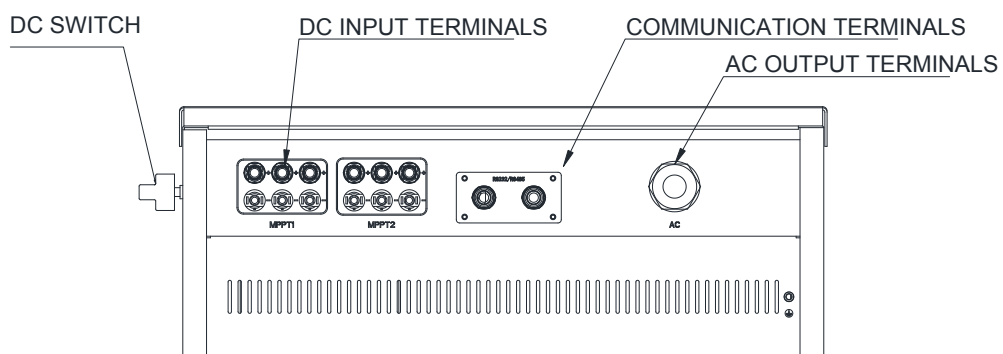


Figure 2-2 Electrical Terminals of TRM Series Inverter



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

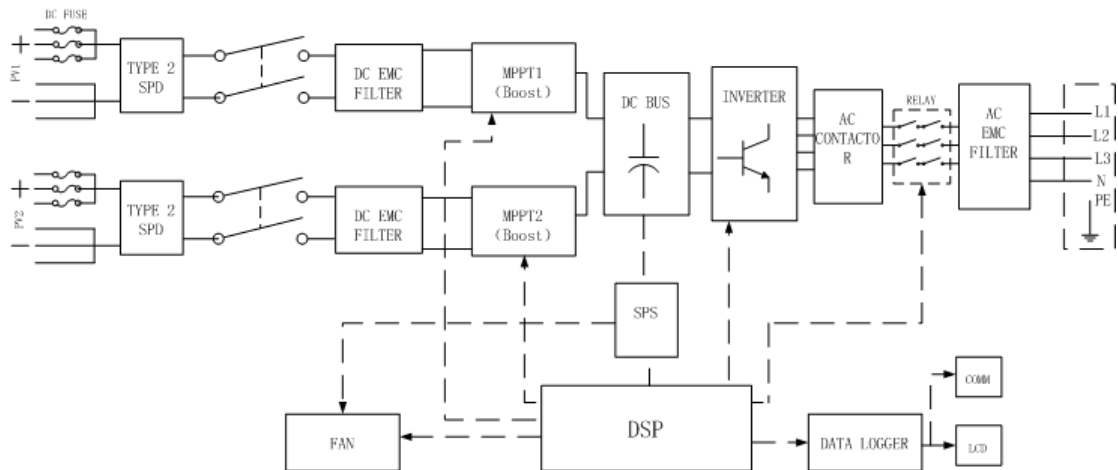


Figure 2-3 wiring diagram of the whole TRM inverter system

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 100°C or the ambient temperature is over 75°C.
- Derate the output power linearly when the temperature of power devices is between 93-100°C or the ambient temperature is between 71-75°C.

3. Operation mode illustration of the inverter

TRM 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.

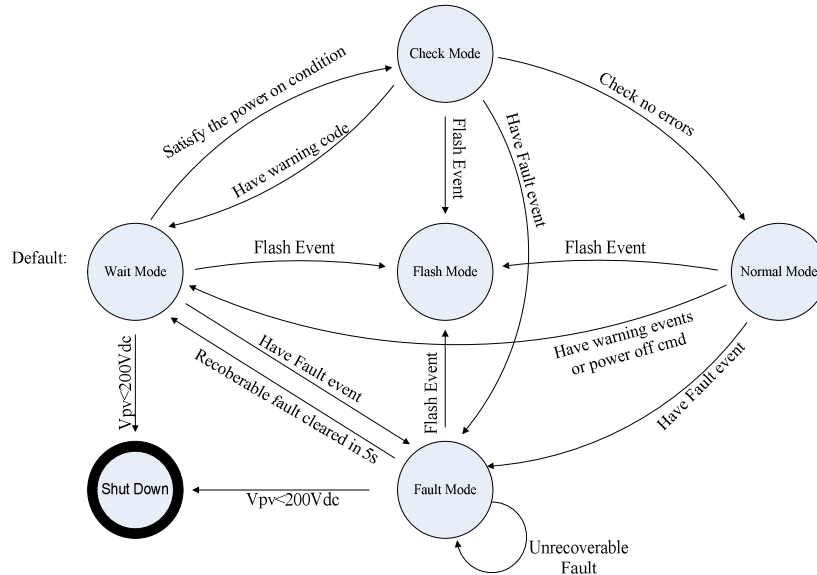


Figure 3-1 State Machine of Inverter working mode

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 300Vdc 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 200Vdc, 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 15 minutes to ensure the capacitors completely release the energy and inverter is not electrified.



Note!

Inverters must be installed by qualified person.

Tranergy assures the product guarantee of the TRM 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 Tranergy 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:

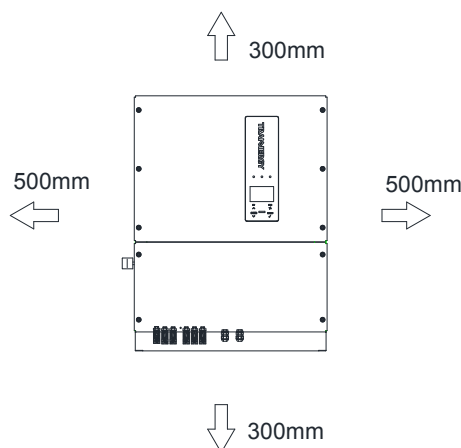


Figure 4-1 Distance required of Invertors

4.2. Install steps

4.2.1 Install on the wall

Setp1: Drill Fix $\varnothing 14$ holes in the wall according to the dimensions shows in Figure 4-2:

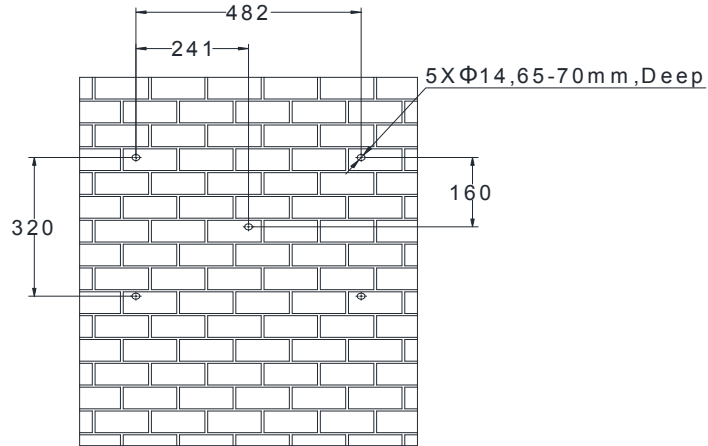


Figure 4-2 Dimensions of drilling holes



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.

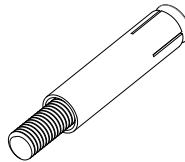


Figure 4-3 Expansion tube

Step3: Put the mounting panel on the wall and twist the M10 screws into the expansion tube to fix the mounting panel.

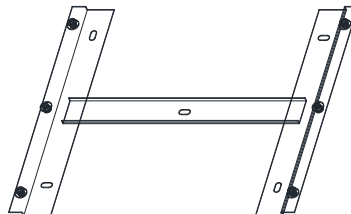


Figure 4-4 Install the mounting panel

Setp4: Hung the inverter on to the mounting panel:

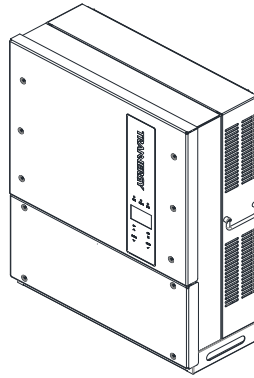


Figure 4-5 Hung the inverter

4.2.2 Install on the bracket

Step1: Drill Fix Ø12 holes in the bracket according to the dimensions shows in Figure 4-6:

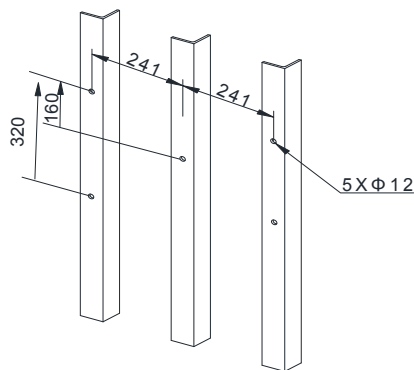


Figure 4-6 Dimensions of drilling holes

Step2: Put the mounting panel on the bracket and use the M10 screws fix the mounting panel.

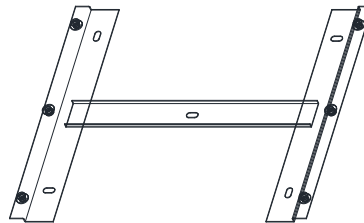


Figure 4-7 Install the mounting panel

Step4: Hung the inverter on to the mounting panel:

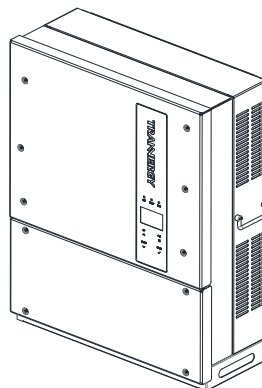


Figure 4-8 Hung the inverter

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

TRM inverter integrated universal current-sensitive residual current monitoring unit inside, the inverter will disconnect from mains as soon as a fault current of more than limit value has been detected.

However if an external RCD or residual current breaker is mandatory, the switch must trigger at a failure current of 300mA or higher.

Connection Procedure:

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

Step2: Loose the Four screws on the lower connection cabinet:

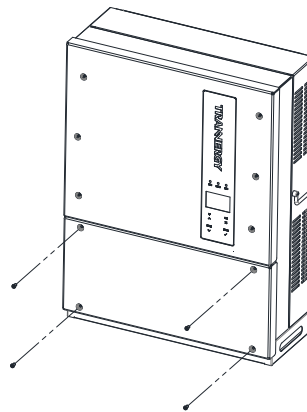
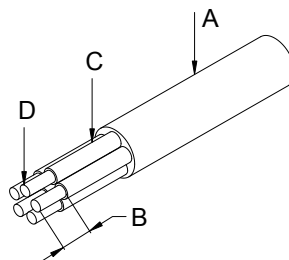


Figure 4-9 loose the lower cabinet

Step3: Strip off AC cables as figure 4-10:



No.	Description	Remark
A	protective layer	diameter ranges : 22-27mm
B	length of stripped off	18mm
C	insulate layer	-
D	cross section of ac cables	10-16mm ²

Figure 4-10 Strip off AC cables

Step4: Insert AC cables through cable gland from outside;

Step5: Pull the cables through and fix PE/L1/L2/L3/N cables ends to the terminals according to markings:

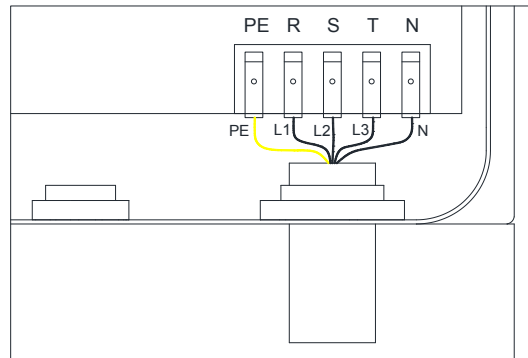


Figure 4-11



Attention!

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

Step6: Screw cap nut tightly onto the cable.

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 TRM Inverter, and each MPPT tracker provides 3 DC input interface.



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



DC PANEL OF TRM025KTL/030KTL/033KTL/035KTL

Figure 4-12 TRM Series Inverter input interface

Assembly Instruction for Amphenol H4 High Performance Solar Connector

	<p>Attention!</p> <p>The maximum current of each string is less than 12A; The maximum open voltage of each string is less than 950V</p>
	<p>Attention!</p> <p>Connectors must not be connected or disconnected under load!</p>

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



Figure 4-13

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.

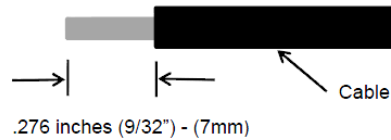


Figure 4-14

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



Figure 4-15

- 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.

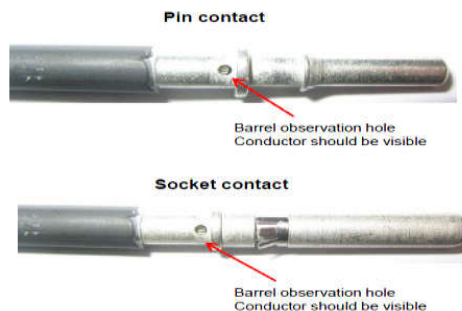


Figure 4-16

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

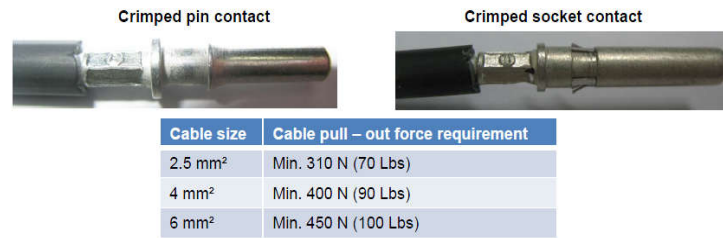


Figure 4-17

- 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 4-18

- 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.



Figure 4-19

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

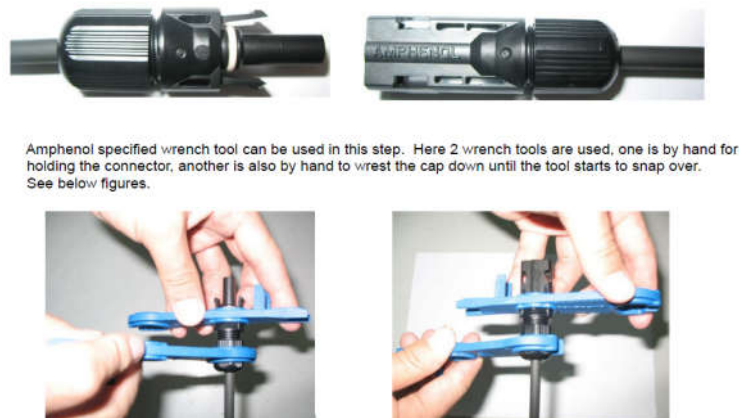


Figure 4-20

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.

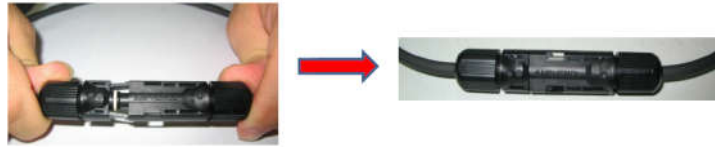


Figure 4-21

- 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 4-22



DANGER!

DANGER to life due to potential fire or electric shock.

NEVER connect or disconnect the DC connectors under load.

4.3.3. Grounding the inverter



The TRM inverter is a transformerless based inverter, neither the DC positive pole nor the DC negative pole of the PV string is permitted to be grounded.

- Where there is only one inverter in the PV power system, connect “PE” cable to the installation ground;
- Where there are multiple inverters in the PV power system, connect “PE” cables of all Inverters and mounting frame of PV arrays to the same copper bus bar.
- There is a second PE terminal on the bottom of the inverter. Users may choose to connect PE connection.

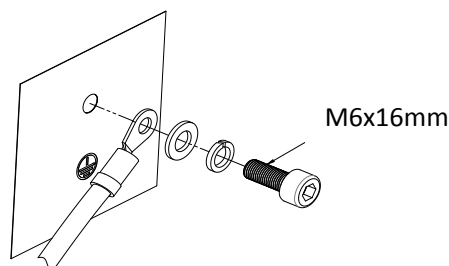


Figure 4-23 second PE terminal

4.4. Test run

Before turn on the inverter, please confirm:

- a) Three phase five wires (PE/L1/L2/L3/N) 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).

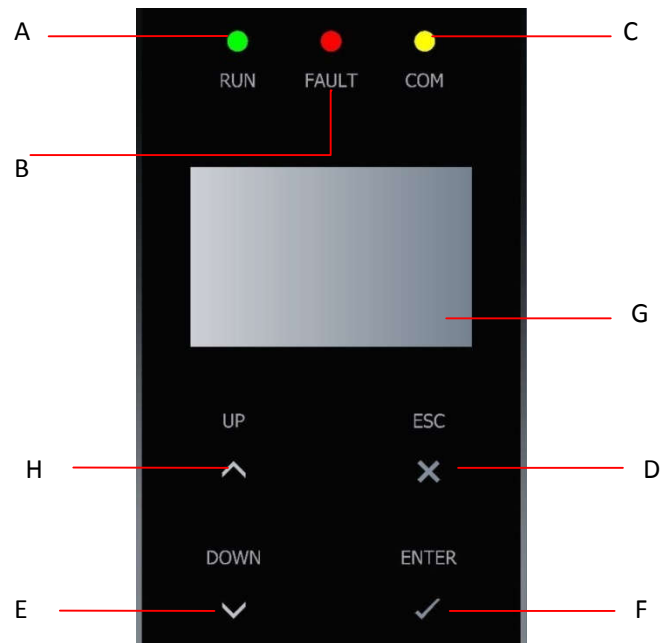


Figure 5-1 Control and Display Panel

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)

TRM inverter have 3 LEDs, 1 LCD and 4 function keys:

- LEDs
 - ◆ Green LED: Working normally.
 - ◆ Yellow LED: Communication.
 - ◆ Red 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

TRM inverter 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	Normal	The inverter is working normally.
Yellow	Communication state	The inverter 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)

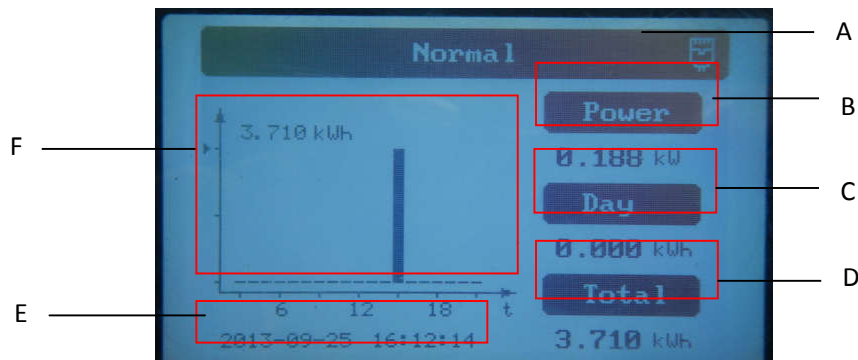


Figure 5-2 Main Interface 1

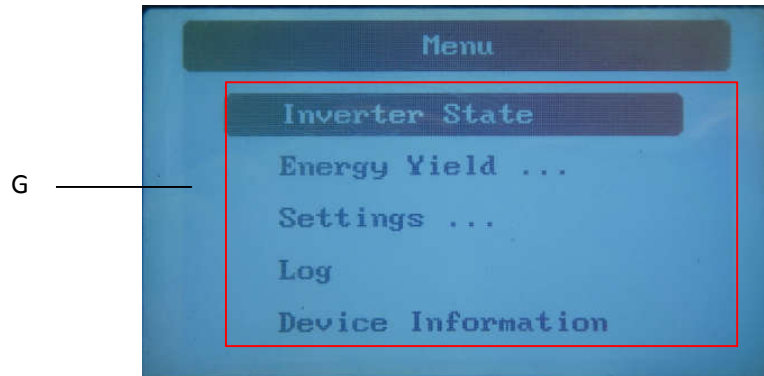


Figure 5-3 Main Interface 2

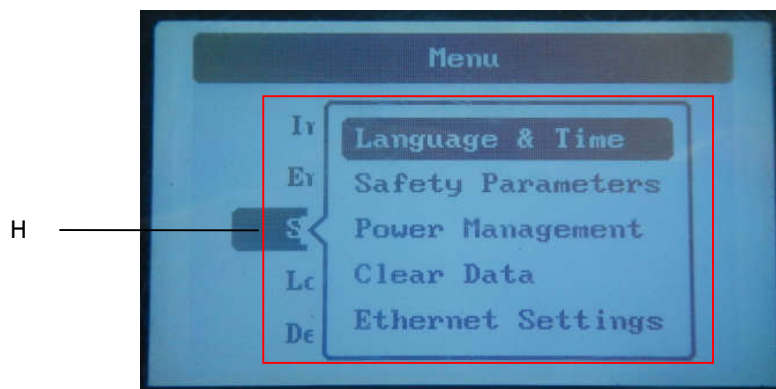


Figure 5-4 Main Interface 3

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	Serial number、 safety type、 version 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.

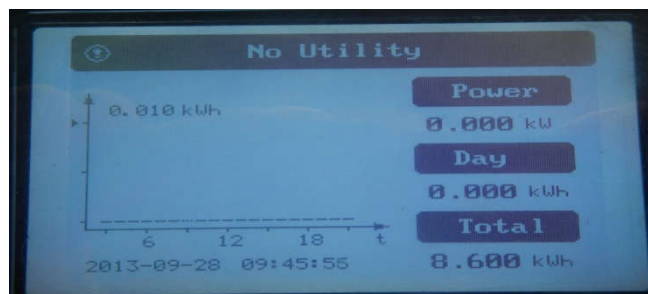


Figure 5-5 Fault Windows

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.

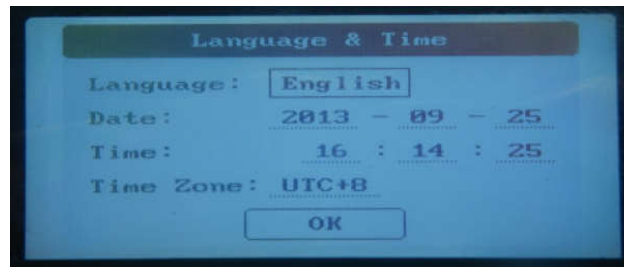


Figure 5-6 Language and Time Setting

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).

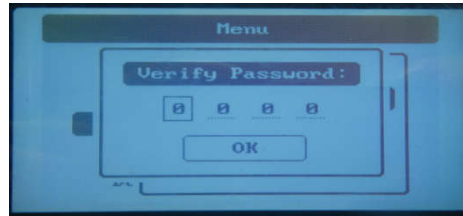


Figure 5-7 Password Input Interface

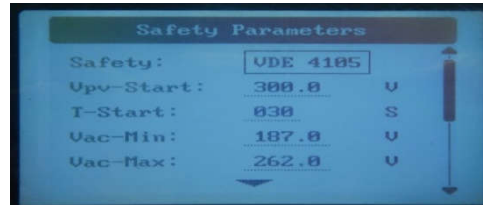


Figure 5-8 Safety Parameters Setting

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.

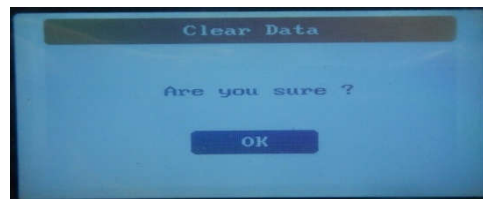


Figure 5-9 Clear Data Verify Interface



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.

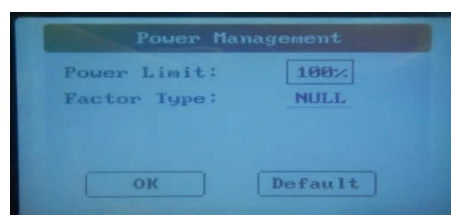


Figure 5-10 Power Management Interface

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 obtain current IP and mask automatically. if user choose to fixed IP address, it need user input IP and mask .

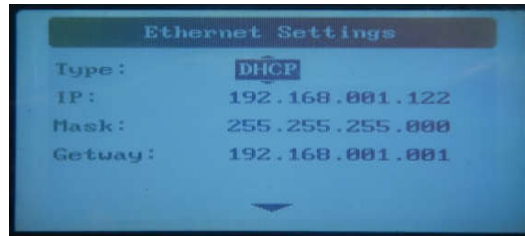


Figure 5-11 Power Management Interface



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.

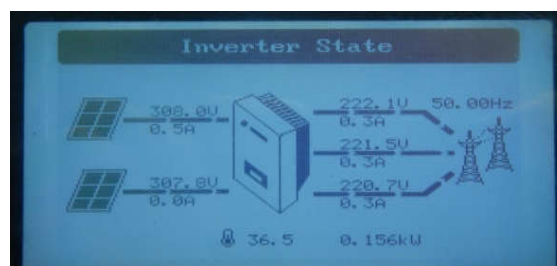


Figure 5-13 Inverter state Interface

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.

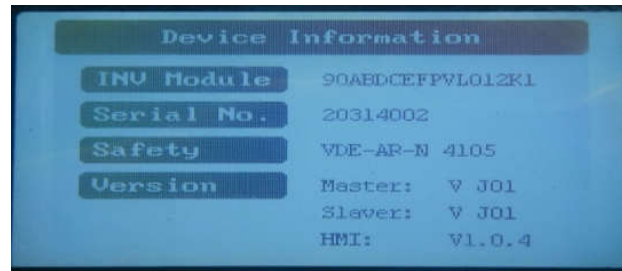


Figure 5-14 Device Information

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.

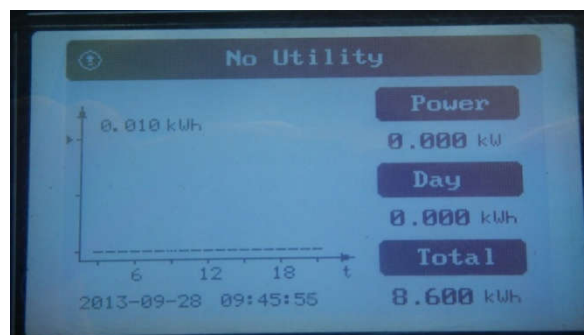


Figure 5-16 Fault Windows

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

6. Communication and Monitoring

6.1. Communication Interfaces

TRM inverter has a communication interface RS-232, RS-485/422 and WiFi/GPRS/Ethernet (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

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.

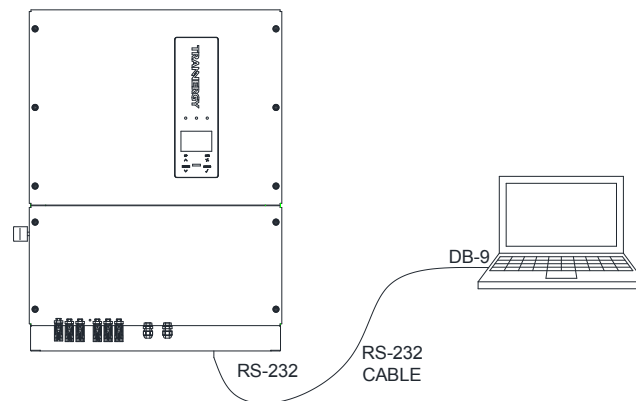
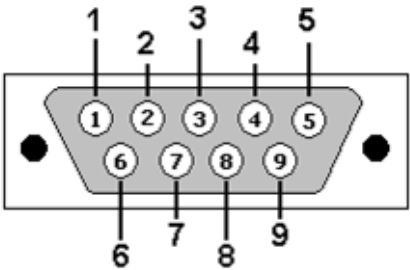



Figure 6-1 RS-232 Communication Diagram

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



A diagram of a DB-9 connector showing 9 pins numbered 1 through 9. Pins 1, 2, 3, 4, and 5 are on the top row, and pins 6, 7, 8, and 9 are on the bottom row. The connector is shown in a perspective view with a central shielded area.

 **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-485/422 Communication

RS-485/422 is generally for multi inverters' communication. It 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.

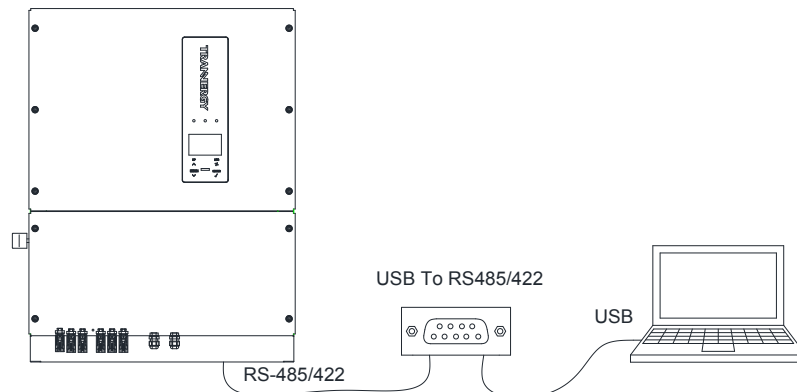
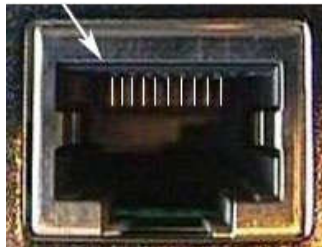


Figure 6-2 RS-485/422 Communication Diagram

PIN1	TXD+_RS-485/422
PIN2	TXD-_RS-485/422
PIN3	RXD+_RS-485/422
PIN4	GND
PIN5	
PIN6	RXD-_RS-485/422
PIN7	+7V/DC
PIN8	

Pin 1





Notes:

1. The wires connection sequence of two ends of a RS-485/422 cable is the same.
2. If customer communicate with inverter via RS-485/422 ,you can buy USB to RS-485/422 converters and install pvcs software.
3. TX termination of inverter connect with RX termination of USB to RS-485/422 converters, RX termination of inverter connect with TX termination of USB to RS-485/422 converters.

6.2.3. WiFi/GPRS/Ethernet Communication

TRM025KTL/TRM030KTL/TRM033KTL/TRM035KTL can be communicated with WiFi/GPRS/Ethernet. Trannergy can customize the required special device from customers to realize wireless communication.

6.2.4. USB Communication

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

6.3. Monitoring System

Monitoring system is divided into local monitoring and remote monitoring

1. Local monitoring system

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-485/422 interface, is shown below (Figure 6-3). The software “PVCS” in the PC can handle real-time monitoring of max 32 inverters at the same time.

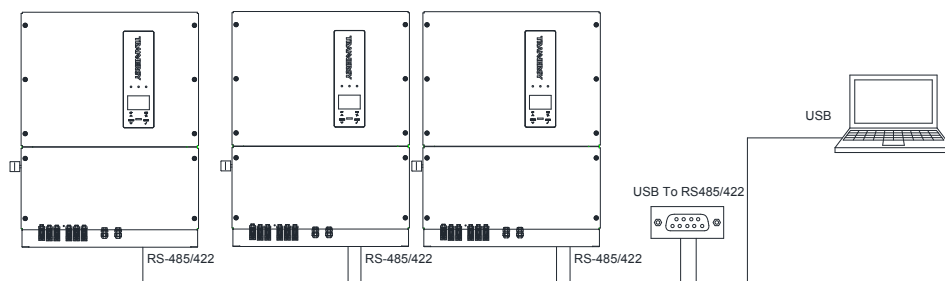


Figure 6-3 Monitoring Topology Diagram

2. Remote monitoring system

When user choose WiFi/GPRS/Ethernet communication, User can open a web browser and visit the portal website: <http://log.tranergy.com/> , after register and log in, you can monitor information of inverter.

At Apple’s and Android’s app store, you can input the key words: Tranergy-log, then you can download and install the Tranergy-log to your Mobile equipment. After the download and installed, input your user name and password, then visit your station,(we supply a free demo, for the users who do not register)choose the power station and enter the main interface, then you the daily energy etc. will be displayed. Meanwhile, you can view the relevant date to view the curve.

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.

7.4 Replacing the string fuses

For optional version inverter, it is necessary to replace the blow string fuses due to over current. To do so, proceed as follows:

1. Disconnect the AC circuit breaker.
2. Turn off the DC circuit and rotate DC switch to the "OFF" position.
3. Wait at least 20 minutes.
4. Loose the lower cabinet as Figure 4-9.
5. Observe the string fuse assignment and check the fuse conductivity using the multimeter. A non-conductive fuse indicates a fault in the affected string.
6. Have the installer of the PV generator check the affected string and order the fuse from Tranergy.
7. Replace the broken fuse and close the inverter and startup the inverter again.

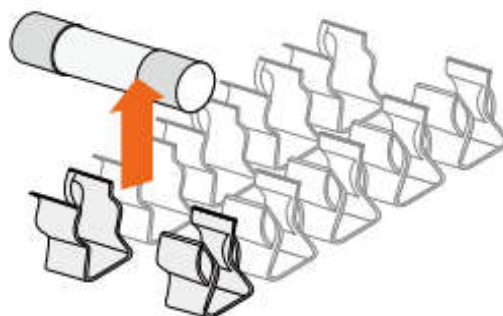


Figure 7-3 Replace the broken fuse

8. Technical data

MODEL	TRM025KTL	TRM030KTL	TRM033KTL	TRM035KTL
Rated AC power	25000 W	30000 W	33000 W	35000 W
Maximum AC power	25000 VA	30000 VA	33000 VA	35000 VA
INPUT				
Maximum input power	26000W	32000 W	35000 W	37000 W
Maximum DC voltage in an open circuit	1000 Vdc	1000 Vdc	1000 Vdc	1000 Vdc
MPP voltage range / rated input voltage	250 - 800 Vdc / 600Vdc	250 - 800 Vdc / 600Vdc	250 - 800 Vdc / 660Vdc	250 - 800 Vdc / 660Vdc
Maximum input current	20Adc / 30 Adc	30Adc / 30 Adc	30Adc / 30 Adc	30Adc / 30 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+3	3+3	3+3	3+3
MPPT number	2	2	2	2
OUTPUT				
Operating voltage	3/N/PE~400 Vac			
Number of grid phases	3	3	3	3
Voltage Range	310 Vac - 470 Vac			
Frequency range	50 Hz, 60Hz / -5 Hz ... +5 Hz			
Power factor	-0,8 - 0,98controllable			
Maximum current	38Aac	45.5Aac	48Aac	48Aac
DC current injection (max.)	< 2.5‰	< 2.5‰	< 2.5‰	< 2.5‰
Current Harmonic Distorsion(THDi)	< 3%	< 3%	< 3%	< 3%
SYSTEM				
Maximum efficiency	>98,3%	>98,3%	>98,3%	>98,3%
European efficiency	>97,9%	>97,9%	>97,9%	>97,9%
Switching plan	>99.5%	>99.5%	>99.5%	>99.5%
Off-grid protection	Yes	Yes	Yes	Yes
Night power consumption	< 0,2 W	< 0,2 W	< 0,2 W	< 0,2 W
Detecting earth leakage	Yes	Yes	Yes	Yes
Heat dissipation	Convection / Smart Air Cooling			
MECHANICAL SPEC.				
Dimensions in mm	590 x 230 x 780	590 x 230 x 780	590 x 230 x 780	590 x 230 x 780
Weight	45 Kg	47 Kg	47 Kg	47Kg
Protection class	IP65			
Display	3.5 inch LCD			
Display	RS232 / RS485 / RS422 / Ethernet / WiFi / GPRS			
Noise emission	<45Db(<55Db with fan)			
Ambient operating temp	-25 °C - +60 °C			
Casing	Aluminium			
CERTIFICATIONS				
Safety compliance	VDE AR-N-4105, VDE 0126-1-1+A1, CE,G59/3, UTE C15-712, MEA, PEA, NB/T32004-2013			

9. Warranty

9.1. Standard Warranty Period

For Tranergy inverters sold to UK, Netherlands, and Ireland, the standard warranty period is 120 months from the date of installation and no more than 126 months (10.5 years) from the date of shipment from Tranergy Co., Ltd.

For Tranergy inverters sold to other countries, the standard warranty period for Tranergy inverter is 60 months from the date of installation and no more than 66 months (5.5 years) from the date of shipment from Tranergy Co., Ltd.

9.2. Extension of Warranty

The purchaser may apply for a warranty extension up to 12 months following the installation date or 24 months from the date of shipment (whichever date comes first) from Tranergy by providing the serial number of the unit and purchased receipt. Extension warranty can be purchased for extra 5, 10 or 15 years for all inverters. Please refer to the Warranty Extension Order Form for more details.

9.3. Liability Insurance

Tranergy inverters are insured up to a maximum of \$3,000,000 by Chubb Insurance Company Limited.

9.4. Warranty Claim Procedure

Please report defective device with a brief error description and SN code to our service mail or service hotline for registration.

Alternatively, please contact your specific dealer or installer if your unit is defective or faulty.

To claim the warranty under the warranty terms of Tranergy, you need to supply us with the following information and documentation regarding the faulty unit: (email to our service mail is high recommended)

- Fill the warranty card including the following information:
 - ✓ Product Model No. (e.g. TRM030KTL) and serial number (e.g. PCL0030N15085020);
 - ✓ Error message on LCD screen (if available) or any information that would be helpful to describe the situation;
 - ✓ Detailed information about the entire system (modules, circuits, etc.);
- Documentation of previous claims/exchanges (if applicable);
- Copy of the invoice and warranty certificate for the inverter;
- Copy of the installation receipt with installation date;

After receiving above information, Tranergy will decide how to precede the service:

- Provide a replacement device of equivalent value according to model and age, and compensate the labor cost for the replacement , or;
- Perform on site replacement by Tranergy when necessary.

In the case of an exchange, the remainder of the warranty entitlement will be transferred to the replacement device. In this event, you will not receive a new certificate, as this replacement will be

noted by Trannergy. If the unit needs to be replaced following assessment, Trannergy will send a replacement unit immediately. The defective inverter should be sent back to the closest Trannergy office by packing in its original package if possible or other comparable packaging.

9.5. Exclusion of Warranty Claims

To provide better service to Trannergy's End Users, all Trannergy authorized Dealers or Distributors are requested to respond to End Users' warranty claim. Trannergy will replace any products or parts of the product during the Warranty Period proved to be defective in design or manufacture. Any defect caused by the following circumstances will not be covered by the manufacturer's warranty (the Dealers or Distributors are responsible and authorized by Trannergy for the following investigation):

- Product modified, parts replaced or attempt to maintain;
- Changes, or attempted repairs and erasing of series number or seals by non Trannergy technician;
- Incorrect installation or commissioning;
- Failure to comply with the safety regulations (VDE-A-RN-4105, VDE0126 standards, etc.);
- The Product has been improperly stored (including stored over time) and damaged while being stored by the Dealer or the end user;
- Transport damage (including scratch caused by movement inside packaging during shipping). A Claim should be made directly to shipping company/insurance Company as soon as the container/packaging is unloaded and such damage is identified;
- Failure to follow any/all of the user manual, the installation guide and the maintenance regulations;
- Improper use or misuse of the device;
- Insufficient ventilation of the device;
- Influence of foreign objects and force majeure (lightning, grid overvoltage, severe weather, fire, etc.);
- Customers get the Trannergy product under improper transaction such as with legal dispute, unpaid debt, etc.
- During the warranty period more than 10 years and less than 25 years, the freight and replacement cost is covered by the customer, no matter how long the warranty is extended. Trannergy will offer a repaired product after receiving the defect product in those cases.
- Trannergy reserves the right of final interpretation of all the terms.

9.6. Service after Warranty Expiration

For products which are out of warranty, Trannergy charges an on-site service fee, parts, labor cost and logistic fee to end-user which can be any/all of:

- On-site attendance fee: Cost of travel and time for the technician in attending on-site;
- Parts: Cost of replacement parts (including any shipping/admin fee that may apply);
- Labor: Labor time fee charged for the technician, who is repairing, maintaining, and installing (hardware or software) and debugging the faulty product;
- Logistic fee: Cost of delivery, tariff and other derived expense when defective products are sent from user to Trannergy or/and repaired products are sent from Trannergy to user;

10. Contact Information

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

Trannergy Co., Ltd

Address: No.188 Weiwu Rd, Shanghai China 201802

Email: service@trannergy.com

Hotline: +86 400-012-9979

Trannergy UK Ltd

Address: Mezzanine Floor 19, 19-21 Crawford Street, London, W1H 1PJ

Email: service@trannergy.com

Hotline: 0845 056 4118

Trannergy Benelux Service Center

Address: Loosterwegnoord 2J, 2161AP Lisse, The Netherlands

Email: service@trannergy.com

Hotline: +31 2 02170801

Trannergy Australia Service Center

Email: service@trannergy.com

Hotline: +61 (0)9 2188 2117

Signature:

For and on behalf of
TRANENERGY CO., LTD.
上海兆能电力电子科技有限公司

.....
Authorized Signature(S)

Date: Mar.1 2015

For further information of Trannergy warranty regulation and reliability, please visit
www.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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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

