

GCI-5K INSTALLATION AND OPERATOR'S MANUAL

Grid-tied inverter for wind

Ningbo Ginlong Technologies

- 1 INTRODUCTION**
- 2 SAFETY GUIDELINES AND WARNINGS**
- 3 INSTALLATION**
 - 3.1 Selecting a location for the inverter**
 - 3.2 Mounting the inverter**
 - 3.3 Electrical connections**
- 4 MANIPULATE AND MONITOR**
 - 4.1 Overall view**
 - 4.2 Status Indicator Lights**
 - 4.3 Keypad**
 - 4.4 Display LCD**
 - 4.5 Advanced Info.**
 - 4.6 Advanced Settings**
- 5 SPECIFICATIONS**

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions for model GCI-5K that shall be followed during installation and maintenance of the inverter.

To reduce the risk of electrical shock hazards, and to make sure the equipment is safely installed, special safety symbols are used in this manual to highlight potential safety hazard and important safety information. The symbols are



WARNING: the paragraphs highlighted by this symbol contain processes and instructions that must be absolutely understood and followed to avoid potential danger to people.



NOTE: the paragraphs highlighted by this symbol contain processes and instructions that must be understood and followed to avoid potential damage to the equipment and wrong results.



CAUTION: Risk of electric shock. Please operate the GCI-5K under the following explanation.



CAUTION: Risk of hot.

1 INTRODUCTION

GCI-5K is a transformerless grid-tied inverter. It has a good response for wind speed change and a very wide input voltage operate range from 30Vdc to 540Vdc. The 40 points power curve that can be set by the display inside GCI-5k is very helpful for the turbine catching the wind energy better. Anyway, the GCI-5K is designed for small scale wind turbine system specially.

2 GENERAL SAFETY

The labels utilize the following symbols

GRID	Equipment grid wires connect terminal.
COM	Equipment communication connect terminal.
DC+	The DC input positive terminal
DC-	The DC input negative terminal



CAUTION: Risk of Electric Shock, Do Not Remove Cover. No User Serviceable Parts Inside. Refer Servicing To Qualified Service Personnel. Each circuit must be individually disconnected and the service person must wait 5 minutes before servicing.



CAUTION: Hot surface. Do not touch.



Warning: Because the GCI-5K is transformerless inverter, so if testing the GCI-5K, please insure that the DC input source and AC output source must be electrical isolation, otherwise the inverter will be broken.



All electrical installations must be done in accordance with the local and National Electrical Code ANSI/NFPA 70.



The GCI-5K has a heat sink on its top surface to help cool the internal components. The heat sink can reach temperatures as high as 158°F(70°C). to avoid the risk of burns, never touch the GCI-5K's heat sink while the unit is in operation.

CAUTION:

- i) The inverter contains no user-serviceable parts. Refer maintenance to qualified service personnel.
- ii) Risk of Electric Shock from energy stored in capacitor. Do not remove cover until 5 minute after disconnecting all sources of supply.
- iii) To reduce the risk of fire, connect only to a circuit provided with the required branch circuit overcurrent device sized in accordance with the National Electric Code, ANSI/NFPA 70. The maximum size overcurrent device shall not be more than 25 amperes.

INTENDED USE

The inverter is constructed as per the applicable safety-technical guidelines. Use the inverter only in installations that meet the following qualifications:

- i) In permanent installations;
- ii) Connected to a separate, grounded AC group, to which no other electrical equipment is connected;
- iii) The electrical installation must meet the applicable regulations and standards, must be carried out correctly and must be in a good condition;
- iv) Installed according to the instructions stated in this manual;
- v) According to the technical specifications

3 INSTALLATION

3.1 Selecting a location for the inverter

In choosing a location for the inverter, consideration should be given to the following criteria:

3.1.1 The heat sink temperatures can exceed 75°C. This product must be installed so that persons will not contact the top of the unit.

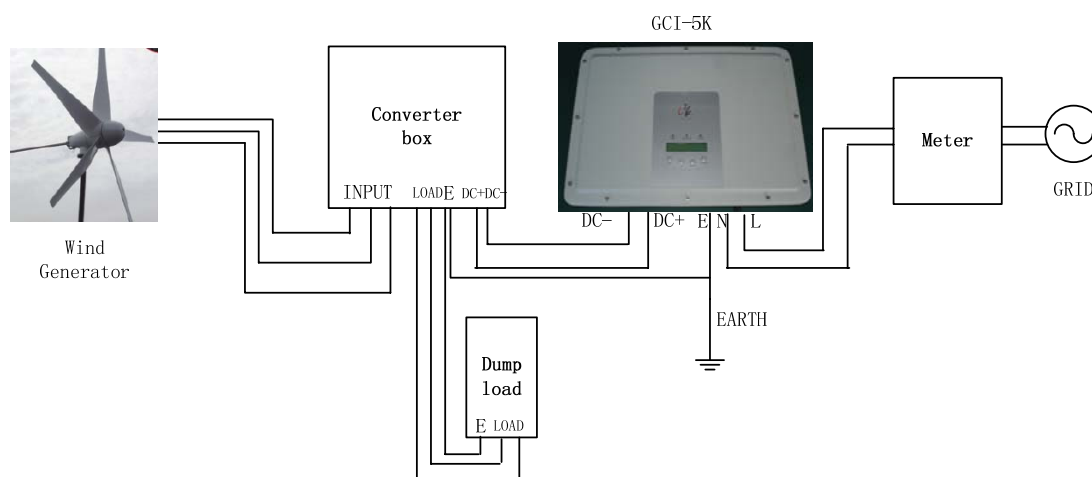
3.1.2 The inverter is designed to suit for extremes temperature for most climates. The operating ambient temperature range is from -25 °C to 60 °C.

3.1.3 the following clearances are recommended for proper placement of the inverter: A minimum 500mm clearance between the bottom of the inverter and the ground; visibility of the operating LED's and display located at the top front of the inverter box should be considered.

3.1.4 if the inverter is to be installed in an enclosed space, adequate ventilation must be provided.

3.2 Assembly

The following picture is the system assembly demonstration.



3.3 Wall mounting

Inverter should be mounted in a vertical position as shown in Figure 3-1.

The package includes a hardware kit with 6 5.5×38 stainless steel screws, 4 stainless steel washers and 6 SX8 wall plugs for installation of metal bracket to a masonry wall, 2 M4×30 stainless steel screws for installation of inverter to bracket.

3.3.1 Locate the wall studs in the desired location and align the mounting bracket over the studs. Mark the mounting holes. For concrete wall mounting the holes should be min. 8mm in diameter and min. 40 mm deep. Ensure that locations A, B, C, D, E and F (in Fig 2) are aligned over the wall studs.

3.3.2 **MAKE SURE BRACKET IS LEVEL.** Ensure points A, B, C, D, E and F (in Fig 2) are aligned with wall studs. Use 5.5×38 stainless steel screws, washers and SX8 wall plugs to A, B, C, D, E and F (in Fig 2) to the wall.



WARNING: Bracket shall be mounted vertically on wall.

3. Carefully hang the inverter on the upper part of the bracket so that the hooks located at the rear of the inverter hang over the bracket. Use

M4×30 stainless steel screws and stainless steel washers to secure points G and H (in Fig 1) to the

bracket .



Figure 3-1 Wall Mounting

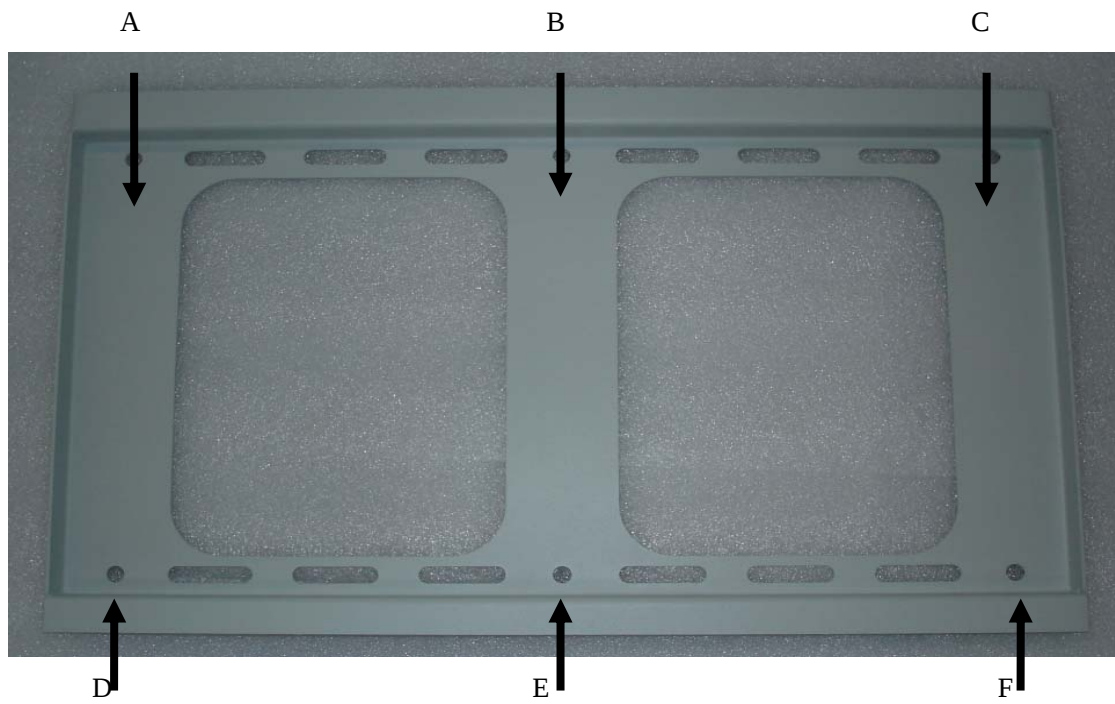


Figure 3-2 Mounting Bracket

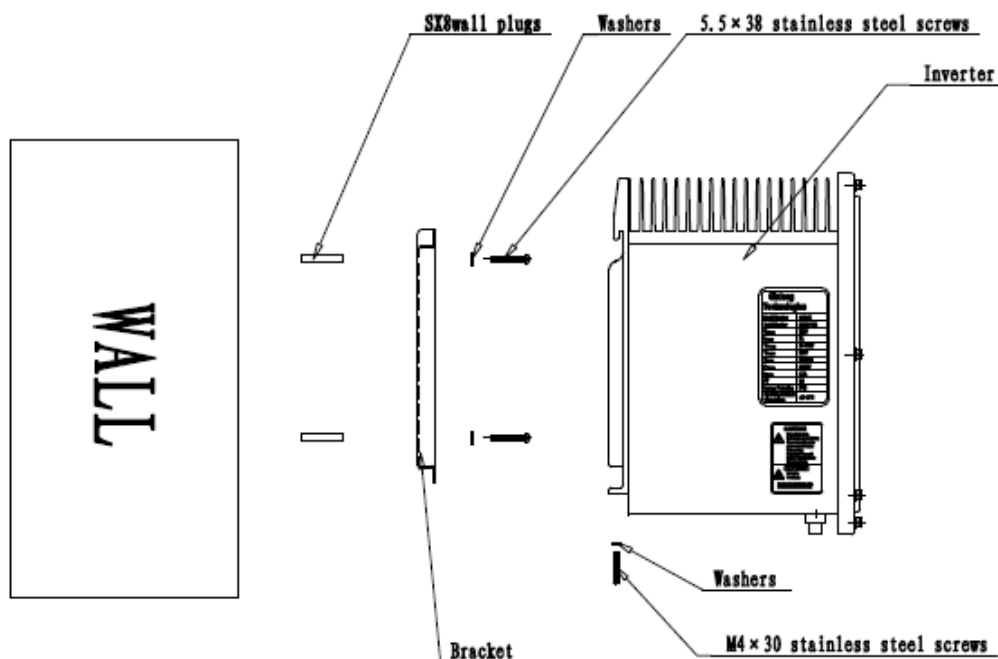


Figure 3-3 Inverter Mounting

3.4 Electrical connections

GCI-5K is designed for easy electrical connection, and the cover can be able to not open when connection.

All electrical installations must be done in accordance with all local electrical codes and with the National Electrical Code (NEC), ANSI/NFPA 70. Use #10 AWG (maximum), 105 °C, copper wire for all AC wiring connections to the grid. Voltage drop and other considerations may dictate that larger size wires be used.

GCI-5K will transfer the power available for any input DC voltage value in a 30V to 540Vdc range to the utility. the max input current is 25A_{dc}. GCI-5K utility rated output is 240Vac.

- 3.4.1 open the AC grid disconnect switch
- 3.4.2 open the wind generator output AC disconnected switch.
- 3.4.3 connect GCI-5K to wind turbine output rectifier.

Ensure that output voltage polarity from the rectifier matches the “DC +” and “DC –” symbols. Connect the positive DC connector (refer to Fig.3-4) from the rectifier output positive terminal. Connect the negative DC connector (refer to Fig. 3-5) from the rectifier output negative terminal. Finally, connect the DC $\pm$ connector to the GCI-5K. The DC connector execute following from the step Figure 3-6 to step Figure 3-10.



Figure 3-4 DC+ connecter



Figure 3-5 DC- connector



Figure 3-6 connect step No.1

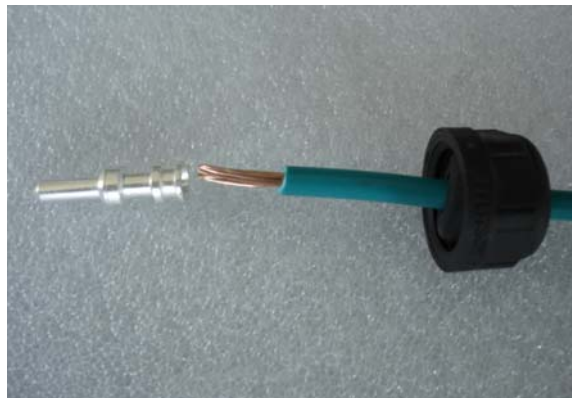


Figure 3-7 connect step No.2



Figure 3-8 connect step No.3



Figure 3-9 connect step No.4



Figure 3-10 connect step No.5

3.4.4 connect GCI-5K to the AC grid switch.

Each GCI-5K have a AC grid terminal connector that is showed in Fig.3-11.



There are “L” “N” “ $\perp$ ” symbol on the connector (refer to Fig3-12), the Line wire of grid must be connected to “L” terminal; the Neutral wire of grid must be connected to “N” terminal; the Earth of grid must be connected to

“” (refer to Fig.3-13).



Figure 3-11 AC terminal connector



Figure 3-12 grid terminal connector.2



Figure 3-13 connect the wires to grid terminal
Where, put terminal coat to the terminal.



Figure 3-14 put the coat to the terminal
Where, put the connector to the GCI-5K.



Figure 3-15 connect the terminal to GCI-5K

4 Manipulate and monitor

In order to start up GCI-5K, the following step must be done:

- i) Switch the Grid AC breaker ON. If the utility have the normal power supply, the GCI-5K turn on(the display red light on).
- ii) Switch the wind generator breaker on.
- iii) When both the inverter DC side and Grid side have the power, the inverter will prepare to generating. In the beginning, the inverter check the grid and inner inverter in order to ensure the inverter is ok and the grid voltage and frequency is ok. At this time the green light will glitter.
- iv) After 3 minutes, the GCI-5K will generate electricity normally. This time, the green light will be on.



Do not touch the heat sink when the inverter is operating, because some parts may be hot and cause burns.

4.1 Overall view



Figure 4-1 Front Panel display

4.2 Status Indicator Lights

There are three status indicator lights on the cover of GCI-5K. The left POWER light (red) indicates power status of the inverter. The middle OPERATION light (green) indicates the operation status. The right ALARM light (yellow) indicates the alarm status. The following table explains the meanings (Table 4-1).

Table 4-1 Status Indicator lights

light	Status	Description
POWER	ON	The inverter is power on from the grid
	OFF	The inverter is power off.
OPERATION	ON	The inverter is operating correctly.
	OFF	The OPERATION light turns off indicates that inverter has stop generate electricity.
	BLINKING	The inverter is Initializing.
ALARM	ON	Alarm or fault condition is detected. The inverter stores last 10 messages.
	OFF	The inverter is operating correctly.

4.3 Keypad

There are four keys in the front of panel (from left to right): **ESC**, **UP**, **DOWN**, **ENTER KEYS**. The keypad is used for:

- Scroll the displayed parameter(**UP** and **DOWN** keys);
- Accessing and modifying the adjustable parameters (**ESC** and **ENTER** keys).

4.4 Display LCD

The two-line Liquid Crystal Display is located on the front panel of inverter.

The LCD shows:

- Inverter operation status and data;
- Service messages for operator;
- Alarm messages and fault indications.

During startup (5 sec), the LCD shows logo of company and model of inverter(see **Figure 4-2**).



Ginlong
GCI-5K

Figure 4-2

During regular operation, the display will show the power and GCI-5K status alternately (see **Figure 4-3**). The display shows a different screen every 10 seconds. Screens can be scrolled manually by pressing the **UP** and **DOWN** keys. Pressing the **ENTER** key gives access to **Main Menu**.

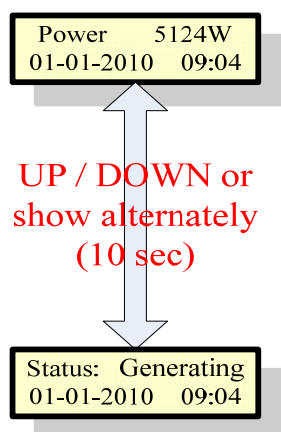


Figure 4-3

4.4.1 Main menu

There are four submenus in the main menu. Flowing:

- **Information**
- **Settings**
- **Advanced Info.**
- **Advanced Settings**

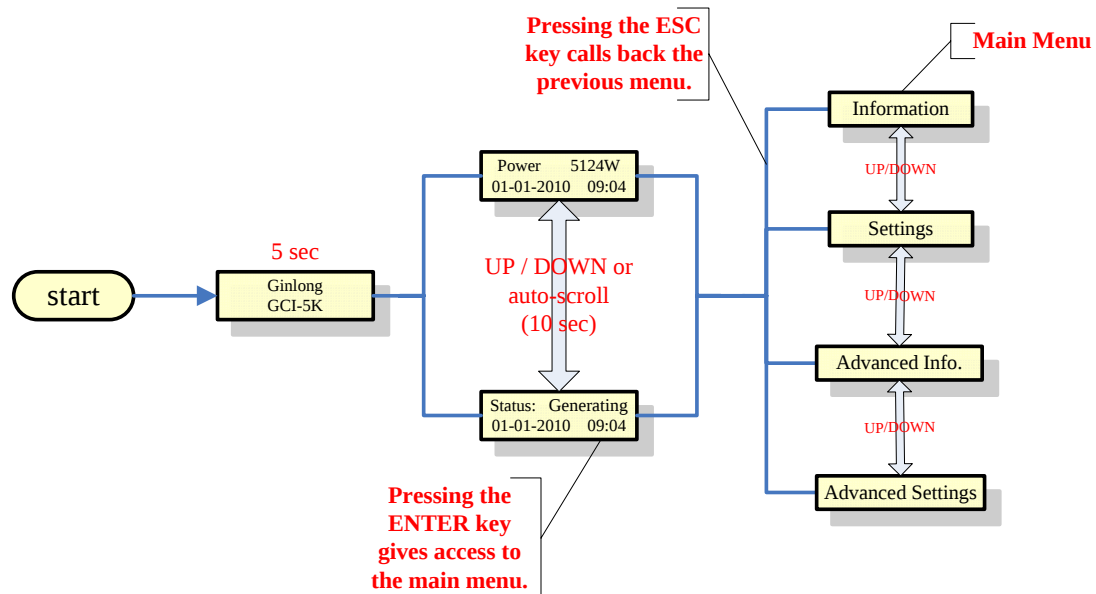


Figure 4-4 Startup Overall view

The display has 2 lines; use the keys at the side of the display to scroll through items or open the corresponding submenus. An arrow on the left side of the display highlights your current selection as shown in the following figure (**Figure 4-5**):

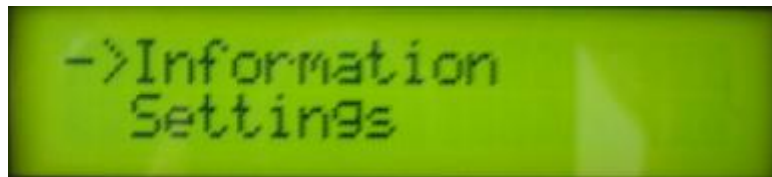


Figure 4-5

4.4.2 Information

Select the Information menu to display the information of inverter. These screens appear in the following order(**Table 4-2**).

Table 4-2 Information Indicator

Display	Duration	Description
V_DC 350.8 I_DC 5.1A	10 sec	V_DC : shows input voltage value. I_DC : shows input current value.
V_Grid 230.4V I_Grid 8.1A	10 sec	V_Grid : shows grid voltage value. I_Grid : shows grid current value.
Status: generating power: 1488W	10 sec	Status : shows instant status of GCI-5K. Power : shows instant output power value.
Grid Frequency F_Grid 50.06Hz	10 sec	F_Grid : shows instant frequency of grid value.

Total Energy 0258458 kwh	10 sec	Lifetime energy output value (since first clearing energy).
This Month: 0123kwh Last Month: 0123kwh	10 sec	This Month: Total energy output during this month. Last Month: Total energy output of last month.

During regular operation, the display will show the power and status of inverter alternately. The display shows a different screen every 10 seconds. Screens can be scrolled manually by pressing the **UP** and **DOWN** keys. Pressing the **ESC** key calls back the Main menu. At the same time, **ENTER** key can make the display lock (**Figure 4-7**) and unlock (**Figure 4-6**). Two figures is in the following.



Figure 4-6



Figure 4-7

Table 4-3 Status Indicator

Display	Description
Generating	Generating electircity
Low wind	Wind is low and no output power
Initializing	Inverter is initializing and ready to operate
OV-G-V	Over grid voltage
UN-G-V	Under grid voltage
OV-G-F	Over grid frequency
UN-G-F	Under grid frequency
G-IMP	Grid impedance high
NO-G	No grid
OV-DC	Over DC voltage
OV-BUS	Over DC bus voltage
UN_BUS	Under DC bus voltage ^a
SHORT-PRO	Short circuit fault
INI-PRO	System initial fault ^a
TEM-PRO	Over Temperature
GROUND-PRO	Ground fault

NOTE: a if GCI-5K's status is this, please connect to distributor or manufacture.

4.4.3 Settings

Select the **Settings** menu to display the following submenu:

- **Set Time**
- **Set Address**
- **Clear Energy**
- **Restore Settings**

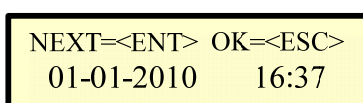
An arrow on left side of the display highlights your current selection. When chosen item is selected, press **ENTER** key to open the submenu. Pressing the **ESC** key calls back the Main menu.

4.4.3.1 Set Time

This function allows time and data setting.

Pressing **UP/DOWN** keys to set time and data. Pressing **ENTER** key to move from one digit to the next (from left to right). Pressing the **ESC** key to save time and data setting, and calls back the pervious menu.

The screen shows in the following figure:



NEXT=<ENT> OK=<ESC>
01-01-2010 16:37

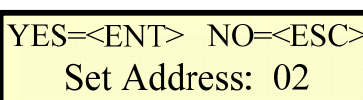
Figure 4-7

4.4.3.2 Set Address

This function is used to set addresses for communication of the single inverters connected in the system on RS485 line. You can assign number from 1 to 99.

Pressing **UP/DOWN** keys to set address. Pressing **ENTER** key to complete setting of address. Pressing **ESC** key to cancel pervious setting and call back pervious menu.

The screen shows in the following figure:



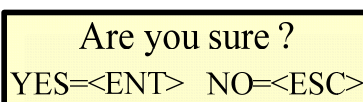
YES=<ENT> NO=<ESC>
Set Address: 02

Figure 4-8

The default address setting is NO.1.

4.4.3.3 Clear Energy

This function is used to clear energy (total energy, this month energy and last month energy). When selecting **Clear Energy**, the screen shows in the following figure:



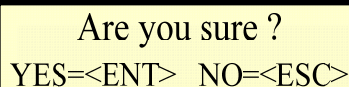
Are you sure ?
YES=<ENT> NO=<ESC>

Figure 4-9

Pressing **ENTER** key to make sure it setting. Pressing **ESC** key to cancel pervious setting and call back pervious menu.

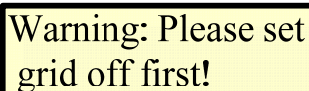
4.4.3.4 Restore Settings

This function is used to restore settings (see **Figure 4-10**). You must set **Grid OFF** before select it. If not, the screen will show in the following figure:



Are you sure ?
YES=<ENT> NO=<ESC>

Figure 4-10



Warning: Please set
grid off first!

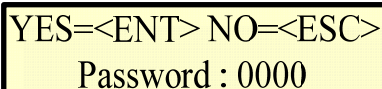
Figure 4-11

Pressing **ENTER** key to make sure it setting. Pressing **ESC** key to cancel pervious setting and call back pervious menu.

4.5 Advanced Info.

Select **Advanced Info.** from the Main menu to display the first screen, that refers to the password (see **Figure 4-12**). Type in the correct password and press **ENTER** to access all information in the following:

- **Alarm Message**
- **Temperature**
- **STD NO. & Curve NO.**
- **Version**
- **Communication Data**



YES=<ENT> NO=<ESC>
Password : 0000

Figure 4-12

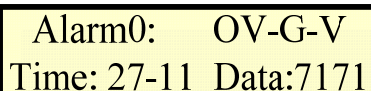
Screens can be scrolled manually by pressing the **UP** and **DOWN** keys. Pressing the **ENTER** key gives access to **Main Menu**. Pressing the **ENTER** key access to submenu.



NOTE: The default password is “0010”

4.5.1 Alarm Message

The display shows 10 alarm messages recently. Screens can be scrolled manually by pressing the **UP** and **DOWN** keys. Pressing the **ESC** key calls back the pervious menu.



Alarm0: OV-G-V
Time: 27-11 Data:7171

Figure 4-13

4.5.2 Temperature

The screen shows the power module temperature of GCI-5K.

Temperature
046.6°C

Figure 4-14

4.5.3 STD NO. & Curve NO.

STD NO.: shows the reference standard of GCI-5K.

Curve NO.: shows power curve version.

Standard: G83
Power Curve NO. : 02

Figure 4-15

4.5.4 Version

Model: shows the model of GCI-5K.

Software Version: shows the software version .

Model: 02
Software Version :8201

Figure 4-16

4.5.5 Communication Data

Shows the GCI-5K inner data. Just for the service person.

01-05: 01 25 E4 9D AA
06-10: C2 B5 E4 9D 55

Figure 4-17

4.6 Advanced Settings

Select **Advanced Settings** from the Main menu to display the first screen, that refers to the password. Type in the correct password and press ENTER to access all information in the following:

- **Power Curve**
- **Select Standard**
- **Grid ON/OFF**
- **New Password**

4.6.1 Power Curve

Select the **Power Curve** menu to display the following submenu:

- **Set power Curve**
- **Select Power Curve**

This function is used to set and select power curve.



NOTE: in order to make the function availability, you must set **Grid OFF** first (please see 4.6.3) .

A) **Set Power Curve**

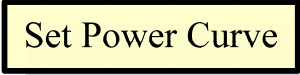
A yellow rectangular box with a black border containing the text "Set Power Curve".

Figure 4-18

This function is setting the power curve data by customer.

Please choose the version number of the setting power curve data which is from 01 to 03(see Fig.4-19).

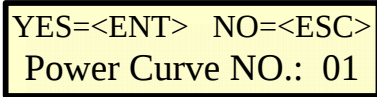
A yellow rectangular box with a black border containing the text "YES=<ENT> NO=<ESC>" on the first line and "Power Curve NO.: 01" on the second line.

Figure 4-19

And then, set power curve:

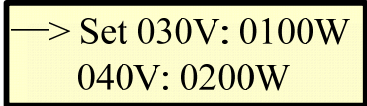
A yellow rectangular box with a black border containing the text "—> Set 030V: 0100W" on the first line and "040V: 0200W" on the second line.

Figure 4-20

Pressing **UP/DOWN** keys to set power curve. Pressing **ENTER** key to move from power digit to the next (from left to right). Press the **ECS** key to save and send power curve (see **Figure 4-21**).

A yellow rectangular box with a black border containing the text "—> Save & Send" on the first line and "Cancel & Exit" on the second line.

Figure 4-21



NOTE: In order to make the power curve setting availability, GCI-5K must be set **GRID-ON NOW** (see 4.6.3).

When customer set the power curve (01—03), the power curve data will save to the EEPROM. Next starting the GCI-5K, the power curve data can be used directly.

B) Select Power Curve

This function is choosing the power curve number. When you have set the power curve data, you can choose the power curve number which you want to run by this function.

A yellow rectangular box with a black border containing the text "Select Power Curve".

Figure 4-22



NOTE: in order to make the function availability, you must set **Grid OFF** first (please see 4.6.3)

Select the **Power Curve** menu to display the following:

YES=<ENT> NO=<ESC>
Curve NO.: 01

Figure 4-23

Press the **ENTER** key to save and send power curve. Pressing **ESC** key to cancel pervious setting and call back pervious menu. In this menu, you can select four power curve number from 01 to 04. The 01,02,03 power curve is the user edit ; the 04 power curve is the GCI-5K default value and be not able to change (refer to Table 4-4).

Table 4-4 the 04 number power curve

DC value (V)	Power (W)	DC value (V)	Power (W)
30	0	230	2550
40	0	240	2700
50	0	250	2850
60	0	260	3000
70	0	270	3150
80	0	280	3300
90	0	290	3450
100	360	300	3600
110	600	320	3900
120	780	340	4200
130	960	360	4500
140	1140	380	5010
150	1320	400	5010
160	1500	420	5010
170	1710	440	5010
180	1920	460	5010
190	2010	480	5010
200	2100	500	5010
210	2250	520	5010
220	2400	540	5010

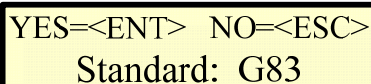


NOTE: In order to make the power curve setting availability, GCI-5K must be set **GRID-ON NOW** (see 4.6.3).

4.6.2 Select Standard

This function is used to select reference standard of grid (see **Figure 4-20**).

Pressing **UP/DOWN** keys to select standard (**AS4777, VDE0126, UL1741, G83, User-Def**). Pressing **ENTER** key to complete selection. Pressing **ESC** key to cancel pervious setting and call back pervious menu.

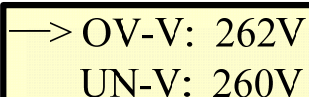


YES=<ENT> NO=<ESC>
Standard: G83

Figure 4-24

Select the **User-Def** menu to display the following submenu:

- **OV-V:** 240---265V
- **UN-V:** 180---210V
- **OV-G-F:** 50.3---52.0Hz(60.3—62.0Hz)
- **UN-G-F:** 47.0---49.5Hz(57.0—59.5Hz)



—> OV-V: 262V
UN-V: 260V

Figure 4-25

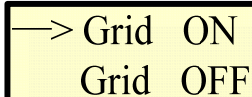
Press the **UP/DOWN** keys to scroll through items. Press the **ECS** key to save and send standard of grid. Press the **ENTER** key to set standard of grid.

NOTE: in order to make the function availability, you must set **Grid OFF**

4.6.3 Grid ON/OFF

This function is making the inverter generate electricity or not.

Screens can be scrolled manually by pressing the **UP** and **DOWN** keys. Pressing **ENTER** key to make sure it setting. Pressing **ESC** key to call back pervious menu.



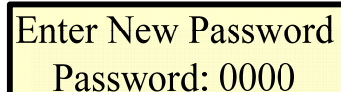
—> Grid ON
Grid OFF

Figure 4-26

4.6.4 New Password

This function is used to change the password.

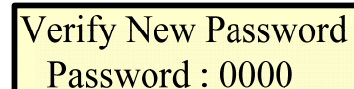
The first time set a new password.



Enter New Password
Password: 0000

Figure 4-27

Verify new password.



Verify New Password
Password : 0000

Figure 4-28

Setting is ok.

Verify New Password
Done !

Figure 4-29

If verify new password failed, the screen will shows in the following:

Warnning:
Verify error!

Figure 4-30

5 SPECIFICATIONS

The DC Max voltage	600Vdc
The DC operation range	30V~540Vdc
The rating max dc input current	25Adc
The grid voltage range	211~264Vac (adjustable)
Operation phase	single
Rating grid output current	20.8Aac
Rating output power	5KW
The transient max power	5.5KW
Grid current THD	Total THd<4%,
The dc injection current	<50mA
Output power factor	>0.99
Grid frequency range	50Hz/60Hz (adjustable)
efficiency	95.5%
Design lifetime	>20 years
operation environment temperature	— 25~60°C