# Operating and Installation Instructions Edition CE –G83/1

## UWT-I-250W Grid Tie inverter

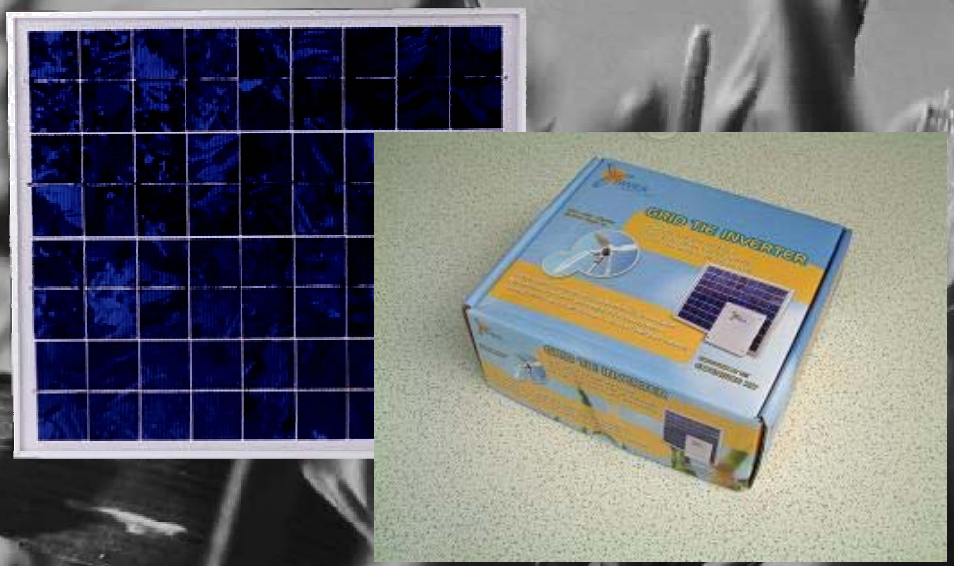
**120V-60HZ or 230V-50Hz**

### SWEA Grid Tie Inverter UWT-I-250W Starter-Kit

**For connection of small wind turbines to the grid.**


### SWEA Grid Tie Inverter UWT-I-250W Extension-Kit

**For connection of PV solar panels to the grid and to enlarge the power of the UWT-I-250W Starter-Kit**



# SWEA, SOLAR & WIND ENERGY APPLICATIONS

## Operating and Installation Instructions for the UWT-I-250W grid tie inverter for wind and solar connection.

**SWEA Grid Tie Inverter UWT-I-250W Starter-Kit for connection of small wind turbines to the grid.**

**and the**

**SWEA Grid Tie Inverter UWT-I-250W Extension-Kit to enlarge the power of the UWT-I-250W Starter-Kit and to use as a stand alone grid tie inverter for connection of solar panels to the grid.**

**UWT-I-250W Starter-Kit**

**UWT-I-250W Extension-Kit**

**Installation Guide SWEA UWT-I-250W Starter-Kit and SWEA UWT-I-250W**

**Extension-Kit.**



**SWEA EUROPE BV**
Info@swea.nl
www.swea.nl
skype: sweaeurope

# IMPORTANT SAFETY INSTRUCTIONS

## SAVE THESE INSTRUCTIONS

This manual contains important instructions for SWEA models UWT-I-250W Starter-Kit and UWT-I-250W Extension-Kit as well as SWEA SOLAR & WIND GRID TIE Inverter instructions that should be followed during installation and maintenance of the Inverter.
The SWEA Inverters are designed and tested according to international safety requirements, but as with all electrical and electronic equipment, certain precautions must be observed when installing and/or operating the SWEA Inverters. To reduce the risk of personal injury and to ensure the safe installation and operation of the SWEA Inverters, you must carefully read and follow all instructions, cautions and warnings in this Installation Guide.

## Warnings

A *warning* describes a hazard to equipment or personnel. It calls attention to a procedure or practice which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the SWEA equipment and/or other equipment connected to the SWEA equipment or personal injury.

### DANGER!

DANGER indicates a hazardous situation that, if not avoided, **will result** in death or serious injury.

### WARNING!

WARNING indicates a hazardous situation that, if not avoided, **could result** in death or serious injury.

### CAUTION!

CAUTION indicates a hazardous situation that, if not avoided, **could result** in minor or moderate injury.

### NOTICE!

NOTICE indicates a situation that **can result** in property damage if not avoided.

# Other Symbols

In addition to the safety and hazard symbols described on the previous pages, the following symbol is also used in this Installation Guide:

## General Warnings Information

This symbol accompanies notes that call attention to supplementary information that you should know and use to ensure optimal operation of the system.

## General Warnings

All electrical installations must be done in accordance with the local and national electrical codes.

The SWEA Grid Tie Inverter contains no user-serviceable parts except for the fans on the left site of the Inverter.

For all repairs and maintenance, always return the unit to an authorized SWEA appointed distributor or dealer.

Before installing or using the SWEA Grid Tie Inverters, read all of the instructions, cautions, and warnings on the SWEA Inverter.

The connection of the SWEA Grid Tie Inverter to the grid must be made only by qualified personnel.

PV arrays and urban wind turbines are producing electrical energy when exposed to light and wind and thus can create an electrical shock hazard. Wiring for the PV-arrays and wind turbines should only be done by qualified personnel.

**AC - Abbreviation for “Alternating Current”**
**DC - Abbreviation for “Direct Current”**

**Grid Connected System:** Wind turbine or PV system which is connected to the power supply grid of an external energy supplier.

**Grid impedance:** The grid impedance is a characteristic grid specification, which is determined both by the grid infrastructure, and by the number of power suppliers and power consumers.

**Inverter:** A device for converting the direct current (DC) from the PV generator or wind turbine generator into alternating current (AC), which is used by most normal household devices, and especially for feeding energy into an existing supply grid.

# Table of Contents:

**A. Installation guide for the SWEA Grid Tie Inverter UWT-I-250W Starter-Kit and SWEA Grid Tie Inverter UWT-I-250W Extension- Kit and grid tie inverter for small wind turbines.**

A1. Introduction
A1.1 Product overview
A1.2 Safety
A1.3 Installation overview.

A2. Unpacking and inspection of the system parts.
A2.1 Scope of delivery
A2.2 Opening the inverter parts.
A2.3 Locating internal components.
A2.4 Automatic grid voltage detection.

A3. Mounting of the delivered parts.
A3.1 Location
A3.2 Mounting procedure
A3.3 Mounting of the diode Box, AP-box, dump load and Grid Tie Inverter
A3.3.1 Test the dump load
A3.4 Mounting and calculating extra UWT-I-250W Extension-Kits.

A4. Wiring of the complete system.
A4.1. Wiring diagram, AC grid, wind turbine, inverter system.
A4.2 Torque values and wire sizes.
A4.3 Switch system ON and OFF

A5. LED indicators
A5.1 LED indicators, Grid Tie Inverters and AP-box

A6. Troubleshooting.
A6.1. General
A6.2 Error messages

A7. Maintenance.
A7.1 Cleaning the fan.
A7.2 Change DC wind turbine line fuse and AC grid line fuse.

A8. Technical specifications / How to adjust your power curve?
A8.1 Operation specifications
A8.2 FCC compliance information
A8.3 Specifications including trip limits and trip times.

B1. SWEA UWT-I-250W Inverter (UWT-I-250W-Extension-Kit) as a PV grid tie inverter B2.1 Specifications and software.

B.1.1 Specifications
B.1.2 Software
B.2 Wiring diagram
B.2.1 AC grid connection
B.2.2 DC connection
B.2.3 PV Solar DC connection
B.3 Calculating the PV Solar panels that may be connected to the UWT-I-250W Extension-Kit.
B.3.1 Table of PV- Solar panels that can be connected to the UWT-I-250W Extension-Kit.
B.3.2 How to calculate the DC-in and the Max. DC-in power of your PV solar panels
B.4 Switch on the PV solar system.
B.5 Troubleshooting.
B.6 Maintenance
B.7 Factory information.

# A. Installation guide for the SWEA UWT-I-250W Grid Tie Inverter together with UWT-I-250W Starter-Kit for wind, and the UWT-I-250W inverter as a Solar inverter to connect PV Solar Panels to the public grid.

## A1. Introduction

This installation guide provides all the information needed to install, understand and use the SWEA UWT-I-250W Grid Tie Inverter system.

### Information

To make installation easy and safe, read the entire manual before starting installation.

**WARNING!**

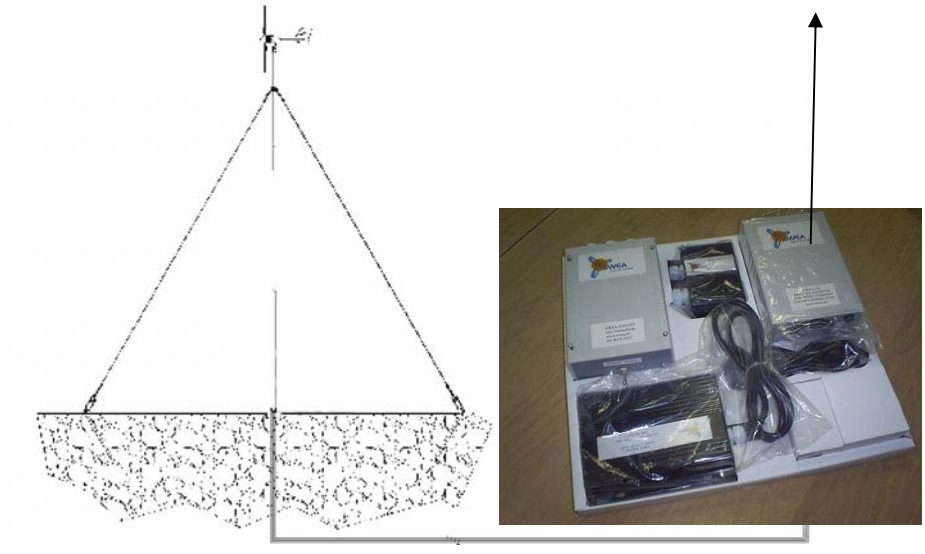
High and deadly voltage levels are present at several system parts. For safety reasons, it is recommended that only qualified personnel install this unit.

## A 1.1 Product Overview

The SWEA UWT-I-250W Starter-Kit is a special device to connect either an urban wind turbine or a PV solar panel to the grid without using batteries. The SWEA UWT-I-250W Starter-Kit also acts as a safety device to protect the wind turbine and is also an overvoltage protector for the UWT-I-250W itself.

The UWT-I-250W Extension-Kit can be used to extend the power of the UWT-I-250W Starter-Kit but can also be utilized as a stand-alone grid tie inverter to connect solar panels to the public grid.

In general, the SWEA UWT-I-250W Starter-Kit and UWT-I-250W Extension-Kit feed the power generated by the wind turbine or solar panels to the public AC grid of your own house. The power will first be used by your personal electrical consumption like TV set, lightning systems etc. When more power is generated than is used in your house or office, the power is delivered back via your meter to the public grid. During periods of high power production and low consumption, your meter will spin backwards



## Information

Policies vary from one utility company or city government to another. Contact your local utility company and the representative of your city government before installing a grid connected wind turbine.

# A1.2 Safety

### Anti-Island Protection ( for USA-CANADA-Australia-New Zealand-Germany eo)

Islanding is a condition that can occur when the utility grid is disconnected while the SWEA Grid Tie Inverter UWT-I-250W Starter-Kit is operating and is attempting to deliver power to the grid. When the above situation occurs, the SWEA Grid Tie Inverter must stop attempting to deliver power to the grid within 2 seconds. For this reason, SWEA has built in a high-tech, ANTI-ISLAND PROTECTION DEVICE to automatically disconnect the power delivery to the grid. This built in system has been rigorously tested and proven by the test house.

### Grounding

The SWEA UWT-I-250W Grid Tie Inverter is equipped with grounding hard wired connectors.
Caution must be used for correct installation of these wires to avoid dangerous situations.
AC output (neutral) is not bonded to ground.

### AC and Wind Turbine Series Fusing

The SWEA GRID TIE Inverter comes equipped with 2 built in fuses. One fuse is for the AC line and the second fuse is for the DC line. When replacing the fuses, take care to place the correct fuse (AC or DC) into its correct position.

### Certificates of Conformities

The SWEA Grid Tie Inverter UWT-I-250W Starter-Kit is listed as follows:

**USA: market: certification is pending**

UL-1741 for static Inverters and charge controllers for use in delivering power back to the public grid.

**Canada: market: Certification is pending**

C22.2.no. 107.1 for static Inverters and charge controllers for use in delivering power back to the public grid. Both marked with UL or ETL logo on the Inverter system.

**Australia Market: Certification is AS-4777 Ready Aug. 2010.**
AS-4777 for static inverters and charge controllers for use in delivering power back to the public grid.

**Europe: market is tested accordingly:**

CE certificate in accordance with EN61.000.x.x. and ENV50204 as per BICON test report SWE-20070626-A1. Marked with CE Logo

**UK and Ireland: market is tested accordingly**

G83/1 certificate

Engineering Recommendation G83/1 Annex IV.

Tested at Bicon Laboratories BV, Helmond The Netherlands.

in accordance with : Report no. SWE-20070911-A1-REV. Date: 2008-03-31
Marked with G83/1 logo.

## Information

Contact the local authority and/or the local utility company for information prior to connecting the SWEA Grid Tie Inverter to the grid.

### FCC Compliance

The SWEA UWT-I-250W Starter-Kit has been tested and conforms with the CE, EMI and EMC emission regulations EN61.000xxx and ENV50204.

## A1.3 Installation Overview

This chapter provides an overview of the steps required to install the SWEA Grid Tie Inverter UWT-I-250W Starter-Kit and the UWT-I-250W Extension-Kit to a small urban wind generator.

**Unpacking and Inspection of the System Parts. (A2)**

- Unpack the system and check that all necessary components for installation are in the box.

**Mounting of the Delivered Parts. (A3)**

- Outlines and illustrates how to attach the various parts to the wall.

**Wiring of the Complete System. (A4)**

- Outlines system wiring requirements including types of wire to be utilized, installation specifications as well as inverter's ON/OFF system.

## A2. Unpacking and Inspecting System Parts

All SWEA Grid Tie Inverters are carefully tested and inspected before they are shipped out to the customers. Although packaged in a purpose-built box with inner carton, damage to inverters can occur during transport. Upon receipt of the unit, it is important for the customer to check that all the listed components are received in undamaged condition. If the package or the inner components appear to be damaged in any way, contact both the shipping company as well as your local dealer. If a satisfactory resolution is not reached, contact SWEA USA at www.swea.nl.
If it is necessary to return the inverter, always use the original box with additional protective packaging.

If you need assistance with a defective SWEA Grid Tie Inverter, contact your local SWEA dealer or:

SWEA EUROPE BV
www.swea.nl
The Netherlands.

## A2.1 Scope of Delivery

SWEA UWT-I-250W Starter-Kit

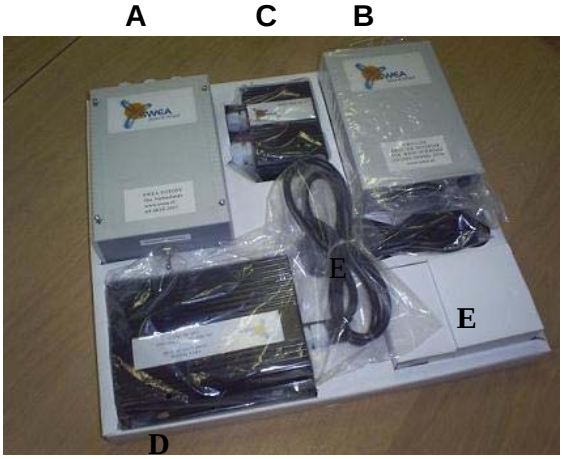
**A: UWT-I-250W Grid Tie Inverter**

**B: AP-BOX**

**C: Diode box**

**D: Dump-load**

**E: Accessories**




## A2.2 Opening the Inverter Parts with Connectors

**NOTICE!**

Do not install the SWEA Grid Tie Inverter system during periods of high humidity (>95%). Moisture will enter the component and may cause corrosion and damage to the electronic components.

**A: On Grid Tie Inverter 230V-50Hz. Or 120V-60Hz.**

Program CPU

as per separate manual to use the RS-232 communication cable.
When you has to install the inverter to the wall do not open the housing. Turn at the back the wall mounting brackets outside and use this to screw the inverter to the wall.
When you buy ask dealer for correct grid voltage to use in your region.

**WARNING!**

DO NOT OPEN THE TOP COVER OF THE INVERTER!

High and deadly voltage levels are present at several system parts. For safety reasons, it is recommended that only qualified personnel install this unit.

## B: AP-Box

Remove top cover. Unfasten 4 screws

Open AP-BOX with screw connectors to Diode box, Grid tie Inverter(s) dump load and Adaptor (optional)

## C: Diode-Box

Open top cover to unfasten 4 x top screw

Opened Diode- Box for connection to 3-phase wind turbine and DC out to AP-Box

## D: Dump load

Unfasten 4 x screws on top cover

Opened Dump load for connection to AP-Box.

# A2.3 Locating Components

**- Grid Tie Inverter**

1 Red and green LED indicators

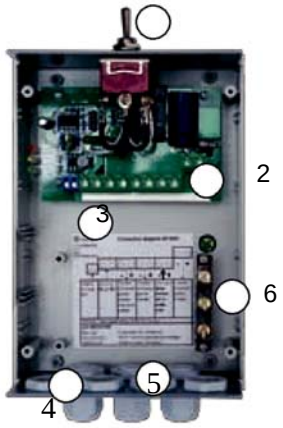
2 8 Amp T DC Fuse and DC connector
3 2 Amp T AC Fuse and AC Power connector


Opened fuse and AC-DC wiring compartment

---

**- AP-BOX**

1 Stop switch
2 Red, Green and Yellow LED indicators

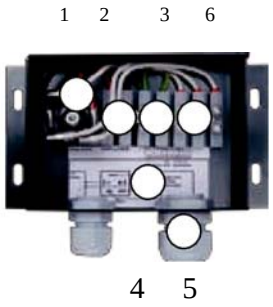




1 Stop switch
2 Connectors for wiring
Grid Tie Inverter(s)
Dumpload
Diode-box
Adaptor (optional)
3 Wiring diagram
4 3x Cable glands
5 4 x Breakouts
6 Grounding terminal. 4 wires
(DL/Diode box/ Inverter(s))

---

## E: Diode-Box

2 pcs cable Glands.




1 3 phase rectifier
2 DC-out
3 3 phase of wind
4 turbine Wiring diagram
5 cable inlet
6 Grounding wind turbine & AP-Box

Diode-Box for connection to 3 phase wind turbine

**F: Dump load**

◯ Cable gland

1 3 2 5 4

◯ 1 Dump load resistors
◯ 2 Wiring diagram
◯ 3 Wiring connectors
◯ 4 Cable gland
◯ 5 Grounding terminal

Opened Dump load for connection to AP-Box

---

## A2.4 Automatic Grid Voltage Detection

The SWEA Grid Tie Inverter system is manufactured for a grid of 230V-50 Hz. When the inverter is connected to the grid it automatically detects the AC-Grid. In the table below, the limits of the grid voltage and frequency are outlined. The unit is connected to the grid via one-phase, neutral and ground.

| **AC-GRID** | | |
|---|---|---|
| AC- Voltage | 214 – 253 V / 100-145V | 230 V Nominal<br>120V nominal |
| Frequency | 49,5 Hz - 40,5 Hz./ 59,5-60,5 | 50 Hz or 60 Hz nominal |

# A3. Mounting of the Delivered Parts

### A3.1 Location

This chapter provides guidelines to assist in selecting the optimum mounting location, information on installing the inverter system in order to maximize results, cautions and warnings that should be followed in order to avoid injury and/or equipment damage as well as step-by-step instructions for mounting and connecting the SWEA Grid Tie Inverter system.

**Information**

Rating labels on the SWEA Grid Tie Inverter and all other parts of the Grid Tie Inverter system should be mounted visual on either the side or the top of the inverted to ensure easy visual access

## A3.2 Mounting Procedure

Choosing a mounting location:

- Do not install the equipment in direct sunlight.
- Install the equipment at a location were the temperature will not rise above 105º F (40º C) nor fall below 14º F (-10º C)

The lower the temperature, the more power the inverter will bring to the grid.

The fan inside the grid tie inverter will start automatically once the temperature inside the inverter becomes too high according to the adjusted figures. Once the temperature is reduced, the fan will stop automatically. The fan operates with a speed controller.

- The SWEA Grid Tie Inverter system is manufactured for inside installation in a dry location. It should not be exposed to oil, acid, fumes, moisture, dust or other foreign materials.
- The inverter should be installed in a place inaccessible to children.
- When the grid tie inverter is operating it makes a low vibration noise. For this reason, install the inverter in a living area which will not be adversely affected by this low-level noise.

## Information

This Swea Grid Tie Inverter system is manufactured for inside use in a dry place were the temperature never exceeds (105º F) 40º C.

## DANGER!

There is always a degree of risk with electrical devices and fire hazard despite great attention being paid to avoid this during installation and development.

Do not install the inverter:

- On flammable construction materials.
- In areas where highly flammable materials are stored.
- In potentially explosive areas.

## CAUTION!

Do not install the Swea Grid Tie Inverter during rain or in periods of high humidity (> 95%). Moisture may cause corrosion to the inside of the inverter.

## CAUTION:

When you install the Swea Grid Tie Inverter system in a small cabinet, ensure that adequate ventilation is provided. Without ventilation, the equipment becomes too hot and this will lower the efficiency of the grid tie Inverter. The power being fed to the grid will be reduced as the inverter will shut itself off for longer periods when the temperature remains too high.

## WARNING!

Before drilling or fixing the equipment to the wall, check existing electrical or plumbing installations in the walls to avoid injury or electric shock.

# A3.3 Sizes and Mounting of the SWEA Grid Tie Inverter System

## - Grid Tie Inverter.

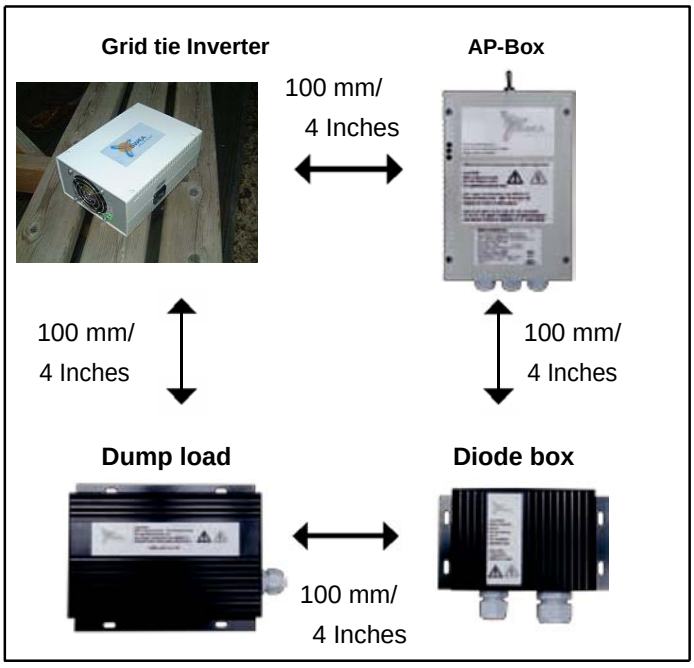
Size inverter: 135x 80x 220 mm

**Mounting of the Inverter**

Install the inverter in the position as per the picture with 4 screws via the mounting brackets placed at the bottom of the inverter and attached to the wall.

---

## - AP-BOX/ Diode-Box/Dump load.




**Dimensions AP-Box.**

Width: 134 mm (5.27in)

Height: 82 mm (3.22in)

Length: 240 mm (9.45in)

**Mounting of the AP-Box**

Install the inverter in the position as per the picture with 4 screws via the mounting brackets placed

at the bottom of the inverter and attached to the wall. Open the cover of the AP-Box.
Install the AP-box at a minimum distance of 4 inches (+/- 10 mm) from the inverter.

**Dimensions Diode Box**

Width: 147 mm (5.8in)
Height: 40 mm (1.57in)
Length: 110 mm (4.33in)
Place the diode box in a location under the AP-Box at a distance of 4 inches (+/- 10 mm). Use 4 screws to fasten the diode box to the wall.

**Dimensions Dump load.**

Width: 147 mm (5.8in)
Height: 40 mm (1.57in)
Length: 208 mm (8.19in)
Place the dump load in a location under the inverter at a distance of 4 inches (+/- 10 mm). Use the included distance spacer to mount the dump load 20mm from the wall.

## Information

Ensure that space between the SWEA Grid Tie Inverter parts is sufficient to provide adequate airflow around parts. Use caution, regarding the dump load. The dump load can become hot under certain circumstances.

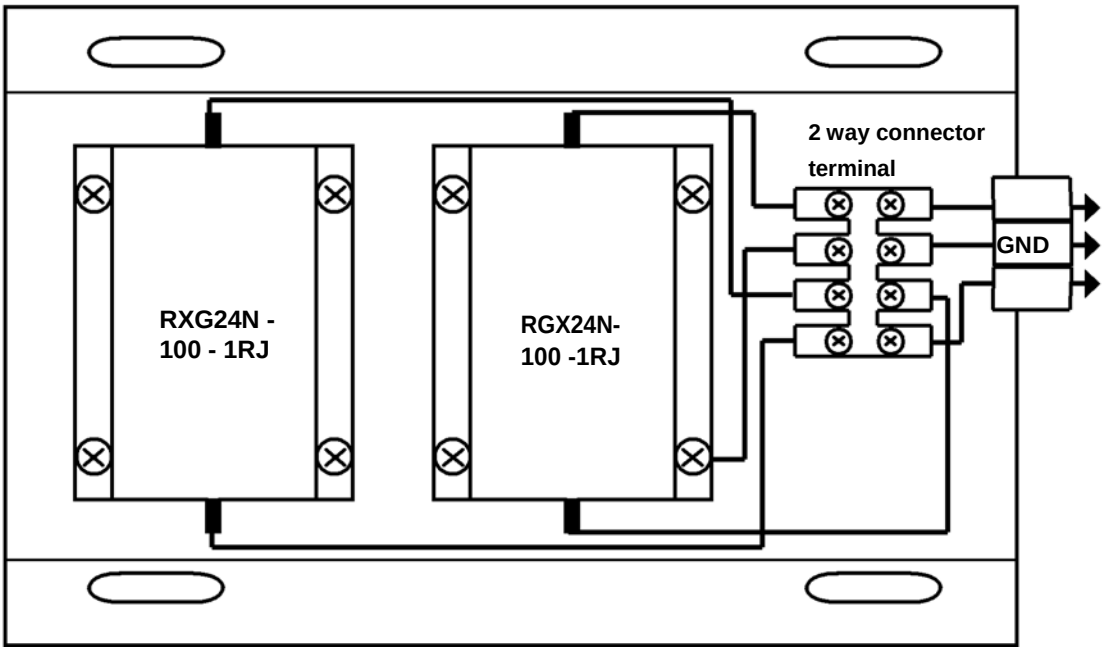
## A3.3.1 Test Your Dump Load

When the inverter installation is completed and connected to the grid, it is important to test the brake system of the wind turbine. In order to brake the wind turbine, the system is using the dump load of the UWT-I-250W Starter-Kit. The default the dump load installed is a total of 2 Ohms. 2 resistors of 100 Watts are connected in serial to get 2 Ohms resistance.
Be sure to test the brake of the system. In situations of high wind, check that the dump load is adjusted correctly. When the dump load becomes hot, the resistance inside the dump load is too high or the cables from the wind turbine to the grid tie inverter are too long and too thin.
When the dump load becomes hot, test as follows:

A. Stop the turbine with the stop switch found on top of the AP-box. The turbine must stop rotating within 5-10 seconds.

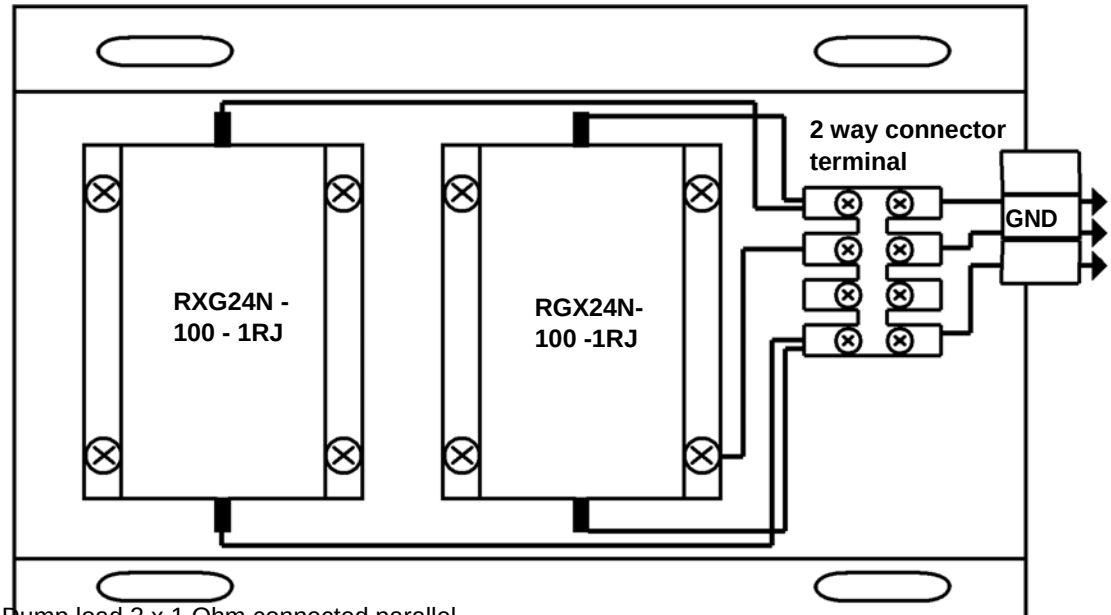
B. If the turbine stops as per instructions in step A and the dump load remains hot, then the connections inside the dump load must be changed.
Stop the turbine with the stop switch and change the resistor configuration. See page 17 for instructions for how to change the connections in this situation.

**Schematic DUMP LOAD DL-2-100 (DEFAULT WIRING at 2 OHM)**




Dump load 2 x 1 Ohm serial.

**Schematic DUMP LOAD DL-2-100 (WIRING at 0,5 OHM)**




Dump load 2 x 1 Ohm connected parallel.

## A3.4 Mounting and Calculating Extra UWT-I-250W Extension Kits

To install a turbine of greater than 300 watts, extra UWT-I-250W Watt Extension Kits must be used.

The following schematic chart indicates the additional UWT-I-250W Extension Kits required to obtain a maximum power output to the grid while maintaining a safely operating system.

| Type of wind turbine AC out 48V | Low wind < 5 m/s | High wind > 5 m/sec. |
|---|---|---|
| Wind turbine 200-300W | UWT-I-250W Starter-Kit | UWT-I-250W Starter-Kit + 1 x UWT-I-250W Extension Kit |
| Wind turbine 300-500W | UWT-I-250W starter-kit + 1 x UWT-I-250W Extension Kit | |
| Wind turbine 500-700W | UWT-I-250W starter-kit + 2 x UWT-I-250W Extension Kit | |
| For wind turbines of > 700Watt and 1 KW ask for the SWEA 1 KW IP54 grid tie inverter. Includes 3 or 4 UWT-I-250W grid tie 1 KW IP 54 inverters system includes extra dump load, 58V safety device built in and IP-54 steel case with a cooling fan built in. | | |

**The extra UWT-I-250W extension kits can be connected to the AP-Box ( DC-IN power) and the AC grid as per 4.1 Wiring diagram. The AC connectors can be installed parallel to the grid . You can see that the AP-Box has more connectors for connecting UWT-I-250W Grid tie Inverters. ( max-3 pcs).**
**When you install the extra Inverters to the wall take a minimum space in between of 4 Inches / 100 mm.**

### Information

Tips for installing:
Use all the included mounting material to fasten the equipment to the wall. When drilling in concrete use the correct size drill for the included plugs.

## A4. Wiring of the Complete System

This chapter shows a step by step plan to wire the SWEA grid tie Inverter system to the grid and the wind turbine.

### WARNING!

Before beginning the installation of the SWEA grid tie Inverter system, read all of the included instructions, cautions and warnings on the SWEA grid tie Inverter, AP-Box, Diode Box and the Dump load. Also read the manual of the Wind turbine that you will be connecting.

Connect the wires to all the parts of the SWEA grid tie Inverter system. This wiring includes the AC voltage from the SWEA grid tie Inverter to the public grid and the AC voltage from the wind turbine to the Diode box. Carefully follow the instructions as described in this chapter. Deviating from these instructions could expose you to lethal voltage that can cause serious injury or death.

### WARNING!

Always prevent the wind turbine from running during wiring. A high level AC voltage during high wind periods can cause serious injury and equipment damage.

### AC Grounding:

The AC out section of the grid tie Inverter, as shown in chapter A2.3 - grid tie Inverter switch- fuse-wiring section, has a ground connector. This ground must be connected to the main grid ground.

### Wind Turbine Grounding.

The wind turbine grounding can be connected to the diode box. The diode box grounding is connected to the AP-box grounding and the AP-Box grounding is connected to the AC/DC side grounding of the Inverter. The Inverter AC side is connected to the ground of the grid.

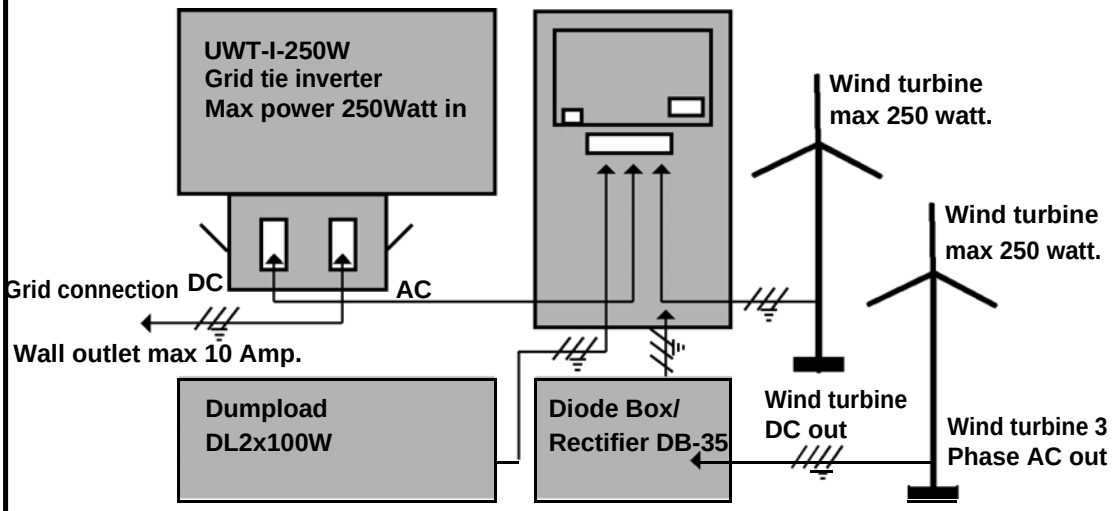
## A4.1. Wiring Diagram, AC Grid, Wind Turbine

### WARNING!

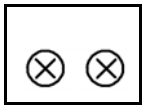
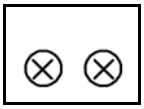
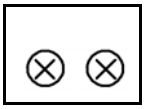
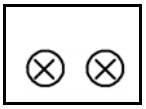
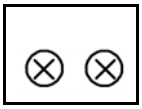
Install the wires as per the schematic diagram below. Follow the sequence as illustrated.
Enclosure ground is isolated from input and output terminals.
AC output (neutral) is not connected to ground.

**- Wiring diagram of total system**

| **Wiring diagram grid tie Inverter UWT-I-250W Starter kit** |
|---|
| **Wind turbine 200-300W 1 x UWT-I-250W starter-kit.** |
| **Wind turbine 300-500W 1 x UWT-I-250W starter-kit + 1x UWT-I-250W Extension-kit.** |
| **Wind turbine 500-700W 1 x UWT-I-250W starter-kit 2x UWT-I-250W Extension-kit.** |
| **For wind turbines of > 700 Watt and 1 KW request the 1 KW ON GRID combination with 4 UWT-I-250W grid tie Inverters, extra dumpload and safety devices.** |



**- Wiring AP-Box to Inverter, Diode box and Dump load.**

| | | | | | | |
|---|---|---|---|---|---|---|
| | Red Led | | Connection diagram AP-BOX | | | |
| | Yellow Led | | | | | |
| | Green Led | | | | |  |
| |  |  |  |  |  | - + |
| | | | - + | - + | - + | |
| | Adaptor<br>AC-max<br>24V | Dump load<br>DL-2-100 | Inverter<br>UWT-I-<br>250W<br>grid tie<br>Inverter<br>1 pc | Inverter<br>UWT-I-<br>250W<br>grid tie<br>Inverter<br>1 pc | Wind<br>turbine<br>DC in<br>0-55V max.<br>Length cable<br>max. 15 mtr<br>600 Inch.<br>Wiring<br>cables to<br>wind turbine<br>min. AWG<br>13. | Inverter<br>UWT-I-<br>250W<br>grid tie<br>Inverter<br>1 pc |
| **Connector** | **1** | **2** | **3** | **4** | **5** | **6** |
| | **WIRING: Use copper wiring AWG 16 -12 only or 1,5- 2,5 mm2** | | | | | |
| | **LED INDICATION:** | | | | | |
| | RED LED | Dump load ON (Brake on) | | | | |
| | YELLOW LED | Wind Turbine is generating power. | | | | |
| | GREEN LED | Adaptor power connected | | | | |

# Inverter Connection.

**- AC- GRID CONNECTION.**

## WARNING!

All electrical installations must be done in accordance with all local electrical codes and with the Local National Electrical CODES ( NEC) , ANSI/NFPA 70. and others. Use minimum 1,5 m2 or AWG15 (maximum), 90 degree C ( 194 Degree F) Copper wire for all AC wiring connections to the Inverter UWT-I-250W. Voltage drop and other considerations may dictate that larger size wires are used. Use solid or stranded wire but, not fine stranded wire.

## WARNING!

The National Electric Code (NEC) states that the Inverter UWT-I-250W must be connected to a dedicated circuit, and that no other outlets or devices can be connected to the same circuit. See NEC Section 690-64(b)(1). The NEC also imposes limitations on the size of the Inverter and the manner in which it is connected to the utility grid. See NEC Section 690-64(b) (2).

When there are other grid regulations they has to be follow up.

## WARNING!

To reduce the risk of fire, connect the Inverter only to a wall outlet of maximum 10 Amps in accordance with the NEC ANSI/NFPA 70. or other local regulations The Inverter itself is protected with a fuse of 2 Amps (slow). You can find this fuse at the bottom side of the wiring box of the UWT-I-250W Inverter.

### AC GRID CONNECTION:

The Inverter UWT-I-250W must be connected to the 120-60Hz or 230V-50 HZ line breaker with minimum AWG 15 copper cable in accordance with NEC ANSI/NFPA 70 regulations.

Ensure connection is through a maximum 10 Amp breaker!

Also connect the Inverter UWT-I-250W to the ground in the breaker box with AWG-15 size cable. AWG-15 size is 1,5mm2.

120V-60 HZ or 230V-50 Hz Power cord IS included in the package

DC connector

.

| Voltage and Frequency Limits for the AC Connection. | |
|---|---|
| Voltage range: | 214V – 253 V 110 – 145V |
| Frequency range: | 49,5 Hz and 50,5 Hz. 59,5-60,5 Hz. |

**- DC- Connection of the Inverter UWT-I-250W**

## WARNING!

All electrical installations must be done in according with all local electrical codes and the National Electrical CODE (NEC), ANSI/NFPA 70. Use minimum 1,5 mm2 or AWG 15 (maximum), 90 degree C (194 Degree F) Copper wire for all AC wiring connections to the Inverter UWT-I-250W. Voltage drop and other considerations may dictate that larger size wires be used. Use solid or stranded wire but, not fine stranded wire.

AWG15 = 1,5 mm2.

Installation Guide

**WARNING!**

The National Electric Code ( NEC) states that the Inverter UWT-I-250W must be connected to a dedicated circuit, and that no other outlets or devices can be connected to the same circuit. See NEC Section 690-64(b)(1). The NEC also imposes limitations on the size of the Inverter and the manner in which it is connected to the utility grid. See NEC Section 690-64(b) (2).
For many Europe countries every 220V-50Hz wall outlet can be used to connect the inverter.

**WARNING!**

To reduce the risk of fire, the Inverter has a fuse of 8 Amp(slow) in accordance with NEC A NSI/NFPA 70.
You can find this fuse at the bottom side of the wiring box of the UWT-I-250W Inverter. NEVER INSTALL A BIGGER FUSE THAN 8 Amp./ 250V (slow version)

**WARNING!**

When you connect the DC line wiring make sure your polarity is correct, ie connection of + to + and - to - connection!

The below wiring is required to connect the DC-IN line to the AP-Box .
Ensure polarity, connect the + to + connector and the - to - connector.
Use copper wire minimum AWG 15. or 1,5 - 2,5 mm2 copper wire.

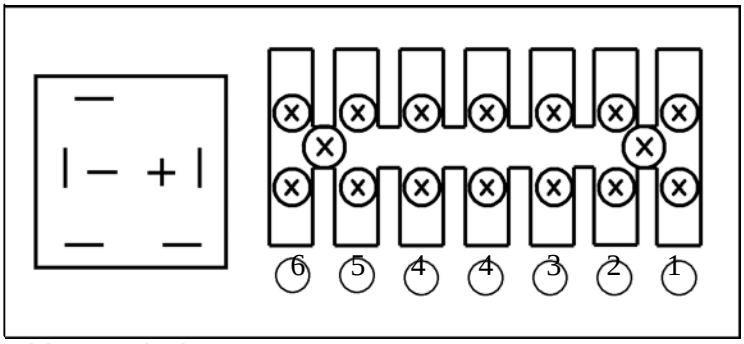
DC in connector.
Connector is included in package.

**DIODE BOX CONNECTION**

**WARNING!**

Install on the UWT-I-250W Starter-kit only wind turbines with power out of 200-300 WATT IN LOW WIND AREA'S and with a nominal AC out of min 24V and max 48V. WHEN YOU HAVE BIGGER WIND TURBINES >300 Watt UP TO 700 WATT YOU HAVE TO INSTALL EXTRA UWT-I-250W EXTENSION KITS. SEE THE CHAPTER UWT I 250W EXTENSION KITS.

Wind Turbines may be 3 phase AC out or single Phase DC out.
When you want to connect a max 48V nominal AC out 3 Phase AC out turbine, connect the turbine to the Diode-box as per wiring diagram.
When you want to connect a max. 48V nominal DC out single phase wind turbine do NOT CONNECT THE DIODE-BOX. The DC wind turbine may be connected directly to the AP box connector 5.




**Wiring terminal DIODE BOX**
**DB-35 3 Phase rectifier**

1-2-3 L1, L2, L3. 3 Phase wind turbine phase AC

4 Ground

\- Ap-Box Connector 5

+Ap-Box Connector 6

## A4.2 Torque values and Wire sizes

| **Screw force DC connector Inverter UWT-I-250W, Diode box, AP-Box and dump load.** |
|---|
| Screw torque value: screw 3 mm, 20 IN/LB |

## A4.3 Switch wind turbine system ON and OFF

**WARNING!**

Before you are going to do any maintenance or replacements of parts of the Installation

**FIRST STOP THE WIND TURBINE WITH THE STOP-SWITCH LOCATED ON TOP OF THE AP-BOX.**

. Now it is save to work at all the components.

**WHEN YOU DISCONNECT THE WIND TURBINE FASTEN THE BLADES TO THE POLE FIRST BEFORE YOU DISCONNECT THE WIRES FROM THE TURBINE.!!!**

**SWITCH ON WIND TURBINE SYSTEM.**

1. Switch the STOP SWITCH LOCATED AT THE TOP of the AP-Box to position NORMAL OPERATION. Now the brake is off and wind should start the turbine turning.

**WARNING!**

Don't forget to unfasten the rope from the blades at the pole!


## A4.3.D: With sufficient wind, the turbine starts rotating.

# A5. LED Indicators

On both the UWT-I-250W Inverter and the AP-Box, LED indicators are located at the outside of the housing. These indicators provide information about the status of the Inverter and the system in general.

# A5 Inverters and AP-Box

## A5.1. A. LED indicators UWT-I-250W Grid tie Inverter:

| Green blinking | Red blinking |
|---|---|
| Power indication | Fault indications |

| Green LED on + Red LED blinking |
|---|
| Green LED on + red LED blinking = reconnect delay |

| Green LED Indicator signals: | |
|---|---|
| - Green LED is ON | = Inverter ready for start/ or restart procedure is running |
| - Green LED is blinking | = Inverter is delivering power to the grid. The speed of blinking from 1 up to 8 times gives an idea of the height of the power that it is delivering back to the grid. 1 x blinking is almost zero watt and 8 x blinking is the maximum power to the grid. |

| Red LED Indicator signals: (Error messages) | |
|---|---|
| - Red LED is on | = prestart procedure is running |
| - Red LED 1 x blinking | = temperature Inside the grid tie Inverter is to high. |
| - Red LED 2 x blinking | = grid NOT available. |
| - Red LED 3 x blinking | = grid voltage to low. |
| - Red LED 4 x blinking | = grid voltage to high. |
| - Red LED 5 x blinking | = grid frequency is to high or to low. |
| - Red LED 6 x blinking | = synchronization fault. |
| - Red LED 7 x blinking | = DC in to high |
| - Red LED 8 x blinking | = DC in current above 7,25 Amp. |
| - Red LED 9 x blinking | = island detection |

## A5.1.B LED indicators AP-Box

| | |
|---|---|
| Red LED: | Dump load ON (Brake on) |
| Yellow LED: | Wind Turbine is generating a Voltage |
| Green LED: | Adaptor power connected. Not applicable |

# A6. Troubleshooting

## A6.1. General

When the Inverter is not functioning well, check the RED LED INDICATOR on the UWT-I-250W Inverter. In chapter A6.2 troubleshooting tips are provided to assist with RED LED ERROR indication.

# A6.2 Error Messages

Error messages occur with the RED LED on at the UWT-I-250W grid tie Inverter.
Possible error solutions are listed below:

## Green LED on + Red LED blinking

When the Green LED is on and Red LED is blinking the system is unable to make a connection to the grid. This indication occurs when the grid voltage is switched off.

## Red LED Indicator signals:

**- Red LED 1 x blinking = Temperature Inside the Grid tie Inverter Is to high.**

The system resumes working again automatically when the temperature lowers inside the UWT-I-250W Inverter. High temperatures can occur inside the inverter when the ambient temperature is high. Direct sun on the Inverter can be a problem. Also, high wind will result in the turbine producing high power, increasing the temperature inside the inverter.
Solution: Wait until the temperature lowers, the Inverter will start automatically. When direct sun on the inverter is causing high operating temperatures, please install the Inverter in shade.
When the temperature controller is frequently operating because of high wind power, it is suggested to install a second UWT-I-250W Grid tie Inverter. (UWT-I-250W Extension-kit)

**- Red LED 2 x blinking = Grid NOT available**

110V- grid is not available and the wind turbine is turning, the RED LED will be blinking x2.
To troubleshoot the problem, check the fuse or circuit breaker in the breaker box of your grid system and also the fuse built in to the UWT-I-250W Inverter. Check the wiring from the breaker box to the UWT-I-250W Inverter.

◯ AC Grid fuse 2 Amp (SLOW) 250V

Slide in fuse holder with 2 Amp T
( slow 5 mm x20 mm fuse.

**- Red LED 3 x blinking = Grid voltage to low.**

A minimum AC grid voltage is adjusted and specified for your area that may be connected to the UWT-I-250W Inverter. When the grid is lower than the adjusted and specified voltage in the Inverter, the Inverter will shut down the connection to the grid and stop sending power to the grid.
Check first if the NORMAL line of the grid voltage is in the range of the specifications of this UWT-I-250W Inverter. If it is not, contact your local energy company and ask for an investigation of the grid.

**- Red LED 4x blinking = Grid voltage to high.**

A maximum AC grid voltage is adjusted and specified into the Inverter that may be connected to the GTI250W Inverter. When the grid is higher than the adjusted and specified voltage in the Inverter, the Inverter will shut down the connection to the grid and stop sending power to the grid.
Check first the NORMAL grid voltage is in the range of the specifications of this GTI-250 Inverter. If it is not, contact your local energy company and ask for an investigation of the grid.

**- Red LED 5 x blinking = Grid frequency is beyond normal limits.**

When the minimum and maximum adjusted and specified AC grid frequency into the Inverter is higher or lower, the UWT-I-250W Inverter will shut down the connection to the grid and stop sending power to the grid. Check first the NORMAL grid frequency is in the range of the specifications of this GTI-250 Inverter. If it is not, contact your local energy company and ask for an investigation of the grid.

**- Red LED 6 x blinking = Synchronization fault.**

Synchronization fault can occur when there is disruption on the grid. The fault will reset automatically when the grid is working correctly again.

**- Red LED 7 x blinking = DC in to high** **D**C in is above 55Volt. Reduce DC in.

**- Red LED 8 x blinking = DC in current above 7.25 Amps.**

DC in current is above 7.25 Amps. When DC in current reduces due to lower wind speeds or lower Sunshine, the fault will reset automatically.

**- Red LED 9 x blinking = Island detection**

Island detection is an indication that the grid is off and must be restored by the electricity company. This island detection can also be detected by 2 times red LED or 3 times red LED.

# A7. Maintenance

**A7.1. Clean the fan when necessary.**

When dust is visible on the blades of the fan, clean this fan with a small cotton bud. Switch off the stop switch of the AP-Box and switch off DC and AC switches of the Inverter to avoid that the fan starting accidently during the cleaning.

**A7.2 Change DC wind turbine line fuse and AC grid line fuse.**

**WARNING!**

High voltage levels can be found at the AC and DC Fuse holders. Always switch off the AC and the DC power before you are going to change the fuse(s)

**Location of the AC and DC fuses.**

- DC fuse 8 Amp/250V/slow
- AC fuse 2 Amp/250V/ slow

Change the fuse as follows.
First turn off AC and DC switches located in the same housing where the fuses are located. Turn anti clockwise the outer part of the fuse.
Replace the fuse and screw fuse holder back into the fuse-housing.
Use always the same fuses as specified near the fuse holder on the box.

# A8. Technical Specifications
## How to adjust the Power curve

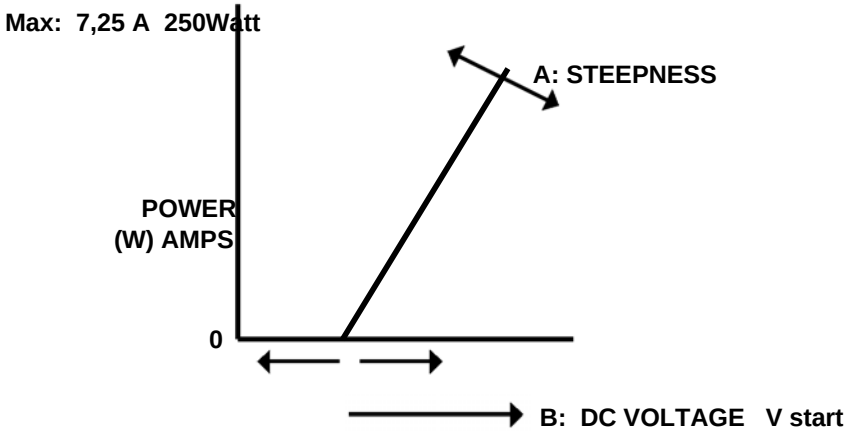
The next chapter discusses the technical specifications of the UWT-I-250W Inverter starter-kit. With this information you can calculate the device capacities that you may want to connect to this GTI-250 Inverter starter-kit. Also learn how to adjust your power curve inside the inverter.

**WARNING!**
NEVER EXCEED THE UWT-I-250W Inverter DC-IN OF MORE THAN 55 VOLT!.
A HIGHER DC-IN WILL INCREASE THE RISK OF FIRE AND MAY DAMAGE THE INVERTER. WARRANTY IS VOID IS USED IN THIS SITUATION.

## A8.1 Operating Specifications / Adjustment Power curve.

The GTI-250 grid tie Inverter CPU comes loaded with a standard Power curve.
Only by factory or by dealer can be the power curve be adjusted. Ask your dealer or distributor when you wish to change the power curve for non standard power sources. When you buy the UWT-I-250W starter-kit, inform the dealer what power source you wish to connect, the unit will be set accordingly.
This optimizes your grid tie Inverter system to the maximum power production to the grid.

**Power curve UWT-I-250W Starter-kit. Type of CPU 071230U63034-134V**



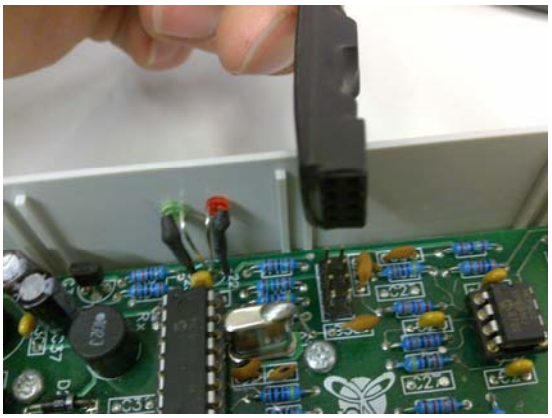

**B: Start Voltage DC out of the Wind turbine ( DC V )**
**DC- in to the Grid Tie Inverter ( DC V )**

The default adjustments are:
V-start: 30V DC steepness of the power curve: 3.4V/A.

**MANUAL HOW TO USE THE MENU FOR ADJUSTING THE POWER CURVE**

1: Install the SIT Menu software on your PC.
- Download the SIT MENU software from internet. www.swea.nl downloads.
- Connect the SWEA RS-232 communication cable to the inverter and your PC.
  Special RS-232 cable from SWEA. art. number: 10.004. Ask your supplier.
  When you don't have a RS-232 COM port on your laptop you can use a USB>> RS-232 converter in between. You can order at your supplier also
- Put 12 V Dc at the DC-in connector of the inverter. ( you may use a 12 V Dc adaptor.

Adjust the SWEA RS-232 cable:
2: Shoos COM.
3: Connect
4: File menu >> Login
5: Username: distributor
6: Password: tevvep20
7: PV/dl >>> Adjust your settings for the power curve
8: restart.
9. Disconnect.



**Install the RS-232 cable at your inverter. Open the cover of the inverter.**

## A8.2. FCC Compliance information

SWEA Utility Interactive Inverter, model UWT-I-250W starter-kit.

This Inverter complies with article 15 of the FCC Rules.

Operation is according to the following conditions:

1: This Inverter system may not cause harmful interference, and

2: This Inverter system must accept any interference received, including interface that may cause undesired operation.

## INFORMATION:

This Inverter system has been tested and found to comply with the limits for Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This Inverter system generates, uses and can radiate radio frequency energy and if not installed and used in according with the instructions, may cause harmful interference to radio communications. However there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the Inverter system OFF and ON, the user is encouraged to try to correct the interference by one or more of the following measures:

- Place the Inverter system in another location.
- Look for the receiving antenna and choose another location.
- Connect the Inverter system to another outlet on a circuit different than the Inverter system is installed.
- Consult your dealer or an experienced radio/TV technician for help.
- When user is changing or make modifications not approved by SWEA EUROPE BV could void the user's authority to operate this equipment.

Contact: SWEA EUROPE BV www.swea.nl.

# A8.3 Specifications including trip limits and Trip times

| UWT-I-250W starter-kit | |
|---|---|
| **UWT-I-250W Inverter:** | |
| AC-Operating Range | 214V and 253V (230V Nominal)<br>100V and 145V ( 120V Nominal) |
| AC frequency Range | 49,5 - 50,5 (50 Hz Nominal)<br>59,5 – 60,5 Hz ( 60 Hz Nominal) |
| Range of Input operating Voltage | 0 - 55V DC. |
| Nominal DC input Power | 240 Watt. (per connected UWT-I-250W Inverter) |
| Nominal AC continuous Output Power | 200 Watt. (per connected UWT-I-250W Inverter) |
| Output Power factor | 0,95-1.0 at nominal AC power 200Watt output |
| Peak Inverter efficiency | 93% - 84% (10% - 100% nominal power) |
| Cooling | Fan speed, temperature controlled. |
| Maximum AC Continuous Output Current | 1 Amp. RMS (230V) 1,66A ( 1320V) |
| Maximum DC input current | Maximized by CPU adjustment at 7,25 |
| Maximum impedance of the grid | 0,5 Ohm<br>Amp. limited at 7,8 Amp. With auto switch off and auto reset. |
| Power consumption out of grid at standby position | 50 mW |
| Level 1: Heavy fault Switch off time: | < +/- 0,03 sec. |
| Level 2: minimum fault Switch off time | < +/- 0,8 sec. |
| Power consumption from wind turbines at 25V DC | +/- 0,3 watt ( Inverter at standby position) |
| Ambient temperature Rating | -10 degree C to + 40 degree C |
| Dimensions: | W= 135 H=80 Max length incl. cable gland 220 mm ( 5,31 x 3,14 x 8,67Inch) |
| Weight: | 2 KG ( 4,4 LBS.) |

Serial number: fi .2009-4-010

2009 year of manufacturing

4 month of manufacturing

010 production number

| AP-BOX | |
|---|---|
| Range of Input operating Voltage | 0- 58V DC. |
| Maximum DC peak current | 30 Amp. |
| Power consumption | 0,5 watt (Inverter at standby position and DC power source 47 V) |
| Ambient temperature Rating | -10 degree C to + 40 degree C |
| Dimensions: | W= 134 H=82 Max length incl. cable guides and stop switch : 240 mm (7,6 x 3,2 x 9,4 Inch) |
| Weight: | 0,6 KG (1,34 LBS.) |

| DIODE BOX DB-35 | |
|---|---|
| Range of Input operating Voltage | 0- 60V DC. |
| Maximum DC input current | 15 Amps. |
| Power consumption at 7,25 Amp – | 15 watt |
| Ambient temperature Rating | -10 degree C to + 40 degree C |
| Dimensions: | W=147 H=40 Max length incl. cable guides and stop switch : 110 mm |
| Weight: | 0,28KG (0,62 LBS.) |

| DUMP LOAD DL-2-100 | |
|---|---|
| Range of Input operating Voltage | 0 - 60V DC. |
| Continuous DC Power | 40 Watt. |
| Resistant: | 2 OHM (serial connected ) or 0,5 Ohm (Parallel connected.) |
| Maximum DC input current | Max 30 Amp. |
| Ambient temperature Rating | -10 degree C to + 40 degree C Max temp at operating: 60 Degree C. |
| Dimensions: | W= 147 H=40 Max length incl. cable guides and stop switch : 208 mm (5,5 x 1,6 x 7,8 Inch) |
| Weight: | 0,7KG (1,56 LBS.) |

# B. SWEA UWT-I-250W Inverter (UWT-I-250W-extension-kit ) as a PV solar grid tie Inverter.

### Introduction:

The SWEA UWT-I-250W Extension-kit is not only an extension-kit for The UWT-I-250W Starter-kit to allow grid connection from very small to 1000 Watt wind turbines, but is also a stand alone grid tie Inverter for connection of PV solar panels to the grid.

To connect solar panels to the grid you do not need a controller (AP-Box) to keep the speed maximized or a dump load to brake the solar panels. Disconnecting the solar panels is enough to "brake "the PV solar system. Also the Diode Box is not necessary because the solar panels normally already produce DC out voltage that can be connected directly to the UWT-I-250W Extension-kit.

CONTENTS:

B. SWEA UWT-I-250W Inverter (UWT-I-250W Extension-kit) as a PV grid tie
Inverter B.1 Specifications and software.
B.1.1 Specifications
B.1.2. Software B.2
Wiring diagram
B.2.1 AC Grid Connection
B.2.2 PV-Solar DC Connection
B.3 Calculating the PV Solar panels that may be connected to the UWT-I-250W Extension kit.
B.3.1. Table of PV- Solar panels that can be connected to the UWT-I-250W Extension-kit.
B.3.2 How to calculate the DC-in and the Max. DC-in Power of your PV Solar panels
B.4 Switch on the PV-Solar system.
B.5 Troubleshooting.
B.6 Maintenance
B7. Factory information.

## B.1. Specifications and software.

## B.1.1 Specifications

The UWT-I-250W Extension-kit has a DC-IN capacity of 250W Nominal each and a maximum DC - in Voltage of 55V.

UWT-I-250W Extension-kit for PV connection to the grid

.

| Specifications UWT-I-250W Extension kit. | |
|---|---|
| **UWT-I-250W Inverter:** | |
| AC-Operating Range | 214V and 253V (240V Nominal)<br>100-145V ( 120V Nominal)<br>49,5-50,5 (50 Hz Nominal) |
| AC Frequency Range | 59,5-60,5 Hz ( 60 Hz Nominal) |
| Range of Input operating Voltage | 0-55V DC. |
| Nominal DC Power | 240 Watt. (per connected UWT-I-250W Inverter) |
| Nominal AC continuous Output Power | 200 Watt. (per connected UWT-I-250W Inverter) |
| Output Power factor | 0,95-1.0 at nominal AC power 200Watt output |
| Inverter efficiency | 93%, 84% |
| Cooling | Fan speed: temperature controlled. |
| Maximum AC Continuous Output Current | 1 Amp. |
| Maximum DC input current | Maximized by CPU adjustment at 7,8 Amp. With auto switch Off en auto reset. |
| Maximum impedance of the grid | 0,5 Ohm |
| Power consumption out of grid at standby position | 0,375Watt |
| Trip time accuracy | |
| AC Power consumption | < 0,05 watt (Inverter at standby position) |
| Level 1: Heavy fault Switch off time | < +/- 0,03 sec. |
| Level 2: minimum fault Switch off time | < +/- 0,8 sec. |
| Power consumption | +/- 0,2 watt (Inverter at standby position) |
| Ambient temperature Rating | -10 degree C to + 40 degree C |
| Dimensions: | W= 135 H=80 Max length incl. cable gland 220 mm ( 5,31 x 3,14 x 8,67 Inch) |
| Weight: | 2 KG ( 4,4 LBS.) |

## B.1.2 Software:

Default software is installed as mentioned in chapter A 8.1,

V start = 30V and Steepness of the Power curve is 3,4V/A.

Depending of the type of PV solar panels that you want to connect to the UWT-I-250W Extension kit your dealer has to adjust the Power curve installed into the Inverter. Ask your dealer before you purchase this Inverter to make the correct adjustment of the power curve for the type of PV solar panels that you want to connect. This is important to get the optimum power output to the grid.

# B2 Wiring diagram

## B.2.1 AC- GRID CONNECTION

### WARNING!

All electrical installations must be done in accordance with all local electrical codes and with the National Electrical CODE (NEC) , ANSI/NFPA 70. Use minimum AWG 15 (maxi mum), 90 degree C (194 Degree F) Copper wire for all AC wiring connections to the Inverter UWT-I-250W. Voltage drop and other considerations may dictate that larger size wires be used. Use solid or stranded wire but, not fine stranded wire. AWG15=1,5 mm2

### WARNING!

The National Electric Code ( NEC) states that the Inverter UWT-I-250W must be connected to a dedicated circuit, and that no other outlets or devices can be connected to the same circuit. See NEC Section 690-64(b)(1). The NEC also imposes limitations on the size of the Inverter and the manner in which it is connected to the utility grid. See NEC Section 690-64(b) (2).

### WARNING!

To reduce the risk of fire, connect the Inverter only to a breaker of maximum 10 Amp in accordance with the NEC ANSI/NFPA 70. The Inverter itself is secured with a fuse of 2 Amps (slow). You can find this fuse at the bottom side of the wiring box of the UWT-I-250W Inverter.

| **Voltage and Frequency Limits for the AC Connection.** | |
|---|---|
| Voltage range: | 214V – 253 V or 100V – 145V |
| Frequency range: | 49,5 Hz and 50,5 Hz. or 59,5 – 60,5 Hz |

## B2.2 DC- CONNECTION OF THE UWT-I-250W Extension-kit

### WARNING!

All electrical installations must be done in accordance with all local electrical codes and with the National Electrical CODE ( NEC), ANSI/NFPA 70. Use minimum AWG 14 (maximum), 90 degree C (194 Degree F) Copper wire for all AC wiring connections to the Inverter UWT-I-250W. Voltage drop and other considerations may dictate that larger size wires be used. Use only solid or stranded wire but not fine stranded wire.

### WARNING!

The National Electric Code (NEC) states that UWT-I-250W Extension kit must be connected to a dedicated circuit, and that no other outlets or devices can be connected to the same circuit. See NEC Section 690-64(b)(1). The NEC also imposes limitations on the size of the Inverter and the manner in which it is connected to the utility grid. See NEC Section 690-64(b) (2).

### WARNING!

To reduce the risk of fire, the Inverter has a breaker of 8 Amp(slow) who is accordance with the NEC A NSI/NFPA 70.
You can find this fuse at the bottom side of the wiring box of the UWT-I-250W Inverter. NEVER INSTALL A BIGGER FUSE THAN 8 Amp./ 250V (slow version)

### WARNING!

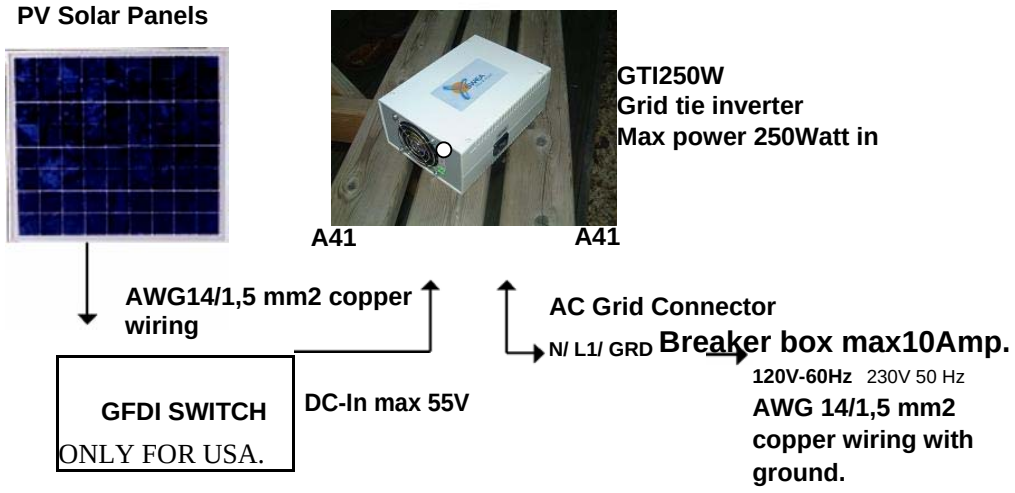
When you connect the DC line wiring of the Inverter, ensure polarity is correct for wiring of + to + and - to - connection from Inverter to AP-Box. Before you start connecting the solar panels to the grid!

## B.2.3 PV Solar DC CONNECTION

The below wiring is required to connect the DC-IN line to PV- Solar Panels. Caution with polarity, ie connection of the + to + connector and the - to - connector.
Use copper wire minimum AWG 15.

DC-in Line connector UWT-I-250W Extension-kit

## Schematic diagram UWT-I-250W Extension-kit for connection with PV solar panels



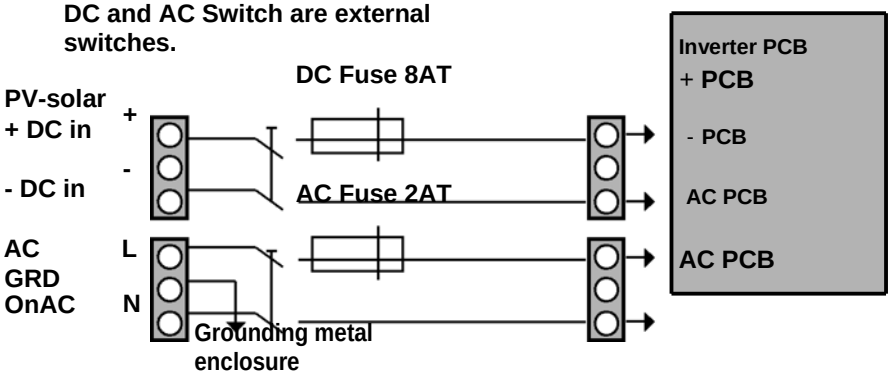

## Caution!

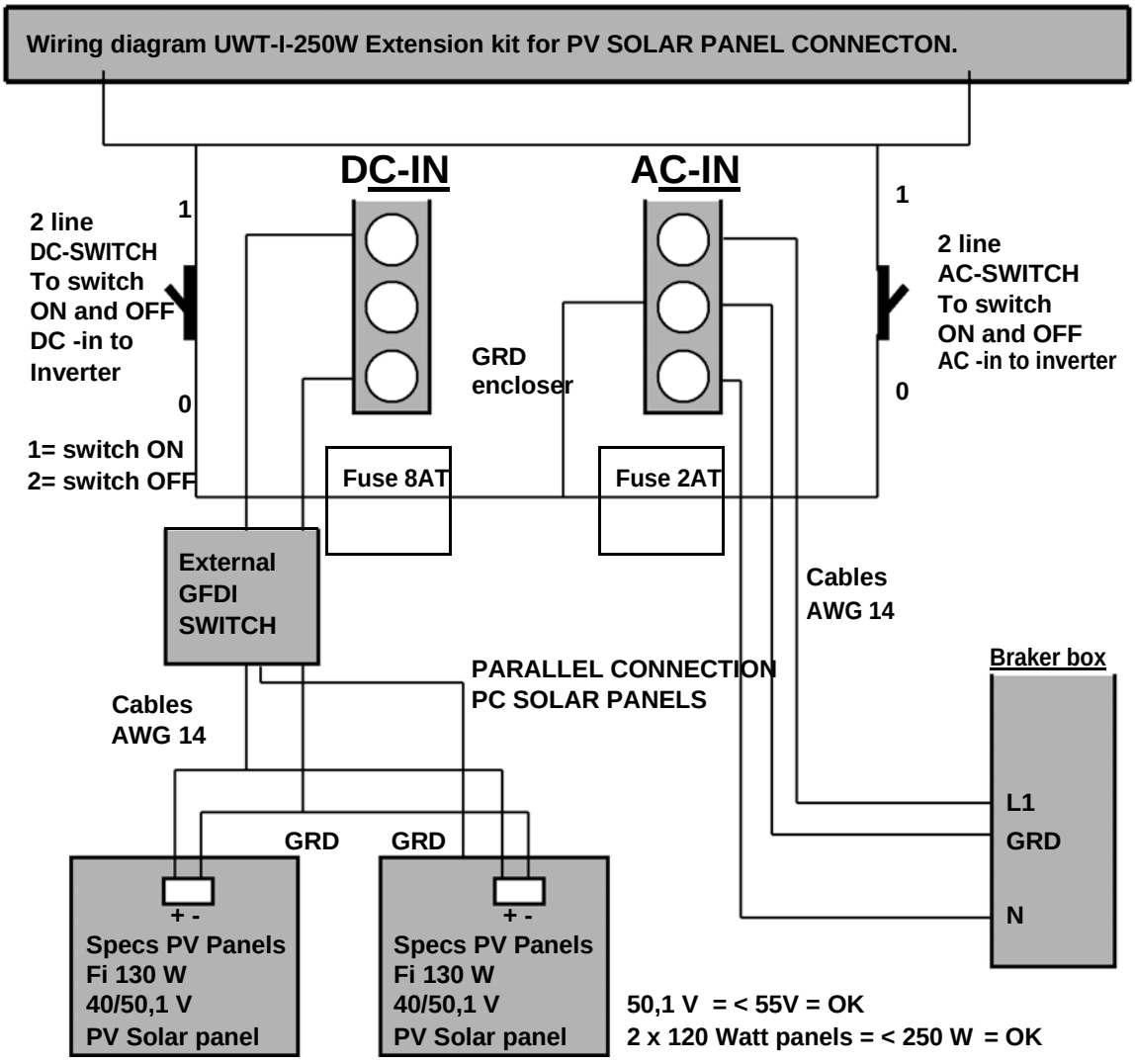
Risk of electric shock. Normally grounded (safe) conductors may be ungrounded and energized when a ground-fault is indicated

## WARNING!

The inverter is not provided with a GFDI device. This inverter must be used with an external GFDI device as required by AFC 96/NEC.

## Wiring Diagram of the UWT-I-250W Extension-kit

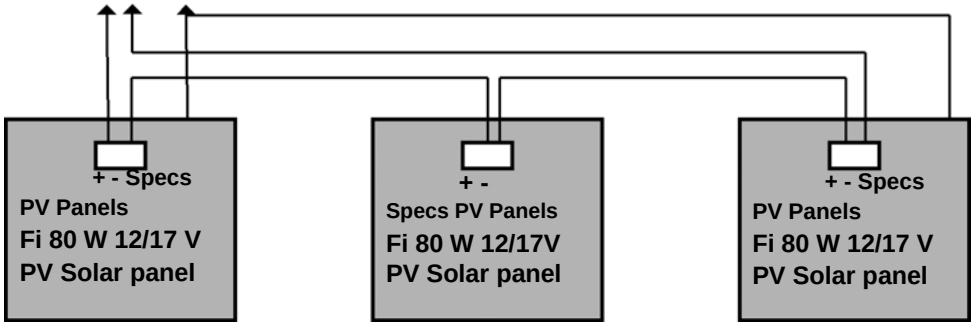





**Above PV panels are connected parallel.**
**Depending of the DC out of the PV solar panels**
**2 or more PC panels have to be connected in serial. See below schematic.**

**GFDI SWITCH is ONLY FOR USA USE.**

**To DC-IN Connector of UWT-I-250W Extension-kit. SERIAL CONNECTION PV-SOLAR PANELS**




**3 pcs Solar panels Connected in serial: 3 x 17V = 51V = < 55V = OK**
**Total connected Power = 3 x 80 Watt = 240W = < 250W nominal = OK**

## B.3 Calculation of the PV solar panels that may be connected to the UWT-I-250W Extension-kit.

**WARNING!**

NEVER EXCEED AT THE UWT-I-250W Inverter A DC IN OF MORE THAN 55 VOLT!. A HIGHER DC-IN SHALL MAKE RISK OF FIRE AND WILL DAMAGE THE Inverter. NO WARRANTY IS GRANDED AT THIS POINT.
CONNECT NEVER PV SOLAR PANELS WITH A TOTAL POWER OF MAX 260 WATT.

## B.3.1 Calculation of the PV solar panels that may be connected to the UWT-I-250W Extension-kit.

The UWT-I-250W Inverter is maximized by the DC-in Voltage and the DC -in Power. Maximum DC-in = 55V. Maximum DC Power in = 250 Watt.

In below table you can see how many PV-solar panels you can connect to the Inverter and how to connect.

| Power | Voltage | Qty | Serial | Parallel | Vopen total | Total Power |
|---|---|---|---|---|---|---|
| 50W | 12/17V | 3 | S | - | 51,0V | 150W |
| 50W | 17/21V | 2 | S | - | 43 V | 100W |
| 80W | 12/17V | 3 | S | - | 51V | 240W |
| 80W | 17/21V | 2 | S | - | 42V | 160W |
| 110W | 12/17V | 2 | S | - | 34V | 220W |
| 110W | 17/21V | 2 | S | - | 42V | 220W |
| 130W | 17/21V | 2 | S | - | 42V | 260W |
| 130W | 40/51V | 2 | - | P | 51V | 260W |

**Information**

When you connect solar panels in an area where the temperature can be far below zero degree C of far below 32 degree F. The capacity of the solar panels can come above 250 Watt. This will not harm the Inverter. When this power is loading your Installed Inverter will switch off automatically when the temperature inside the enclosure of the Inverter becomes to high. When temperature falls again the Inverter is switching on again automatically. It is recommended to use solar panels of max. 110 Watt/pc.

## B.3.2 How to calculate the DC-in and the Max DC-in Power of your solar panels.

- Read the specifications of your PV-Solar panels.
- Read the Power in Wp. and the V-open Voltage.

PV solar panels produce giving 10% more Power when the temperature outside is below 32 degree F, or below zero degree Celsius with high density sun.

Calculating Size and quantity of PV Solar panels.:

Make the Vopen as close as possible to the 58V DC-in with PV solar panels in serial or when the V-open is above 35 V, put 2 or more PV Solar panels in parallel. Add up all the connected PV Solar panels. Never install more than 260 Wp. (Recommended 242 Wp).

## B.4 Switch ON the PV Solar Installation.

- Check first the connected cables. Check or + and - cables are connected correctly.
- Switch on the external installed GFTI switch. ( only for USA)
- Plug in the power cable to the wall outlet.
- Take away the cove from the solar panels.

Now the system is ready to send power to the grid.

When the sun starts shining the green Led goes burning at the Inverter.

When the Sun light is high enough to make DC-in higher than V-Start adjusted into the Inverter green LED will go blinking. When the green LED is blinking the Inverter is sending power to the grid. See chapter A5.1 to see the functions of the green LED.

## B.5 Troubleshooting.

Look at Chapter A6.1 and A6.2.

## B.6 Maintenance.

Look at A7.

## B.7 Factory information:

SWEA USA BV / SWEA EUROPE BV

The Netherlands

For address details please look at our website:

www.swea.nl