CHINT Grid PV-Inverter

CPS SC4.6KTL-O
Installation and Operation Manual
Version 2.0E

Contents

Before you start

Congratulations on choosing CHINT Grid PV-Inverter (referred to in this manual as "PV-Inverter", or simply "Inverter"). This PV-Inverter is a highly reliable product due to its innovative design and perfect quality control. The device is dedicated to high-demand, grid-linked PV systems.

This manual contains important information regarding installation and safe operation of this unit. Be sure to read this manual carefully before using.

If you encounter any difficulties during installation or operation, please refer to this manual before contacting your local dealer or representative. To obtain the latest manual and product information, please find the contact information at Chapter 12. **Contact Information**

Thank you for choosing this product. Please keep this manual on hand for quick reference. Start enjoying CHINT INVERTER and your life!

1. Safety Instructions

1. Do not remove the casing. Inverter contains no user serviceable parts. Refer servicing to qualified personnel.

2. Both AC and DC voltage sources are terminated inside the PV-Inverter. Please disconnect these circuits before servicing.

3. When the Photovoltaic panel is exposed to sunlight, it generates a DC voltage. When connected to this equipment, a Photovoltaic panel will charge the DC link capacitors.

4. Energy stored in this equipment's DC link capacitors presents a risk of electric shock. Even after the unit is disconnected from the gird and photovoltaic panels, high voltages may still exist inside the PV-Inverter. Do not remove the casing until as least 30 minutes after disconnecting all power sources.

5. This PV-Inverter is designed to feed power to the public power grid (utility) only. Do not connect this PV-Inverter to an AC source or generator. Connecting the inverter to external devices could result in serious damage to your equipment.

6. Carefully remove the unit from its packaging and inspect for external damage. If you find any imperfections, please contact your local dealer.

Hot Surfaces

Although designed to meet all safety requirements, some parts and surfaces of the inverter are still hot during operation. To reduce the risk of injury, do not touch the heat sink at the back of the PV-Inverter or nearby surfaces while it is operating.

2. Limited Warranty

This INVERTER comes with a 5-year warranty. An optional extended warranty may be available by special request before delivery. This warranty covers all defects due to design, manufacturing and components. This warranty does not cover damages resulting from:

- Seal on the product is broken
- Improper transportation and delivery
- Unqualified persons opening the unit
- Improper installation
- Unauthorized modification, testing or repairing
- Use and application beyond the definition in this manual
- Application beyond the scope of safety standards (e.g. VDE)
- Acts of nature, such as lightening, fire, storm etc.

Repairs and/or replacement of parts or the device are made at the manufacturer's discretion. Defective parts or malfunction discovered during installation should be presented in a written report for confirmation before applying for replacement or repair. The damage report must be issued within 5 working days after receiving the PV Inverter. Manufacturer is not responsible for damages beyond the scope of this warranty

3. Overview

3.1. Introducing the Grid PV System

The Grid PV System is mainly composed of 4 parts: the PV-panels, the PV-Inverter, the AC-Connection Unit (the connection Interface) and a connection to the Public Utility.

When a PV-panel is exposed to sunlight and connected to an inverter, it generates DC power. The PV-Inverter converts DC to AC and feeds in to the Public Utility via the AC-Connection unit.

Inverter

GRID Public Utility

+   −

DC-Input

AC Ouput

AC-Connection Unit

Feeding AC Power to Public Utility
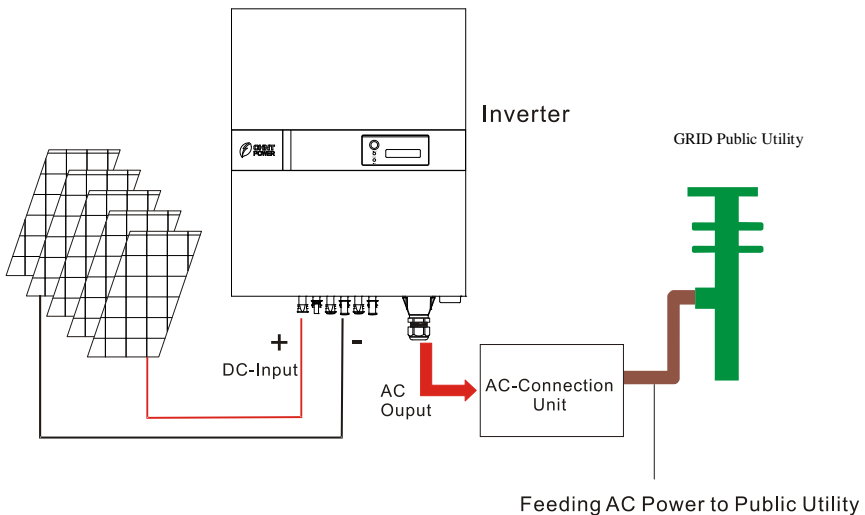
3.2. Introducing the Grid PV Inverter
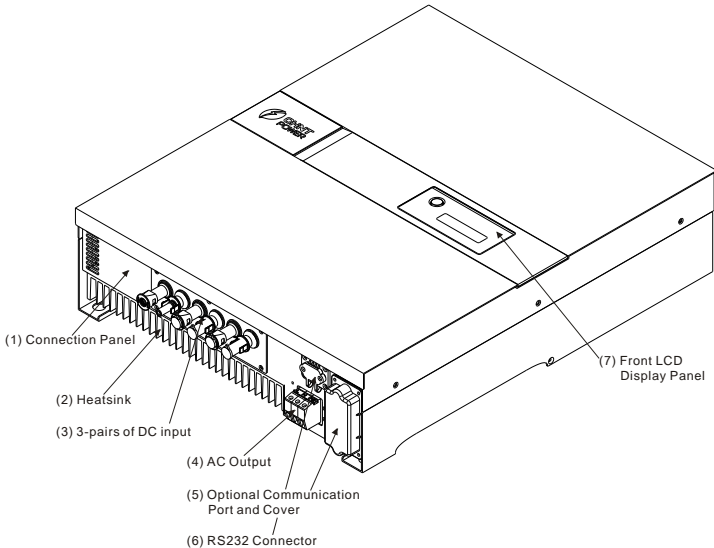
CHINT CPS SC4.6KTL-O Inverter

(1) Connection Panel: The connection panel contains DC and AC terminals, and communication ports as detailed below.

(2) Heat-sink: Part to dissipate heat produced by the inverter

(3) 3 pairs of DC-input terminals: Each input pair consists of positive and negative terminals. Refer to Installation Section for set-up information.

(4) AC-Output: Delivering AC to the Public Utility.

(5) Optional Communication Slot and Cover: An optional port to extend the communication interface, for example connecting an RS485 card. The port is protected by a water-proof cover.

(6) RS232 Port: Interface allows communication with computer with RS232 serial port.

(7) LCD Display: Device to display inverter operation status.

3.3. Front Panel LEDs

There are 2 LED's on the inverter, one is **green** and the other is **red**. Normally, only the green LED will turn on during operation. Their indicated status are explained as follows:

Power on (green LED): It lights when inverter is running. The only condition it will be dark is no power provided to inverter. In this case, inverter is in shutdown mode.

Fault (red LED): Once the LED lights, it means inverter is in "fault" or "failure" condition. To see the conditions, please refer to related section:
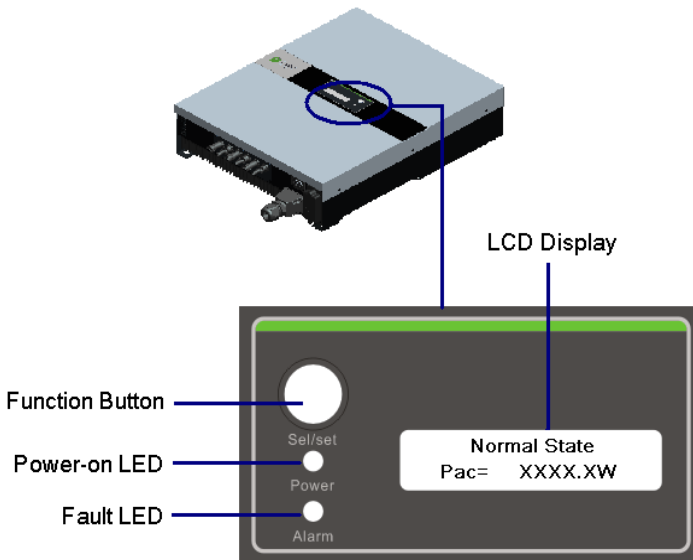
4. Features

- Very high conversion efficiency (up to 96%)
- 3 MPP (Maximum Power Point) trackers, independent or parallel operation
- IP65 compliant for outdoor application
- Embedded LCD, displaying status and system information
- Fanless design, quiet operation
- Stylish design
- Compact and unobtrusive
- High reliability
- Easy installation
- Maintenance free
- Standard RS232, optional RS485 and others
- Embedded ENS, complying with VDE 0126
- Internal GFCI (Ground Fault Current Interrupter)

5. Installation

5.1. Inside the Package

The following items are included with this Inverter package:

(1) One PV-Inverter

(2) Installation and Operation Manual

(3) 4 Mounting Screws and 4 Snap Bushings

(4) 2 Safety-lock screws

(5) Rubber Bushing

(6) Mounting Bracket

5.2. Mounting the PV-Inverter

Suggestions before mounting
To obtain optimal results from the PV-Inverter, please consider the following guidelines before installing the device:

Do not expose the PV-Inverter to direct sunlight. Direct sunlight increases the internal temperature that may reduce conversion efficiency.

✓ Check the ambient temperature of installation is within specified range -20 ~ +55°C.
✓ The AC grid voltage is between 190 and 267 VAC,50Hz.
✓ Electric utility company has approved the grid connection.
✓ Qualified personnel are performing the installation.
✓ Adequate convection space surrounds the inverter.

✓ Inverter is being installed away from explosive vapors.

✓　No flammable items are to be near the inverter.

Inverter can be installed and operated at locations where the ambient temperature is up to 55°C. However, for optimal operation, it is recommended that inverter is installed where the ambient temperature is between 0~40°C.

Mounting inverter to the wall

1. Choose a dry place, out of direct sunlight with ambient temperature between 0 and 40°C.

2. Select a wall or solid, vertical surface which is strong enough to support the inverter.

3. The PV-inverter requires adequate cooling space for heat dispersal. Reserve at least 50 cm above and below the inverter.
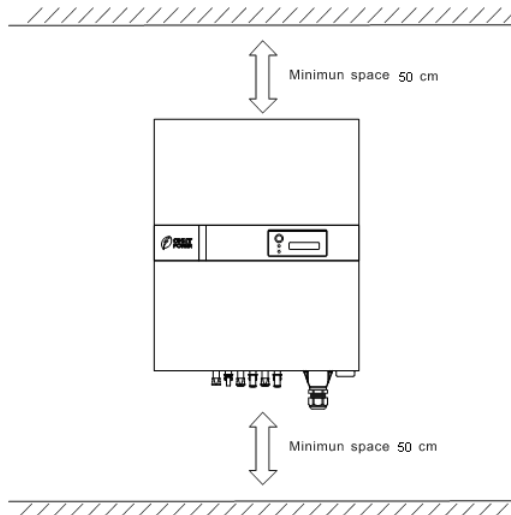
4. Fix the bracket by using outer mounting holes:

(a) To install the device to a wall, mark 4 outer holes at the back of the bracket as illustrated below.

4 Pcs Outer Holes
4 Pcs Snap Bushings

WALL

367 mm

50 mm

4 Pcs Screws

267 mm
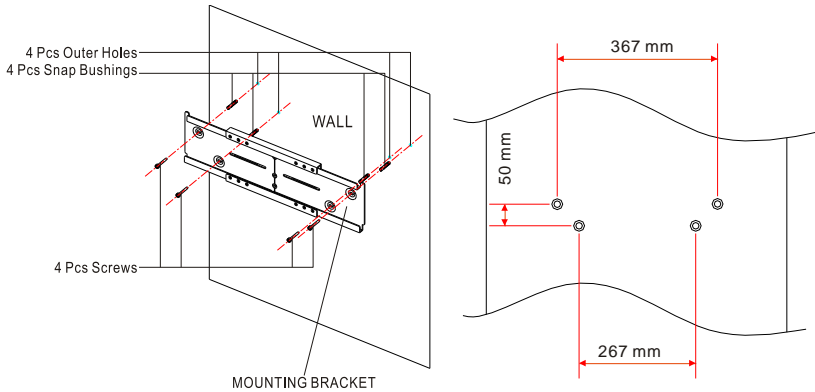
MOUNTING BRACKET

DIMENSIONS OF OPENING

（b）Drill the 4 marked holes in the wall, and then drive in the 4 Snap Bushings. Now insert the screws, and tighten.

（c）Mount the PV-Inverter onto the bracket as illustrated below.
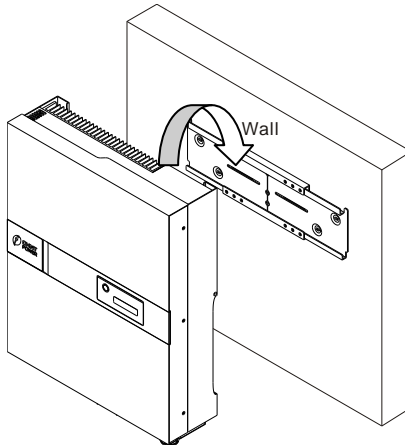
Wall

5. Fix the bracket by using central mounting holes:

    (a) To install the device to a narrow upright, mark 3 central holes at the back of the brackets as illustrated below.
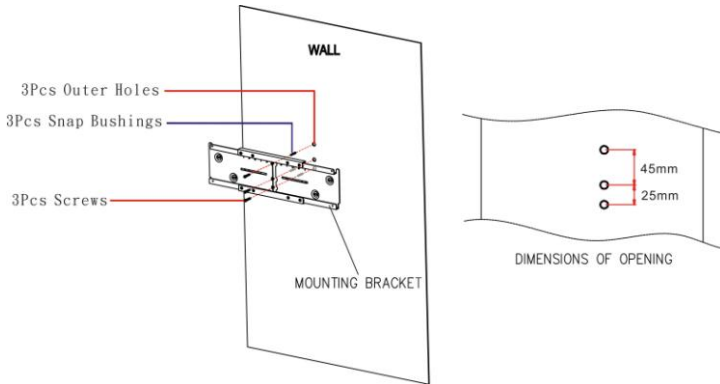
    (b) Drill the 3 marked holes in the wall, and then drive in the 3 snap bushings. Now insert the screws, and tighten.

6. Mount the PV-Inverter onto the bracket.
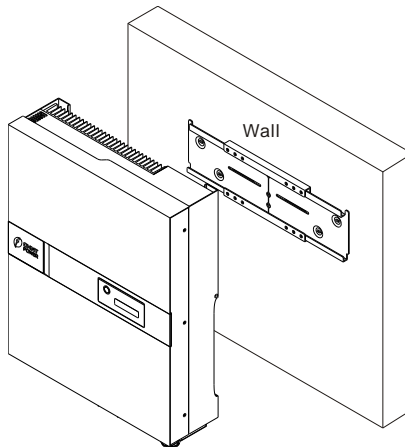
7. Insert the Safety Lock screws to fix the PV-Inverter in place.
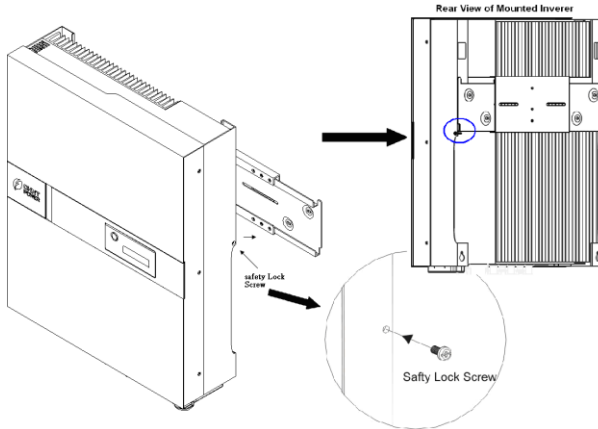
8. Ensure the device is properly fixed to the bracket.
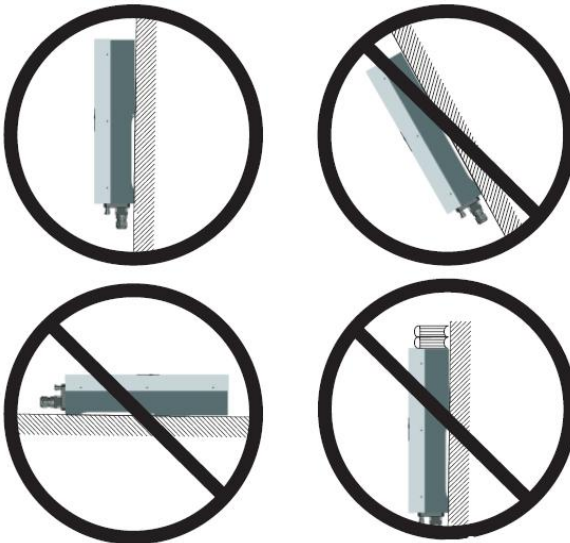
5.3. Connecting the AC-Output Cable

Connect PV-Inverter to the AC-Connection unit via the AC-output cable as following steps:
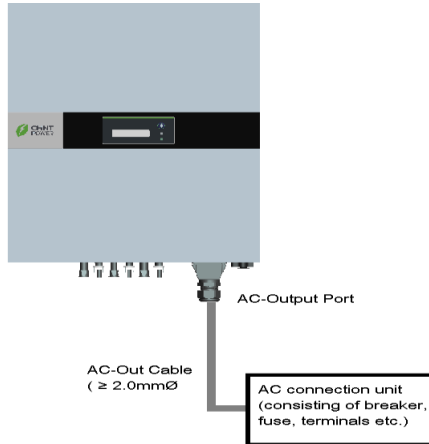
(1) Unscrew those four screws around terminal block, keep them for AC cover screwing later.

(2) Find rubber bushing in accessory box, cut a suitable hole in it for feeding AC cable.

(3) Unscrew cable gland of AC cover, feed AC cable through cable gland; bushing; AC cover orderly before crimping it with insulated cord end terminal.

(4) Crimp an insulated cord end terminal to each wire.

(5) Screw terminals of wires to correct poles of terminal block individually, check all wires are tightly connected.
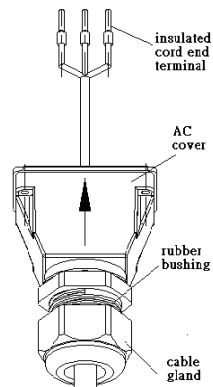
(6) Screw AC cover to chassis firmly, then screw
cable gland to lock cable with AC cover together.
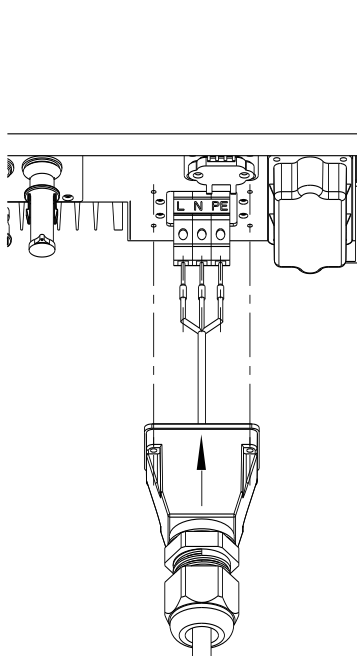
Please note that all wires should be at least 2.0mmØ and firmly connected with torque value 1.5Nm.

To obtain solid connection to terminal block, we strongly suggest that appropriate insulated cord end terminals are used for each wire, and the stripping length is 12mm.

5.4. Connecting the PV-Panel
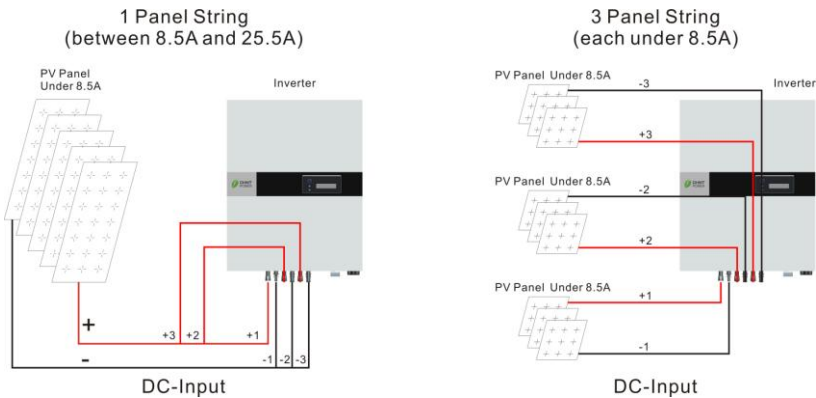
(1) First make sure the maximum open circuit voltage Voc of each PV string is below 750VDC UNDER ANY CONDITION.
(2) Always connect PV-Panel positive (+) terminal to PV-Inverter DC positive (+) terminal, and the PV-Panel negative (-) terminal to PV-Inverter DC negative (-) terminal.
(3) Each set of PV-Inverter DC terminals takes a maximum DC input of 8.5A. As a result, 3 pairs of PV-Inverter DC terminals can take a combined input of up to 25.5A.

(4) To fully optimize the PV DC output set-up, use the following configuration guidelines:
    (a) For PV DC output less than 8.5A, use a single pair of PV-Inverter DC terminals.
    (b) For PV DC output between 8.5A and 17A, use two sets of inverter DC terminals.
    (c) For PV DC output between 17A and 25.5A, use 3 sets of inverter DC terminals.

5.5. Connecting to the connection unit

The AC connection unit is an interface between PV-Inverter and the Public Utility. It may consist of an electrical breaker, fuse and terminals for connection to both PV-Inverter and the Public Utility. This Connection unit must be designed by qualified technician to comply with local safety standards.

AC-Output Port

AC-Out Cable
(≥ 2.0mmØ

AC connection unit
(consisting of breaker,
fuse, terminals etc.)
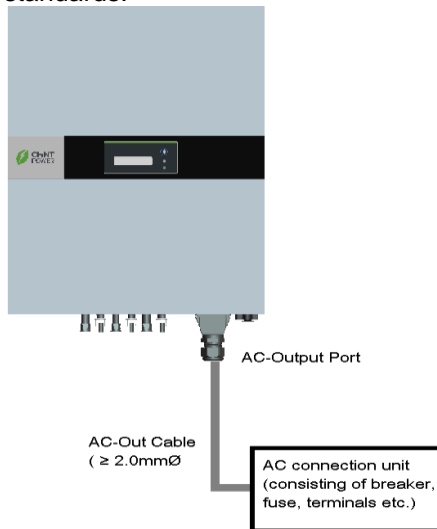
5.6. Installation checklist

(1) High voltages exist when the PV-Panel is exposed to the sun. Exposed terminals of the PV-Panel are live, and can cause electric shock. Avoid making physical contact with live parts of the device.

(2) After the PV-Panels are connected to the PV-Inverter, the output voltage is greater than 100VDC and the AC grid is not connected to the inverter, the LCD displays "Model= XXXXXX"-> "Waiting"-> "No Utility". The RED "fault LED" turns on.

Initial Display before Connecting to the Public Utility

Function button

Sel/set
Power
Alarm
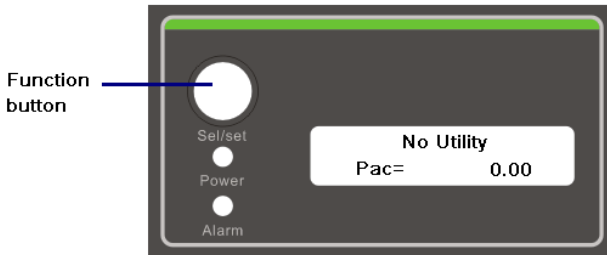
No Utility
Pac=   0.00

(3) Check the connection between PV-Inverter and AC Connection System. And then check the connection between the Public Utility and AC Connection unit. Close the AC breaker or fuse in the unit.
(4) Under normal operation, the LCD displays:

Sel/set
Power
Alarm

Normal State
Pac=   XXXX.XW
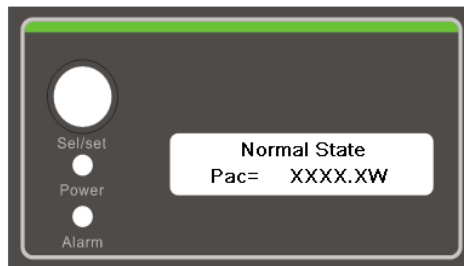
The PV-Inverter is feeding power to the grid, and the green LED displays.

Before connecting PV-Panels to DC terminals, make sure the polarity of each connection is correct. An incorrect connection could permanently damage the inverter.

(5) Congratulations, you have successfully installed PV-Inverter!

6. Operation of PV-Inverter

LCD Display

Function Button

Sel/set

Normal State
Pac=   XXXX.XW

Power-on LED

Power

Fault LED

Alarm
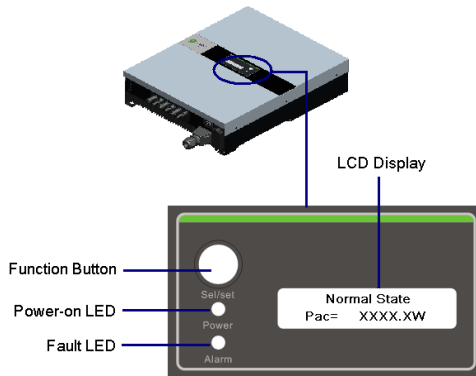
6.1. Initialization for Regulation Type Setting

1. The Inverter provides a "Initialization" function at the first time start-up as an process in which user is able to select the intended regulation type before normal operation.

2. The inverter will not able to operate normally before regulation setting is completed even though it is connected correctly at both DC input and AC output.

3. The foliiwing figure illustrates the process of "Initialization", and the display sequence of regulation available.

4. For example, if user need to set regulation type to RD1663, user have to power on the inverter to start the "Initialization" and change the menu by button control until RD1663 present, hold on to this regulation page and

then press the button for 5 more seconds unitl "**INIT OK**"
message appeared, the regulation setting is completed.

Note: Incorrect regulation type setting would cause inverter to non-operation, please consult with your dealer if you are not familiar with regulation type setting.

```
            ┌─────────────────────────┐
            │     INITIALIZATION      │
            │       Pac=xxxxW         │
            └─────────────────────────┘
                        │ Press button (1sec)
                        ▼
            ┌─────────────────────────┐
            │      VDE0126-1-1        │◄──┐
            │       Pac=xxxxW         │   │
            └─────────────────────────┘   │
                        │ Press button (1sec)
                        ▼                  │
  ┌──────────────┐    ┌─────────────────────────┐
  │   INIT OK    │◄───│        RD1663           │
  │  Pac=xxxxW   │    │       Pac=xxxxW         │
  └──────────────┘    └─────────────────────────┘
                        │ Press button (1sec)
                        ▼                  │
            ┌─────────────────────────┐   │
            │    ENEL Guide 2010      │   │
            │       Pac=xxxxW         │   │
            └─────────────────────────┘   │
                        │ Press button (1sec)
                        ▼                  │
            ┌─────────────────────────┐   │
            │          CGC            │   │
            │       Pac=xxxxW         │   │
            └─────────────────────────┘   │
                        │ Press button (1sec)
                        ▼                  │
            ┌─────────────────────────┐   │
            │         G83/1-1         │   │
            │       Pac=xxxxW         │   │
            └─────────────────────────┘   │
                        │ Press button (1sec)
                        └──────────────────┘
```

"**INIT OK**" indicate
Regulation type setting is completed

Press button (5sec) to set
intended Regulation type

Only appear for relevant model (CGC)

Only appear for relevant model (G83/1-1)

6.2. Auto-power

The PV-Inverter starts up automatically once DC-power from the PV-Panel is sufficient. There are 3 modes of operation.

6.3. Operating Modes

1. Normal

In this mode, the PV-Inverter automatically detects the system status and selects the best mode of operation.

If the power from the PV-Panel is greater than 150VDC, the supply is converted to AC fed in to the grid. If the power is less than 100VDC, the PV-Inverter displays "Waiting". During the wait state, the device uses minimal power from the PV-Panel to monitor the system status. During normal mode, the green LED is on.
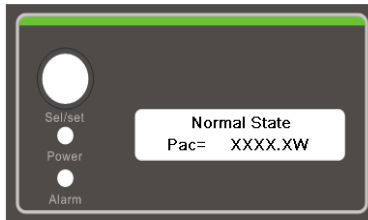
2. Fault

The PV-Inverter's intelligent controller continuously monitors the system status. Unexpected conditions such as grid problems or internal failures are displayed on the LCD and the "Fault LED" turns on.

Faults are indicated by the red "FAULT" LED. ————
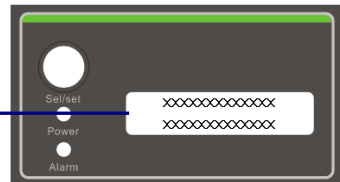
3. Shutdown

At the moment of reduced sunlight, the PV-Inverter automatically shuts down. No power is used from the grid, the LCD display and LEDs on the front panel do not work, and the function button is inactive.

4. Three Operating States: Standby, Waiting, Normal

During normal operation, the PV-Inverter enters a 'standby' state at voltages below 100V. Between 100V and 150V the device enters the 'waiting' state and begins checking its own internal status. The 'Normal' state is entered when the voltage is above 150V. The following example shows the LCD when the PV-Panel input increases above 100V:
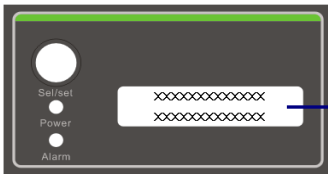
The LCD first displays the model name

```
Model= xxxxxx
Pac =  0.0W
```

When PV-Panel provides a voltage greater than 100V, the device enters the 'Waiting' state.

```
Waiting
Pac =  0.0W
```

When PV-Panel provides a voltage greater than 150V, the PV-Inverter counts down from 20 to 0 whilst checking the internal status before entering the 'Normal' state.

```
Checking   19s
Pac =  0.0W
```

```
Normal State
Pac = XXXX.XW
```

CHiNT POWER

Before connecting PV-Panels to DC terminals, make sure the polarity of each connection is correct. An incorrect connection could permanently damage the device.

6.3. Using the LCD Display

Use the Function Button to customize the LCD display settings, or view further information about the internal status of the PV-Inverter.

Press the Function Button to change the LCD display

```
Sel/set    xxxxxxxxxxxx
           xxxxxxxxxxxx
Power
Alarm
```

Pressing the Function Button during the 'Normal' state displays the grid voltage

```
Normal State
Pac = XXXX.XW
```

Pressing the Function Button twice reveals the grid frequency

```
Vac= xxx.xV
Pac = XXXX.XW
```

Pressing the Function Button three times displays the PV-Panel input voltage

```
Frequency= XX.XHz
Pac = XXXX.XW
```

Pressing the Function Button four times reveals the input current

```
Vdc= ----/ ---- / ----V
Pac = XXXX.XW
```

Pressing the Function Button five times displays the output current to the grid

```
Idc=----/ ----/ ----A
Pac = XXXX.XW
```

Press the Function Button six times displays the current energy output →
```
AC-current = XX.XA
Pac = XXXX.XW
```

Pressing the Function Button seven times displays the Model No. of the Inverter →
```
Energy = XXXKWh
Pac = XXXX.XW
```

Pressing Function Button nine times displays the firmware version →
```
CPS SC4.6KTL-O
Pac = XXXX.XW
```

Pressing the Function Button a tenth time returns to the status display →
```
Ver xx.xx
Pac = XXXX.XW
```

```
Normal State
Pac = XXXX.XW
```

Adjusting the LCD Contrast

Rapidly press the Function Button during the 'Normal' state to display contrast settings →
```
Normal State
Pac = XXXX.XW
```

To adjust the contrast settings, press the Function Button again →
```
Contrast▬■■■
Pac = XXXX.XW
```

"Set contrast" indicates to start to set contrast level →
```
Set Contrast
Pac = XXXX.XW
```

28

Repeatedly press the Function Button until the contrast reaches the desired level

Contrast ▄ ▄ ▄ ■ ■ ■ ■
Pac = XXXX.XW

After the highest level is reached, the contrast starts to decrease

Contrast ▄ ■ ■ ■
Pac = XXXX.XW

A few seconds delay and the display automatically returns to its "Normal" display

Contrast ■ ■
Pac = XXXX.XW

Normal State
Pac = XXXX.XW

Changing the Language

Repeat press the Function Button until "Set Language" shown on LCD

Normal State
Pac = XXXX.XW

Press and hold the Function Button to change the language

Set Language
Pac = XXXX.XW

Press the Function Button cycles through the available languages

Language: English
Pac = XXXX.XW

After a brief period of inactivity, the display returns "Normal"

Normal State
Pac = XXXX.XW

Locking the display

To lock the current display (for example, Frequency), press and hold the Function Button for about a second

> Frequency= XX.XHz
> Pac = XXXX.XW

The screen displays "Lock" then returns to the previous screen

> Lock
> Pac = XXXX.XW

Pressing the Function Button on the locked display changes to the next screen

> Frequency= XX.XHz
> Pac = XXXX.XW

After a few seconds of inactivity the display returns to "Normal"

> AC-current= XX.XA
> Pac = XXXX.XW

> Normal State
> Pac = XXXX.XW

Note: After 30 seconds of inactivity, the backlight switches off. Pressing the Function Button reactivates the backlight.

Accuracy of the LCD Reading
The reading on the LCD is just for reference. The readings during normal operation are accurate to +/- 2%. Over all modes of operation please allow +/- 5%.

The LCD Visibility and Ambient Temperature

Temperature extremes can influence the visibility of an LCD display. Visibility returns to normal within tolerable temperatures (see Installation chapter).

6.4. Auto Test Setting (Only for ENEL GUIDE 2010 model)

The Inverter is supplied with an auto test function which enables the user to check that the protection interface is operating correctly. In order to select this function, press the function button until the message "AUTO TEST SET" appears on the display panel. Press and hold the same button for at least 5 seconds to initiate the auto test procedure.

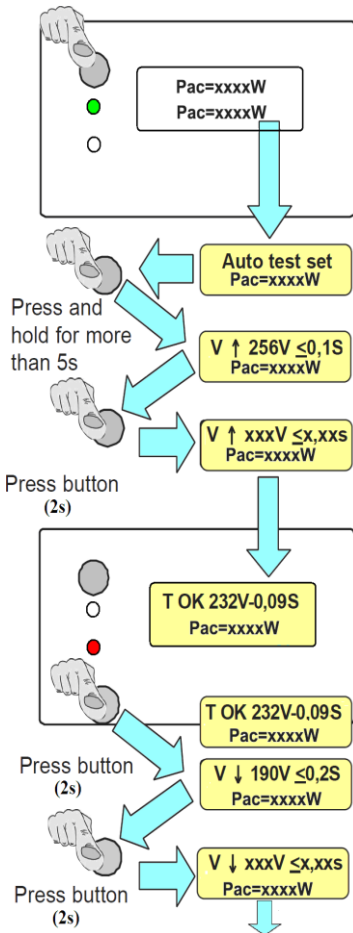|	
Pac=xxxxW Pac=xxxxW	Press function button until Auto test set appears.
Auto test set Pac=xxxxW	Press and hold function button for more than 5s.
V ↑ 256V ≤0,1S Pac=xxxxW	Upper voltage threshold will be checked.
V ↑ xxxV ≤x,xxs Pac=xxxxW	Display shows variation between upper voltage threshold and mains supply.
T OK 232V-0,09S Pac=xxxxW	If the threshold and the grid voltage are equal, the PV Inverter switches to fault.
T OK 232V-0,09S Pac=xxxxW	Display shows a message similar to this witch-off time OK.
V ↓ 190V ≤0,2S Pac=xxxxW	Lower voltage threshold will be checked.
V ↓ xxxV ≤x,xxs Pac=xxxxW	Display shows variation between lower voltage threshold and mains supply.

Press and hold for more than 5s

Press button (2s)

Press button (2s)

Press button (2s)

Auto Test Setting

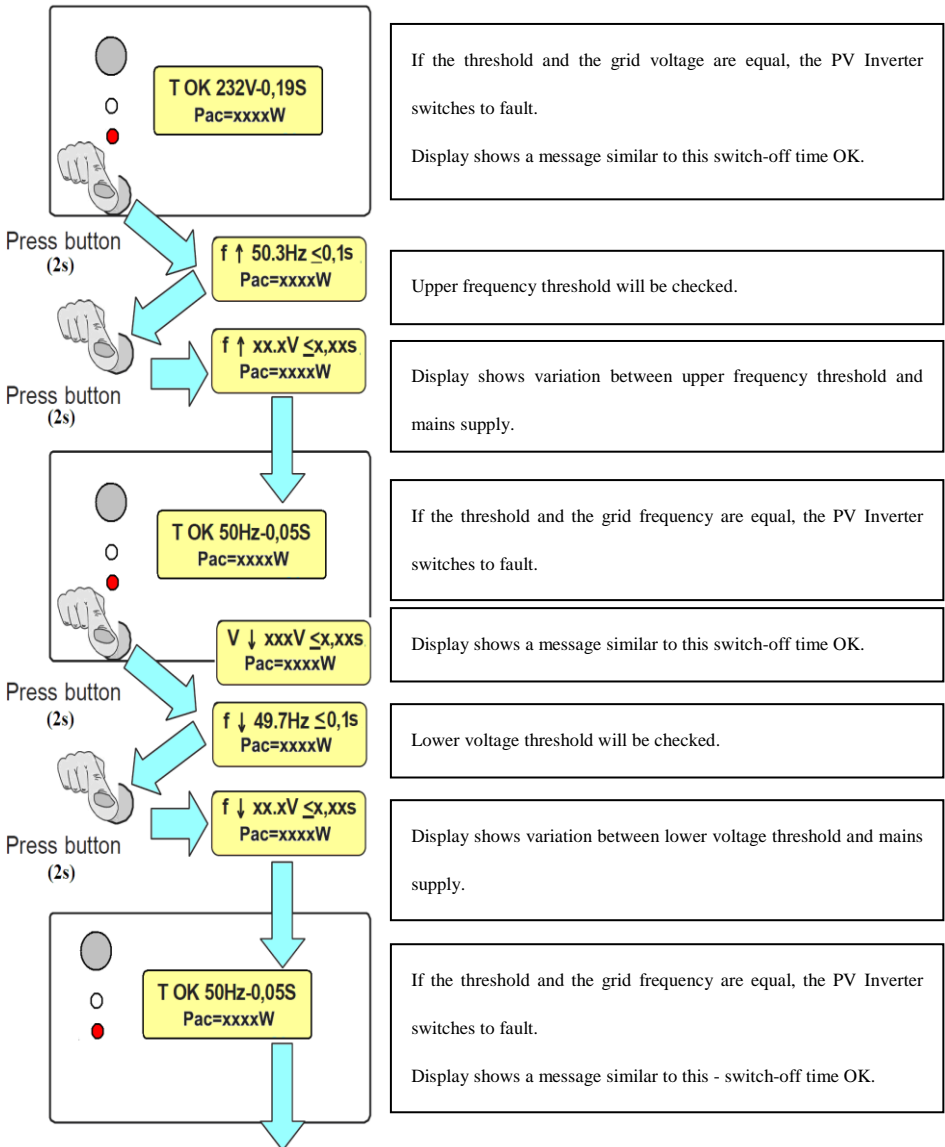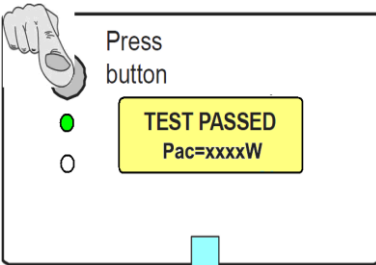|	
T OK 232V-0,19S Pac=xxxxW Press button (2s)	If the threshold and the grid voltage are equal, the PV Inverter switches to fault. Display shows a message similar to this switch-off time OK.
f ↑ 50.3Hz ≤0,1s Pac=xxxxW	Upper frequency threshold will be checked.
f ↑ xx.xV ≤x,xxs Pac=xxxxW Press button (2s)	Display shows variation between upper frequency threshold and mains supply.
T OK 50Hz-0,05S Pac=xxxxW	If the threshold and the grid frequency are equal, the PV Inverter switches to fault.
V ↓ xxxV ≤x,xxs Pac=xxxxW Press button (2s)	Display shows a message similar to this switch-off time OK.
f ↓ 49.7Hz ≤0,1s Pac=xxxxW	Lower voltage threshold will be checked.
f ↓ xx.xV ≤x,xxs Pac=xxxxW Press button (2s)	Display shows variation between lower voltage threshold and mains supply.
T OK 50Hz-0,05S Pac=xxxxW	If the threshold and the grid frequency are equal, the PV Inverter switches to fault. Display shows a message similar to this - switch-off time OK.

Auto Test Setting

If all the above tests have been performed, the display shows the message TEST PASSED.
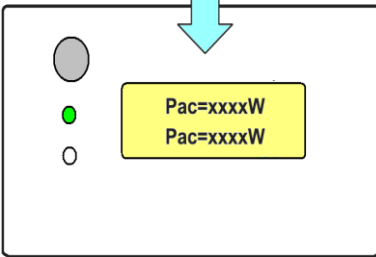
PV Inverter switches to normal operation mode.
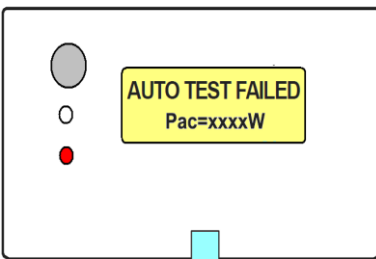
If one of the above tests failed, the display shows the message AUTO TEST FAILED.
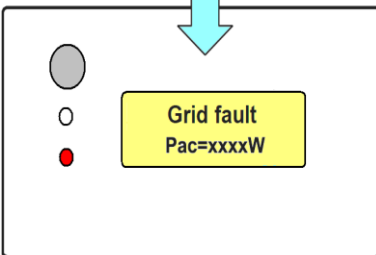
PV Inverter switches automatically and permanently to fault status. Contact the installer.

6.5. Auto Test Record (Only for ENEL GUIDE 2010 model)

After the Auto test setting, inverter will record the test result values, as shown in below.

Auto Test Record
Pac = xx.xW

↓

H:273V - 0.06s
Pac = xx.xW

↓

L:187V - 0.06s
Pac = xx.xW

↓

H:50.3Hz - 0.06s
Pac = xx.xW

↓

L:49.7Hz - 0.06s
Pac = xx.xW
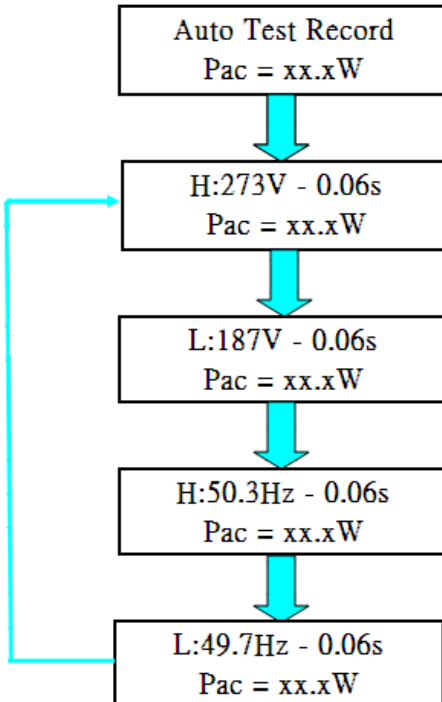
**Press the button for 5 seconds, the messages shown on the screen will change per second.

Un-press the button, the Auto Test Record will be shown on the screen.

If there's no test record, the message of "No Test Record" will be shown on the screen.

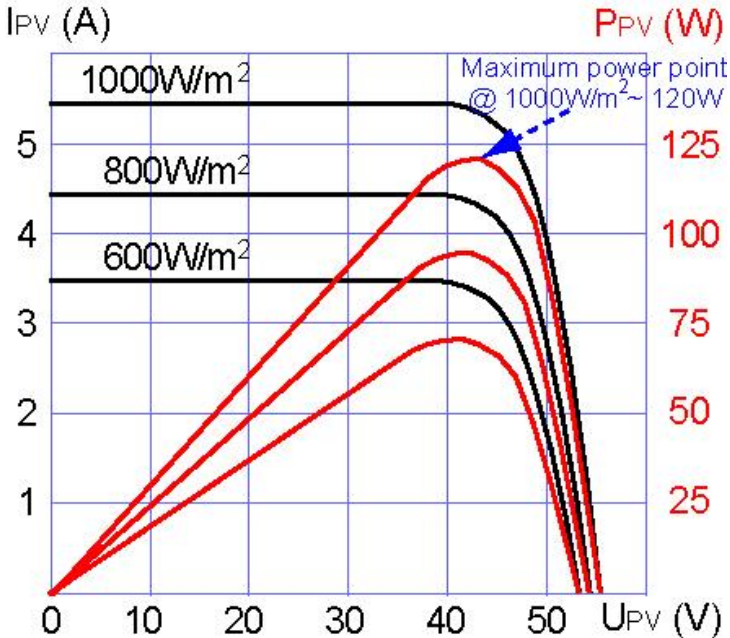## 6.6. Maximum Power Point Tracking (MPPT)

Due to its advanced design, the PV-Inverter can track the maximum power from any PV-Panel under any condition. When the output power display is stable, the PV-Inverter is converting the maximum power available. When the power reading fluctuates, the device is tracking power changes due to varying levels of sunlight.

Individual PV-Panel Output Graph

If the output of the PV-Panel is low, the AC power may drift slowly. It is normal because the PV-Inverter continuously tracks the maximum DC-power and the display reflects the varying power.

6.7. LCD Display Messages

Operating conditions	In English	In German	In Italian	Description
Normal Working Status				
Power off	–	–	–	PV inverter is totally shutdown, V_{PV} <=90V
Standby	Standby	Standby	Standby	90V< Input voltage < =120V
Initialization & waiting	Waiting	Warten	Attendere..	Input voltage range 120~150V during start-up. After PV voltage is higher than 120V, inverter is waiting for feeding to grid
Check grid	Checking xxxS	Netz-Prüfung xxxS	Verifica… xxxS	When PV voltage> 150V, inverter is checking feeding conditions
Feeding grid, MPPT	Normal State	Normalbetrieb	Stato Normale	Inverter is feeding power. After 10 seconds of this display, LED will show wattage.
FLASH	FLASH	FLASH	FLASH	FLASH firmware
Monitoring Parameters				

Operating conditions	In English	In German	In Italian	Description
Instantaneous Output power	Pac = xxxx.xW	Pac = xxxx.xW	Pac = xxxx.W	The real time output power in xxxx W
Accumulated energy information	Energy=xxxxxxkWh	Eac = xxxxxxkWh	Energy = xxxxxxkWh	Total energy to has been fed to grid since inverter was installed
Grid voltage	Vac = xxx.xV	Netz Spg.= xxx.xV	Vac = xxx.xV	Grid voltage in xxx.x VAC
Grid frequency	Frequency = xx.xHz	Frequenz = xx.xHz	Freq = xx.xHz	Grid frequency in xx.x Hz
Feeding current	AC-Current = xx.xA	AC-Strom = xx.xA	Iac = xx.xA	Feeding current amount in xx.x A
PV array voltage	Vdc=xxx/xxx/xxxV	Vdc=xxx/xxx/xxxV	Vdc=xxx/xxx/xxxV	Input voltage from PV array, xxx.x VDC
PV array current	Idc=xxx/xxx/xxxA	Idc=xxx/xxx/xxxA	Idc=xxx/xxx/xxxA	Input current from PV array, xxx.x IDC
Daily Energy	Etoday=xxx.xkWh	Etoday=xxx.xkWh	Etoday=xxx.xkWh	The accumulated kWh of that day
System Fault				

Operating conditions	In English	In German	In Italian	Description
Isolation failure	Isolation fault	Isolationsfehler	Err.Isolamento	Earth fault of the PV-panels or failure of surge voltage protection
GFCI active	Ground I fault	Fehlerstrom	I dispers.Alta	Leakage current on ground conductor is too high
Grid failure	Grid fault	Netzfehler	Err.Rete	Grid measured data is beyond the specification (voltage & frequency)
No utility	No Utility	Kein Netz	Non disponibile	Utility is not available
Input voltage too high	PV over voltage	DC–Überspg.	Vdc alta	Input voltage higher than the 750V
Inverter Fault				
Consistent failure	Consistent fault	Konsistenzfehler	Err.interno 01	The readings of 2 microprocessors are not consistent. It could be caused by CPU and/or other circuit do not function well.
Temperature too high	Over temperature	Übertemperatur	Sovratemperatura	The internal temperature is higher than normal value
Output relay failure	Relay Failure	Relais fehler	Err. relè uscita	The relay between inverter and grid is not functional

Operating conditions	In English	In German	In Italian	Description
Output DC injection too high	DC INJ High	DC INJ zu hoch	Idc uscita alta	Output DC injection too high
EEPROM problem	EEPROM Failure	EEPROM Fehler	Err.interno 02	EEPROM inside has data access problem
Communication failure between microprocessors	Sci Failure	CPU Fehlfunktion	Err.interno 03	The communication between MCU inside is abnormal
DC bus voltage is too high	High DC Bus	U/dc bus zu hoch	Err.interno 04	The DC BUS inside is higher than expected
DC bus voltage is too low	Low DC Bus	U/dc bus zu klein	Err.interno 05	The DC BUS inside is lower than expected
2.5V reference voltage inside problem	Ref 2.5V Fault	U/ref Fehlfunkt.	Err.interno 06	The 2.5V reference inside are abnormal
Output DC sensor abnormal	DC Sensor Fault	DC Sensor Fehler	Err.interno 07	The DC output sensor is abnormal
GFCI detection problem	GFCI Failure	FI-Fehler	Anomalia GFCI	The GFCI detection circuit is abnormal
System Information				

Operating conditions	In English	In German	In Italian	Description
Model display	CPS SC4.6KTL-O	CPS SC4.6KTL-O	CPS SC4.6KTL-O	Inverter model name
LCD contrast	Contrast	Kontrast	Contrasto	The top menu of LCD contrast setting
LCD contrast setting	Set Contrast	Kontrast	Regola contrasto	Setting the contrast of LCD
LCD display lock	Lock	Eingestellt	Bloccato	Hold the present display message
Waiting for reconnect to grid	Reconnect xxx S	Kontakt in xxx S	Connessione xxx S	The time for reconnect to grid
Firmware version	Ver xx.xx	Ver xx.xx	Ver xx.xx	F/W version information
Setting Language	Set Language	Sprache	Imposta lingua	Set up of the display language

7. Communication Interface

7.1. RS232

The PV-Inverter is equipped with a versatile communications interface.
Use "Pro Control" to monitor status of multiple inverters. Firmware upgrades are also available via this interface.
CPS SC4.6KTL-O is integrated with a DB9 socket for the RS232 interface. Remove the DB9 socket cover before use.
Pin assignment of this DB9 socket is stated as below:

1	N.C.
2	TxD
Pin	Signal Assignment
3	RxD
4	N.C.
5	Common
6	N.C.
7	N.C.
8	N.C.
9	N.C.

7.2. Optional Communications Interface

The PV-Inverter has an expansion slot for an optional communications interface. Add a RS485 card or compliant card to extend the communication functions of inverter.

RS232 port & cover

Communication Slot
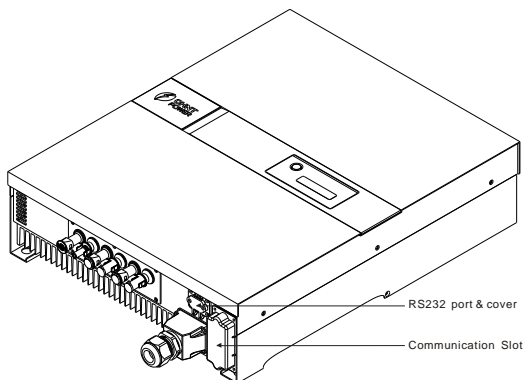
8. Troubleshooting

The PV-Inverter requires very little maintenance. When unexpected situation occurs, please refer to the following table should further assistance be required before calling your local dealer.

The following table lists common fault messages that display when the fault LED is lit, and their solutions.

Troubleshooting the PV-Inverter		
System Fault	**Fault Message**	**Diagnosis and Solution**
	Isolation Fault	(1) Check the impedance between PV (+) & PV (-) and ground. The impedance should be larger than 5Mohm. (2) If the check fails, or the impedance is below 8Mohm, please call service.
	Ground I Fault	(1) This is caused by too high ground current. (2) Unplug the PV generator from the DC-input, check the AC peripheral system. (3) After the cause is cleared, plug PV in again and check the status of Inverter. (4) If above actions cannot clear Ground I fault, please call service.
	Grid Fault	(1) Wait for 1 minute for Grid to come back to normal. (2) Make sure Grid voltage and Frequency meet the specifications. (3) If not, please call service.
	PV Over Voltage	(1) Check open PV voltage, see if it is too close to or over 750VDC. (2) If PV voltage is less than 750Vdc, and the problem still occurs, please call service.
	No Utility	(1) Grid is not connected. (2) Check grid connection, such as wire and connector. (3) Check Grid usability

Troubleshooting the PV-Inverter		
Inverter Failure	**Fault Message**	**Diagnosis and Solution**
	Consistent Fault **SCI Failure**	(1) Disconnect PV(+) and PV(-) from the input, start the unit again. (2) If it does not work, please call service.
	Over Temperature	(1) The internal temperature is higher than specified normal value. (2) Reduce the ambient temperature by some appropriate and effective way. (3) Or move Inverter to a cooler location. (4) If it does not work, please call service.
	Relay Failure	(1) Disconnect PV(+) and PV(-) from the input, start the unit again. (2) If it does not work, please call service.
	DC INJ High	(1) Grid DC current higher than the permissible value. (2) Observe the faulty condition for 1 minute. (3) If it does not restore to normal operation, please call service.
	EEPROM Failure	(1) Disconnect PV(+) and PV(-) from the input, start the unit again. (2) If it does not restore to normal operation, please call service.
	High DC Bus	(1) Disconnect PV(+) and PV(-) from the input, start the unit again. (2) Check if L-LINE and N-Neutral are mistakenly connected. (3) If so, please call service.
	Low DC Bus **Ref 2.5V Fault** **DC Sensor Fault** **GFCI Failure**	(1) Disconnect PV(+) and PV(-) from the input, start the unit again. (1) If it does not work, please call service.

9. Preventative maintenance

Although PV-Inverter requires very little maintenance, the following inspections at regularly would help to ensure PV Inverter operation with optimal performance.

9.1 Visual Inspection

Check the inverter and cables for any signs of external damage. Contact your installer immediately if you find any defects. Do not carry out any repairs on your own.

9.2 Checking and Maintenance

Asking your installer to check for proper inverter operation at regularly

is the measure we suggested for preventative maintenance.

The following check is the key:

(1) Check If the heatsink is covered with debris or just, get rid of it if find any.

(2) Check heatsink to ensure no barrier blocking its air flow.

(3) Inspect for corrosion, especially at connecting point.
Verify all connections are firmly tightened.

(4) Clean the exterior of the unit periodically with a damp cloth to prevent accumulation of dust and dirt, keep warranty label intact anyhow.

(5) To get optimal performance, PV-panel cleaning periodically would also be essential due to it is prone to dust and dirt accumulation.

Be sure to switch off AC power before cleaning PV-panel or Inverter, and cleaning shall be restricted to the exterior surface.

10. Specifications

Model	CPS SC4.6KTL-O
Input (DC)	
Nominal DC voltage	600 V
Max. PV open voltage	750V
System start-up voltage	Typical 120 V
Initial feeding voltage	150 V
Shutdown voltage	Typical 90V
Working voltage range[1]	100 ~ 750 V
Full rating voltage range	450 ~ 750 V
MPPT voltage range	125 ~ 700 V
MPPT efficiency	> 99%
Number of MPP tracker(s)	3
Max. DC current	8.5A/string
DC voltage ripple	< 10%
DC insulation resistance[2]	>5MΩ
Output (AC)	
Nominal AC power	4600W
Max. AC power (in 10 minutes)	5000W
Nominal voltage	230V
Nominal frequency	50Hz
AC wiring system	Single phase
Nominal AC current	20 A
Max. AC current	25.5 A

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[1] Which is the DC voltage range that inverter can feed power to grid.
[2] The DC resistance requirement for positive or negative terminal to chassis ground

Model		CPS SC4.6KTL-O
O/P current distortion (THD i)		< 3%
Power Factor		> 0.99
for Germany (DE)	Operational voltage range[3] (F/W Setting)	190~256V
	Disconnection time of excess operational voltage range	≦0.2 sec.
	Operational frequency range[4] (F/W Setting)	47.55~50.15Hz
	Disconnection time of excess operational frequency range	≦0.2 sec.
	Re-connecting time after disconnection	30 sec
for Italy (IT)	Operational voltage range[5] (F/W Setting)	190~267V
	Disconnection time of excess operational voltage range	Min Voltage protection 0.2 s; Max voltage protection 0.1s
	Operational frequency range[6] (F/W Setting)	49.75~50.25Hz
	Disconnection time of excess operational frequency range	≦0.1 sec.
	Re-connecting time after disconnection	60 sec
Efficiency		
Max. conversion efficiency		96%
European efficiency		94%
General Data		
Topology		Transformer-less
Power consumption: standby / night		< 8W / < 0.1W
Protection degree		IP65

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[3] Regulation voltage range is 184~264.5 V_{AC} according to VDE0126-1-1
[4] Regulation frequency range is 47.5~50.2Hz according to VDE0126-1-1.
[5] Regulation voltage range is 184~267 V_{AC} according to ENEL Guide 2010
[6] Regulation frequency range is 49.7~50.3Hz according to ENEL Guide 2010.

Model	CPS SC4.6KTL-O
Heat dissipation	Convection
Operating temperature range	-20 ~ +55℃
Humidity	0 to 95%, non-condensing
Communication	RS232 standard RS485 optional.
Hazard substance restriction	Lead free, complied with RoHS GP2
RS485 Protocol	Standard protocol, Eaton Phoenixtec MMPL proprietary protocol

*The product's specifications are subject to change without notice.

11. Disposal

The dealer or installers should remove the PV Inverter from the array and contact the supplier for disposal instructions

 The inverter must not be disposed of with the household waste.

Dispose of the PV Inverter at the end of its service life should be done in accordance with the disposal regulations for electronic waste which apply at the installation site at that time.

Please contact supplier for disposal instruction, the contact information could be found in Chapter 12. Contact Information.

12. Contact Information

Should you have technical problems concerning this product, please contact our Service line.

We require the following information in order to provide you with the necessary assistance:
• Inverter type
• Serial number of the PV Inverter
• Type and number of PV panel connected
• Fault message
• Communication method

SHANGHAI CHINT POWER SYSTEMS CO., LTD.

Add: Building 4, No.855 Wenhe Road, Songjiang District, Shanghai, 201614,

China

Tel :+86 - 21 - 3779 1222

Fax:+86 - 21 - 3779 1222 - 6016

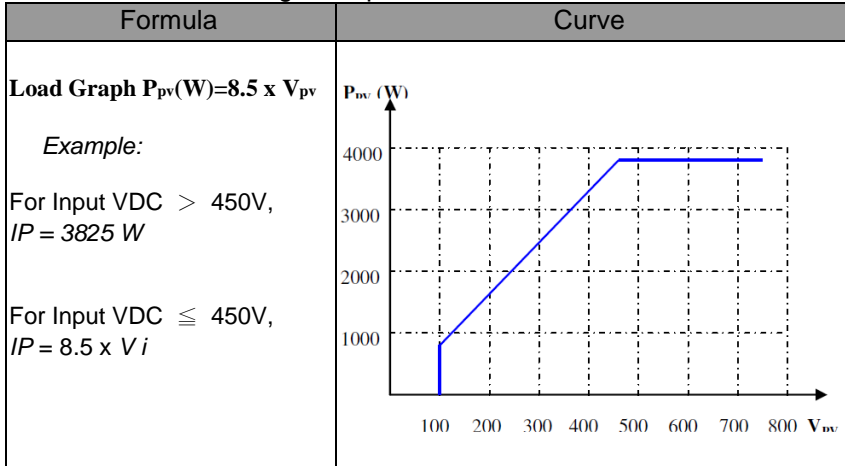Service Hotline：+86 - 21 - 3779 1222 - 6300

Mail:service.cps@chint.com

Web:www.chintpower.com

13. Compliance of Standards

| Regulatory Type	Compliance of Standard
Grid interface regulation	VDE0126-1-1 (DE)
	ENEL Guide 2010 (IT)
Safety	DIN EN 50178 (4.98) (VDE0160) (IEC62103)
EMC: EMS / EMI	EN 61000-6-2 EN 61000-6-3
CE	LVD: 2006/95/EC EMC: 2004/108/EC

14. Load Graph and Efficiency Graph

The relationship between PV input voltage (V_{PV}) and input power (P_{pv}) is shown in the following example.

Formula	Curve
Load Graph $P_{pv}(W)=8.5 \times V_{pv}$ *Example:* For Input VDC $>$ 450V, *IP = 3825 W* For Input VDC $\leqq$ 450V, *IP = 8.5 × V i*	

The typical efficiency chart related to V_{DC} and P_{AC} is shown below.
Note: Results may vary due to test equipment tolerances and product differences.

52
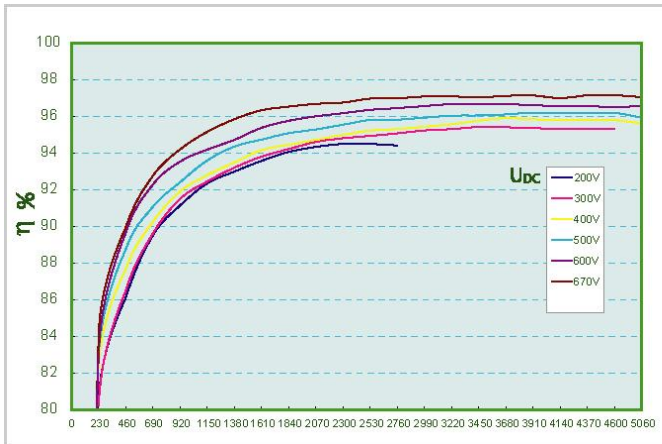
Appendix I: VDE Certification

VDE Prüf- und Zertifizierungsinstitut

ZEICHENGENEHMIGUNG
MARKS APPROVAL

Shanghai Chint Power
Systems Co., Ltd.
#4 Building, No. 855 Wenhe Rd.
201614 SONGJIANG DISTRICT, SHANGHAI
Shanghai
CHINA

ist berechtigt, für ihr Produkt /
is authorized to use for their product

PV-Wechselrichter mit selbsttätiger Freischaltstelle
Power converter for photovoltaic with interactive fail safe interface
PV-Wechselrichter mit selbsttätiger Freischaltstelle (ENS)
PV-Inverter with automatic disconnecting facility

die hier abgebildeten markenrechtlich geschützten Zeichen
für die ab Blatt 2 aufgeführten Typen zu benutzen /
the legally protected Marks as shown below for the types referred to on page 2 ff.

oder/or   oder/or

Geprüft und zertifiziert nach /
Tested and certified according to

DIN EN 50178 (VDE 0160):1998-04; EN 50178:1997
IEC 62103(ed.1)
DIN VDE V 0126-1-1 (VDE V 0126-1-1):2006-02

Das Produkt entspricht den Anforderungen des deutschen Geräte- und Produktsicherheitsgesetzes
(GPSG) hinsichtlich der Gewährleistung von Sicherheit und Gesundheit.
*The product covers the requirements of the German Act "Geräte- und Produktsicherheitsgesetz
(GPSG)" regarding the ensurance of safety and health.*

Befristet zum / valid until: 2014-11-30	Aktenzeichen: 5012648-3971-0001 / 135846
	File ref.:
VDE Prüf- und Zertifizierungsinstitut GmbH	Ausweis-Nr. 40030334 Blatt 1
VDE Testing and Certification Institute	*Certificate No.* *Page*
Zertifizierungsstelle / *Certification*	Weitere Bedingungen siehe Rückseite und Folgeblätter / *further conditions see overleaf and following pages*
	Offenbach, 2010-06-21

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VDE certificates are valid only when published on: http://www.vde.com/certificate

VDE