Invertek

Pure Sine Wave

Grid-Tied Inverter

SolarWorx

Hybrid Grid-Tie Inverter

USER MANUAL

Rich Electric Drives the world

ISO 9001 No:182886

RICH ELECTRIC

SOLARWORX®

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CE 03 6169

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Introduction

SOLARWORX®
Hybrid Grid-Tie Inverter

SOLARWORX®

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SOLARWORX®

GTI-2000

Features:

- **Hybrid Grid-Tied Inverter**
- **Continuous Output Power Rating without de-rating at up to 50℃ ambient temperature.**
- **DC Battery input**
- **Solar, Wind and Hydro MPPT DC input***
- **Maximum Power Point Tracking (MPPT),**
- **Combi Connect, offering True Hybrid interactivity.**
- **Direct feed connection**
- **Solar input capacity up to a 2400Watts.**
- **Remote control replica of main control panel with LCD display*.**
- **Power Stack for increased power**
  - Need more power?
  Just keep stacking!

***Requires optional accessories, please see installation section for more information.**

About SolarWorx® Hybrid Grid-Tied Inverter:

Introduction

The SolarWorx GTI can operate as a true Hybrid power system were power produced from your solar panels, wind generator or hydro system can be sent back into the grid for a credit, however,

authorisation from your electricity provider is required. The system can also operate as a standalone power system when connected to the SuperCombi® or CombiPlus®, allowing you to power your home during a grid failure or for an independent “Off-Grid” setup. When connected with the SuperCombi®, power can be topped up from the grid supply during the “Off Peak Rate” if you don’t have enough being produced from your panels. Alternatively, for “Off-Grid systems, a backup generator can be automatically started to help support the homes power needs.

The SolarWorx® GTI is a highly reliable Grid-Tied Inverter and its most critical feature is to maximise the harvest energy from the PV array by using the advanced technology of Maximum Power Point Tracking (MPPT). The SolarWorx® GTI can also be directly connected to a battery allowing for even more flexibility. The system is available in four different models 12VDC, 24VDC, 48VDC and 96VDC nominal battery voltage inputs each have built-in programmable protection to ensure the correct battery connection and disconnection voltages to avoid exhausting the battery.

A wide range of MPPT input array voltages and battery voltage inputs are available depending on your application. The DC input of GTI-2000-12 may be wired in the range of 16.5-32VDC or nominal battery voltage of 12VDC, the DC input of GTI-2000-24 may be wired in the range of 33-64VDC or nominal battery voltage of 24VDC. The DC input of GTI-2000-48 may be wired in the range of 66-128VDC or nominal battery voltage of 48VDC and the DC input of GTI-2000-96 may be wired in the range of 132-226VDC or nominal battery voltage of 96VDC.

SolarWorx® GTI may not only be used in solar systems but also in wind or hybrid systems. With respect to these systems it is normally required to use an optional turbine controller. The controller with optional rectifier and braking unit for wind system is required to control and stop the control from overload condition caused by excessive wind speeds.

SolarWorx® GTI is very flexible and can be configured in many different ways. It has been designed to operate as a standalone basic grid feed, through to a truly interactive hybrid power management system. By combining the SolarWorx® GTI with the SuperCombi® or CombiPlus® you can now have the benefits of a complete hybrid power system. The power being generated from the solar Array, wind or hydro is fed into the SolarWorx® GTI where it is then transferred into an AC supply. The power is then connected to the AC output of the SuperCombi® or CombiPlus® creating an off

grid power system, (Combi-Grid). The power from the SolarWorx® GTI is either sent to the SuperCombi® or CombiPlus® to recharge the battery bank or can be used in conjunction with the Combi's power to help support the household loads. *Please Note: Some Combi-Grid features maybe limited please see page 62 for more details.*

For example if we used a SolarWorx® GTI-2000 (2000Watts) and connected it to the SuperCombi® SC-3000 (3000Watts), the output from both units can be combined together to support loads of up to 5000Watts. When the AC load is lower than the output of the GTI the excess power is sent back into the SuperCombi to recharge the batteries. Once the Batteries are full, and the system is connected to the mains grid, the excess power is then sent back into the grid for a credit.

The hybrid design allows you to operate your home during a black out and take advantage of the power being generated from the solar array unlike many conventional Grid-Tied Systems.

When connecting the SolarWorx® GTI to the SuperCombi® you can also take advantage of topping up you batteries during the "Off Peak" rate offered by many electricity providers these days.
This offers home owners and businesses even more savings on their electricity bills as well as the comfort of having power during a black-out.

Multiple SolarWorx® GTI units can be connected together with a number of SuperCombi® or CombiPlus® units offering power systems of up to 180KW.

Please carefully read through this manual and all the installations instruction and wiring before beginning installation of your SolarWorx® GTI. The protection and installation equipment must comply with the local codes. The rated fuses, breakers and external lightning protection should be installed along with your SolarWorx® GTI.

A Truly Interactive Hybrid Power System.

Specifications

MODEL	**12 Volt System**	**GTI-2000-12X (1)**
	24 Volt System	**GTI-2000-24X**

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48 Volt System 96 Volt System	GTI-2000-48X GTI-2000-96X
Ventilation	Fan Forced cooling
Temperature – Operation – Storage	-10℃~ +45℃ -25℃~ +80℃
Protection	
a. Output short circuit	✓
b. Over load	✓
c. Battery voltage too high	✓
d. Battery voltage too low	✓
e. DC input voltage too high	✓
f. DC input voltage too Low	✓
Transformer	(105℃)
Electronic & Powerstage	(70℃)
Humidity	0~95% (non condensing)
Combi Connect	✓
Direct Feed	✓
Anti-Islanding	(less than 10 msec)
Direct Battery Connection	✓
3-Phase Capacity	✓
Parallel Operation	✓
Remote Control Port	✓
Extension Port for PC Connection	✓
Please note specifications are subject to Manufactures changes.	

AC OUTPUT	
Output Voltage	205-270V
Cont. Power Output @ 50℃ (W) Under 50℃ (cos θ =1.0)	2000Watt (No derate 50℃)
Power Output Over 70℃	(Shutdown)
Maximum Power (W)	2200Watt
Maximum Efficiency (%)	86/90/94/96

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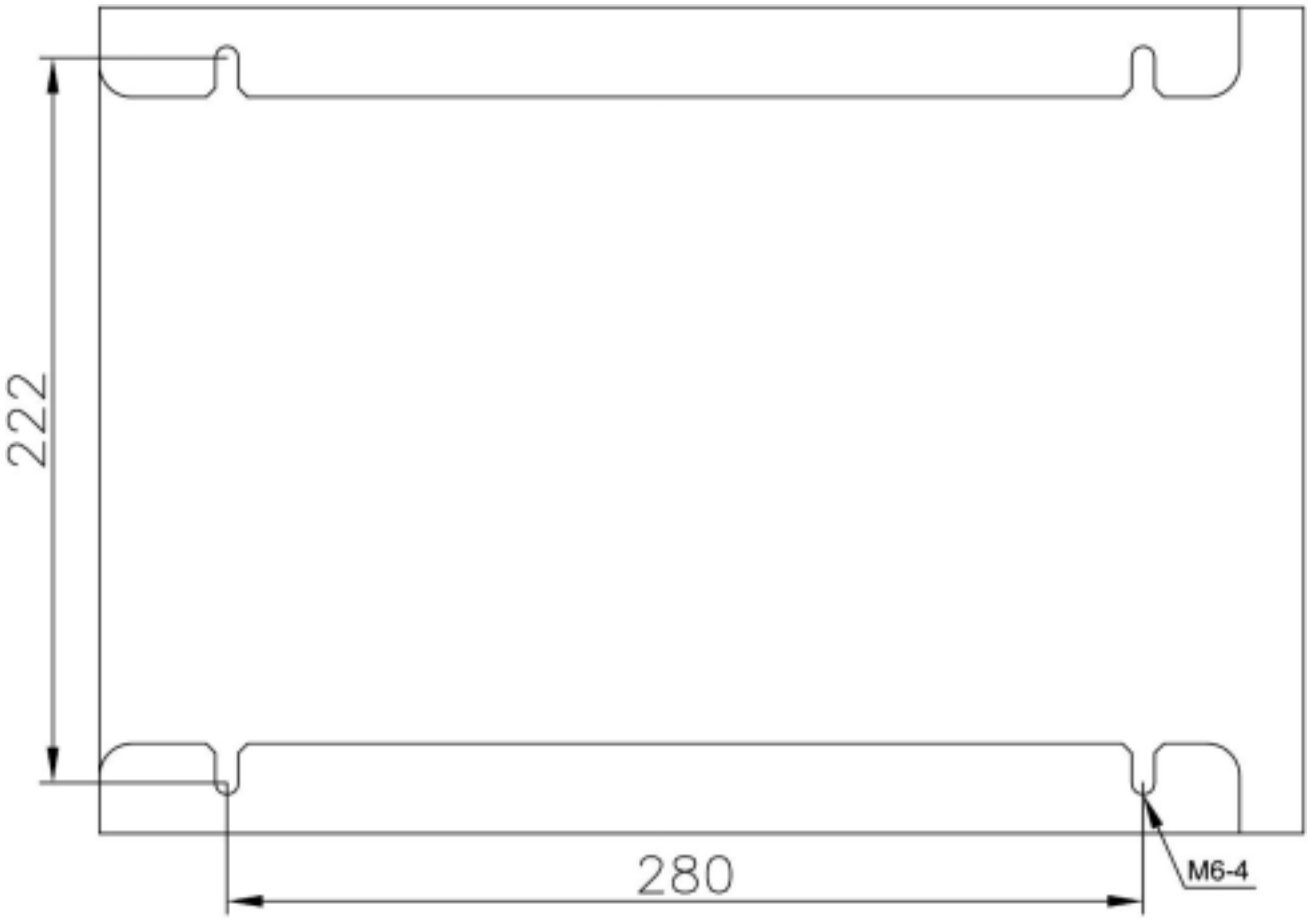
Please note specifications are subject to Manufactures changes.	
DC INPUT	
Maximum DC Input Voltage (VDC)	40V / 80V / 130V / 230V
Maximum Input Current(A)	180A / 90A / 45A / 22A
Input Voltage operating Range (VDC) MPPT Mode	16.5-32V / 33-64V / 66-128V / 132-226V
Input Voltage operating Range (VDC) Battery Mode	10-16V / 20-32V / 40-64V / 80-128V
Battery Voltage Default (VDC)	12V / 24V / 48V / 96V
(1) X should be 1, output voltage = 102-135 VAC or 2, output voltage = 205-270 VAC Eg. GTI-2000-121= 110VAC Model and GTI-2000-122 = 230VAC Model. *Specifications subject to change*	
AC INPUT	
Detection Time AC Input Fault	<10 msec.
Normal AC Input Range	102 VAC - 135VAC 110v Model 205VAC – 270VAC 230v Model
Trip Level AC Low Input	101 VAC 110v Model 204VAC 230v Model
Trip Level AC High Input	136 VAC 110v Model 271 VAC 230v Model
Min.~ Max. Frequency Range	50 ± 1 Hz / 60 ± 1 Hz
MECHANICAL	
Cabinet / Protecting Class	Aluminum / IP20
Dimension (HXWXD)	368 x 256 x 424 mm
Weight (kgs)	26 kgs

Dimensions

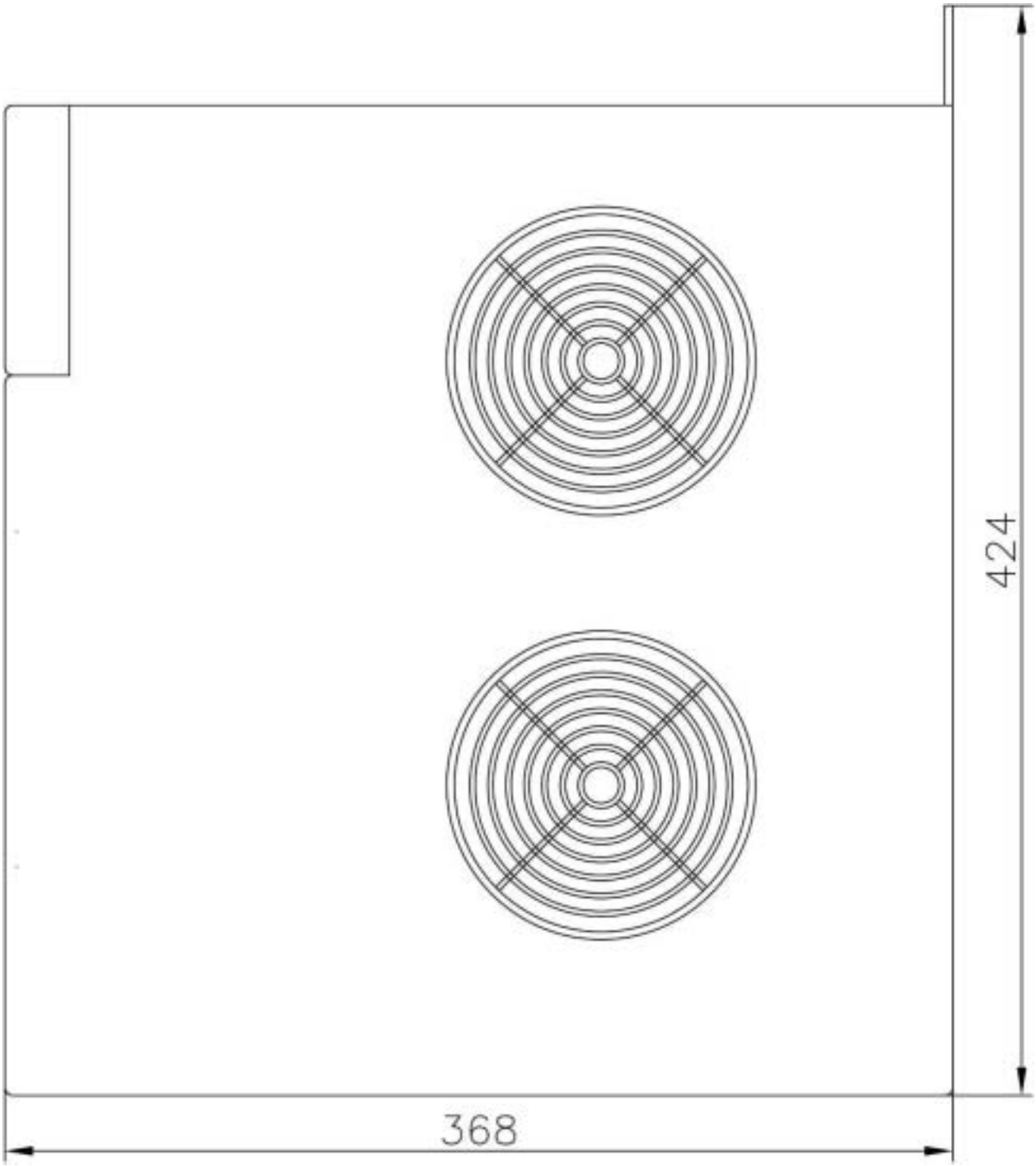
Dimensions 2000watt Model

Dimension for SolarWorx GTI 2000W
GTI-2000W-12/24/48/96

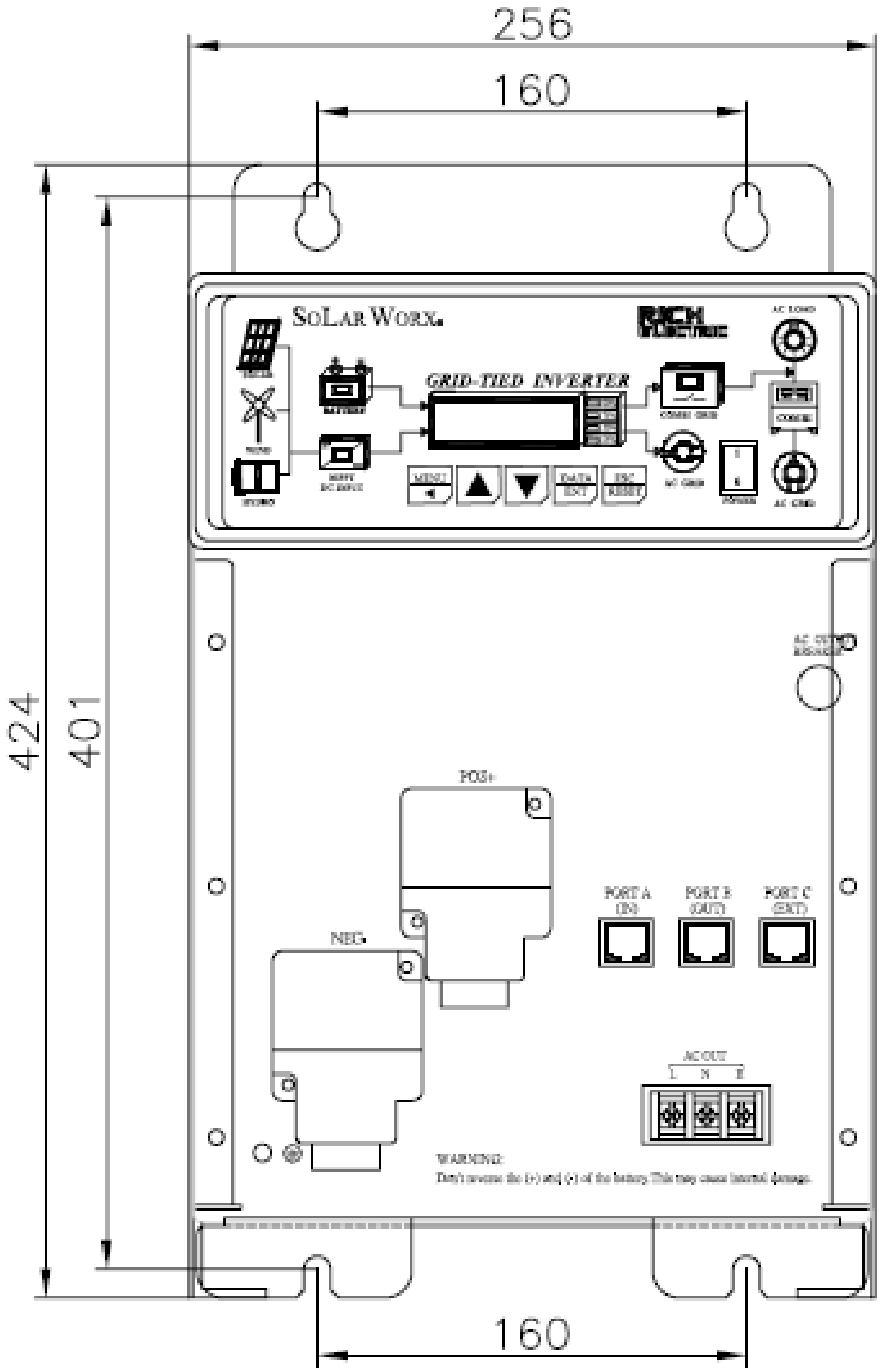
Unit: mm



Bottom View Bottom Mounting Holes



Side View



Front View Backside Mounting Holes

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Chapter 1 Installation

This product should be installed by a qualified electrician.

ALL AC WIRING MUST BE CARRIED OUT BY A LICENSED ELECTRICIAN AND MUST CONFORM TO AS3000 & AS4777 WIRING REGULATIONS OR RELEVANT STANDARDS

AS4777 states all the requirements for protection and isolation when connecting inverters with the grid and all systems shall be installed in accordance with that standard.
AS5033 states all the requirements for protection and isolation within the PV array and all systems shall be installed in accordance with that standard.

All cabling must be sized in accordance with AS/NZS 3000 and AS/NZS 3008.
Cable losses between the PV array and the inverter should never exceed 5% to maximise system output power.

For other regions, the installation and wiring should comply with relevant National Standards, Codes and Practices.

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1.10 Box Contents

- SolarWorx GTI
- User Manual
- Warranty Card
- Bag Containing connection items,
- Four M6 mounting bolts (including spring washers)
- Two DC terminals and casing

1.11 Location

This product must be installed in a dry and well-ventilated area.

There should be a clear space of at least 20 cm around the appliance for cooling.

Excessively high ambient temperature will result in the following

- Reduced service life
- Reduced output current
- Reduced peak capacity or shutdown of the inverter

Never position the inverter directly above the batteries.

SolarWorx GTI is suitable for wall mounting. The back and the bottom of the enclosure has holes for wall mounting purposes.

1.12 Front Panel

The front of SolarWorx GTI must remain accessible after installation. Ensure the AC and DC input cables are fitted with fuses or circuit breakers. Try and keep the distance between the product and battery to a minimum in order to minimise cable voltage losses.
The system should always be earthed for lightning and to reduce the risk of accidental short circuits. Earthing the DC power wiring is not normally required. If the system is installed in a lightning prone area, then protection for the earthing of the DC wiring may be needed.
DC Earth cables must be capable of carrying the battery fault current and tripping the battery fuse before the cabling fails.

A Battery Fuse or Circuit Breaker is required at all times; Never connect the SolarWorx GTI directly to the battery or solar panel without a Fuse or Circuit Breaker. The main Fuse or Circuit Breaker should be connected as close to SolarWorx GTI as possible for easy accessibility.
If the batteries are not earthed, then protection should be provided on both the Positive and Negative sides of the battery.

NOTE: The DC cabling should always be kept separate or be seperated from any of the AC cabling.

1.13 Requirements

- Screwdrivers for removing the lower-front panel and connecting AC input.
- 2x DC input cables (ensure DC input cables are correctly sized).
- Insulated box spanner (12 mm) for securing the DC terminal nuts.
- Twin and Earth power cable for AC cabling.

1.14 Connection of GTI to Battery Bank

When operating in Battery Mode Ensure you have enough battery capacity to be able to operate your SolarWorx® GTI to its full capacity.

Item \ Model	GTI-2000-12X	GTI-2000-24X	GTI-2000-48X	GTI-2000-96X
Minimum Battery Capacity (Ah)	400Ah	200Ah	100Ah	50Ah
Recommended Cable Size	50 mm^2 0 AWG	10mm^2 8 AWG	2.5 mm^2 14AWG	1.5 mm^2 18 AWG

NOTE: Consult your battery manufacturer for correct battery sizing for your application.
Battery cable sizes are based on recommended cable length of 2 meters. Longer cable lengths will require large cable sizes.

Always use an insulated box spanner in order to avoid shorting the battery.
Never short the battery cables!

- Remove the four screws at the lower-front panel of the enclosure and remove the panel.
- Connect the battery cable: the + (red) on the right and the – (black) on the left.
- Don't reverse the (+) and (-) of the battery. This may cause internal damage.
- Secure battery nuts tightly in order to reduce the contact resistance as much as possible.

For more information on battery bank enclosures and installations please refer to AUS/NZ standards AS2676, AS4509, AS3010 & AS4086.
For other regions, the installation and wiring should comply with relevant National Standards, Codes and Practices.

1.15 Connection of GTI to Other DC Sources (MPPT)

When operating in MPPT Mode, ensure your DC cabling is of adequate size and rated to the correct voltage to be able to operate your SolarWorx GTI to its full capacity.

Note: *The table on page 21 is based on a single run of cable. If you are connecting multiple PV strings, you can use multiple cables of smaller sizes and then connect them at the inverter, Each cable will need to be protected with an appropriate rated fuse or circuit breaker. Please take note of the correct cable sizing. We recommend a Maximum cable loss of 3%. The AS/NZ 3000 and AS/NZ 3008 state cable losses should never exceed 5%. During installation of the solar array it is advisable, if possible, to cover the solar panels (during cabling) to help reduce the output voltage and current being generated by the modules. It could be dangerous if a person was to come in contact with the positive and negative outputs of the solar array , especially when the output voltage are greater than 120V DC. All Solar Panel installations should be in accordance with AS/NZS5033:2005 Installation of PV Arrays.*

1.16 DC Cable Size Chart (GTI to Other DC Sources)

Please Note: Cable Chart is based on Max power of 2400watts and normal MPPT voltage, with cable losses of 3%.

Model / DC Cable	GTI-2000-12X	GTI-2000-24X	GTI-2000-48X	GTI-2000-96X
Length 6m	70 mm^2 00 AWG	16 mm^2 6 AWG	4mm^2 12 AWG	1.5 mm^2 16 AWG
Length 8m	95 mm^2 000 AWG	25 mm^2 4 AWG	6mm^2 10 AWG	1.5 mm^2 16 AWG
Length 10m	120 mm^2 0000 AWG	35 mm^2 2 AWG	10 mm^2 8 AWG	2.5 mm^2 14 AWG
Length 12m	NA	35 mm^2 2 AWG	10 mm^2 8 AWG	2.5 mm^2 14 AWG
Length 14m	NA	50 mm^2 0 AWG	10 mm^2 8 AWG	2.5 mm^2 14 AWG
Length 16m	NA	50 mm^2 0 AWG	16 mm^2 6AWG	4 mm^2 12 AWG
Length 18m	NA	50 mm^2 0 AWG	16 mm^2 6 AWG	4 mm^2 12 AWG
Length 20m	NA	70 mm^2 00 AWG	16 mm^2 6AWG	4 mm^2 12 AWG
Length 22m	NA	70 mm^2 00 AWG	16 mm^2 6 AWG	4 mm^2 12 AWG
Length 24m	NA	70 mm^2 00 AWG	16 mm^2 6 AWG	4 mm^2 12 AWG
Length 26m	NA	95 mm^2 000 AWG	25mm^2 4 AWG	6 mm^2 10 AWG
Length 28m	NA	95 mm^2 000 AWG	25 mm^2 4AWG	6 mm^2 10 AWG
Length 30m	NA	120 mm^2 0000 AWG	25 mm^2 4 AWG	6 mm^2 10 AWG

Please Note: *When using PV strings on low voltage 12v and 24v models it is recommended to use multiple cable runs to reduce cable size.*

Example: 1575watt solar system using 9x 175watt panels you could use 9x pairs of 2.5mm cable for runs up to 24m (based on 5% loss) or up to 14m (based on 3% loss).

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1.17 DC Circuit Breaker Size Chart

WARNING:

When connecting the SolarWorx® GTI to PV system, the Solar Panel wiring must be configured so that the DC input voltage is less than the maximum upper voltage limit of the SolarWorx® GTI Solar Panel output voltage is affected by the solar cells operating temperature (panel temperature), the number of panels per string (panels connection is series).

Always check string voltages before connecting to the SolarWorx GTI.

- Remove the four screws at the lower-front panel of the enclosure and remove the panel.
- Connect the DC input cable: the + (red) on the right and the – (black) on the left.
- Don't reverse the (+) and (-) of the DC input supply. This may cause internal damage.
- Secure battery nuts tightly in order to reduce the contact resistance as much as possible.

SolarWorx GTI®	Inverter DC Input (Recommended Maximum Circuit Breaker Rating)
	MCB (Circuit Breaker)
Model	**2000 Watt SolarWorx GTI**
2000W-12v	160Amp
2000W-24v	80Amp
2000W-48v	40Amp
2000W-96v	20Amp (Requires Hi DC Voltage Breaker)

NOTE: *When using MPPT DC input mode you will normally require a HI Voltage Breaker for the 24v, 48v & 96v Models. Please check with the manufacture of the circuit breaker before connection.*
For solar panel protection it is recommended that you base the circuit breaker current on the max current rating of the PV array. The circuit breaker must never be rated more than the current handling capacity of the cable run.

External fuses or circuit breakers must be installed.
A Double Pole DC Input Circuit Breaker should be mounted as close to input of the inverter.

All external DC wiring must be protected with suitably rated external circuit breakers.

1.18 Connection of AC Cabling

Ensure the SolarWorx GTI is grounded for safety.
The main earth screw has been fitted at the bottom left side of the enclosure.
The AC terminal connection is located in lower-front panel of the enclosure:
The AC Supply (AC OUT) cable must be connected to AC OUT terminals,
Use a Twin and Earth power cable; refer to table on page 24 for correct AC cable sizes.

The AC output terminal connection is labeled “AC OUT”, The terminal points are indicated clearly: From left to right “L” (phase), “N” (neutral), and “E” (earth).

External fuses or circuit breakers must be installed.
The AC output circuit breaker built in to the SolarWorx GTI is designed to protect the internal wiring inside the unit only. Faults on sub circuits will not normally trip this breaker.
All external AC wiring must be protected with suitably rated external circuit breakers,

NOTE: RCD Earth Leakage protection must NOT be used for grid tie inverter systems that are connected directly back to the grid.
MEN (Multiple Earth Neutral) must be maintained at all times.
For AC output protection we recommend the use of a Circuit Breaker (MCB).
For correct sizing see table on page 24.

Note: *The cables shall be electrically protected in accordance with AS/NZS 3000 and AS/NZS 3008. All cables used in the installation should be securely fixed in place to minimise any movement of the cable in accordance with AS3000. Mechanical protection of the cables shall be in accordance with AS/NZS 3000.*

SolarWorx GTI®	Inverter AC Output		
	MCB	AC Cable Size single Twin-core and earth	
2000Watt Model	Recommended Circuit Breaker Current	Enclosed conduit	Unenclosed free air
6m	10Amp	1.5mm	1.0mm
10m	10Amp	1.5mm	1.0mm
15m	10Amp	2.5mm	1.5mm
20m	10Amp	2.5mm	1.5mm

THE OUTPUT VOLTAGE FROM THE INVERTER IS LETHAL

For your safety ensure that all installations meet and comply with the relevant requirements of AS3000 wiring standards and

AC wiring is installed by a Licensed Electrical Contractor.

MAKE SURE THE SOLARWORX GTI IS SWITCHED OFF AND DISCONECTED FROM ALL AC AND DC SUPPLIES BEFORE WORKING ON THE SYSTEM!

1.19 Initial Start Up

Before starting to initiate the SolarWorx® GTI, keep all breakers in the OFF position. When you are ready to start the SolarWorx® GTI, turn on ONLY the DC Input breaker. Do NOT turn On the AC breaker until the instruction on LCD shows “Waiting” or “ No Utility”.

Turn On the AC Supply. The AC light will flash and the LCD display will show “Grid Check” after the SolarWorx® GTI has assessed the grid is OK, the AC Grid light will glow steady, and the LCD display will display power being sent back to the grid.

The installation environment of SolarWorx® GTI should be in an area of good ventilation. Never locate the SolarWorx® GTI in a poorly ventilated battery area because batteries can emit explosive gases.

Note: *Always check the open circuit voltage of the PV string before connection to the SolarWorx® GTI.*

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1.20 MPPT Voltage

It is very important to check the PV open circuit voltage before connecting to the SolarWorx® GTI. Caution must be taken when connecting HI Voltage PV strings. NEVER short circuit the PV cables! Test the voltage with a multimeter to check that the PV voltage is within range of the SolarWorx® GTI.

Normal Operating voltages:

12v Solar Panel has optimum operating voltage "Vmpp" of approx 17VDC with an open circuit voltage "Voc" is approx 21VDC

24v Solar Panel has optimum operating voltage "Vmpp" of approx 35VDC with an open circuit voltage "Voc" is approx 43VDC

The SolarWorx® GTI can accept can accept different input voltage depending on the model:

Model	Voltage	MPPT Range	MAX input Voltage
GTI-2000-12	12V DC	16.5V-32V DC	40V DC
GTI-2000-24	24V DC	33 V-64V DC	80V DC
GTI-2000-48	48V DC	66V-128V DC	130V DC
GTI-2000-96	96V DC	132V-226V DC	230V DC

Please note specifications are subject to Manufactures changes.

WARNING: The open circuit voltage of the photovoltaic panels is affected by the ambient temperature (the open circuit voltage increases as the temperature decreases).
Make sure that at the minimum temperature estimated for the installation does not cause the panels to exceed the maximum upper limit of your SolarWorx® GTI.
As an example, the following table on page 26 shows for typical panels of 36, 48 and 72 cells, the maximum voltage of each panel at different temperatures (assuming a nominal open circuit voltage of 0.6VDC at 25°C and a temperature coefficient of 0.38% /°C).

1.21 Solar Panel Voltage (Voc) Temperature chart

Min Panel Temp	36 Cell Solar Panel Voltage (Voc)	48 Cell Solar Panel Voltage (Voc)	72 Cell Solar Panel Voltage (Voc)
+25°C	21.6	28.8	43.2
+20°C	22.0	29.4	44.0
+15°C	22.4	29.9	44.9
+10°C	22.8	30.5	45.7
+5°C	23.2	31.0	46.5
0°C	23.7	31.6	47.3
-5°C	24.1	32.1	48.2
-10°C	24.5	32.7	49.0
-15°C	24.9	33.2	49.8
-20°C	25.3	33.8	50.6
-25°C	25.7	34.3	51.4

Example:

Standard 12v panel open circuit voltage Voc @ 25°C is 21.6v

and the temperature coefficient is 0.38% /°C

21.6 x 0.38% = 0.08208

For every 1°C decrease in temperature, the panel voltage will increase by 0.08208 Volts

If the min temperature for you area is 5°C then the temperature difference would be 20°C

0.08208 x 20 = 1.6416 volts

The open circuit voltage for this panel would now be 21.6 + 1.6416 = 23.24v @ 5°C

Note: *Consult the panel manufacturer for the correct temperature Coefficient of Voc, before calculating the voltage rating of your photovoltaic array.*

1.22 PV Table 2100~2400W Solar Input Range

The SolarWorx® GTI 2000watt can except up to a maximum of 2400watts of Solar Panels.

MODEL	Rated Solar Panel Wattage	Rated Solar Panel Voltage	Number of Solar Panels per String	Number of Strings (Paralleled)	Total Number of Solar Panels	Total Output Wattage
GTI-2000-12	65W	12V	1	36	36	2340W
GTI-2000-12	80W	12V	1	30	30	2400W
GTI-2000-12	120W	12V	1	20	20	2400W
GTI-2000-12	175W	24V	NA	NA	NA	NA
GTI-2000-24	65W	12V	2	18	36	2340W
GTI-2000-24	80W	12V	2	15	30	2400W
GTI-2000-24	120W	12V	2	10	20	2400W
GTI-2000-24	175W	24V	1	13	13	2275W
GTI-2000-48	65W	12V	4	9	36	2340W
GTI-2000-48	80W	12V	4	7	28	2240W
GTI-2000-48	120W	12V	4	5	20	2400W
GTI-2000-48	175W	24V	2	6	12	2100W
GTI-2000-96	65W	12V	9	4	36	2340W
GTI-2000-96	80W	12V	9	3	27	2160W
GTI-2000-96	120W	12V	9	2	18	2160W
GTI-2000-96	175W	24V	4	3	12	2100W

NOTE: *Maximum Voc*

The maximum operating voltage of the SolarWorx ® GTI-2000-12 is 40VDC, of the GTI-200-24 is 80VDC., of the GTI-200-48 is 130VDC.and of the GTI-200-96 is 230VDC. Protection will be activated to shut down the unit when the operating voltage is higher. Check the PV manufacturer's data sheet with rated voltage and current as well as the current and temperature coefficients. The rated Voc is measured at the temperature of 25℃ so when calculated at lower temperature such as 0℃, typically a10% increase of the rated Voc will be expected. At different temperature location of installation, the maximum Voc of the module should be determined by the Voc voltage temperature coefficient, a series string voltage may then be calculated.

1.23 PV Table 1400~2000W Solar Input Range

MODEL	Rated Solar Panel Wattage	Rated Solar Panel Voltage	Number of Solar Panels per String	Number of Strings (Paralleled)	Total Number of Solar Panels	Total Output Wattage
GTI-2000-12	65W	12V	1	24	24	1560W
GTI-2000-12	80W	12V	1	19	19	1520W
GTI-2000-12	120W	12V	1	13	13	1560W
GTI-2000-12	175W	24V	NA	NA	NA	NA
GTI-2000-24	65W	12V	2	12	24	1560W
GTI-2000-24	80W	12V	2	10	20	1600W
GTI-2000-24	120W	12V	2	7	14	1680W
GTI-2000-24	175W	24V	1	9	9	1575W
GTI-2000-48	65W	12V	4	6	24	1560W
GTI-2000-48	80W	12V	5	4	20	1600W
GTI-2000-48	120W	12V	4	3	12	1440W
GTI-2000-48	175W	24V	2	5	10	1750W
GTI-2000-96	65W	12V	9	3	27	1755W
GTI-2000-96	80W	12V	9	2	18	1440W
GTI-2000-96	120W	12V	8	2	16	1920W
GTI-2000-96	175W	24V	4	2	8	1400W

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1.24 Parallel Connection

The SolarWorx GTI can be connected in parallel using multiple units, please see page 45 & 46. The batteries must be connected in accordance with page 34.

Note:

- Make sure you have enough battery capacity to support the number of SolarWorx GTI Units.
- Install the SolarWorx GTI units next to each other making sure there is adequate clearance for ventilation of at least 20 cm. For better ventilation, please install the fan cover (optional).

1.25 3-Phase Operation

The SolarWorx GTI can be configured for use in a 2 or 3-phase applications see page 36.

Note:

- Make sure you have enough battery capacity to support all of the SolarWorx GTI Units.
- Install the SolarWorx GTI units next to each other making sure there is adequate clearance for ventilation of at least 20 cm. For better ventilation, please install the fan cover (optional).
- The battery cables for each SolarWorx® GTI must be of equal in length

1.26 Anti-Islanding

The SolarWorx® GTI inverter will automatically disconnect from the utility grid when the utility grid is out of voltage / frequency range, during a black-out (grid failure) or when the inverter shuts down due to a fault condition. This is to guarantee protection for persons operating on the utility grid, and in compliance with the AS4777 standards.

1.27 Remote Control Panel (RP-GTI)

The SolarWorx GTI can be operated remotely from remote port with the aid of a remote control panel. For connection of a remote control panel, see page 33.
Note: The display panel and operation flow of the remote control panel is exactly the same as the upper-front display panel.

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1.28 Ventilation (Standard Single Unit)

When the unit is installed in an Environment with good ventilation,
the fan cover is not needed.

1.29 Ventilation (Optional Fan Cover Application) "Single Unit Installed"

When the unit is installed nearby wall side which
blocks the airflow coming to the unit,
the fan cover is needed.

1.30 Multiple and 3-Phase Application

When there is more than one SolarWorx GTI in parallel connection or 3-phase connection, the optional accessory, fan covers, are highly recommended to be installed for each SolarWorx GTI to have better ventilation in cooling down the temperature.

Chapter 2 “Net” vs “Gross” Metering

2.10 Net Metering

Net Meters

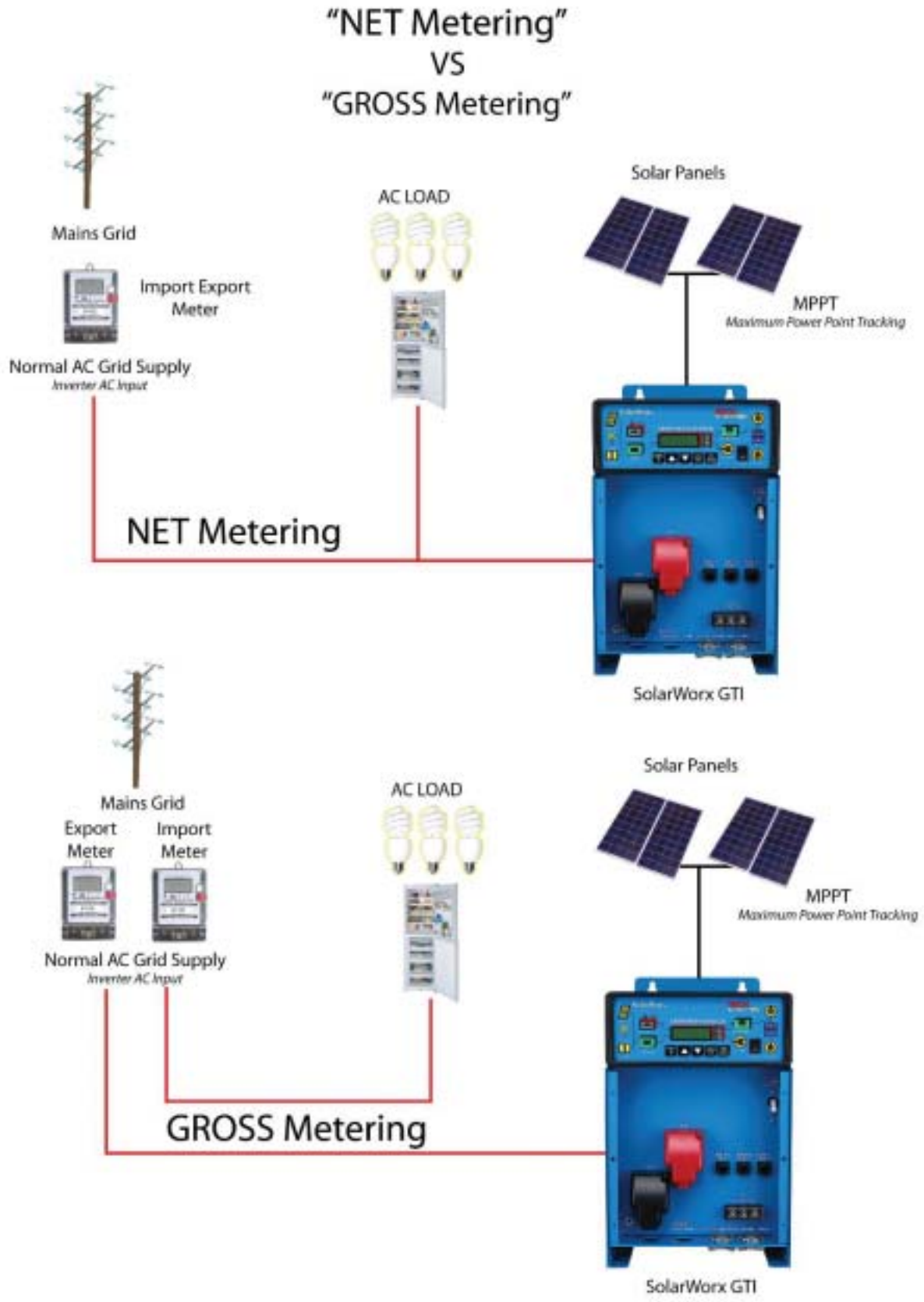
A Net Metering system combines the power being generation from the solar system and the mains grid to support the household’s power consumption. If the household’s power consumption is less than the output from the solar system the excess power will be sent back onto the mains grid and your electricity consumption will be calculated as a net outcome. These metering systems normally capture 30 minute blocks of power being exported or imported to the household. It is sometimes hard to work out the amount of energy your solar system has generated on you electricity bill, as the solar system is supporting your household load first then the excess is being sent back to the grid. So the credit you receive will not reflect the total amount of electricity generated from the system. Your bill will show a decrease in house hold energy usage rather than the actual energy usage of the home as the solar system is supporting the household load first. This is the most common setup for grid feed systems.

2.11 Gross Metering

Gross Meters

A Gross Metering setup measures the export and import of your electricity separately. Gross Metering actually measures the entire output of your solar system independently to your household’s electricity consumption. With this system it is very easy to see the amount of electricity your solar system has generated and the amount of credit the energy provider has given you. Basically you will receive a credit for the entire energy produced from the solar system and then a billed separately for the household energy usage. This system is a little more complicated to set for hybrid or backup (UPS) systems as there are two separate wiring connections , one to purchase electricity the other to sell electricity.

2.12 Diagram Net vs Gross Metering



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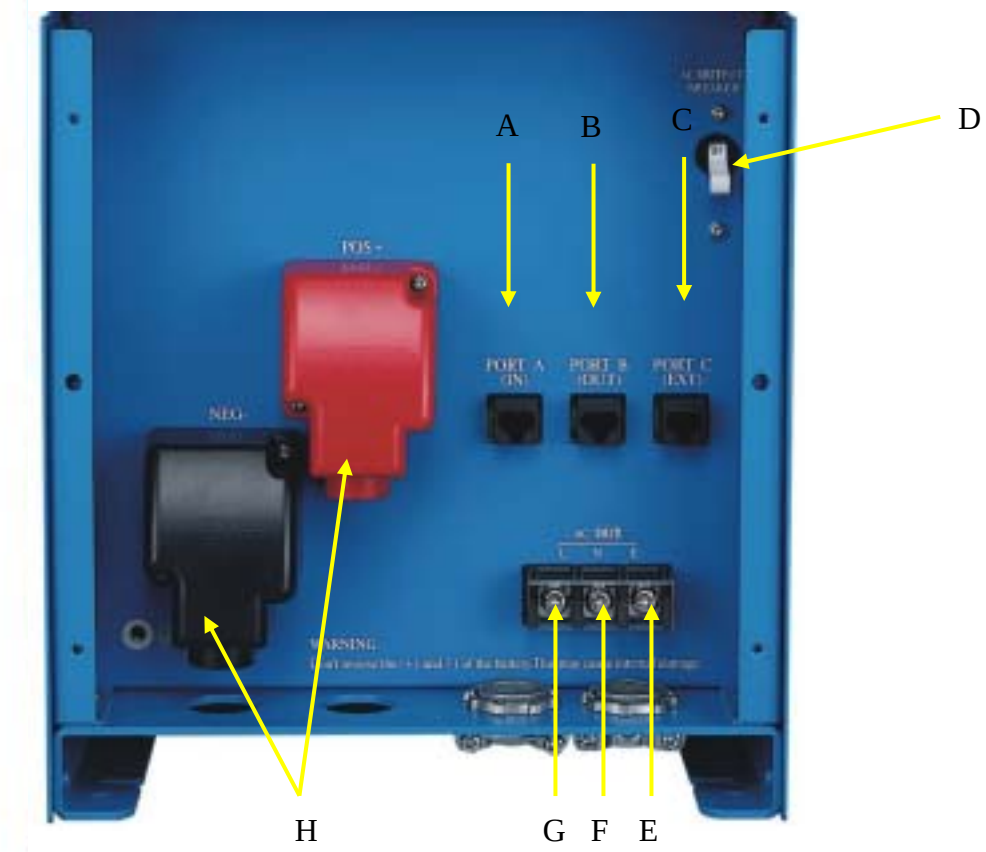
Chapter 3 Wiring Connections

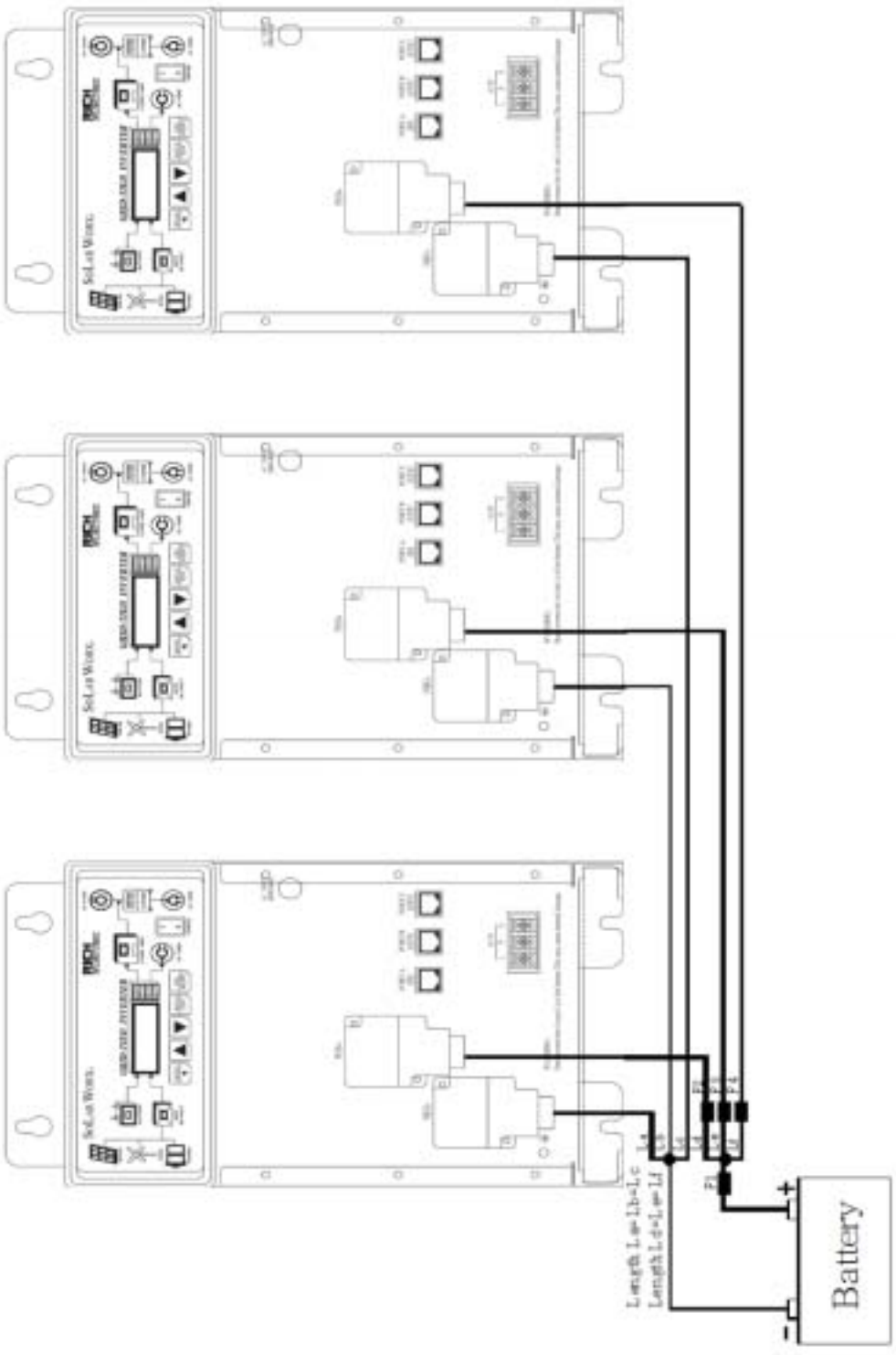
3.10 Lower-Front Panel Connection for SolarWorx GTI



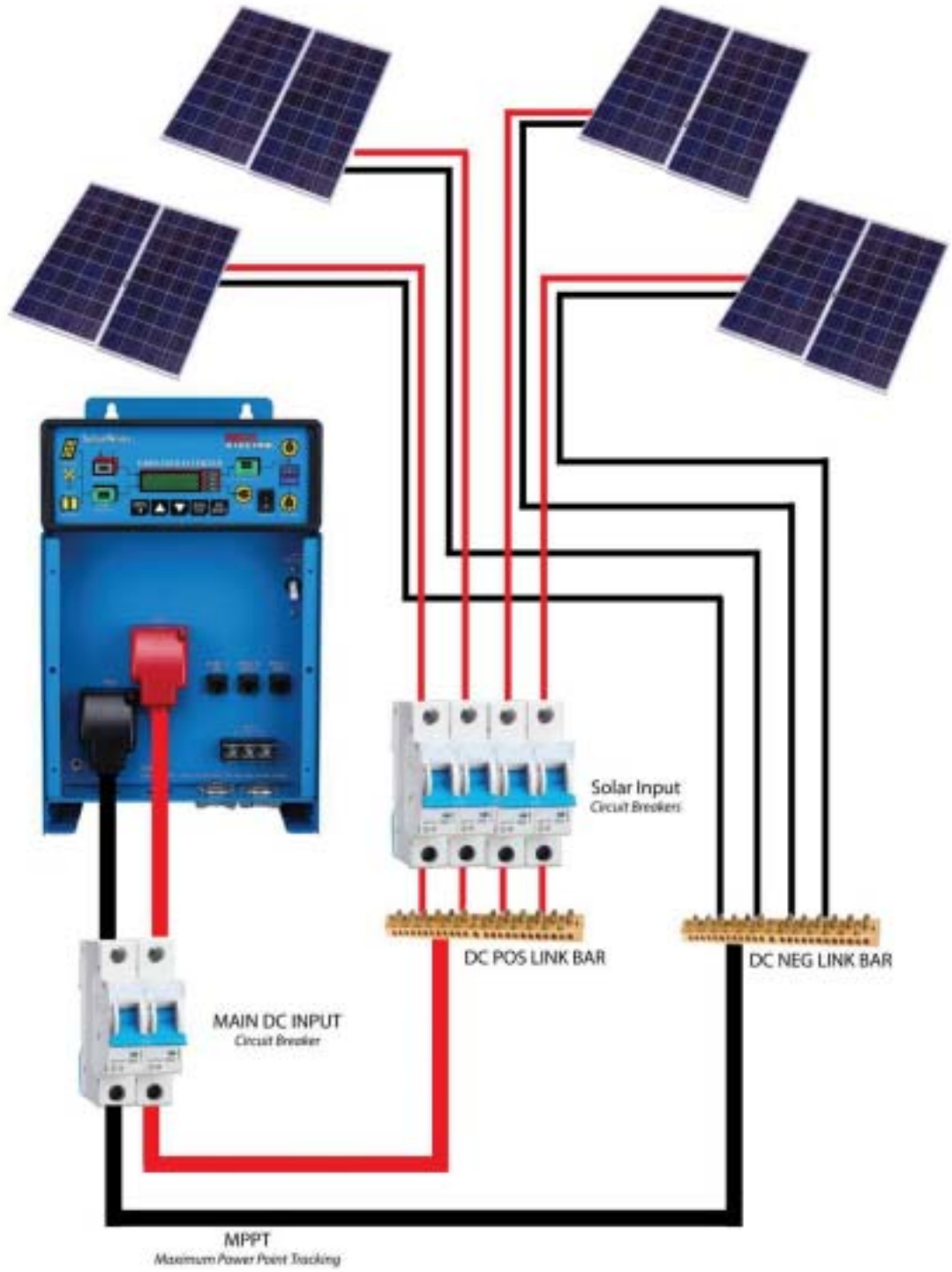
Connections / Lower- Front side

A	PORT A (IN)	Connections for parallel power
B	PORT B (OUT)	Connections for parallel power
C	PORT C (EXT)	Connections for external Remote Control & PC
D	AC Output Breaker	Mains AC output Circuit Breaker
E	AC OUT E	Connecting terminal for AC output Ground (Earth)
F	AC OUT N	Connecting terminal for AC output Neutral (NEG)
G	AC OUT L	Connecting terminal for AC output Live (POS)
H	Battery POS+/ NEG-	DC Input cables.

3.11 Battery Connection schematic



3.12 Connection Schematic "Multi Cable Solar Connection"



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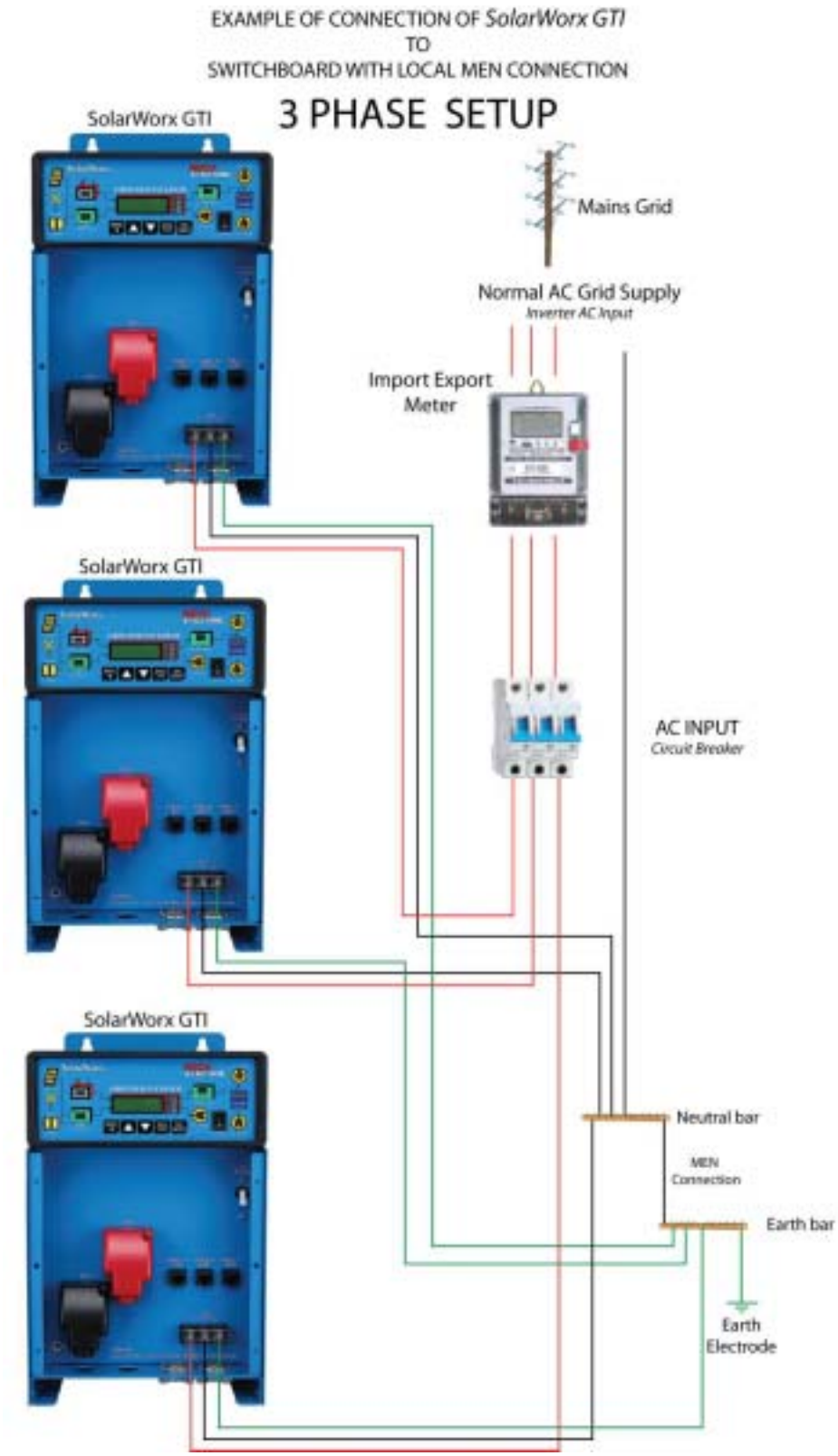
3.13 AC 3-Phase Connection Schematic



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ALL AC WIRING MUST BE CARRIED OUT BY A LICENSED ELECTRICIAN AND MUST CONFORM TO AS4777 & AS3000 WIRING REGULATIONS OR RELEVANT STANDARDS

For other regions, the installation and wiring should comply with relevant National Standards, Codes and Practices.

NOTE: *The optional rectifier with braking unit for wind system is required to control and stop the SolarWorx® GTI from overload condition caused by excessive wind speeds. An external controller is normally required for wind generators and hydro generation systems. DC input Power being sent into the SolarWorx® GTI must be clean & ripple free DC.*

The DC Input voltage MUST NOT exceed the input range of the SolarWorx GTI as this can Damage the SolarWorx® GTI and will void any Warranty Claim.

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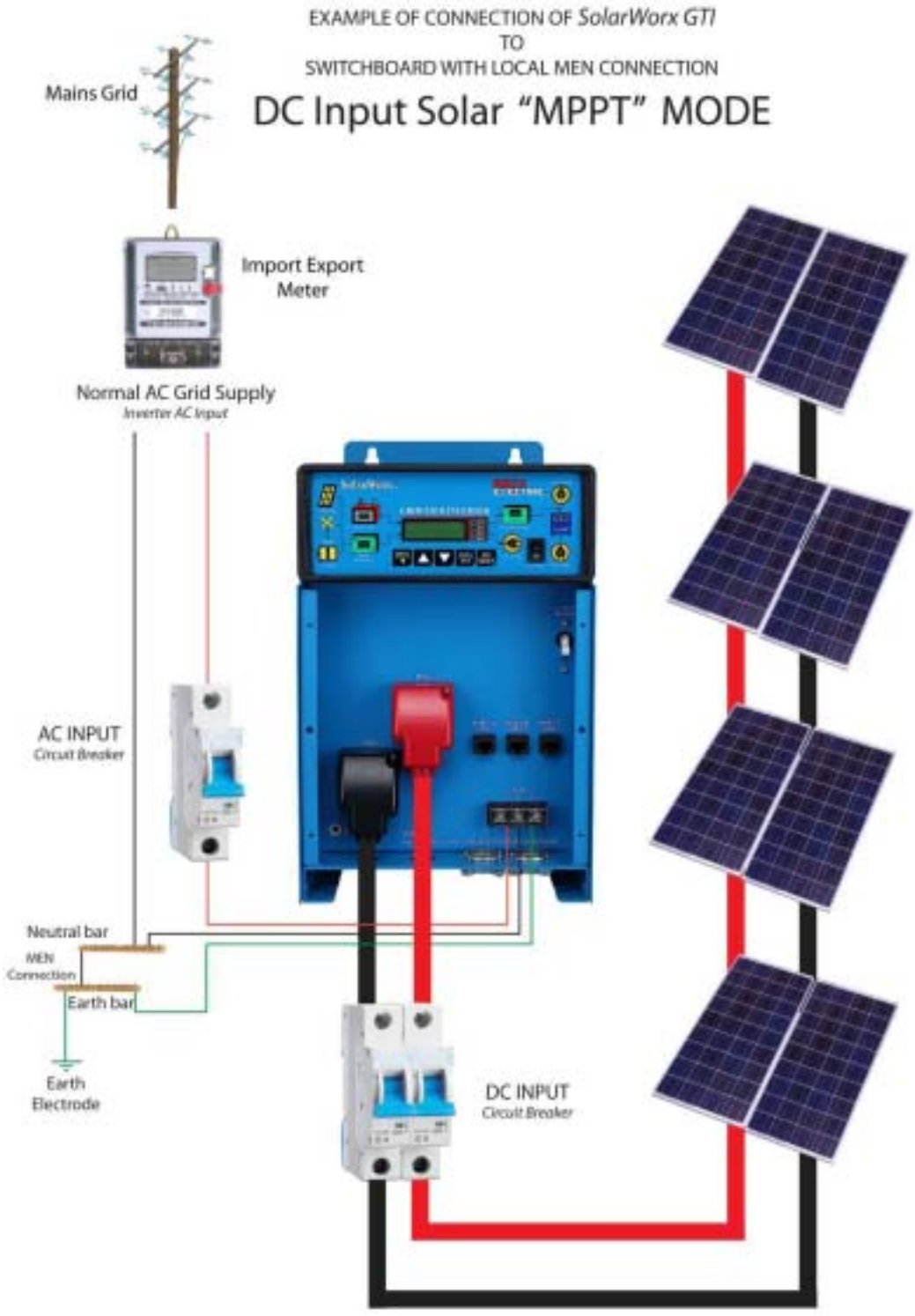
3.20 Connection Schematic (Basic Solar Grid Feed)



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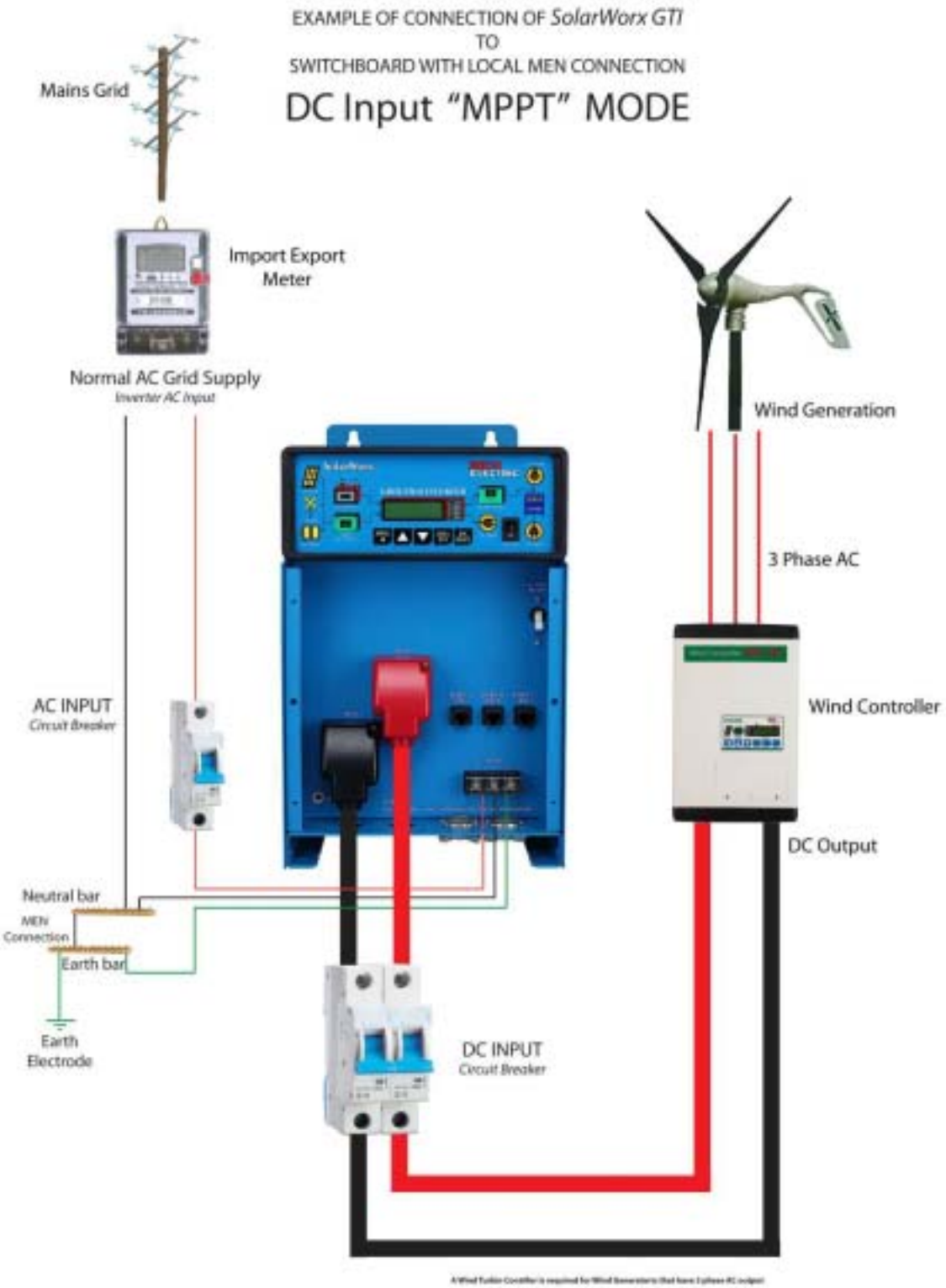
3.21 Connection Schematic (Wind Grid Feed)



Please note specifications are subject to Manufactures changes.

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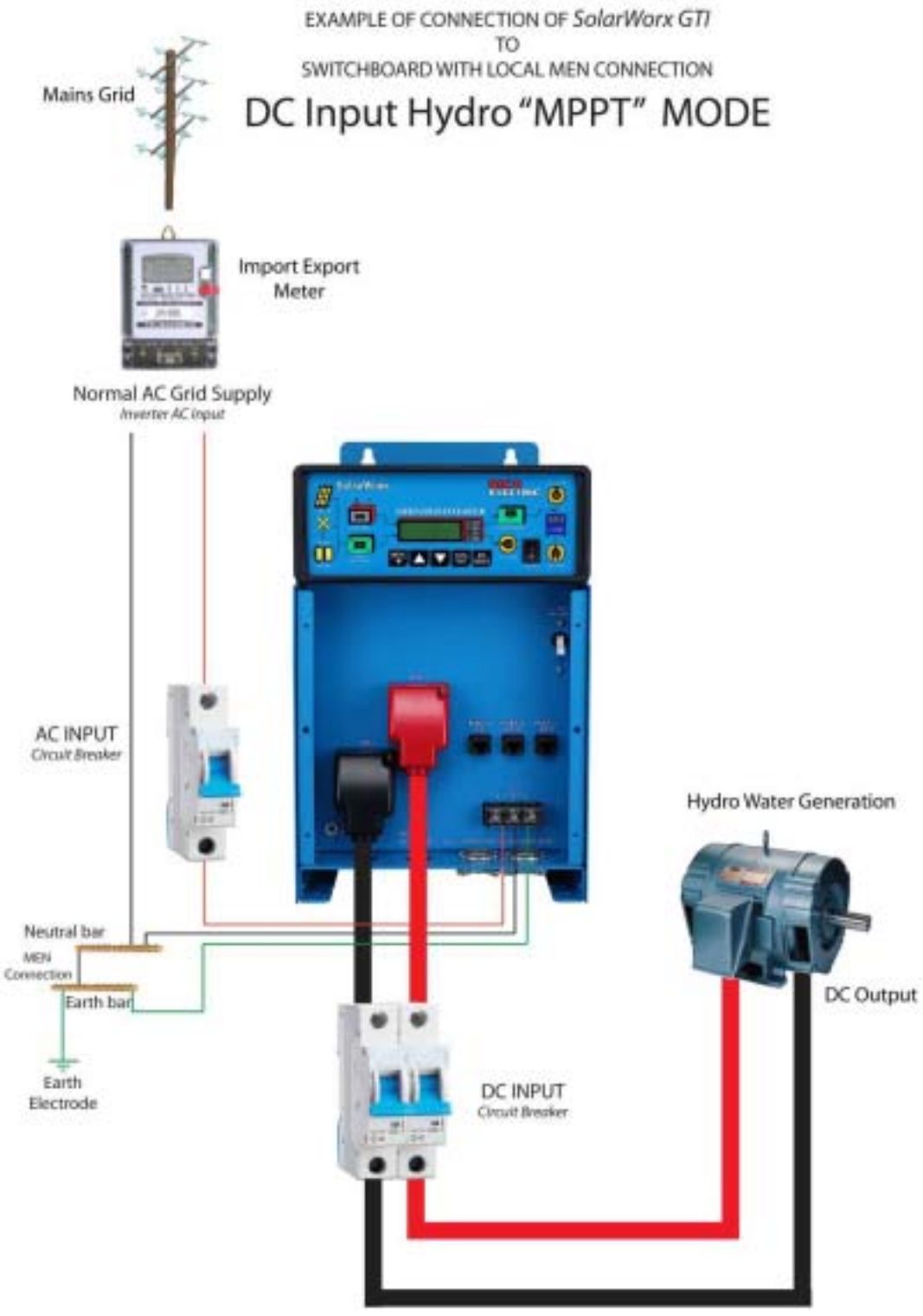
3.22 Connection Schematic (Hydro Grid Feed)



Please note specifications are subject to Manufactures changes.

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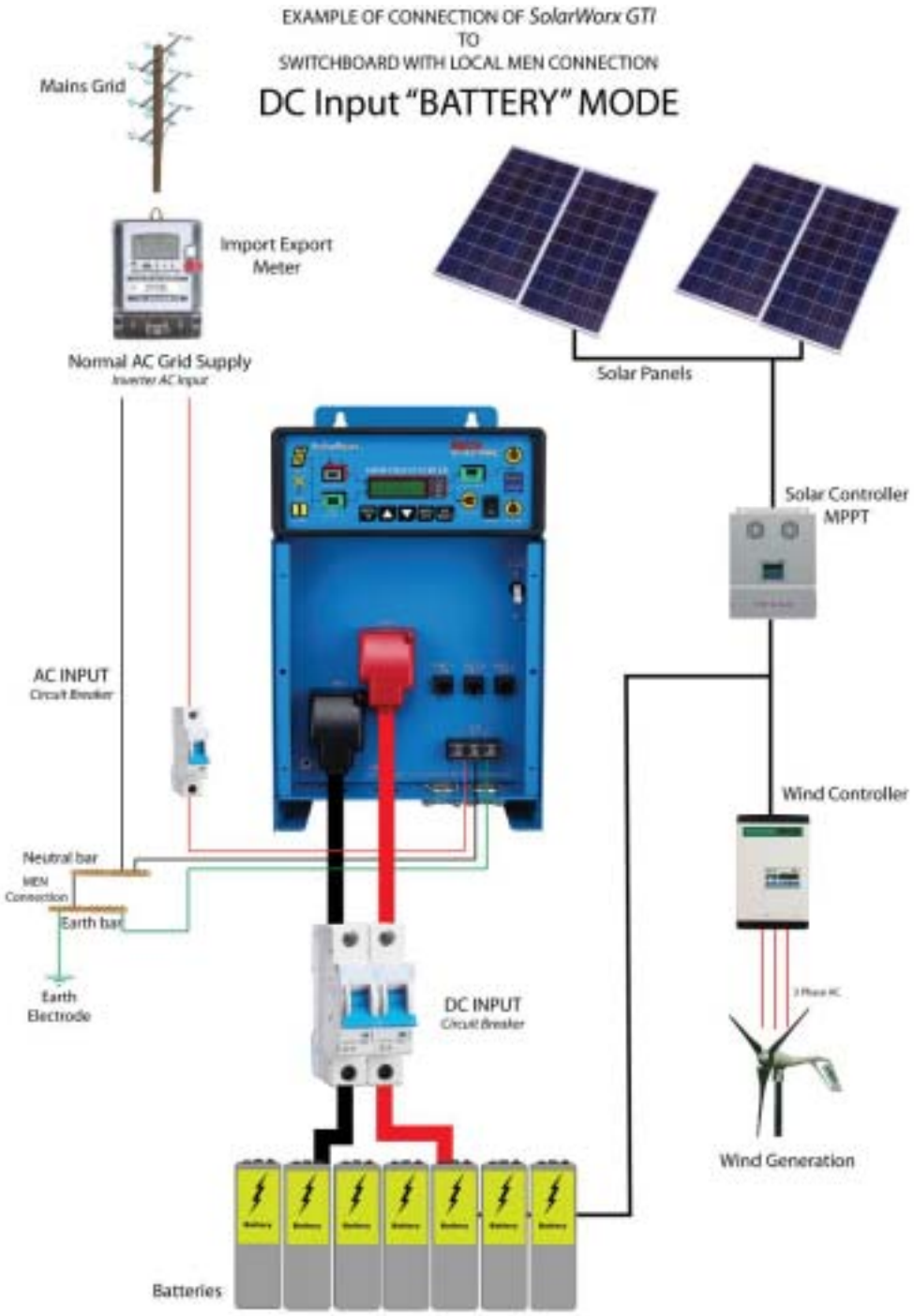
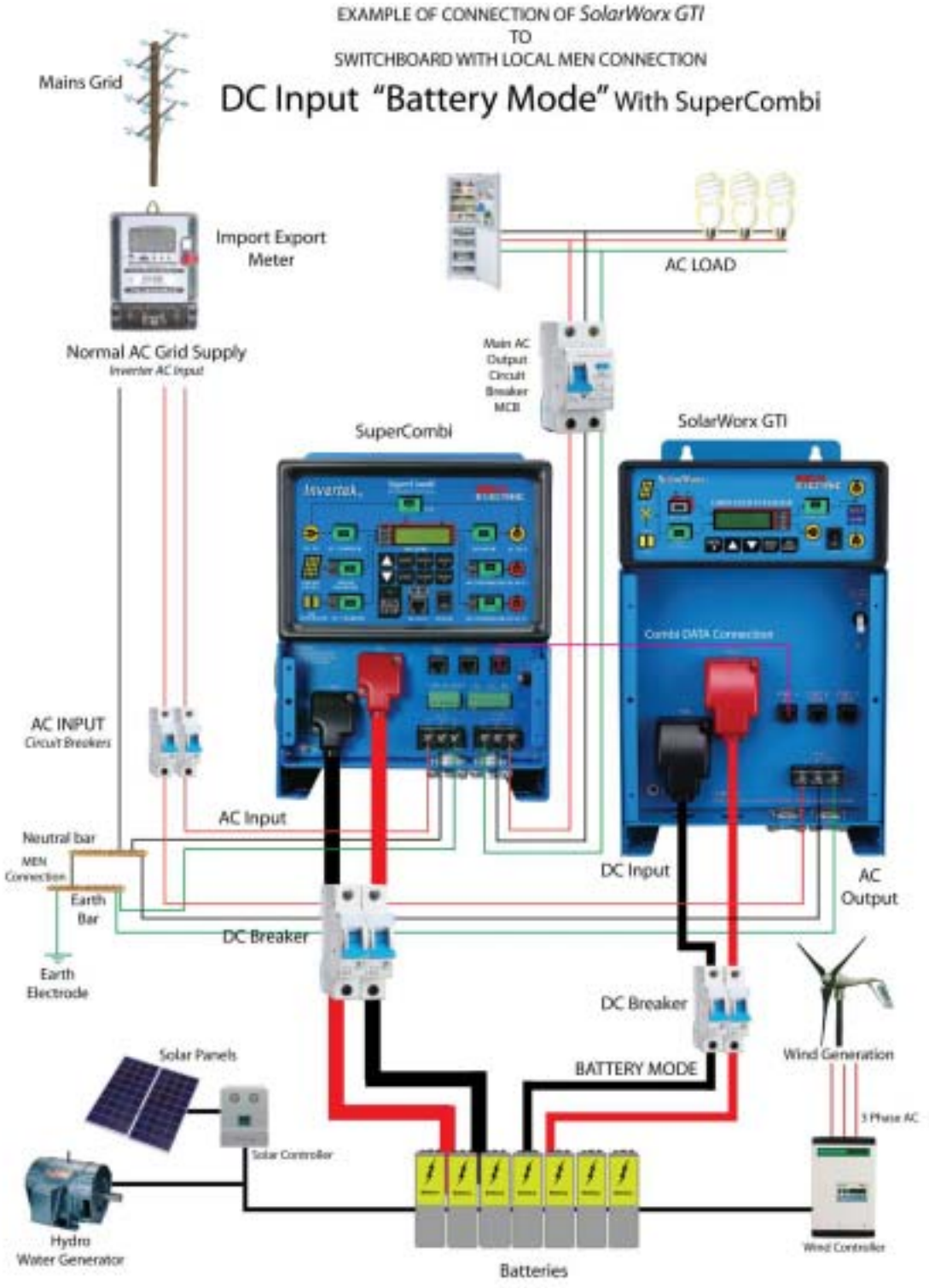
3.23 Connection Schematic (Battery Mode Grid Feed)

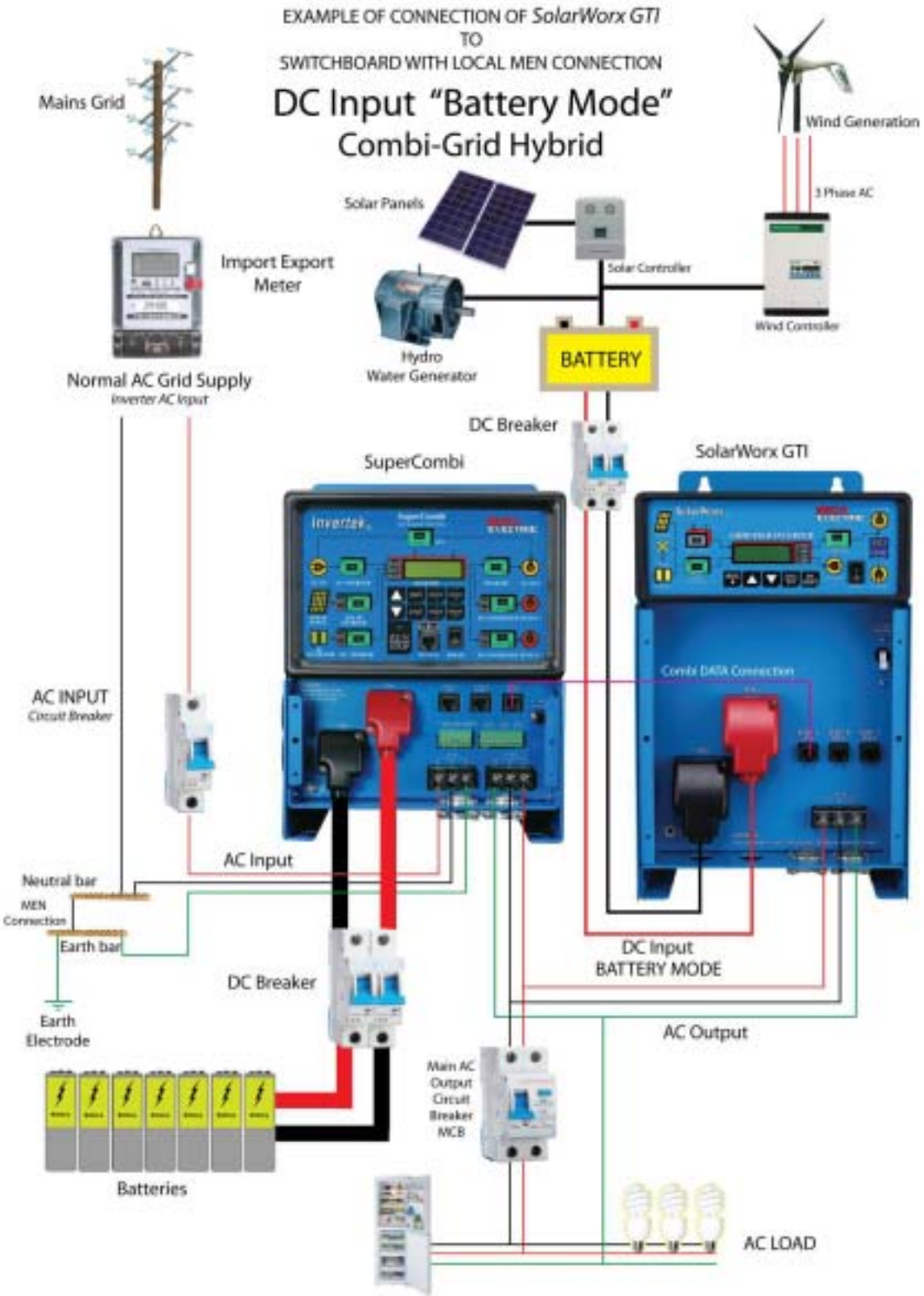


3.24 Connection Schematic (Combi Backup with Grid Feed)



Please note specifications are subject to Manufactures changes.

3.25 Connection Schematic (Combi-Grid Multi Hybrid Battery Mode)



Please note specifications are subject to Manufactures changes.

NOTE: *The Combi Inverter must be Equal or have Greater capacity to that of the SolarWorx GTI*

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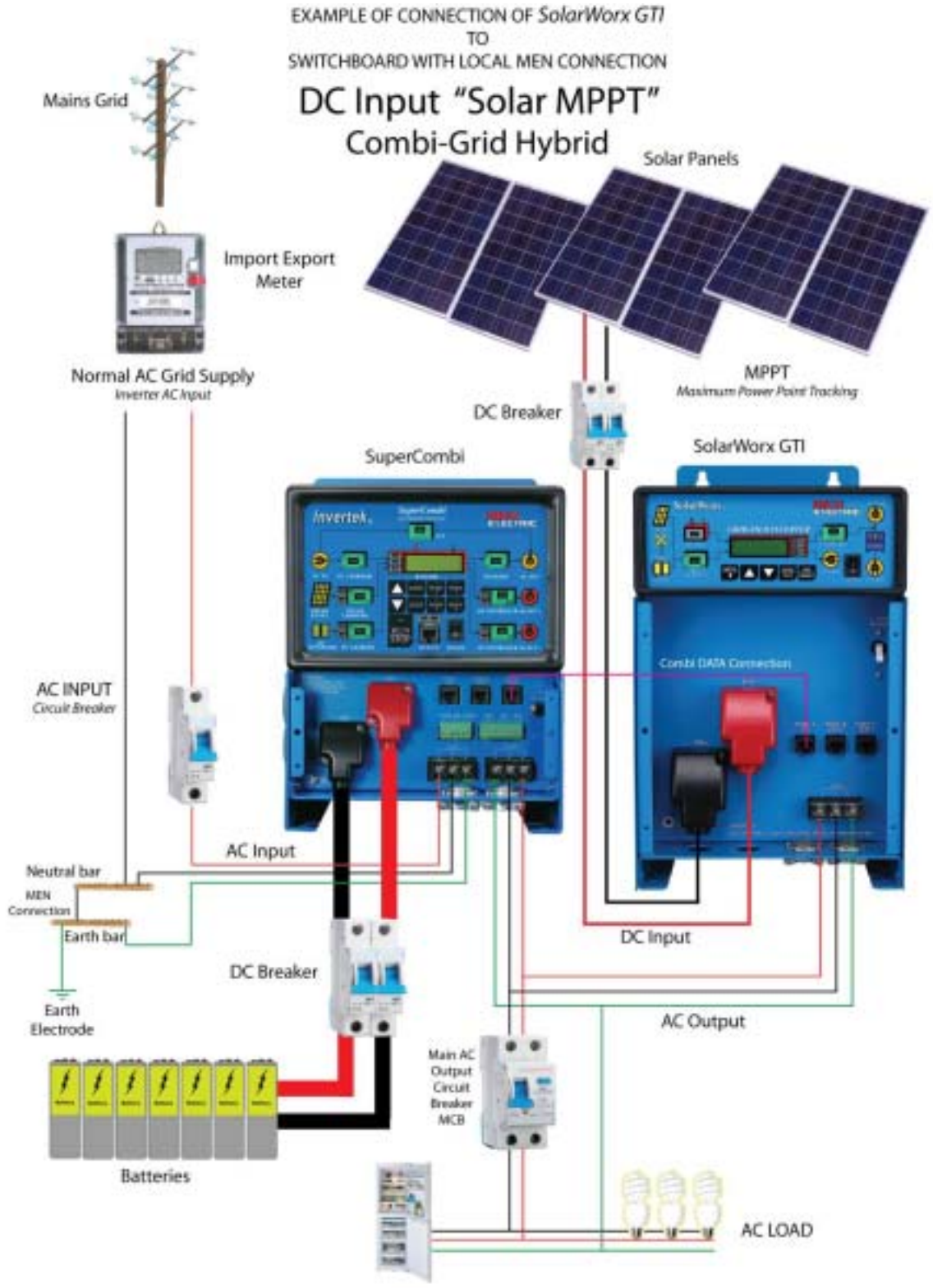
3.26 Connection Schematic (Solar MPPT Combi-Grid Hybrid)



Please note specifications are subject to Manufactures changes.

NOTE: *The Combi Inverter must be Equal or have Greater capacity to that of the SolarWorx GTI*

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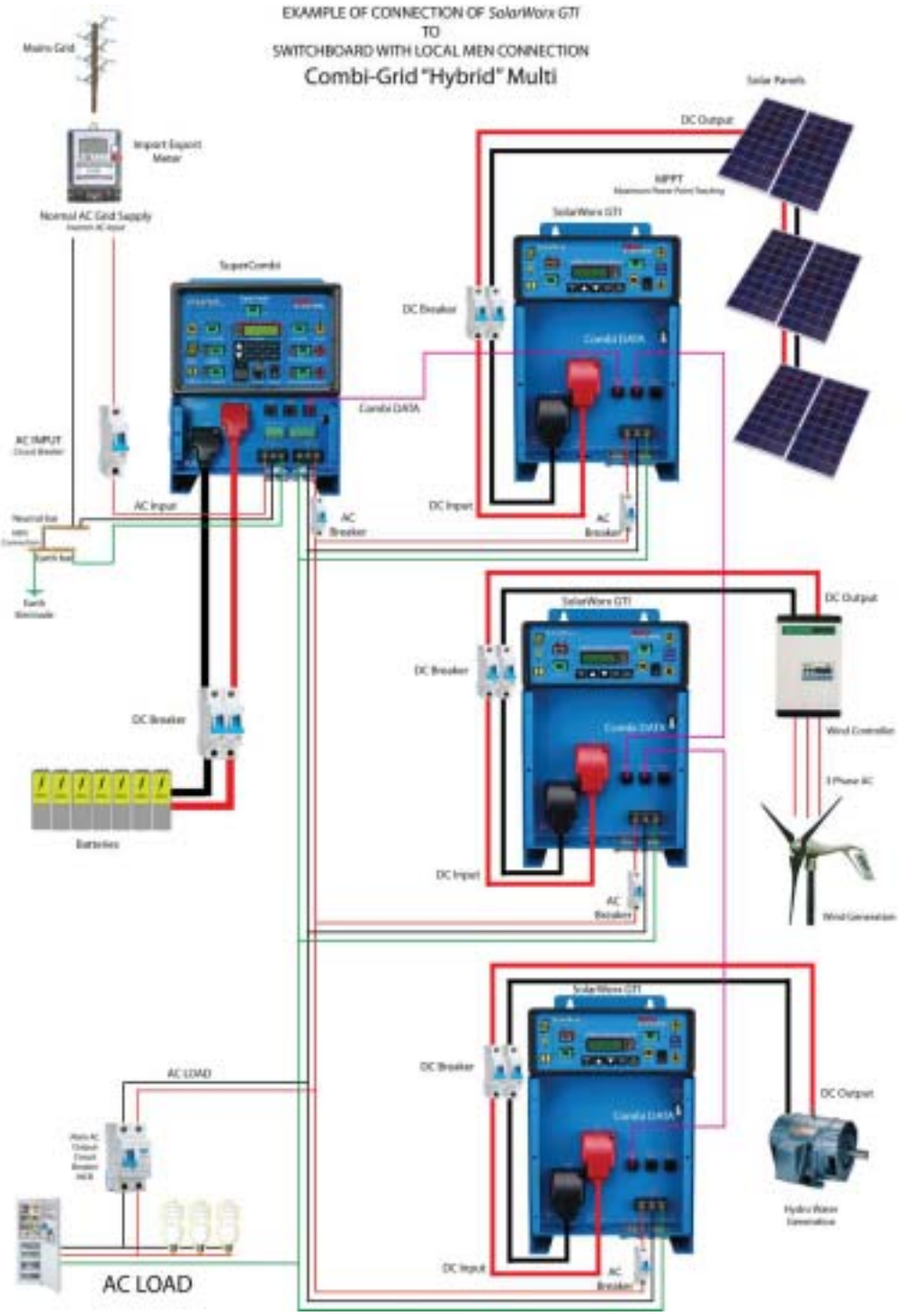
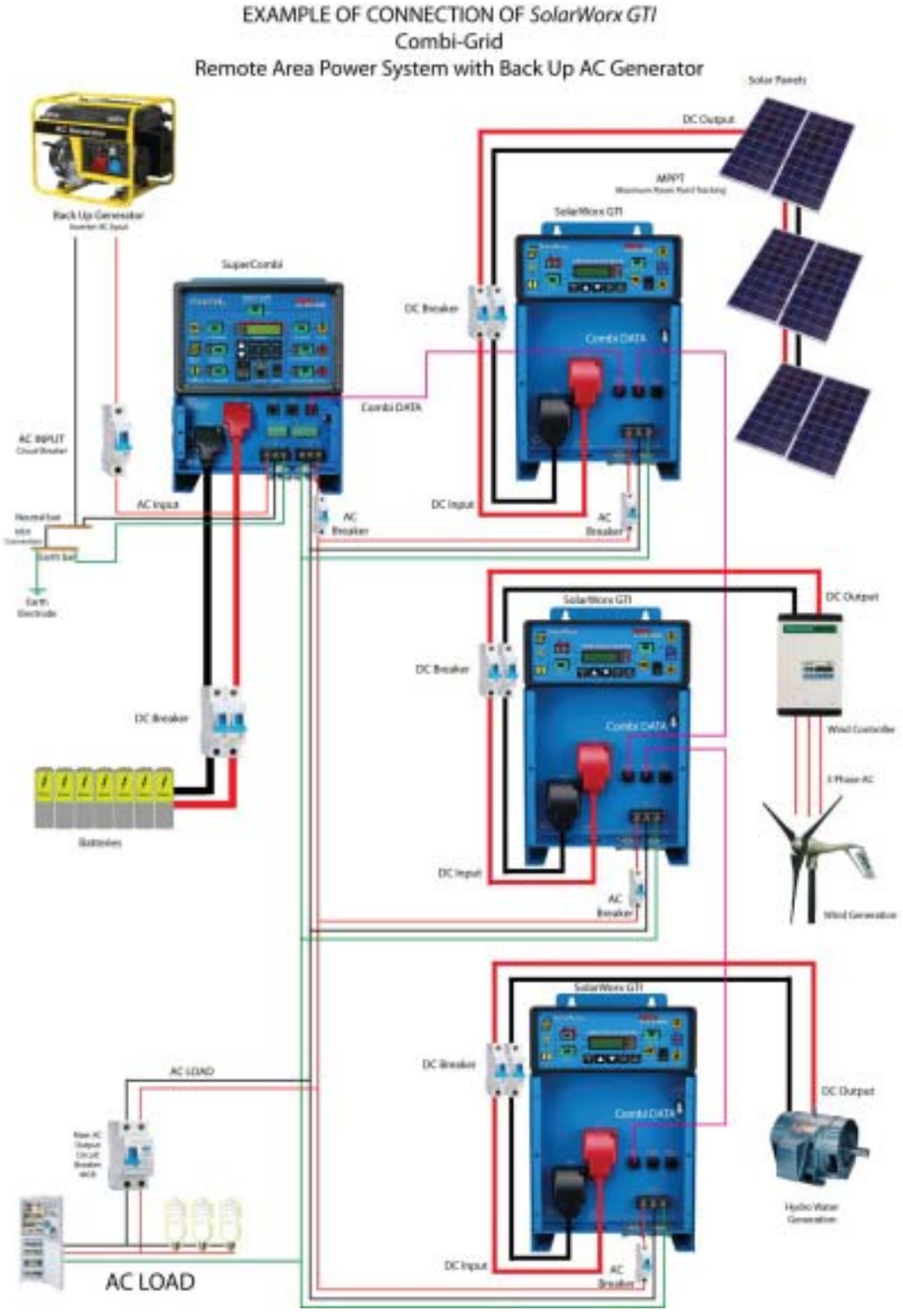
3.27 Connection Schematic (Combi-Grid Multi Hybrid)



Please note specifications are subject to Manufactures changes.

NOTE: *The Combi Inverter must be Equal or have Greater capacity to that of the SolarWorx GTI*

3.28 Connection Schematic (Remote Off Grid System)



Please note specifications are subject to Manufactures changes.

NOTE: *The Combi Inverter must be Equal or have Greater capacity to that of the SolarWorx GTI*

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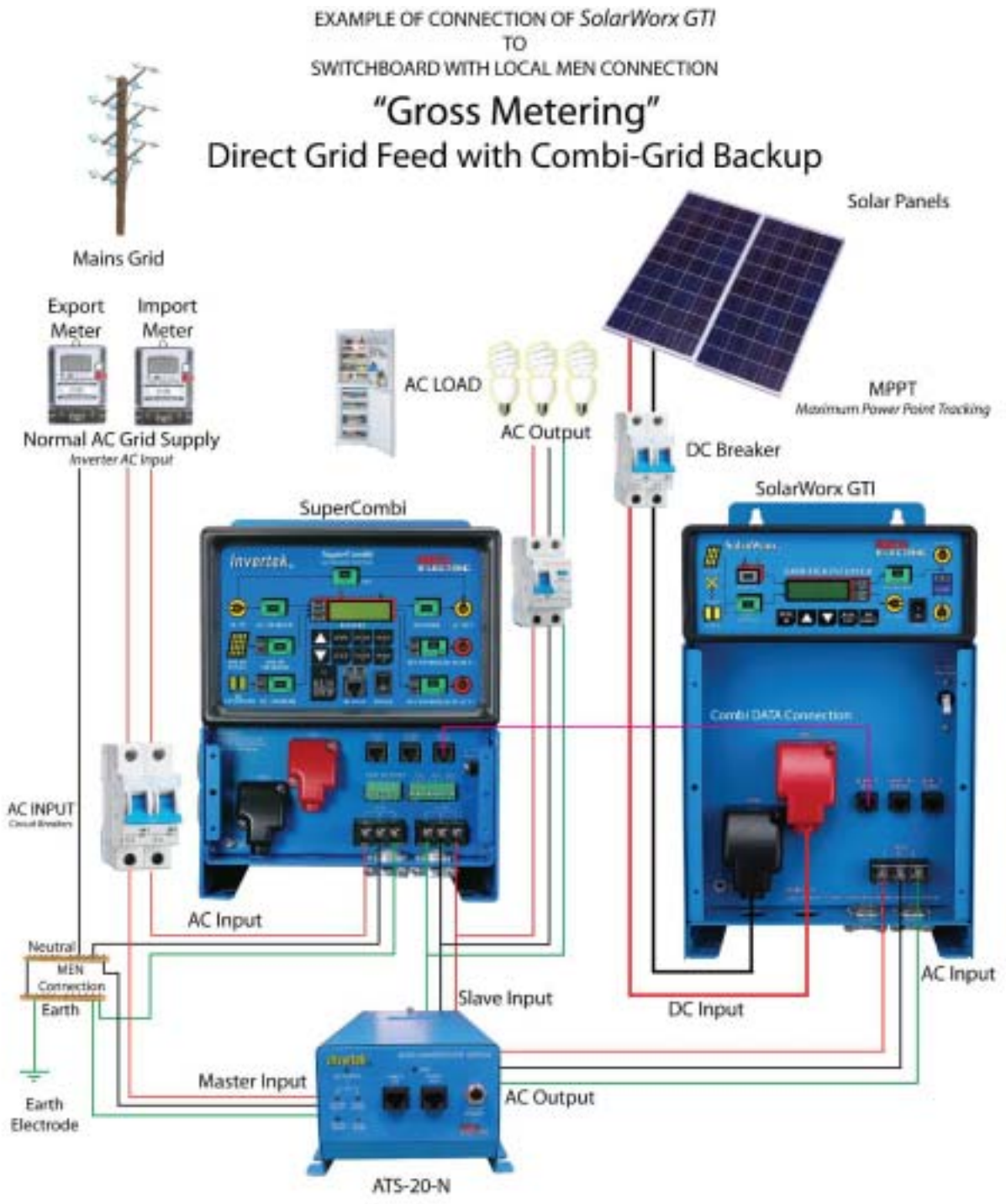
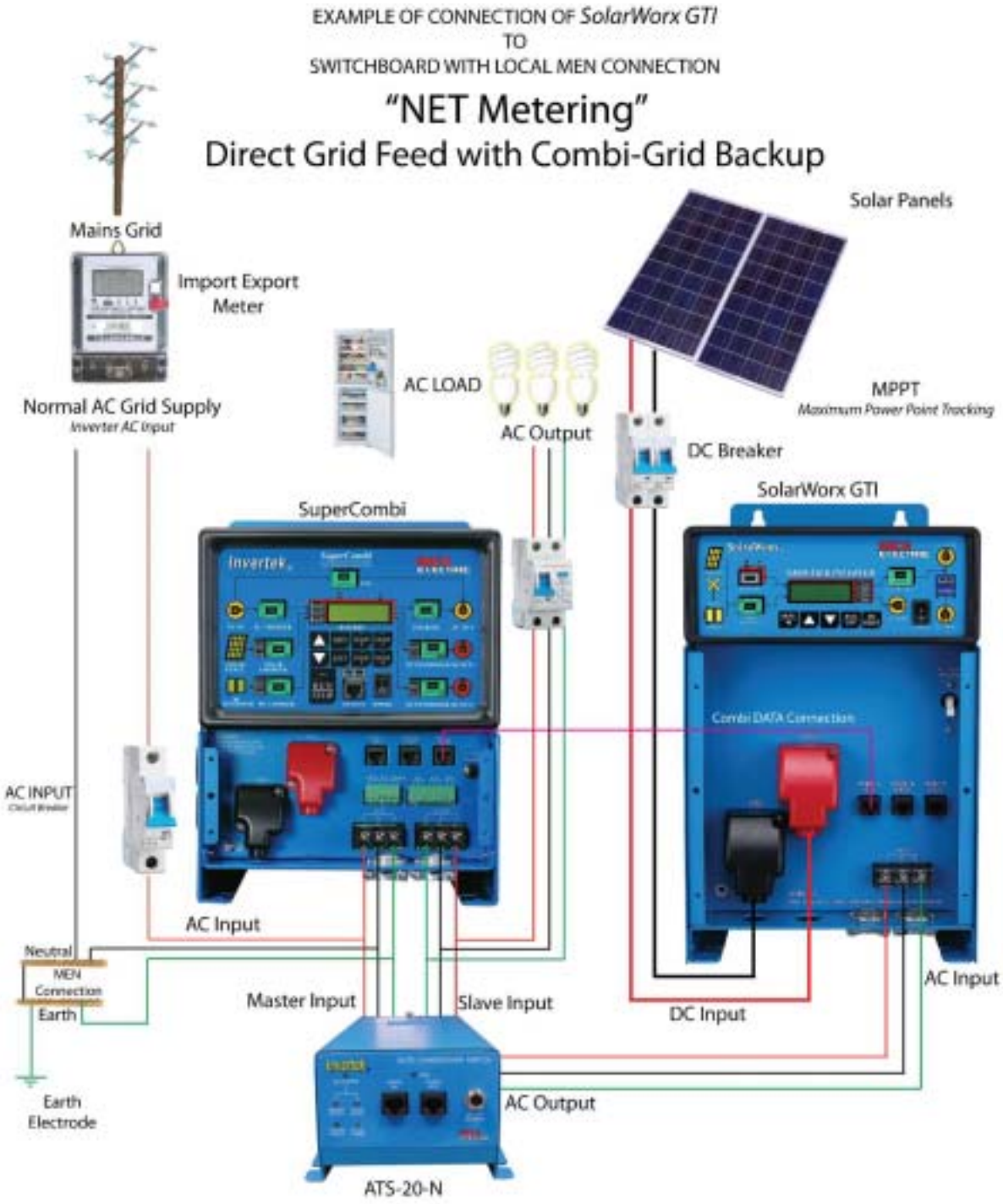
3.29 Connection Schematic (Combi-Grid Hybrid Gross Metering)



Please note specifications are subject to Manufactures changes.

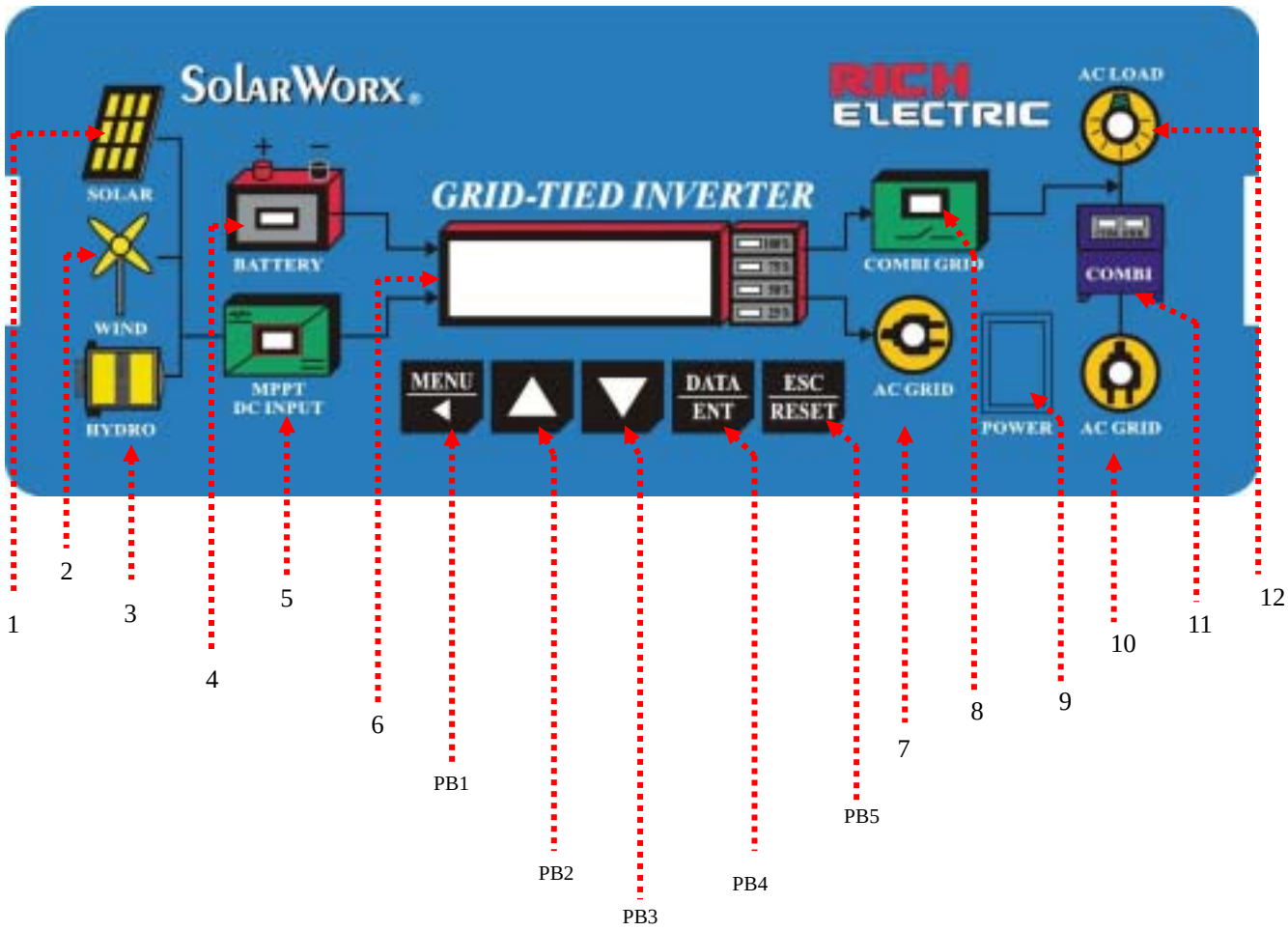
3.30 Connection Schematic (Combi-Grid Hybrid Net Metering)



Please note specifications are subject to Manufactures changes.

Chapter 4 Operation

4.10 Front Panel Display



The **POWER** "rocker" switch (9) is the Master ON / OFF Switch. This switch in the "OFF" position will terminate all functions of the SolarWorx GTI.

NOTE:
The AC Output is turned OFF when the inverter is Switched OFF at the Master Power Switch.

4.10 Front Panel Display

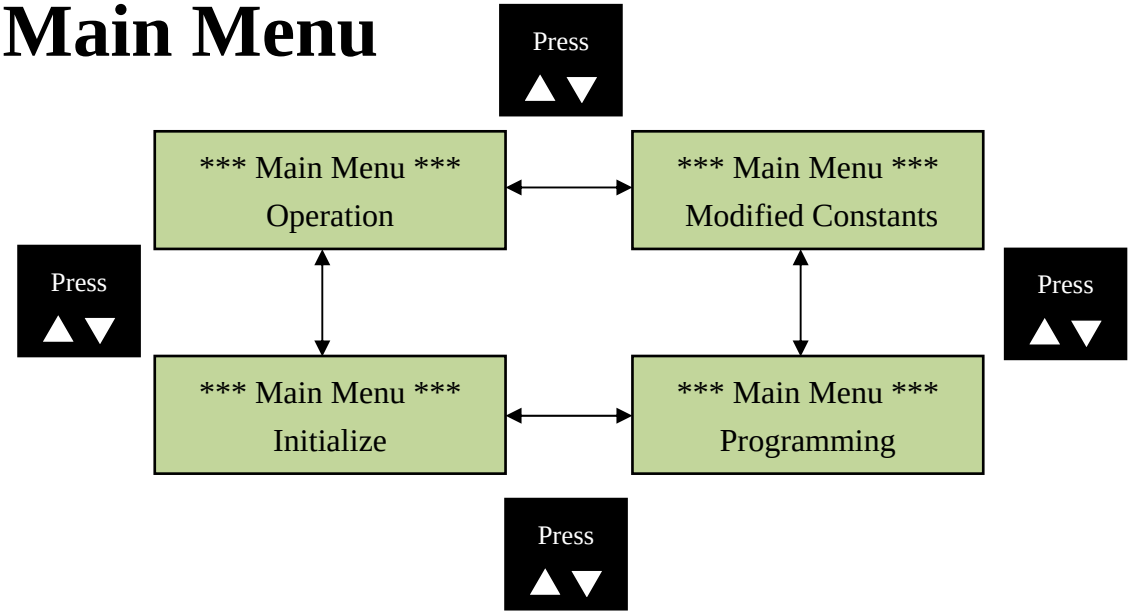
LED Indicators

LED	Name	LED ON	LED OFF
1	SOLAR PANEL	Display Only	NA
2	WIND	Display Only	NA
3	HYDRO	Display Only	NA
4	BATTERY	GTI is operating in Battery Mode	
5	MPPT DC INPUT	GTI is operating in MPPT Mode	
6	LCD Display	Display user information	
7	AC GRID FEED	AC Grid is stable and within the Voltage & frequency settings. Flashing: AC Grid voltage or frequency is checking.	No AC Grid (Blackout)
8	COMBI GRID	Green: Power is being sent to the Combi-Grid	Disconnected from Combi-Grid
9	POWER	MASTER Power Switch	
10	AC GRID	Yellow: Power is being used from the Mains Grid to support AC Load. (Mains AC power plus the Combi Inverter power and the GTI's power is being used). .	No AC Grid (Blackout)
11	COMBI	Green : CombiNet connection is active Red: CombiNet Connect is lost. (check cable or reboot system)	Combi Not Connected or wrong communication settings
12	AC LOAD	Yellow: SolarWorx GTI® is supplying power to the Combi-Grid to support the Combi.	There is NO AC output to the load

Front Panel: Button Operations

	Push buttons	Name	Description
PB1	**MENU** **Arrow <**		1. Function Key to move Cursor to the left digit at Parameter Edit. 2. Function key to return to Main Menu.
PB2	**UP** (△)		△ Increment key to edit Parameter value.
PB3	**DOWN** (▽)		▽ Decrement key to edit Parameter value.
PB4	**DATA** **ENT**		Function Key to edit Data value and Data write-in key
PB5	**ESC** **RESET**		Returns to the status before the DATA/ENTER key was pressed.

Main Menu



Note: *After the set time period (01-02: Key Idle Detect Time) the system will exit any menu GTI screens and return to the standby display (01-01: Power ON LCD Monitor Select).*

4.30 Main Menu

There are four options in the Main Menu of the "SolarWorx GTI®" and they are "**Operation**", "**Initialize**", "**Programming**" and "**Modified Constants**".

Function	Content
Operation	"SolarWorx GTI®" can monitor Operation Status, Output Watts, AC-Grid Voltage, AC-Grid period, DC-IN voltage, Output current, accumulated energy, model number, Elapsed Time and Software Version. This is U (Monitor Group) constants.
Initialize	Operation Condition Setting Group A (Initialize) Group: constants initialization setting and constants modification allowed/prohibited setting.
Programming	Constant groups to program (modify) all the constants: B (General) Group, O (Operator) Group, and PC communication Group
Modified Constants	Operating the read-out and modification of the constants group setting which are different from initial setting. Users can program and modify constants

Note: *On any Menu Screen, pressing "ESC" key will return you to the previous Menu.*

4.40 Main Menu :Operation "Monitor"

Main Menu: Operation

"Monitor"

U1-00: Operation Status

Main Menu>Operation>ENT>Monitor>ENT>

- Use U1-00 to monitor the current status of the GTI,
- Waiting, GTI Fault, Grid Fault, No Utility, GTI OH (Over Heat), Grid Check, Normal.

U1-01: Output Watts

Main Menu>Operation>ENT>Monitor>ENT>

- Use U1-01 to monitor the current output wattage value of AC power out in units of 0.1W.

U1-02: AC-Grid Voltage

Main Menu>Operation>ENT>Monitor>ENT>

- Use U1-02 to monitor AC IN voltage value in units of 0.1V.

U1-03: AC-Grid Frequency

Main Menu>Operation>ENT>Monitor>ENT>

- Use constant U1-03 to monitor AC IN Frequency value in units of 0.1Hz.

U1-04: AC OUT Current

Main Menu>Operation>ENT>Monitor>ENT>

- Use constant U1-04 to monitor DC-IN voltage value in units of 0.1V.

U1-05: Output Current

Main Menu>Operation>ENT>Monitor>ENT>

- Use constant U1-05 to monitor the output current value in units of 0.01A

U1-06: Accumulated Energy

Main Menu>Operation>ENT>Monitor>ENT>

- Use constant U1-06 to monitor the accumulated energy in unit of 1kWh.

U1-07: Model Number

Main Menu>Operation>ENT>Monitor>ENT>

- Use constant U1-07 to display the model number of the GTI.

U1-08: Elapsed Time

Main Menu>Operation>ENT>Monitor>ENT>

- Use constant U1-08 to monitor the elapsed time after power ON (O1-03=0) or after RUN (O1-03=1) in units of 1 hour.

U1-09: Software Version

Main Menu>Operation>ENT>Monitor>ENT>

- Use constant U1-09 to check the software version.

`

Chapter 5 Programming

Note: **Settings should only be changed by a qualified engineer.**

Carefully read the user manual before any change is made.

Programming Constants

A Group (Initialize)

A1 Group (Initialize)

A1-01: Access level

- Use constant A1-01 to select the user constant access level.
  This level determines which user constants can be changed and displayed.

Setting	Function
A1-01=0	This setting allows the “operation” and “initialize” to be changed or displayed. Use this setting to prevent user constant settings from being changed.
A1-01=1 (Initial setting)	This setting allows all user constants to be changed or displayed.

A1-02: Init Parameters

- Use constant A1-02 to initialize the user constants.
- When initialized, the user constants will return to their factory preset values. You should normally record the setting of any constants that are changed from factory presets.

Setting	Function
A1-02=0 (Initial setting)	Returns to initialize Display without initializing any user constants.
A1-02=1	Initializes the user constants to factory settings.

A1-03: Init Password 1

- This constant is reserved for the factory to test and set the functions.
- Users are not allowed to set this constant.

Lock the constants setting (A1-01=1)

1. Finish setting all the programmable parameters to desired values.
2. Change A1-01=0 (Operation only), factory setting is A1-01=1 (Constants set).
3. Go to A1-03 and press MENU key and UP key at the same time till A1-04 parameter occurs.
4. Enter the desired password (max. 4 digits)
5. Press UP key to leave A1-04

   Above procedure completes locking the constants setting and no more programming selection would appear. A1-01 would only display 0 (Operation only) and would not display 1 (Constants set).

Unlock the constants setting

1. Enter the password in A1-03 to be exactly the same as the one earlier set in A1-04

2. When the password in A1-03 matches the one earlier set in A1-04, the unlocking is completed. A1-01=1 (Constants set) would appear again for programming.

B Group (General)

B1 Group (Output Frequency)

B1-01: Operation Mode Sel (Select)

Main Menu>Programming>ENT>General>ENT>Operation Mode Sel>ENT

- B1-01 is used to set the "DC Input" Operation Mode

Setting	Function
B1-01=0 (Initial setting)	Battery Mode
B1-01=1	MPPT (Maximum Power Point Tracking)

B1-02: Grid Frequency Sel (Select)

Main Menu>Programming>ENT>General>ENT>Grid Frequency Sel>ENT

- B1-02 is used to set the normal Grid frequency.

Setting	Function
B1-01=0 (Initial setting)	50Hz
B1-01=1	60Hz

B1-03: Output Max. Power

Main Menu>Programming>ENT>General>ENT>Output Max. Power>ENT

- B1-03 is used to set the Maximum output power.

Setting	Function
B1-03=0	Rated to 25% Max Power
B1-03=1	Rated to 50% Max Power
B1-03=2	Rated to 75% Max Power
B1-03=3 (Initial setting)	Rated to 100% Max Power

B1-04: Battery Voltage Sel

Main Menu>Programming>ENT>General>ENT>Battery Voltage Sel>ENT

- B1-04 is used to set the cut in Voltage of the GTI.
  Example: If the GTI is connected to a battery with a backup inverter (UPS) and you would like to send the excess power generated from a solar system into the grid you would set the cut in voltage to around 13.5v (B1-04=0). This way there is enough power to support the backup inverter in the event of a power failure. If you are not operating a backup UPS inverter then you could set the cut in voltage to a lower setting 10.5v (B1-04=6) allowing for the maximum power to be transferred to the grid.
  ***Note**: Consult your battery manufacture for settings below the initial setting of 13.5v as lower cut in voltages will affect the life expectancy of your battery.*

Setting	GT-2000-12	GTI-2000-24	GTI-2000-48	GTI-2000-96
B1-04=0 (Initial setting)	Battery >= 13.5v	Battery >= 27.0v	Battery >= 54.0v	Battery >= 108.0v
B1-04=1	Battery >= 13.0v	Battery >= 26.0v	Battery >= 52.0v	Battery >= 104.0v
B1-04=2	Battery >= 12.5v	Battery >= 25.0v	Battery >= 50.0v	Battery >= 100.0v
B1-04=3	Battery >= 12.0v	Battery >= 24.0v	Battery >= 48.0v	Battery >= 96.0v
B1-04=4	Battery >= 11.5v	Battery >= 23.0v	Battery >= 46.0v	Battery >= 92.0v
B1-04=5	Battery >= 11.0v	Battery >= 22.0v	Battery >= 44.0v	Battery >= 88.0v
B1-04=6	Battery >= 10.5v	Battery >= 21.0v	Battery >= 42.0v	Battery >= 84.0v
B1-04=7	Battery >= 10.0v	Battery >= 20.0v	Battery >= 40.0v	Battery >= 80.0v

Please note specifications are subject to Manufactures changes.

O Group (Operator)

4.4 Main Menu : Programming "Operator"

Main Menu: Programming "Operator"

Monitor Select…….

O1-01: Power ON LCD Monitor Select

Main Menu>Programming>ENT>Operator >ENT>

- After power of the SolarWorx GTI® is On, the monitor selections will be showed on the LCD Display, U1-01 Output Watts is the initial display shown.
- All the constants in U1 Group can be programmed (U1-01~U-09).

O1-02: Key Idle Detect Time

Main Menu>Programming>ENT>Operator >ENT>

- Use constant O1-02 to set the idle time when the keyboard is not operated and once any key is pressed, the display will return to the LCD monitor selection value set in constant O1-01.
- Initial Setting=180 sec, setting range: 10~600 sec

O1-03: Display IdleTime Set

Main Menu>Programming>ENT>Operator >ENT>

- When O1-03=0, Display Idle Function is disabled.
- Use constant O1-03 to set the idle time when the keypad is not operated and all the LCD Display and LED Indicators of the SolarWorx GTI® entering the idle mode which only RUN/STOP indicator is active.
- Once any key on the panel is pressed, it will return to the display before idle status.
- Initial setting=10 min, setting range: 0~60 min.

O1-04: Elapsed Time Reset

Main Menu>Programming>ENT>Operator >ENT>

- Use constant O1-04 to reset elapsed time.

O1-05: Elapsed Time Select

Main Menu>Programming>ENT>Operator >ENT>

Setting	Function
O1-05=0 (Initial setting)	The elapsed time started to be counted after power is on.
O1-05=1	The elapsed time started to be counted after RUN.

O1-06: Model Number

Main Menu>Programming>ENT>Operator >ENT>

- This will display the model number of the unit on the LCD displayed.

O1-07: Reset Accumulated Energy

Main Menu>Programming>ENT>Operator >ENT>

Setting	Function
O1-07=0 (Initial setting)	Not any movement
O1-07=1	Clear the accumulated energy stored in U1-06 to be 0 WH

P Group (Communication)

P1-01: Communication Mode Sel

Main Menu>Programming>ENT> Communication >ENT

- Use Constant P1-01 setting selects the GTI Mode for commutation to SuperCombi® or CombiPlus® or as Standalone unit.

Setting	Function
P1-01=0 (Initial setting)	0: Standalone (GTI is in Standalone Mode)
P1-01=1	1: CombiNet (GTI is Connected to Combi)

P1-02: CombiNet Address Set

Main Menu>Programming>ENT> Communication >ENT

- Use Constant P1-02 setting to select the CombiNet address.
- The CombiNet Address or "ID" must be set for the SuperCombi® or CombiPlus® to detect the SolarWorx® GTI. When constant setting P1-01 is set to "0" the Combi connection is disabled.
- An ID Number must be given to the Switch for it to be recognized by the SuperCombi® or CombiPlus®.
- If a number of units are to be connected to a network , each unit will require a different ID Number. For example if there was 2 units connected to the SuperCombi® , then the ID's given would be 1,2. If only one unit were connected then the ID would be set as "1".

Constant	LCD Display	Range	Unit	Factory Setting
P1-02	CombiNet Address	1~5	1	1

PLEASE NOTE:

Before connecting the SolarWorx® GTI to the SuperCombi or CombiPlus,
Please check the software version on your Combi to see if it is compatible.
This can be done by using the arrow keys unit the unit displays U1-13= XXXX/XXXX
To allow the SolarWorx GTI to communicate with the Combi,
The Combi software version must be U1-13= 1008/1006 or higher.
If your model does not display this software version or you are unsure,
Please contact your local service centre for software upgrade.

Please note specifications are subject to Manufactures changes.

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Chapter 6 Combi-Grid

WARNING

When connecting the SolarWorx® GTI to a SuperCombi® or CombiPlus® The SuperCombi® or CombiPlus® must EQUAL or be GREATER than the capacity of the total number of SolarWorx® GTI units.

EXAMPLE: If you have 1x GTI-2000 you CANNOT connect it to the SuperCombi 1x SC-1500, (1500watt) as the Combi is only 1500watts and the GTI is 2000watts.
The correct setup would be SC-3000 (3000watt) combi with 1x GTI-2000 (2000watt) were the SuperCombi® is larger than the SolarWorx® GTI.

More Examples:
3x SuperCombi 3000w = 9,000watt connected to 4x GTI-2000 = 8,000watt
Total AC output capability of over
17,000watts = 17kW

5x SuperCombi 3000w units = 15,000watts connected to 7x GTI-2000 = 14,000watts
Total AC output capability of over
29,000watts = 29kW

5x SuperCombi 6000w units = 30,000watts connected to 15x GTI-2000 = 30,000watts
Total AC output capability of over
60,000watts = 60kW
Large 3 Phase system

15x SuperCombi 6000w units = 90,000watts connected to 45x GTI-2000 = 90,000watts
Total AC output capability of over
180,000watts = 180kW

Please note specifications are subject to Manufactures changes.

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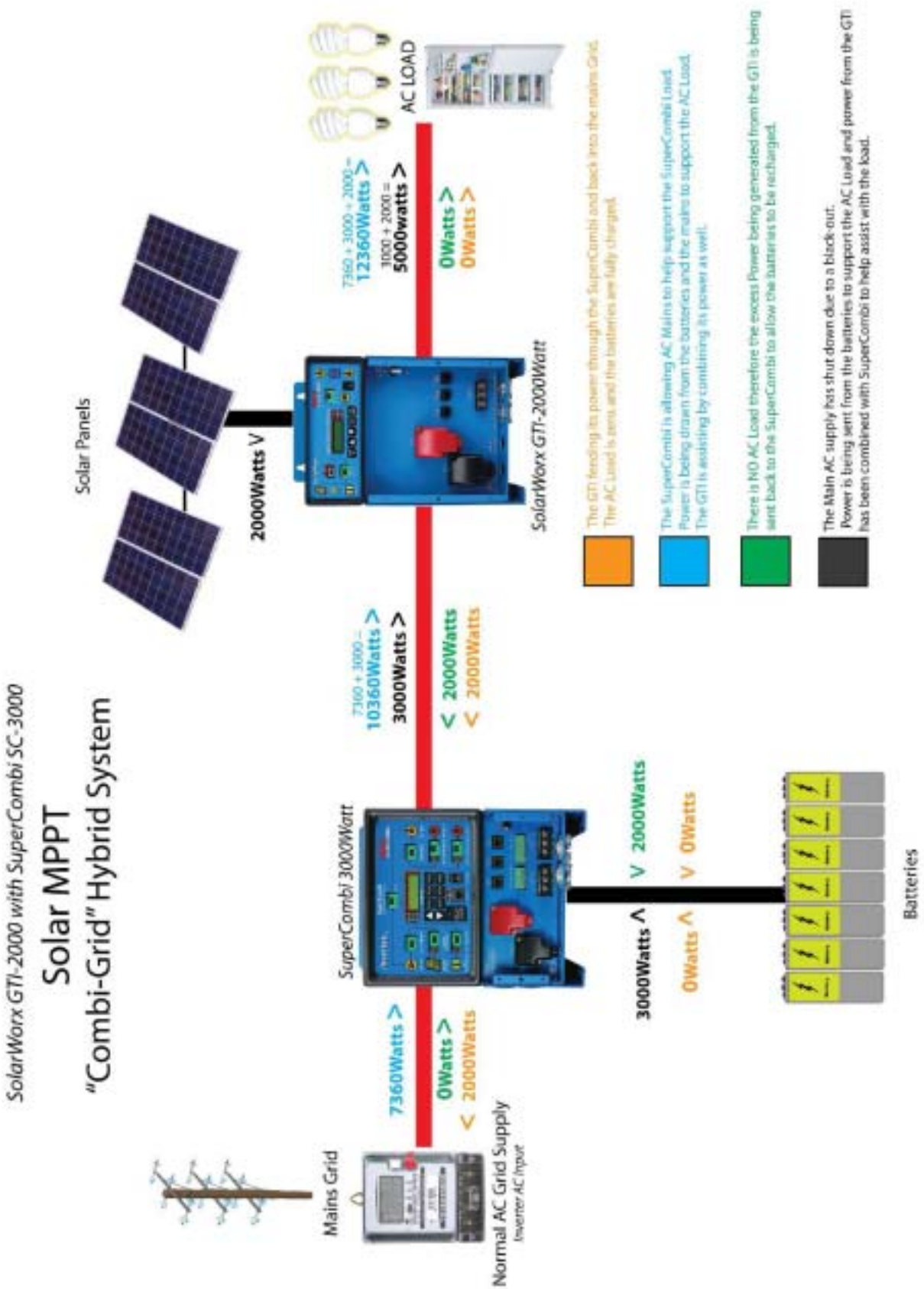
6.1 Combi-Grid Diagram (SuperCombi or CombiPlus with SolarWorx GTI)



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Chapter 7 Constants list

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Constant	LCD Display	Range	Unit	Factory Setting
U1-00	Operation Status	User Display	XXX	See Note 1
U1-01	Output Watts	User Display	1W	-
U1-02	AC-Grid Voltage	User Display	0.1V	-
U1-03	AC-Grid Frequency	User Display	0.1Hz	-
U1-04	DC-IN Voltage	User Display	0.1V	-
U1-05	Output Current	User Display	0.01A	-
U1-06	Accumulated Energy	User Display	1WH or 1KWH	-
U1-07	Model Number	User Display	XXX	-
U1-08	Elapsed Time	User Display	1 Hour	-
U1-09	Software Version	User Display	XXX	-
Notes:				

Constant	LCD Display	Range	Unit	Factory Setting
A1-01	Access Level	0~1	XXX	1: Constant set
A1-02	Init Parameters	0~1	XXX	0:
A1-03	Init Password 1	0~9999	1	0
A1-04	Init Password 2	0~9999	1	0
Notes:				

Please note specifications are subject to Manufactures changes.

Please note specifications are subject to Manufactures changes.

Constant	LCD Display	Range	Unit	Factory Setting
B1-01	Operation Mode Select	0: Battery 1: MPPT	0~1	0:Battery Mode
B1-01	Grid Frequency Select	0:50Hz 1:60Hz	0~1	0: 50Hz
B1-03	Output Max. Power	0:Rated 25% 1: Rated 50% 2:Rated 75% 3:Rated 100%	0~3	3: Rated 100%
B1-04	Battery Voltage Select	0:Battery>=13.5v 1:Battery>=13.0v 2:Battery>=12.5v 3:Battery>=12.0v 4:Battery>=11.5v 5:Battery>=11.0v 6:Battery>=10.5v 7:Battery>=10.0v	0~7	0:Battery>=13.5v
Notes:				

Please note specifications are subject to Manufactures changes.

Please note specifications are subject to Manufactures changes.

Constant	LCD Display	Range	Unit	Factory Setting
O1-01	Power-On Monitor Select	U1-01~09	1	1
O1-02	Key Idle Time Set	10~600	1 Sec	180Sec
O1-03	Display Idle Time Set	0~60	1 Min	10 Min
O1-04	Elapsed Time Reset	0~60000	1 Hour	0
O1-05	Elapsed Time Select	0: Power On 1: Run Time	1	0: Power On
O1-06	Model Number	User Display	XXX	XXX
O1-07	Rst Accumulated Energy	0:No 1:RESET	1	0:No
Notes:				

Constant	LCD Display	Range	Unit	Factory Setting
P1-01	Communication Mode Select	0: Standalone 1: CombiNet	0~1	0: Standalone
P1-02	CombiNet Address	1~5	1	1
Notes:				

NOTE 1:

Operation Status

U1-00 =Waiting : The PV string DC voltage is less than 16.5V*, SolarWorx enters a waiting state. The SolarWorx waits for enough power to connect to Grid.

U1-00=Normal: When PV string DC voltage is greater than 16.5V*, SolarWorx operates normally and feeds power to the Grid.

U1-00=Grid check: The PV voltage >16.5V*. The SolarWorx is checking the grid status.

U1-00=No Utility: Utility is not available

U1-00=Grid Fault: Grid measured data is beyond the specification (voltage & frequency)

U1-00=GTI OH: The internal temperature is higher the normal value

U1-00=GTI Fault: SolarWorx power-ON check fault.

*When MPPT Mode, 12Volt system voltage 16.5V, 24Volt system voltage 33V, 48Volt system voltage 66V, 96Volt system voltage 132V.

*When Battery Mode and B1-04=0, 12Volt system voltage 10V, 24Volt system voltage 20V, 48Volt system voltage 40V, 96Volt system voltage 80V.

Please note specifications are subject to Manufactures changes.

Chapter 8 Trouble Shooting

- Proceed as follows for a quick detection of common faults.
- Consult your Rich Electric dealer if the fault cannot be resolved.

Problem/Error message	Possible Cause	Solution
CPF-01 EEPROM Empty	No data in EEPROM.	Set A1-02=1 to initialize the constants reset EEPROM
CPF-02 EEPROM Fault	EEPROM inside has data access problem	Set A1-02=1 to initialize the constants reset EEPROM
CPF-03 Energy Meter Fault	It could be by the master board and / or other circuit malfunction	Make sure the wire connection between Master board and other boards are well connected.
CPF-04 Write to Master Error	The readings between 2 micro process are inconsistent. It would be caused by the CPU and / or other circuit malfunction	Power switch turn OFF the power. After all the LED lights off turn ON the power
CPF-05 CombiNet Comm Fault	Between SolarWorx and Combi can not communication	Check the wiring is well connected.

Operation Stats U1-00=GTI OH	The internal temperature is higher than normal value	Turn off power switch. Turn on power switch after the temperature drop and check if the fan runs and ventilation condition.
Operation Status U1-00=GTI Fault	After SolarWorx power ON self-check faults	Check the wiring is well connected.

The Inverter is not functioning	The AC IN voltage or frequency is out of range.	Ensure that the AC IN voltage is within the range 220V system: 205VAC-270VAC 110V system: 102VAC-135VAC And that the frequency matches the setting.
	"SolarWorx GTI®" internal circuit breaker has tripped.	Reset the internal circuit breaker.
	A defective battery connection.	Check the battery terminals.
	The battery cut in voltage has been set to an incorrect value.	Adjust the cut voltage to the correct value.
	The internal DC fuse is defective	"SolarWorx GTI®" will need to be set to service for repair.
The Battery is Flat.	The battery is too small.	Increase the cut in voltage or use a battery with a higher capacity.
	A defective battery.	Replace the battery.
	Not enough solar or wind charging capacity	Increase solar or wind capacity or increase battery cut in voltage.

Chapter 9 WARNING Labels

9.10 Labels "Warning Dual Power Supply"

SIGNAGE (White on Red) AS 4777.1 and Appendix A

This label must be permanently fixed on the main switchboard.

9.11 Labels "Normal Grid SUPPLY MAIN SWITCH"

Fixed on the Main Switch

9.12 Labels "Solar / Alternate SUPPLY MAIN SWITCH"

Fixed on the Main Solar Switch

9.13 Labels "Warning Dual Power Supply Isolate at Distribution Board"

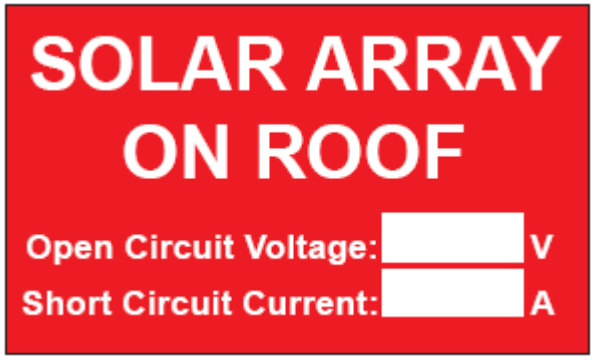
If the solar system is connected to a distribution board
then the following sign is located on main switchboard
and all intermediate distribution boards,
Note: It is recommended that you number the Distribution Boards

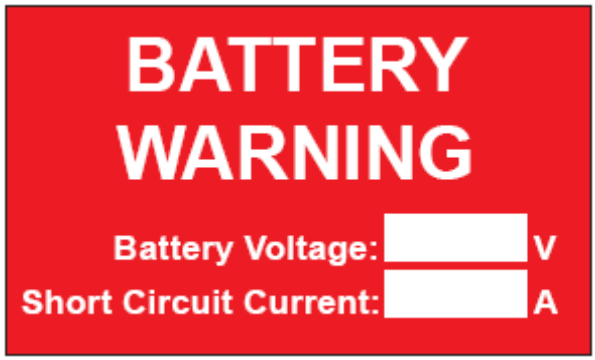
Note: *Where the inverter is not adjacent to the main switchboard, location information is provided.*

9.14 Labels "DC"

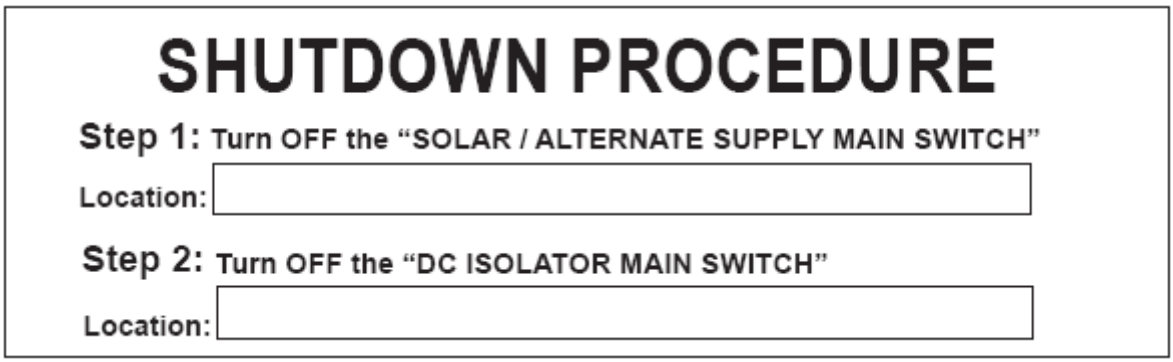
SIGNAGE (Black on White) AS/NZS5033 Appendix G
This label must be permanently fixed
on all array junction boxes and cabling.

9.15 Labels "Fire Emergency Information"





Fire Emergency information is
permanently fixed on the main switchboard
(White on Red)



SHUTDOWN information is
permanently fixed on the main switchboard
(Black on White)

Note:

It is also recommend that a Shutdown procedure is also permanently fixed at inverter. .

9.15 Record sheet "PV Array Total"	
PV Value	**PV STRING**
	Totals
Open Circuit voltage (Voc)	
Normal Voltage (Vmp)	
Short Circuit Current (Isc)	
Normal Current (Imp)	
Rated Power (Pmax)	

9.15 Record sheet "PV Array Strings"

PV Value	PV STRING								
	1	2	3	4	5	6	7	8	9
Open Circuit voltage (Voc)									
Normal Voltage (Vmp)									
Short Circuit Current (Isc)									
Normal Current (Imp)									
Rated Power (Pmax)									

PV Value	PV STRING								
	10	11	12	13	14	15	16	17	18
Open Circuit voltage (Voc)									
Normal Voltage (Vmp)									
Short Circuit Current (Isc)									
Normal Current (Imp)									
Rated Power (Pmax)									

Appendix A: EMC for SolarWorx® GTI

SGS

SGS Reference No: ED/2010/30005C

Page 1 of 1

VERIFICATION OF COMPLIANCE

Verification Report No.	:	ED/2010/30005C
Representative Model	:	GTI-2000-122
Series models	:	GTI-2000-242, GTI-2000-482,GTI-1000-122, GTI-1000-242, GTI-1000-482
Product Name	:	SolarWorx Grid-Tied Inverter
Head Office Applicant	:	RICH ELECTRIC CO., LTD.
Address of Applicant	:	31, Keji 5th Rd., Annan District, Tainan Technology Industrial Park 70955, Taiwan (R.O.C)
Factory Applicant	:	RICH ELECTRIC CO., LTD.
Address of Applicant	:	31, Keji 5th Rd., Annan District, Tainan Technology Industrial Park 70955, Taiwan (R.O.C)
Test Report Number	:	ED/2010/30005
Date of Issue		February 26, 2010
Applicable Standards	:	SGS Onsite Test Standard: 2007 EN 61000-6-2: 2005, EN 61000-6-4: 2007 IEC/CISPR 11/EN55011 CLASS A, EN61000-4-2, EN61000-4-4, EN61000-4-6, Mobile Phone Test

Conclusion

In the opinion of SGS, the equipment complies with the principle requirement of the above standards and following directive:

Electromagnetic Compatibility Directive 2004/108/EC

Note: The verification is only valid for the equipment and configuration tested and in conjunction with the test data described in the Test Report.

The CE mark as shown below can be used, under the responsibility of the manufacture, after completion an EC Declaration of Conformity and compliances with all relevant EC Directives.

Authorized Signatory:

Jason Lin

SGS TAIWAN LTD.
Jason Lin
Technical Manager

CE

Invertek

Pure Sine Wave

Grid-Tied Inverter

Appendix B: C-Tick for SolarWorx® GTI

SGS

Report No.: ED/2010/30010
Page :1 of 9

C-TICK CLASS A COMPLIANCE REPORT

Test Report No. : ED/2010/30010
Head Office Applicant : RICH ELECTRIC CO., LTD.
Address of Applicant : 31, Keji 5th Rd., Annan District,
Tainan Technology Industrial Park 70955, Taiwan (R.O.C)
Factory Applicant : RICH ELECTRIC CO., LTD.
Address of Applicant : 31, Keji 5th Rd., Annan District,
Tainan Technology Industrial Park 70955, Taiwan (R.O.C)
Equipment Under Test (EUT) :
Name : SolarWorx Grid-Tied Inverter
Model No.: GTI-2000-122, GTI-2000-242, GTI-2000-482,
GTI-1000-122, GTI-1000-242, GTI-1000-482
Standard : AS/NZS CISPR 22: 2004
IEC/CISPR 22 : 2004 CLASS A
EN55022 : 2004 CLASS A
Date of Tests: February 24, 2010
Date of Issue: February 26, 2010

Test Result :	**PASS**

In the configuration tested, the EUT complied with the standards specified above.
NOTE:The test standards also meet the CISPR 11 & EN55011 Class A rules.

Remarks :
This report detail the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.
This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS E&C Laboratory or testing done by SGS E&C Laboratory in connection with distribution or use of the product described in this report must be approved by SGS E&C Laboratory in writing.

Authorized Signatory:
Jason Lin
SGS TAIWAN LTD.
Jason Lin

Invertek
Pure Sine Wave
Grid-Tied Inverter

Appendix C: AS 4777 & AS/NZS 3100 for SolarWorx® GTI

SAA APPROVALS®

Certificate of Approval

Certificate No.: **SAA100339**

Date of Issue: **15 April 2010**

SAA Approvals Pty Ltd as accredited by JAS-ANZ under ISO/IEC Guide 65 certifies that the electrical product described on this certificate complies with the minimum safety requirements for which the application has been made.

Certificate Holder:	Rich Electric Co., Ltd. 31 Keji 5th Road Annan District Alnan Technology Industrial Park 70955 Taiwan
Class Description:	Non-Declared
Product Description:	Grid-Tied Inverter
Brand Name:	SOLARWORX®
Model No.:	GTI-2000-122
Markings:	Input: Battery - Nominal 12V dc Operating Voltage 10-16 V dc MPPT - Nominal 20V dc Operating Voltage 16.5-32V dc Output: 230V 50/60Hz 2000W
Standard:	AS/NZS 3100:2002 Inc A1-3 AS 4777.2:2005 AS 4777.3:2005
Conditions:	Nil
Approval Mark:	SAA100339
Date First Registered:	15 April 2010
Date of Expiry:	15 April 2015

For and on Behalf of
SAA Approvals Pty Ltd

SAA Approvals CERTIFIED

JAS-ANZ

SAA Approvals Pty Ltd 10 Barrack Street Sydney NSW 2000 www.jas-anz.com.au/register 100339/1

Invertek
Pure Sine Wave
Grid-Tied Inverter

SAA
APPROVALS

Certificate of Approval

Addendum

Certificate No.: **SAA100339**

Date of Issue: **15 April 2010**

SAA Approvals Pty Ltd as accredited by JAS-ANZ under ISO/IEC Guide 65 certifies that the electrical product described on this certificate complies with the minimum safety requirements for which the application has been made.

Class Description: Non-Declared
Product Description: Grid-Tied Inverter

General Modification:
-

Additional Models	**Description**
GTI-2000-242	Similar to model GTI-2000-122 except for ratings: Input: Battery - Nominal 24V dc Operating Voltage 20-32V dc MPPT - Nominal 40V dc Operating Voltage 33-64V dc Output: 230V 50/60Hz 2000W
GTI-2000-482	Similar to model GTI-2000-122 except for ratings: Input: Battery - Nominal 48V dc Operating Voltage 40-64V dc MPPT - Nominal 80V dc Operating Voltage 66-128V dc Output: 230V 50/60Hz 2000W

For and on Behalf of
SAA Approvals Pty Ltd

SAA Approvals CERTIFIED

JAS-ANZ

SAA Approvals Pty Ltd 10 Barrack Street Sydney NSW 2000 www.jas-anz.com.au/register 100339 /2

NOTES: