



Pure Sine Wave Inverter 10kW 48V & 15 kW 48V User Manual

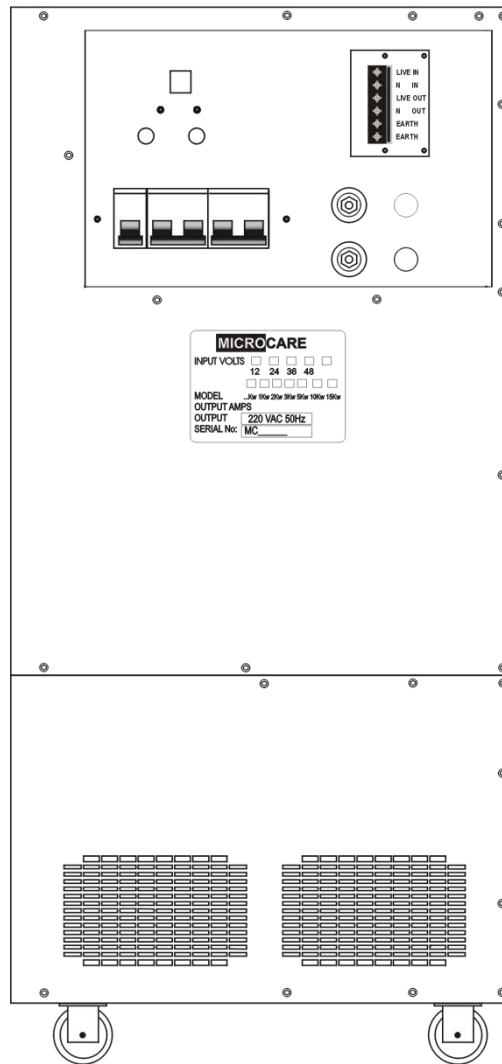


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This manual applies to the Microcare 10kW & 15kW Inverter with Software Version:

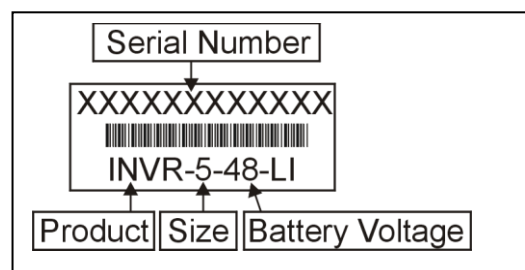
V21R1

Unpacking and Inspection

Upon receipt the unit should be unpacked and inspected for any damage during shipment. Verify that the contents of the box include:

- 1 x Inverter as per the Identification Label
- 1 x V2 Lithium Interface Cable
- 1 x V2 Lithium Interface Termination Socket
- 1 x User Manual (Warranty registration information)

The identification label is positioned on the side of the inverter



This manual applies to the Microcare 10kW & 15kW Inverter with Software Version: V21R1

Termination Sockets

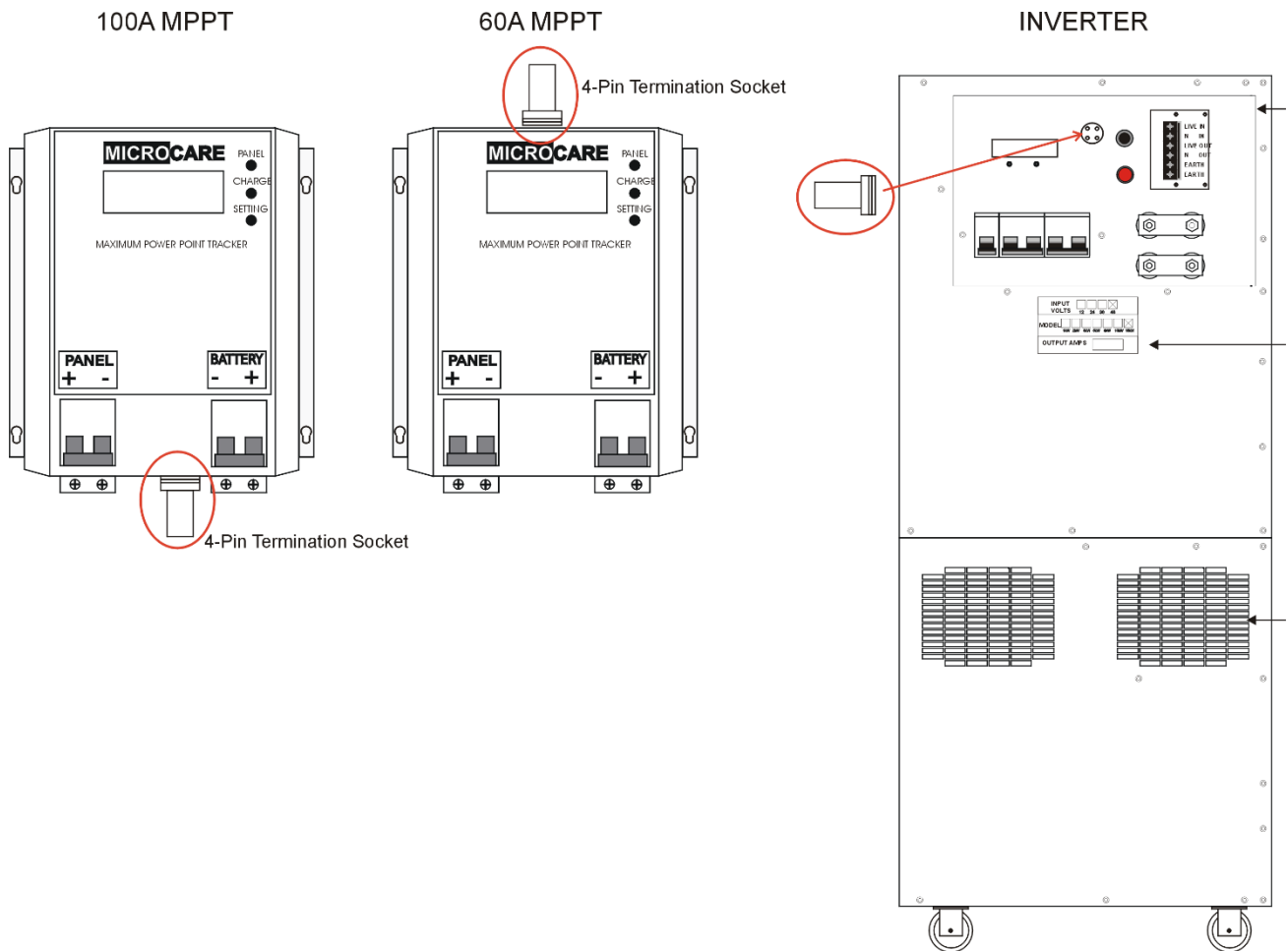
If the termination socket is not fitted to the Inverter

- The Inverter will not charge the batteries.
- The Inverter will not switch power to the load.

If the termination socket is not fitted to the MPPT

- The MPPT charger will not charge the batteries.

Fit the termination Socket as indicated Below



Glossary of Terms

AC	Alternating Current
Ah	Rated battery capacity specified in Ampere-Hour.
AC Run To	The level the solar regulator will charge the battery to before the inverter switches back to battery power
AC Source	The primary AC input that is connected to the inverter, e.g., Mains Grid or Generator.
Bat Run To	The level the battery discharges to before switching to mains power
Bat Off At	The voltage at which the inverter will disconnect the load from the batteries.
DC	Direct Current
Grid Connected	A system that is connected to the grid
Inverter	Is an electronic device or circuitry that changes direct current (DC) to alternating current (AC).
Inverter Mode	The inverter is producing AC from the batteries.
LED	Light emitting diode.
Load	Electrical appliance or device to which an electrical voltage is fed
Off-Grid	A system not connected to the grid
Solar Array	A collection of Solar Panels.
PV	Photo Voltaic solar power
State of Charge (SoC)	Referring to the battery charge condition.
Sealed Battery	A lead acid battery with no access to the electrolyte - either valve regulated or gel. No hydrogen gas discharge during normal operation.
Flooded Battery	A lead acid battery with access caps for maintaining the electrolyte - replacing water lost during recharge operations. Hydrogen gas discharged during normal recharge
SoC	State of Charge is the amount of charge in the battery bank expressed as a % of the battery capacity. When SoC = 100% the battery is fully charged. When the SoC is 50% then the battery is half charged.

1. IMPORTANT INFORMATION AND SAFETY INSTRUCTIONS

- Installers should be qualified electricians or technicians
- The installation information in the manual is for information purposes only.
- The monitoring and operation information in this manual is intended for anyone who needs to operate the inverter.
- The inverter output cannot be paralleled with another inverter or AC source.
- Read the instructions carefully before installing and operating the Inverter.
- Inverter connection and installation instructions must be followed.
- The unit should only be opened by skilled personal.
- To reduce risk of electric shock, disconnect all wiring before making any attempt to maintain or to clean the unit. Turning off the INVERTER will not reduce this risk.
- Retain the load within the rating of Inverter to prevent faults.
- Keep the Inverter clean and dry.
- The Inverter will not operate without batteries.
- The Inverters should be installed indoors, in a ventilated and dry area.
- The mounting surface should be able to support the weight of the inverter.
- Do not install the Inverter on a rugged or inclined surface.
- Do not install the Inverter near water or in a damp environment.
- Do not install the Inverter where it would be exposed to direct sunlight.
- Do not remove the inverter casing while the unit is powered on.
- Keep the Inverter away from heat emitting sources.
- Do not block the inverter ventilation openings.
- Do not leave objects on top of the Inverter.
- Do not expose the Inverter to any corrosive gasses.
- Install the inverter away from any explosive gasses.
- Ambient temperature: 0°C – 40°C
- AC Input breakers have not been provided and must be installed.
- The INVERTER must be used with a battery supply of nominal voltage that matches the inverter as on the “Identification Label”.
- Sketches are intended for illustrative purposes only and are not intended to provide an electrical design.

Do not switch the battery breaker off when the unit is operating or in any other mode when connected to the grid.

Damage caused by reverse polarity, lightning and surges is not covered by warranty.



High AC voltage present and is capable of causing severe injury.

2. INTRODUCTION

2.1 General Description

The Microcare Inverters comes with the latest software included, to improve the automatic change over from the grid to the Inverter. Our cutting edge software innovations allow for uninterrupted supply to a range of applications from a sensitive server room to industrial machines. The Inverter is able to anticipate load failure and pre-charges the circuits for rapid transfer of power and change-over up to 4 times faster. Microcare Inverters use galvanic isolation which makes them highly robust and reliable with low standby current and high efficiency

2.2 Key Features

- Bi-Directional Inverter.
- Output power 10kW for 10kW Model & 15kW for the 15kW model.
- UPS, Off-Grid or Solar Grid Assisted Mode.
- LCD display and low idle current.
- High surge capacity for motor start.
- Timed overload capacity with auto shutdown.
- Adjustable transfer switch time.
- 3-Attempt auto restart with short circuit protection.
- Built in, high rate, multi-stage battery charger.
- Minimum local service turnaround time with a 3 year warranty.
- Fan cooling for optimum performance and component longevity.
- Audible buzzer indicating faults, overload and status.
- Wall Mounted.
- User adjustable settings.
- Remote monitoring via Battery Monitor and Web Logger (Optional)
- Manufactured in South Africa.

Please Note:

This Inverter is pre-programmed with a set of default values.

These settings might not be correct for your battery type.

Please contact your battery supplier for your battery specifications

“Battery Float Voltage, Boost Voltage, Boost to Float Time “ Absorb Time”
and program the Inverter accordingly

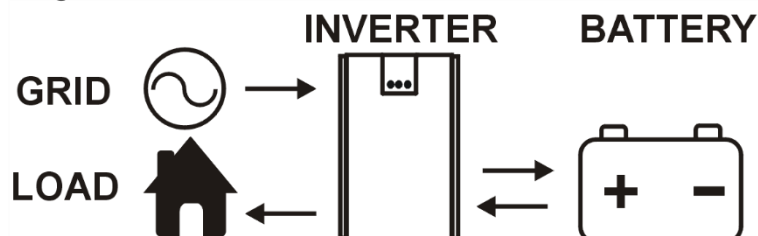
3. OPERATION MODES

3.1 UPS System

The inverter is used as an **UPS**. This operation mode is used for systems that have the grid available as the main AC supply. The grid will supply the load. When the grid supply is interrupted or lost, then the inverter switches to inverter mode. The batteries power the load via the inverter circuitry. When the grid power returns, the load reconnects with the grid. The internal charger charges the batteries when the grid is available.

For this mode of operation select “**UPS**” in the setup menu.

Figure 3-1

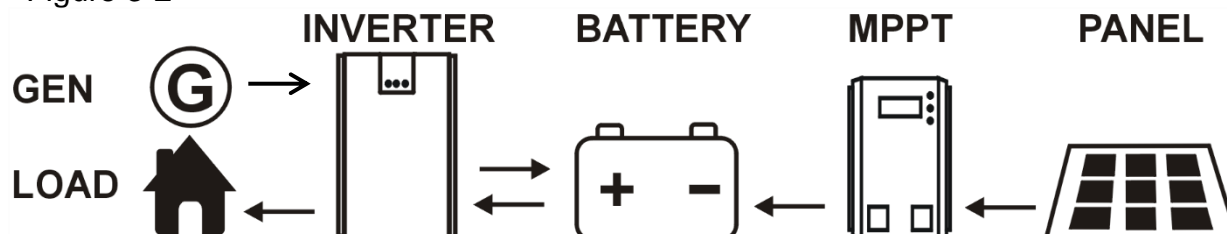


3.2 Off-Grid System (No Grid Supply)

When the inverter is used as an **OFF-Grid** solution, the inverter runs in inverter mode. The batteries power the load via the inverter circuitry. Renewable energy charges the batteries. For this mode of operation select “**UPS**” in the system setup menu.

A generator can be connected to the inverter to assist with charging and supplying the load when required.

Figure 3-2

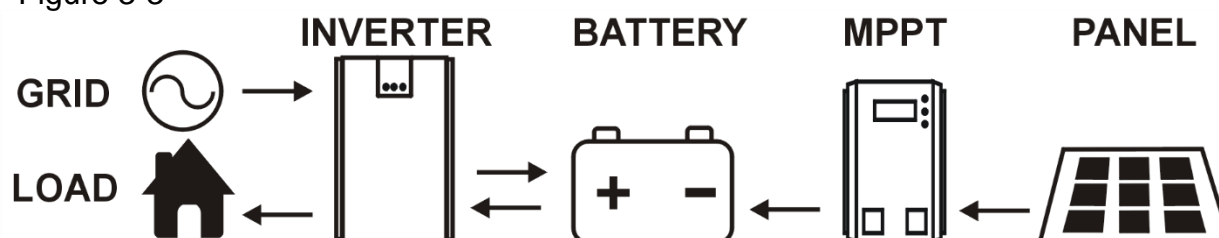


3.3 Grid Assisted Solar Power System

In a Grid assisted system the inverter mainly runs in the inverter mode and the batteries power the load via the inverter circuitry. Renewable energy charges the batteries. The load runs from battery power until the batteries have discharged to a set level. At this level, the load is disconnected from the batteries and the load is connected to the grid. As soon as the batteries are charged to a set level, the load disconnects from the grid and the load is powered from battery power.

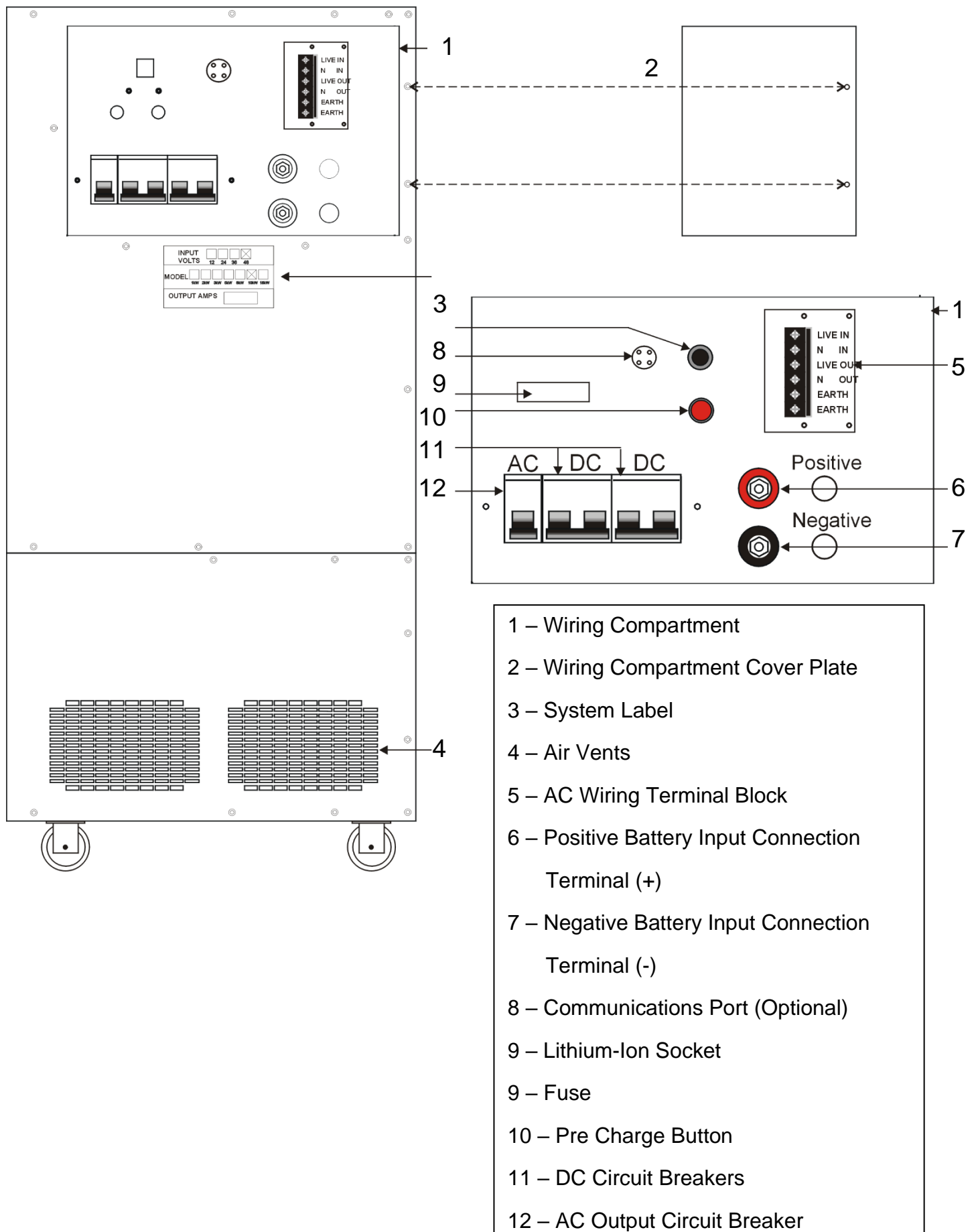
For this mode of operation select “**Solar Control**” in the UPS mode system setup menu.

Figure 3-3

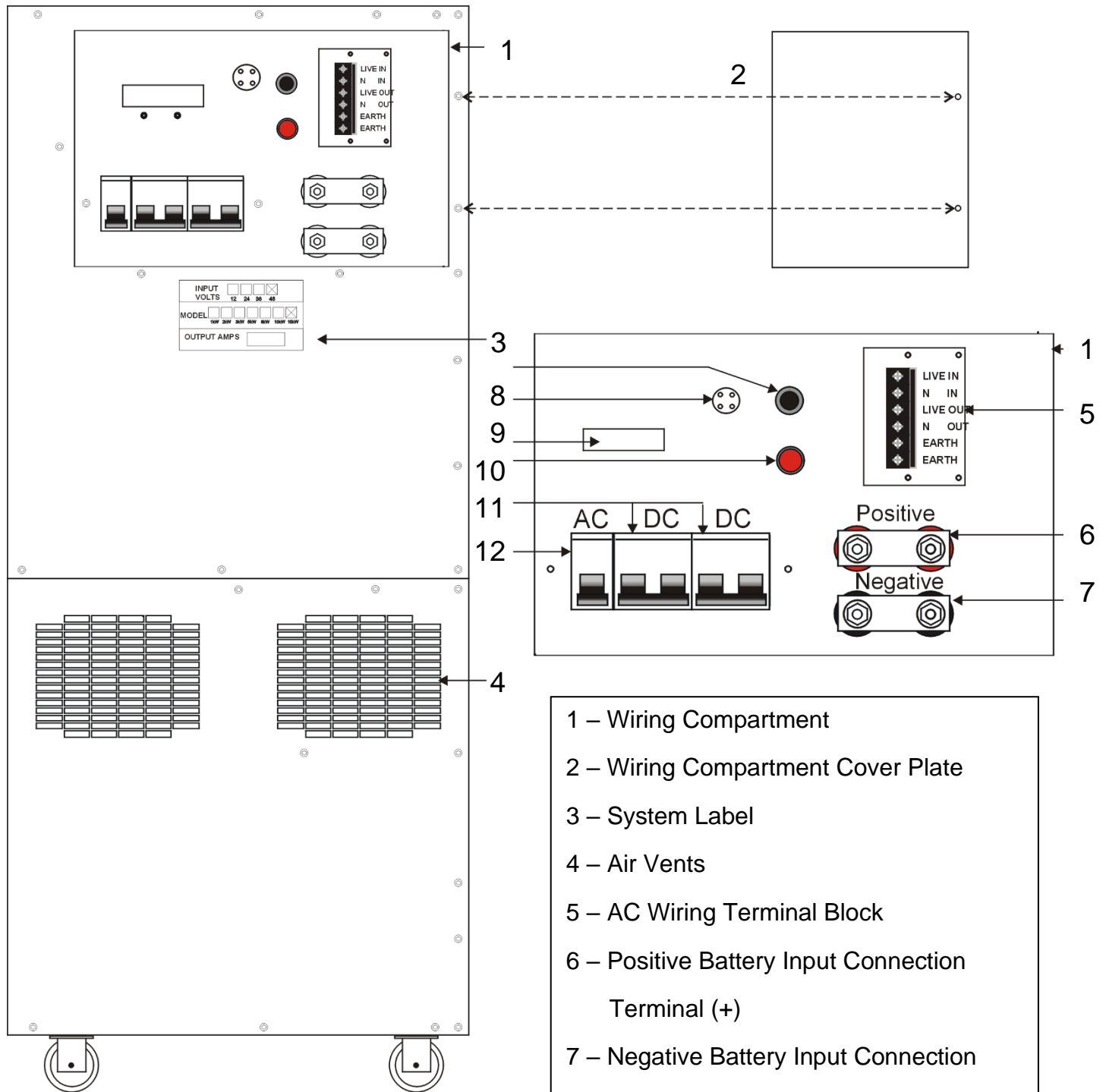


4. INVERTER OVERVIEW

4.1 10 kW Inverter Right Side View



4.2 15 kW Inverter Right Side View



- 1 – Wiring Compartment
- 2 – Wiring Compartment Cover Plate
- 3 – System Label
- 4 – Air Vents
- 5 – AC Wiring Terminal Block
- 6 – Positive Battery Input Connection Terminal (+)
- 7 – Negative Battery Input Connection Terminal (-)
- 8 – Lithium-Ion Socket
- 8 – Communications Port (Optional)
- 9 – System Fuse
- 10 – Pre-Charge Button
- 11 – DC Circuit Breakers
- 12 – AC Output Circuit Breaker

5. INVERTER INSTALLATION

Consider the following when installing the inverter.

5.1 Planning the Installation

Location

- Install the Inverter indoor in a dry protected location away from any sources of moisture.
- Provide enough space for the routing of external wiring, Sub DB board and additional accessories.
- The mounting surface must support the weight of the inverter.
- Exposure to saltwater is particularly destructive.
- Do not mount the inverter in a closed container.
- Unrestricted airflow is required for the inverter to operate at optimal efficiency.
- Ensure a 300mm unrestricted clearance at the top, left and right side of the inverter
- Do not install the inverter in the same compartment as non-sealed batteries.
- Locate the Inverter as close as possible to the batteries in order to keep the battery cables as short as possible as supplied with the inverter.
- If flooded batteries are used, install them in a separate room or compartment.

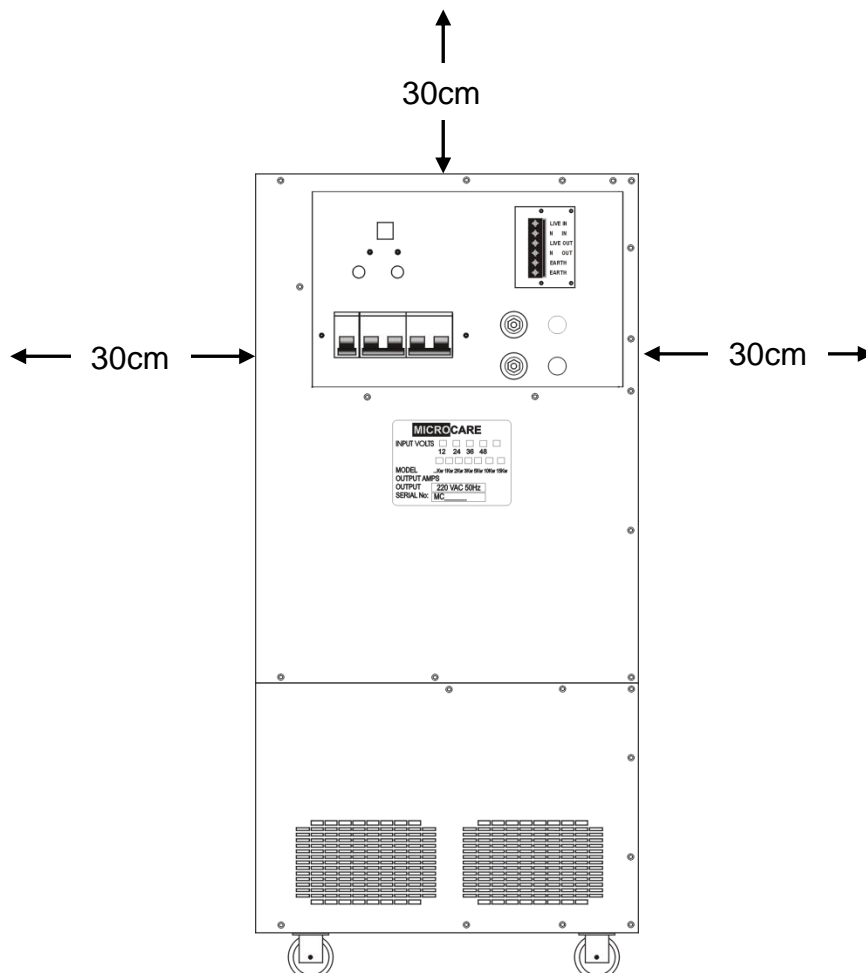
Orientation

Always keep the Inverter standing upright on its wheels.




Temperature

Away from sources of high temperature.

Fig 6-1: Minimum clearance distances



6. GENERAL WIRING INFORMATION

- Wiring must be performed by qualified personnel / certified electrician. 
- Familiarize yourself with the content of the manual following before commencing with the wiring
- The line voltage “AC” applied must comply with the inverter’s specified input voltage.
- The AC connections are located at the top of the inverter under the wiring terminal cover.
- Do not connect the AC output of the inverter directly to another AC source. 
- The inverter is not designed for parallel operation with another inverter. 
- If an electrical load distribution board or sub distribution board is fed from the inverter AC output and the load is also required to be powered from another AC source, the AC load, AC source and the inverter output should be connected to a manual or automatic transfer switch.
- An earth leakage must be fitted at the inverter AC output and not on the AC source input line.
- Make sure the BATTERY INPUT CIRCUIT BREAKER is OFF before attempting any wiring
- Battery interconnection cables must be sized correctly and as short as possible.
- Connect the Positive terminal of the inverter battery cable to the Positive post of the battery and connect the Negative terminal of the inverter battery cable to the Negative post of the battery.

Warning! The inverter battery input is not reverse polarity protected.



Reverse polarity will damage the unit!!

Please Note:

This Inverter is pre-programmed with a set of default values.

These settings might not be correct for your battery type.

Please contact your battery supplier for your battery specifications
“Battery Float Voltage, Boost Voltage, Boost to Float Time “Absorb Time”
and program the Inverter accordingly.

6.1 Earthing Of The Equipment

Equipment surge protection products are an effective way of controlling dangerous surges that can enter a facility.

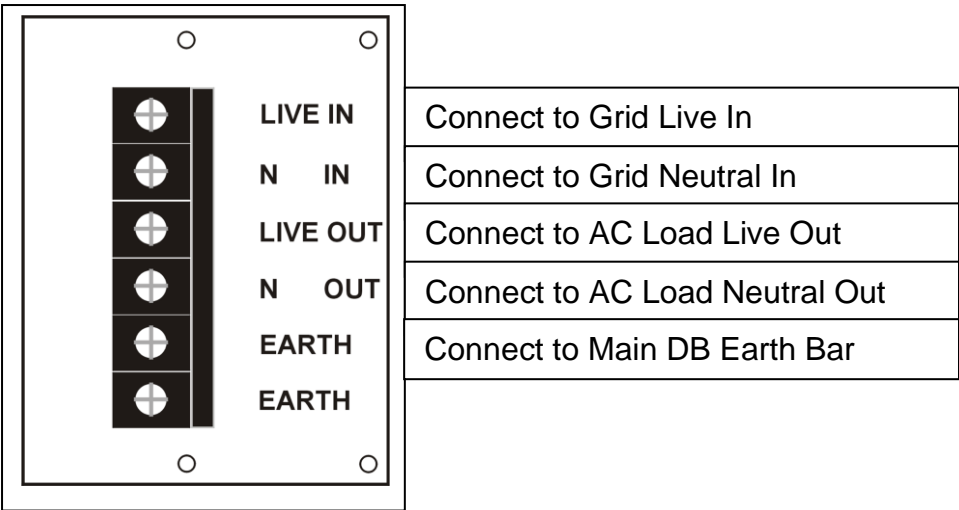
When strategically placed and correctly installed, the Surge Protectors will effectively reduce harmful over voltage conditions that can damage electrical and electronic equipment. It is important that the protection system includes both structural and surge protection equipment.

When lightning current passes into the ground through any conductor (Example: Tree Trunk) a powerful electromagnetic force is set up due to the fast rise times of the strike. This electromagnetic force then couples into any inductive loops that may be available in nearby buildings. When these currents equalize, damage usually occurs to the equipment.

Table 6-1
Lightning Protection Zones

LPZOA	This zone is an area where a direct hit to the structure is possible. The current may rise to a value of 200000A (10/350us) producing extremely high electromagnetic fields. Any conductor system must be capable of carrying the full lightning current.
LPZOB	This zone is an area where a direct hit is not possible, but high electromagnetic fields will be present. This zone is determined by the effectiveness of the structural protection system.
LPZ1	Again, a direct hit in this area is not possible due to the screening measures applied. The electromagnetic field is much lower than LPZOA and LPZOB. It is in this zone where appropriate surge arresters may be fitted that will limit the value of surge current entering a facility.
LPZ2	The value of surge current and electromagnetic field will be lower than that of LPZ1 when correct protection principles have been applied. It is in this area where sensitive electromagnetic equipment may be safely installed.

Figure 6-1



When Mains is connected to the inverter the Neutral connection is bonded to Earth via the Mains utility supply, earth bar.

If the Inverter is connected as a stand-alone inverter with no Mains Connection, the Neutral is required to be earthed using an earth spike.

If the Inverter is not earthed; warranty will be null and void.

6.2 Inverter Neutral Connection

6.2.1 Inverter Connected to the Grid

When connecting the inverter to AC from the grid, the inverter input must not be connected via an earth leakage.

The earth leakage must be connected directly after the inverter

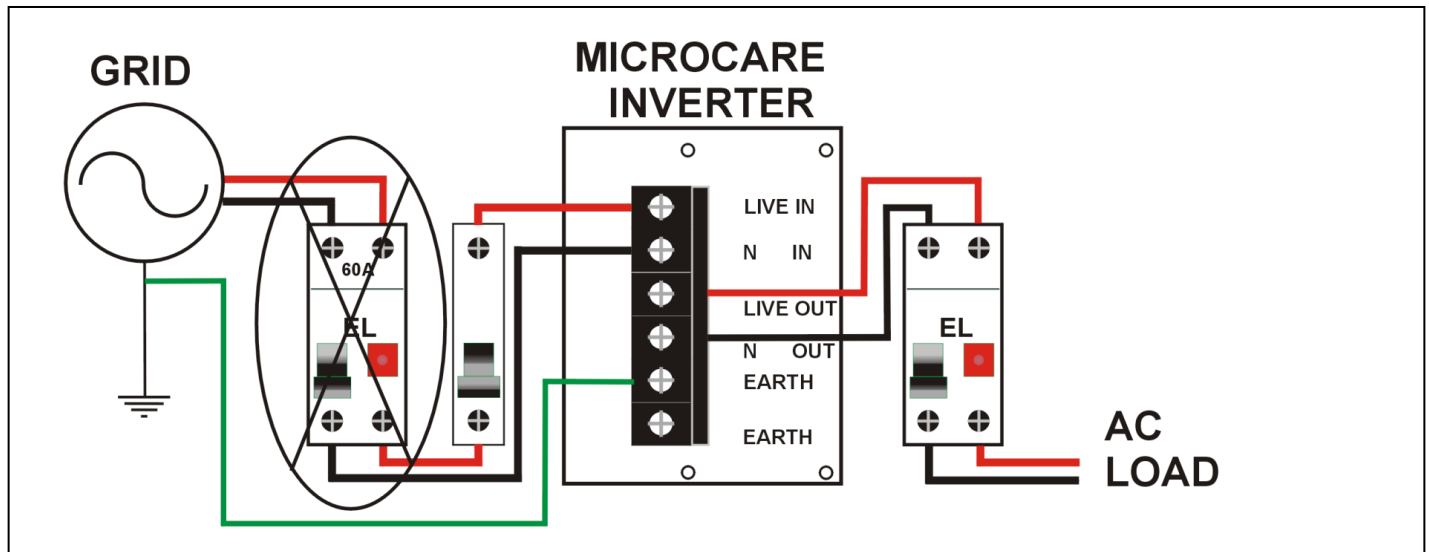
Keep the inverter neutral input connected to the **GRID neutral** at all times.

Connect the inverter Earth to the Earth Bar on the DB board.

When switching off the GRID input to the inverter, only **SWITCH OFF LIVE**. Refer to Figure 6-2

The grid will pull the inverter neutral to 0v.

Figure 6-2

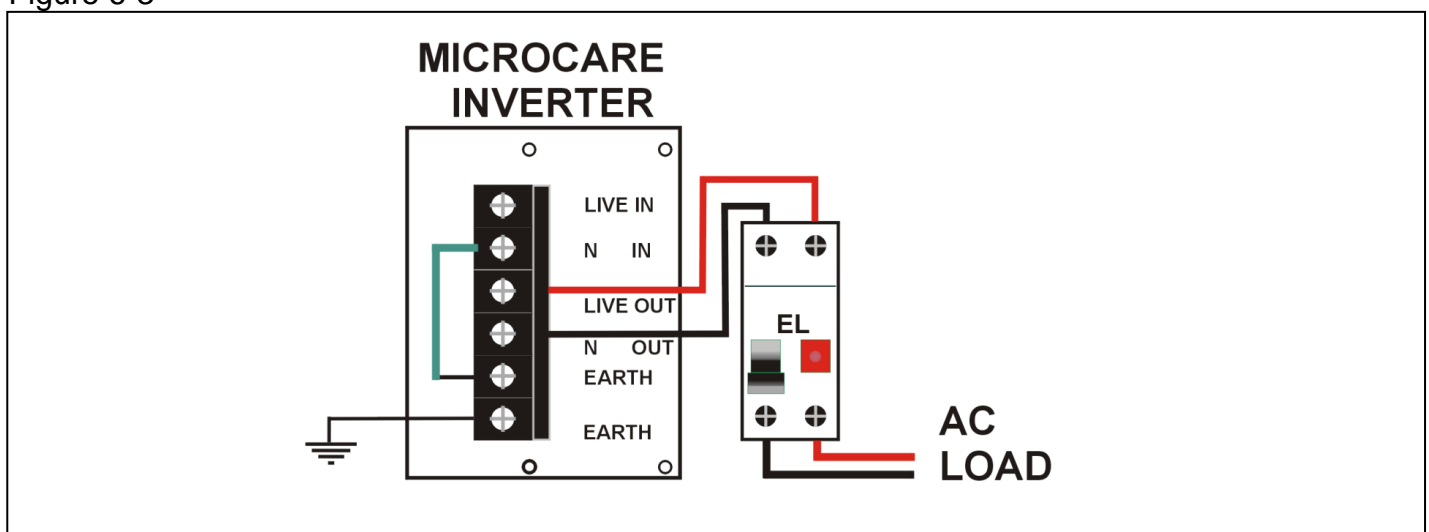


6.2.2 Off-Grid Connection

For an **OFF-GRID** application you need to bridge the **Neutral Input** to the **Earth** terminal on the inverter AC wiring terminal block.

You can now fit an earth leakage after the inverter. Refer to Figure 6-3

Figure 6-3



6.3 AC Wiring

The inverter AC input and AC load output wiring must be sized correctly and fitted with appropriate circuit breakers.

6.4 Pre-Wiring Procedure

Make sure that the wiring to and from the inverter is not connected to any AC sources.
 Switch off the inverter battery “DC” circuit breaker and AC circuit breaker.
 Remove the AC wiring terminal cover plate by unscrewing the 2 cover plate screws.
 Remove the 2 cable glands from the terminal compartment.
 Install the supplied glands.
 Unscrew the wiring terminal screws until a clicking noise is heard, this is to ensure that the terminals are screwed fully open.
 AC wiring should be fed through the appropriate glands and terminated into the correct terminals.

6.5 Inverter AC Input wiring

Feed the AC Input wiring through the correct gland.
 Strip adequate insulation from the end of each wire.
 Individually insert the bear end of the: Live In, Neutral In and Earth Wires fully into the correct terminal slots till it stops and tighten the screws firmly.
 Tighten the cable gland ends.

6.6 Inverter AC Output wiring

Feed the AC output wiring through the correct gland
 Strip adequate insulation from the end of each wire.
 Individually insert the bear end of the Live Out and Neutral Out wires fully into the correct terminal slots till it stops and tighten the screws firmly.
 Tighten the cable gland ends.

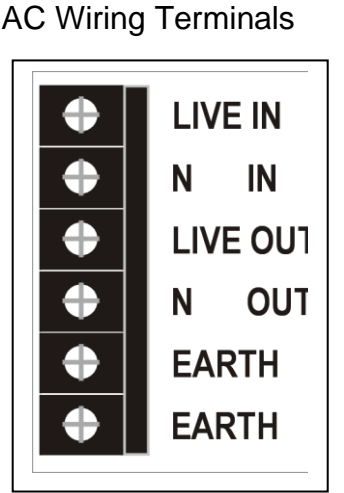





Figure 6-4

 The neutral conductor must be maintained such that the operation of the inverter isolator will not alter the bonding between Neutral and Earth.

 Earth the inverter by connecting the earth from the Main Distribution Board “DB” to the inverter Earth wiring terminal.

 Earth leakage devices must be fitted after the inverter. On the load AC wiring side.

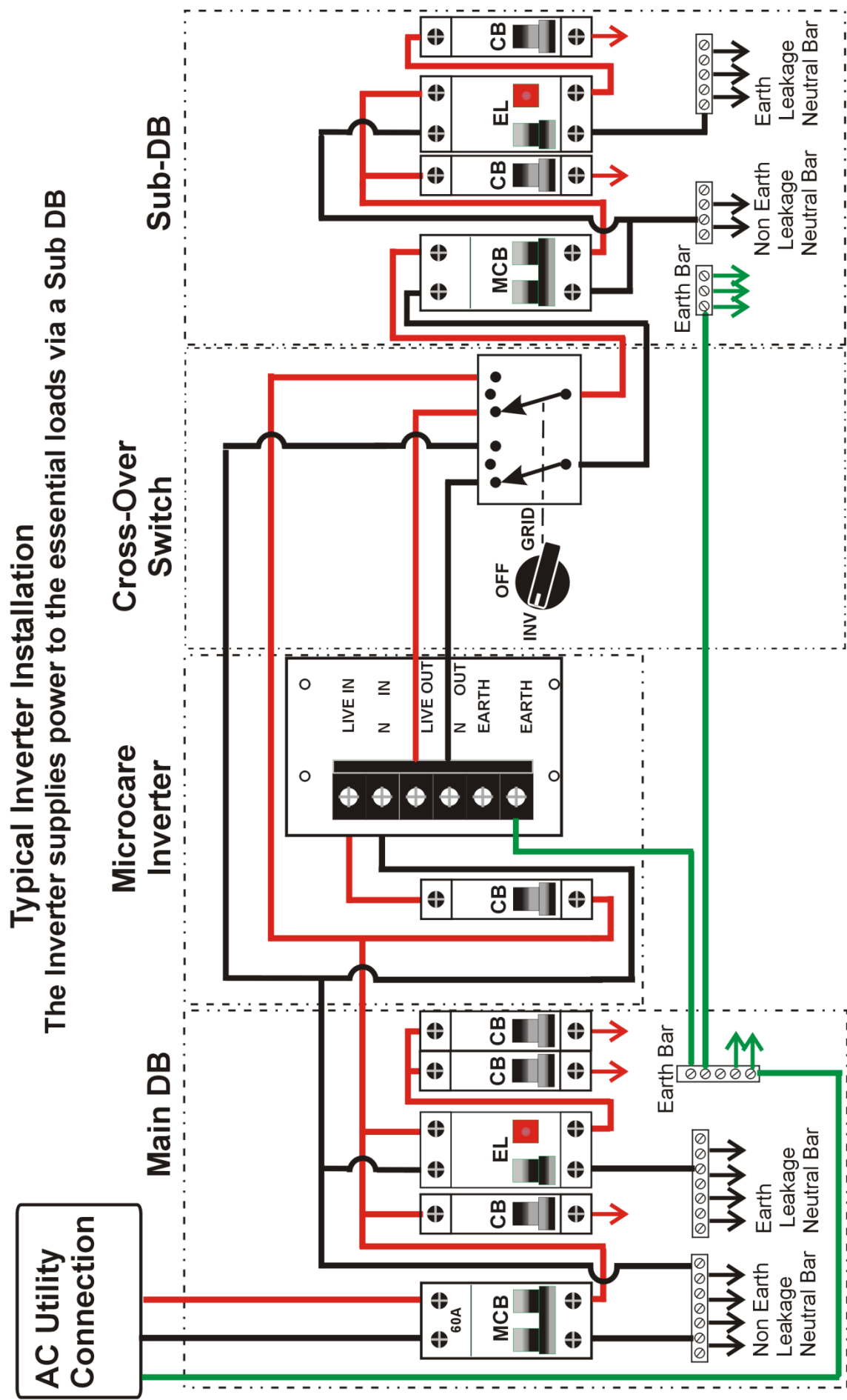


Diagram disclaimer: Connections shown are for illustrative purposes only. This sketch is intended to be used for illustrative purposes only. This sketch is not intended to provide an electrical design.
EL= Earth Leakage, CB = Circuit Breaker, DPI = Double Pole Isolator, MCB = Main Circuit Breaker.
Circuit Breaker, Isolators ratings are not shown, ratings are sized by the size of the inverter and the loads connected.

Figure 6-4: Sample Wiring Diagram

6.7 DC Wiring



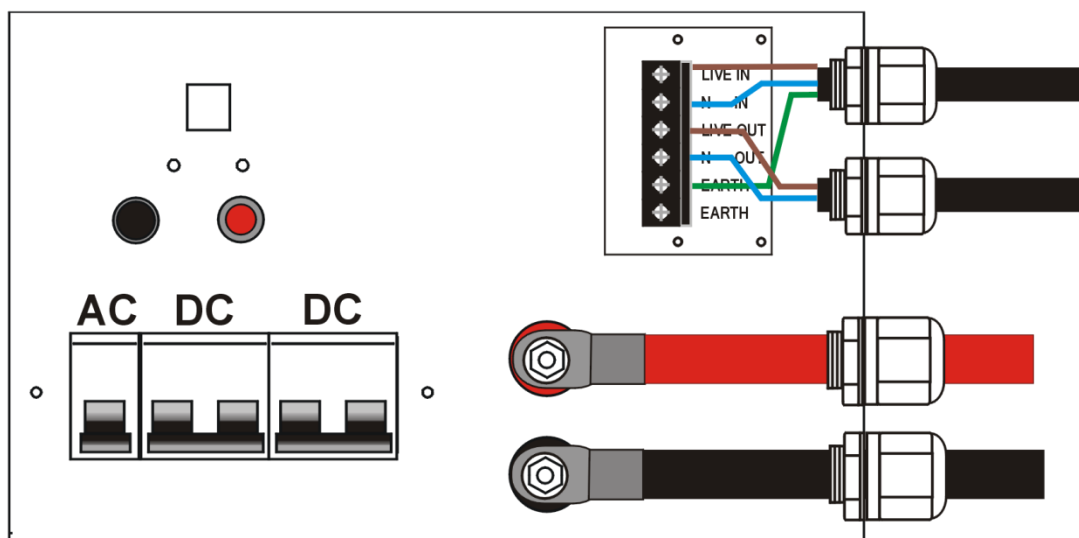
**Warning! The Inverter battery input is not reverse polarity protected.
Reverse polarity will damage the unit!!**

The battery connection leads between the inverter and batteries should be kept to a minimum length.

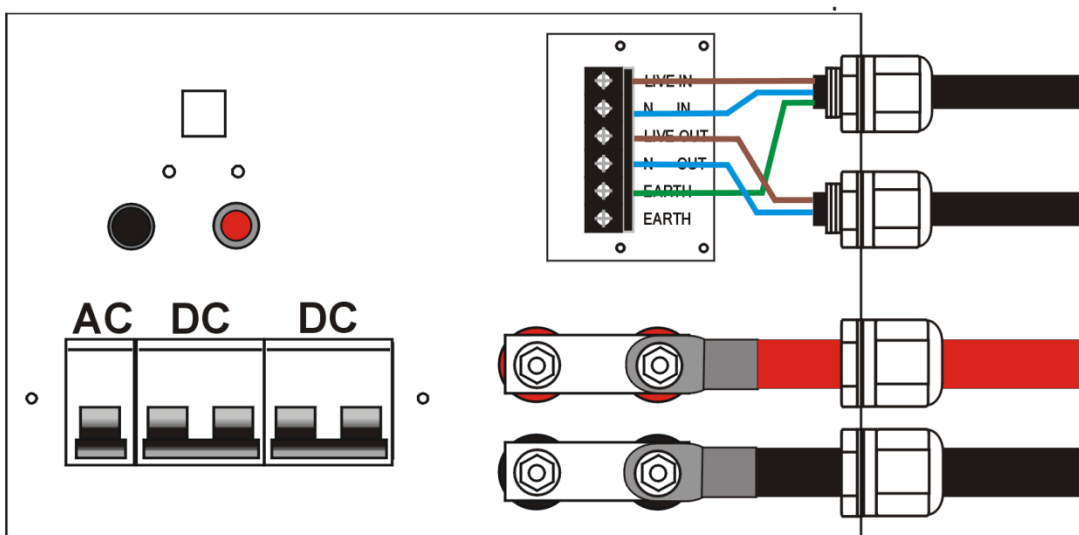
Before connecting the battery leads to the battery/batteries make sure that the batteries are connected according to the correct operating voltage for the model of inverter. eg: 36 VDC, 48 VDC system.

- Turn the DC & AC Battery breakers off.
- Connect the Positive (Red) battery lead to the Positive Inverter terminal.
- Connect the Negative (Black) battery lead to the Negative Inverter terminal.

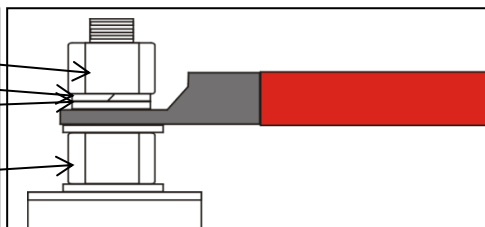
10 kW Inverter DC Wiring Terminals Layout



15 kW Inverter DC Wiring Terminals Layout



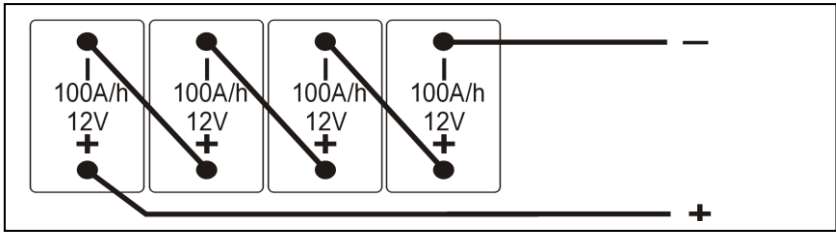
Nut
Split Washer
Flat Washer
Do not Loosen this nut



6.8 Battery Connection Methods

6.8.1 Series Connection

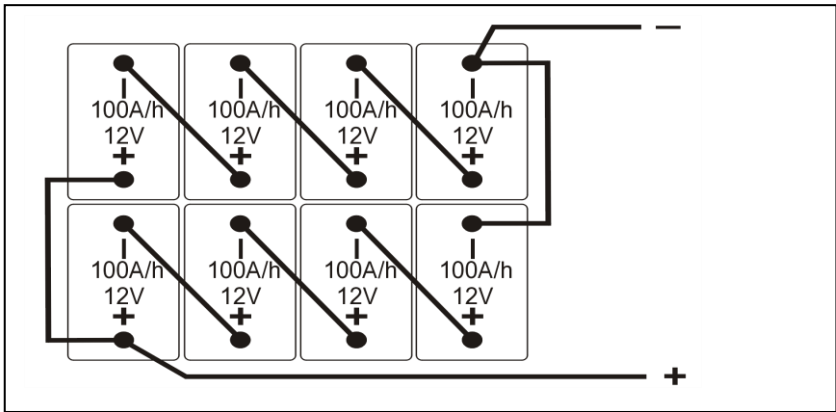
12V + 12V + 12V + 12V = 48V A/h remains at 100 A/h



Series Connection (Voltage increases, amperage stays the same as a single battery)

6.8.2 Series and Parallel Connection

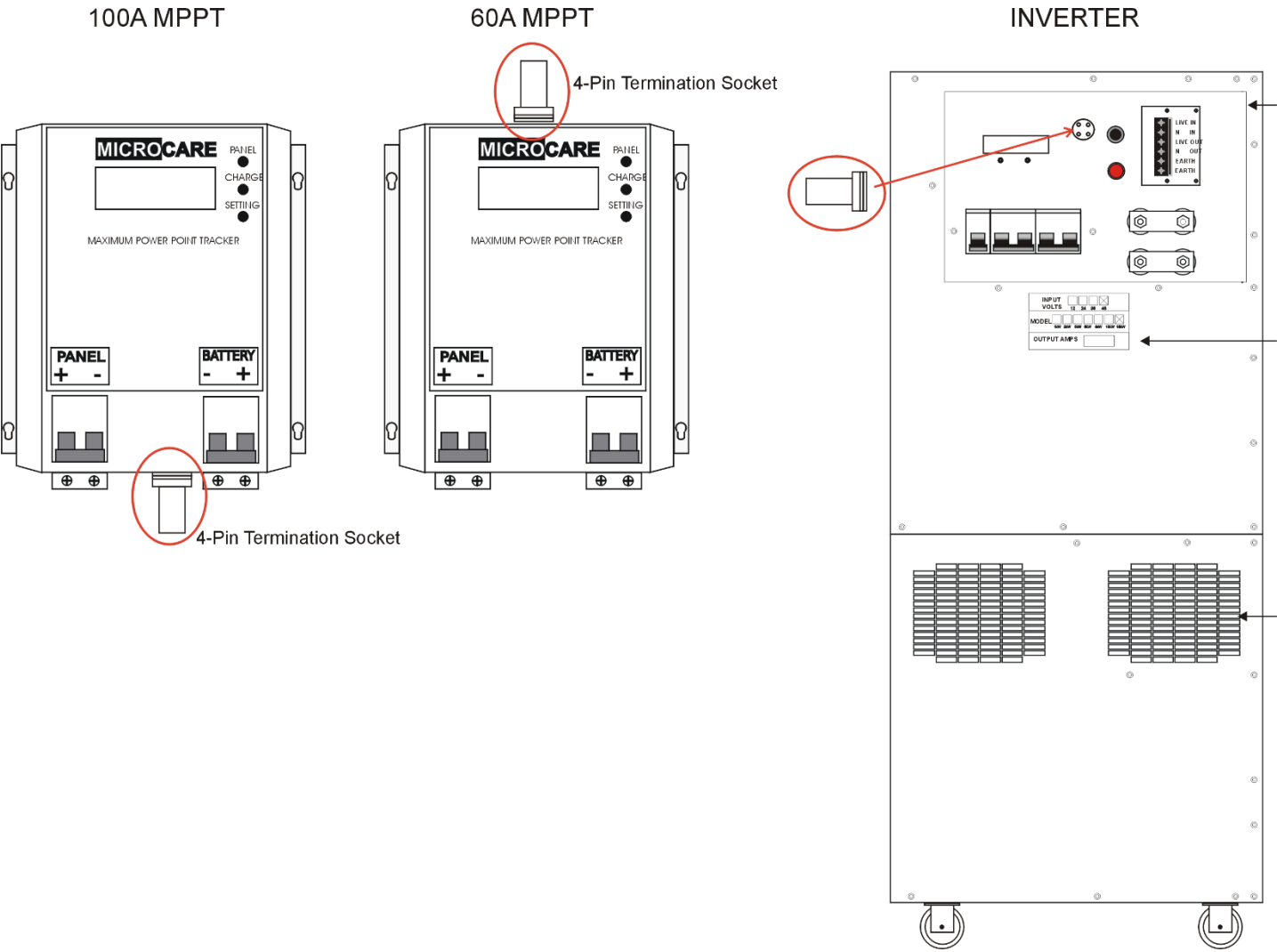
Voltage increases to 48 V A/h increases to 200 A/h



2 Strings of batteries in series, connected in parallel
Series/Parallel Connection (both voltage and amperage increase)

6.9 Termination Sockets

Ensure that the 4pin termination plug is inserted in the MPPT and Inverter.



6.10 Maintenance and service

Caution – Risk of Electric Shock.

Batteries may cause electric shock and have a high short-circuit current.

Please take the precautionary measures specified below and any other measures necessary when working with batteries.

Remove wristwatches, rings and other metal objects.

Use only tools with insulated grips and handles.

Wait a minimum of five minutes after power has been turned OFF before starting an inspection.

Also confirm that the charge light is OFF and that the DC bus voltage has dropped below 25Vdc.

Never touch high voltage terminals in the inverter.

Make sure power to the inverter is disconnected before disassembling the inverter.

Only authorized personnel should perform maintenance, inspection, and replacement operations.

7. INVERTER OPERATION

7.1 Front Panel LCD Display/Keypad and Description

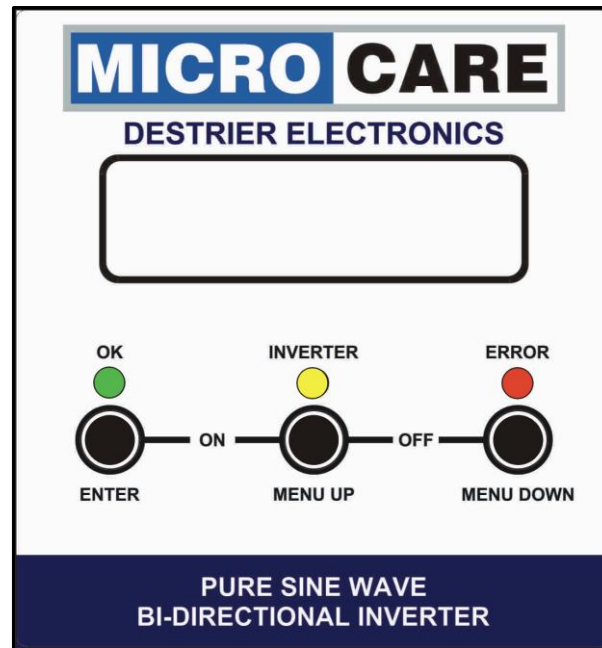


Figure 7-1: LCD Display & Keypad

The front Panel Display/Keypad indicates the Inverter's operational information, including output voltage, battery voltage, output load, internal temperature and is used for programming. Panel Display/Keypad operation explained. For ease of explanation the following symbols will be used to represent the Enter, Menu Up and Menu Down Buttons.

Button Function Description

Symbol	Button Name	Function description
	Enter	Confirms or store DATA, increment or decrement values and to reset alarm conditions.
	Menu Up	Navigates through the list of operational information, parameters and functions.
	Menu Down	Navigates through the list of operational information, parameters and functions.


Press and hold both   turns the inverter "ON".

Press and hold both   turns the inverter "OFF"



7.2 Inverter Status LED's

Indicator	Indicator Name	Description
	On	Led on: Indicates the INVERTER is turned on and operating normally
	Inverter	Led on: Notification that the Inverter is inverting power from DC Power to AC Power
	Error	Led on: Indicates the INVERTER is in a fault condition because of inverter shutdown or over temperature




7.2.1 Inverter ON and Grid Supplying the Load

			
ON	INVERTER	ERROR	

7.2.2 Inverter ON and the Battery Supplying the Load “Inverter Mode”



			
ON	INVERTER	ERROR	

7.2.3 Inverter Displaying WARNING “Battery Low Battery Capacity”

			WARNING!!! LOW
ON	INVERTER	ERROR	Steady “ON”, Green , Yellow and Red LED

Buzzer sounds continuously, Press  to clear the buzzer and warning

7.2.4 Inverter Warning Switched OFF due to Battery LOW/HIGH Battery Voltage

			UPS LOW/HIGH BATTERY
ON	INVERTER	ERROR	Steady “ON”, Yellow and Red LED

Buzzer sounds continuously

7.3 Checks Prior To Start-Up

Ensure the INVERTER is mounted vertically.
Check if the Input and Output cables are secured.
Check if the Battery voltage meets the INVERTER rating.
Ensure that the polarity of the battery connections is correct.

7.4 Start-Up Procedure

Press and hold the RED **PRECHARGE BUTTON** for 6 seconds until the display shows writing, then turn on the **BATTERY CIRCUIT BREAKERS** while holding the RED **PRECHARGE BUTTON** in.

Once the BATTERY CIRCUIT BREAKERS have been turned ON, the RED **PRECHARGE BUTTON** can be released.

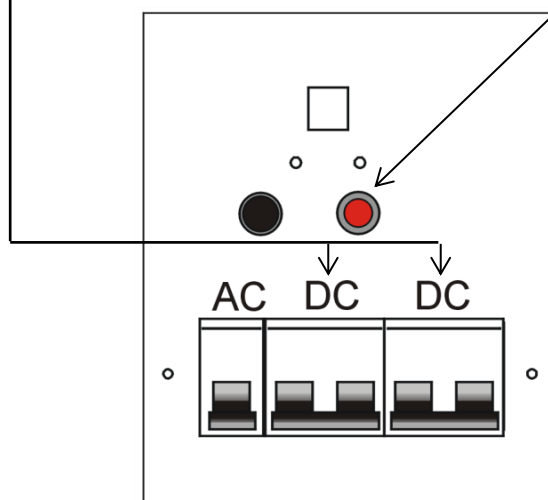


Figure 8-2: Pre-Charge button position

The display will show the following:

**TURNING ON
...PLEASE WAIT...**

The display then changes to

**CALIBRATING
...PLEASE WAIT...**

The display then changes to



**CALIBRATION DONE
PRESS ENTER**

Press the ENTER Button and the display will change to:

**UPS MODE
Inverter Off**

7.5 Switching the Inverter On & Off



7.5.1 Switching the inverter "ON"

Press and hold both  and  buttons for up to 3 seconds.

The UPS will start up and the Green LED will light up to indicate the power is being supplied from the inverter to the load. (Yellow when no mains)



**UPS MODE
Inverter On**

7.5.2 Switching the inverter "OFF"

Press and hold both  and  buttons for up to 3 seconds, the UPS will turn OFF after two beeps.

**UPS MODE
Inverter Off**

8. INVERTER MENU

In either the inverter ON or OFF mode, use the  OR  buttons to view the menu displays on the LCD screen explained below.

8.1 Power rating of the UPS

The load drawn as a % of the rated power is displayed.

UPS MODE	
OUTPUT	= 47%

By turning on a load, the **OUTPUT %** will change to indicate the **LOAD** as a % of the unit being used in KW. Above 5% of load is displayed.

This status menu is displayed when the inverter runs from the grid or in inverter mode.

8.2 Battery Volts and Amps

Battery voltage and the **amps** that the UPS is drawing from the battery when the inverter runs from the battery.

This status menu is only displayed in inverter mode, the Green and Yellow LED is on.

BATT VOLTS	: 54.2
BATT AMPS	: 7.0

8.3 Battery Charge Amps and Volts

This shows the **Charge Amps** that are being put back Into the battery bank from the charging source.

The inverter only charges the batteries when a grid connection is present

This status menu is only displayed when the inverter runs from the grid, the Green LED is on.

BATT VOLTS	: 54.2
CHGR AMPS	: 10.0

8.4 Output Volts and Amps

AC Output voltage and amps that the load is drawing In inverter mode.

This status menu is displayed when the inverter runs in inverter mode, the Green and Yellow Led is on.

INV VOLTS	: 220
INV AMPS	: 7.0

8.5 Grid Volts and Grid Amps

Grid Volts and power draw from the grid power supply:

This status menu is displayed when running from the grid, the Green LED is on

GRID VOLTS	: 227
GRID AMPS	: 10.0

8.6 Temperature

Internal temperature of the inverter.

TEMPERATURE
26.3 °C

8.7 Signal Strength

Control cards in the Inverter have 100% communication.

SIGNAL
STRENGTH

8.8 Serial Number & Software Version

Serial number of the inverter.

Software version of the inverter.

SN: MCxxx7777
FW: VXXXX

The Serial number of the inverter needs to be noted and supplied when requesting any fault support information.

8.9 System Setup

This menu allows the user **TO CHANGE** the system settings

**ENTER
Setup Menu?**

8.10 Battery Setup

This menu allows the user **TO CHANGE** the battery settings

**ENTER
Battery Menu?**

8.11 Log Menu

**ENTER
Log Menu?**

8.12 Exit & Save

This menu allows the user **TO SAVE** all the new setting changes

**SETUP MENU
Exit And Save**

8.13 Restore Factory Settings

This menu allows the user **TO RESTORE** the factory default settings

**SETUP MENU
Restore Factory**

8.14 Exit Do Not Save

This allows the user **NOT TO SAVE** any system settings that were changed

**SETUP MENU
Exit, Do Not Save**

Please Note:

This Inverter is pre-programmed with a set of default values.

These settings might not be correct for your battery type.

Please contact your battery supplier for your battery specifications

“Battery Float Voltage, Boost Voltage, Boost to Float Time “ Absorb Time”
and program the Inverter accordingly.

Sections 9 and 10 Cover the programming of the different parameters.

Set the “Battery Setup Menu” values first and then make changes to the “System Setup Menu”.

9.

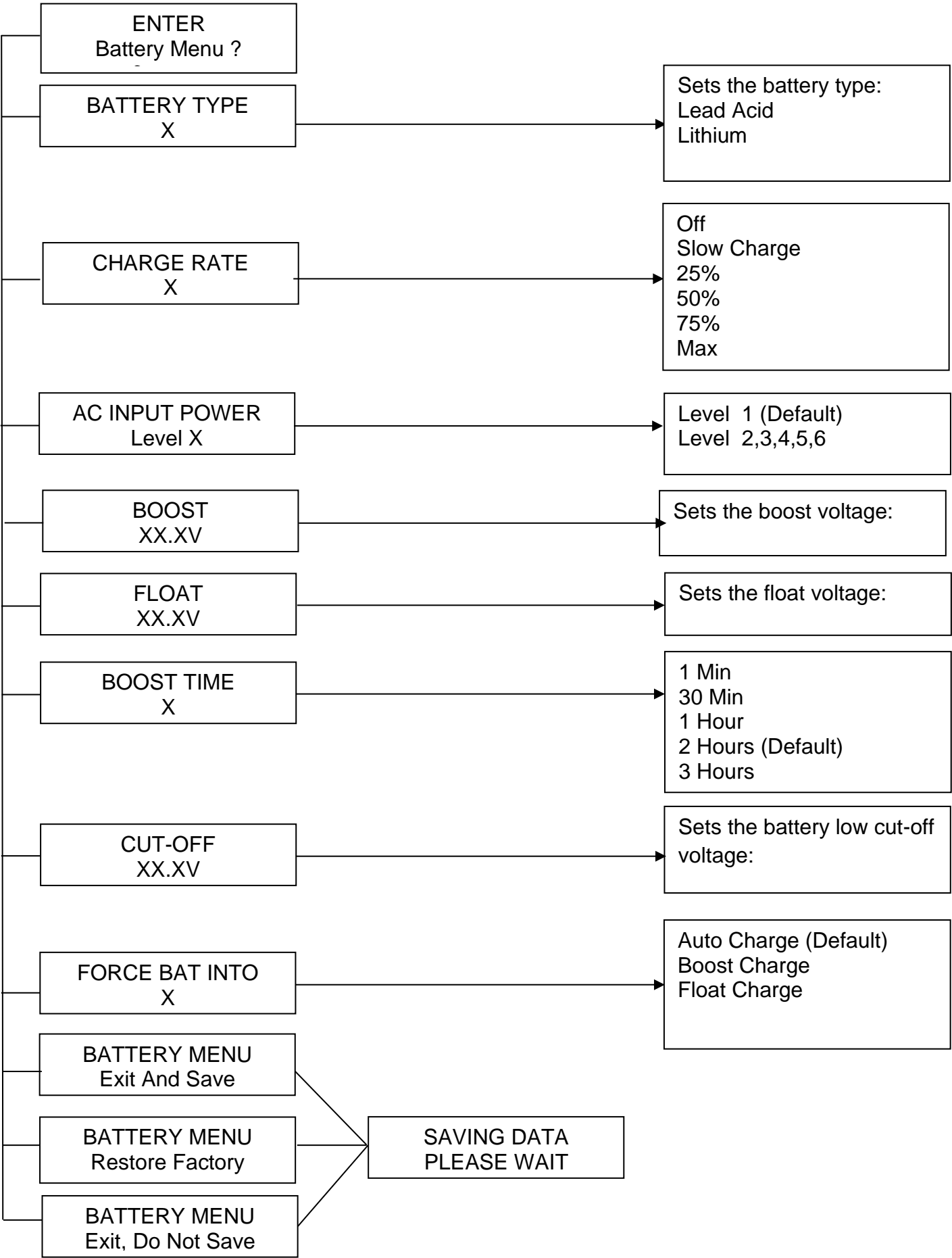
9.1

BATTERY SETUP SETTINGS

Battery Setup Settings - Quick Reference Guide



Menu


Settings



9.2 Battery Setup Procedure

Please consult your battery supplier for the correct battery charging specifications

Press  OR  to select BATTERY Set-Up Menu: →

Press  to access the Battery Setup Menu:

ENTER
Battery Menu?

Press , the menu changes to **Battery Type**

9.3 Battery Type

To change the **BATTERY TYPE** settings, Press 

BATTERY TYPE
X

This allows the user to select the **BATTERY TYPE**.

BATTERY TYPE
Lead Acid

OR

BATTERY TYPE
Lithium

“Please consult your battery supplier for the correct battery charging specifications”

Press , the menu changes to **Battery Charging Rate**

9.4 Battery Charging Rate

To change the **BATTERY CHARGE** settings, Press  :

BATTERY CHARGE
LEVEL (X)

TURNED OFF	-	0% of charge rate as per the list supplied below.
SLOW CHARGE	-	5% of charge rate as per the list supplied below.
25% OF RATED CHR	-	25% of charge rate as per the list supplied below.
50% OF RATED CHR	-	50% of charge rate as per list supplied below. (Default)
75% OF RATED CHR	-	75% of charge rate as per the list supplied below
.MAX CHARGE RATE	-	100% of charge rate as per the list supplied below.

Below is the list of available charge amps for the inverters.

Table 10-1: Battery Setup – **10kW48V** Inverter Battery Charging rates


INVERTER	Charging Rate (A)				
Model	5%	25%	50% - Default	75%	100%
10kW48V	5	25	50	75	100

Table 10-2: Battery Setup – **15kW48V** Inverter Battery Charging rates

INVERTER	Charging Rate (A)				
Model	5%	25%	50% - Default	75%	100%
15kW48V	5	25	50	75	100

Regarding the battery charge level. The level selected will allow the battery charge to the batteries.

- Great care should be taken when charging batteries. Please consult your battery supplier for the optimum battery charging rate for the batteries you have purchased for your installation.
- Also inform your battery supplier of how many batteries you will be connecting in series, parallel or in series and parallel.
- The charging rate will determine the correct setting as in Table 10-1 or 10-2
- Overcharging and undercharging can reduce the life of the batteries.

To change the Menu press , the menu changes to **AC Input Power**

9.5 AC Input Power From Generator

AC INPUT POWER
Level X

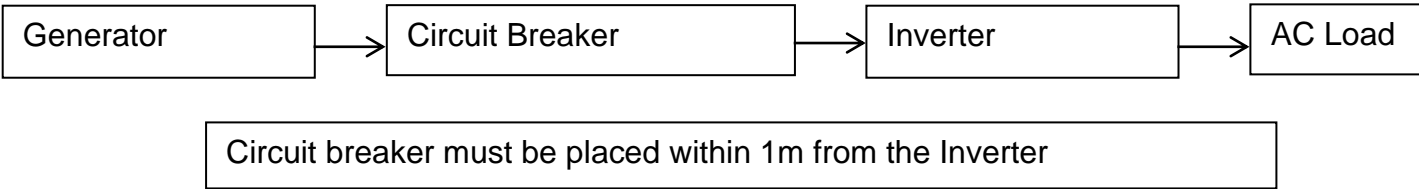
To change the **AC INPUT POWER** settings, Press 

This allows the inverter to extract the maximum amount of power from a generator.
The inverter constantly monitors the Voltage from the generator and then applies maximum charge.

LEVEL 1 is the highest load to the generator while
LEVEL 6 is the minimum.
The factory default LEVEL is 1.
This setting only needs to be adjusted if there is a generator connected.

When a generator is running the generator will supply the AC Load first and the inverter charges the batteries with any excess power created from the generator.

Always install a generator with a circuit breaker or contactor connection
Keep the circuit breaker off until the generator is running fully.
Turn of the circuit breaker before switching off the generator.



To change the Menu press , the menu changes to Battery Boost Voltage

9.6 Battery Boost Voltage

BOOST
XX.XV

To change the **BATTERY BOOST VOLTAGE** settings, Press 

This allows the user to adjust the **BATTERY BOOST** voltage.
The float settings can be changed as follows:

9.6.1 Battery Boost Voltage Settings

Table 10-2A: Battery Setup - Battery Boost Voltage Firmware V21R1

48V System	
51.6	Default – Lithium
52.0	
54.4	
54.8	
55.2	Default – Lead Acid
55.6	
56.8	
57.6	
58.8	
62.0	

“Please consult your battery supplier for the correct battery charging specifications.

9.7 Battery Float Voltage Settings

To change the **BATTERY FLOAT VOLTAGE** settings, Press 

FLOAT
XX.XV

This allows the user to adjust the **BATTERY FLOAT** voltage.
The float settings can be changed as follows:

9.7.1 Battery Float Voltage Settings

Table 10-3a: Battery Setup - Battery Float Voltage Firmware V21R1

48V System	
51.6	Default – Lithium
52.8	
53.6	
54	Default - Lead Acid
55.2	

“Please consult your battery supplier for the correct battery charging specifications.


To change the Menu press , the menu changes to Battery Boost Time

9.8 Battery Boost Time

To change the **BATTERY BOOST TIME** settings, Press 

BATTERY BST
TIME

This allows the user to select the **TIME duration** that the **BOOST VOLTAGE** will be held at before changing to FLOAT.

By Pressing  you can select 1 min, 30min, 1, 2 or 3 hours.

“Please consult your battery supplier for the correct battery charging specifications”

To change the Menu press , the menu changes to Battery Low Off At

9.9 Battery Low Voltage Shut Down

To change the **BATTERY LOW OFF AT** settings, Press 

BATTERY OF AT	LOW 44.0 V
--------------------------	-----------------------

This selects at what **BATTERY LOW VOLTAGE** the inverter will shut down
“Also known as: low battery voltage cut-out”
This function prevents the inverter from draining the batteries completely.
When the DC voltage drops below a specified level, the inverter will stop functioning.
The system display will give a Low Battery Voltage message or Low Battery Voltage error.
This function is intended to protect both the batteries and the inverter’s output.
This voltage is adjustable as below.

By Pressing ENTER you can select to change the Battery Low OFF At voltage.

Table 10-4: Battery Setup
Lead Acid Battery Low Voltage Shutdown

48 V System	
42	
44	
46	Default – Lead Acid
47	
48	

Table 10-5; Battery Setup
Lithium Ion Battery Low Voltage Shutdown

48V System	
46.4	
47.6	
48.4	
49.2	Default – Lithium
50.8	


To change the Menu press , the menu changes to Force Bat Into

9.10 Force Charge


To change the **FORCE BAT INTO** settings, Press 

FORCE AUTO	BAT INTO CHARGE
-----------------------	--------------------------------

It is possible to **FORCE** the charger to go into another charge mode on a temporary basis.
If the charger is in **FLOAT** but you require it to go back into **BOOST** then the next menu will allow this.

Pressing  allows the charge to be changed from, **AUTO** to **BOOST** or **FLOAT**.

Pressing  will give you 3 options to **SAVE** the changed data.

This will give you the options of saving the changes that have been made. Press  at the correct **SAVE** menu.

**BATTERY MENU
Exit And Save**

OR

**BATTERY MENU
Restore Factory**

OR

**BATTERY MENU
Exit, Do Not Save**

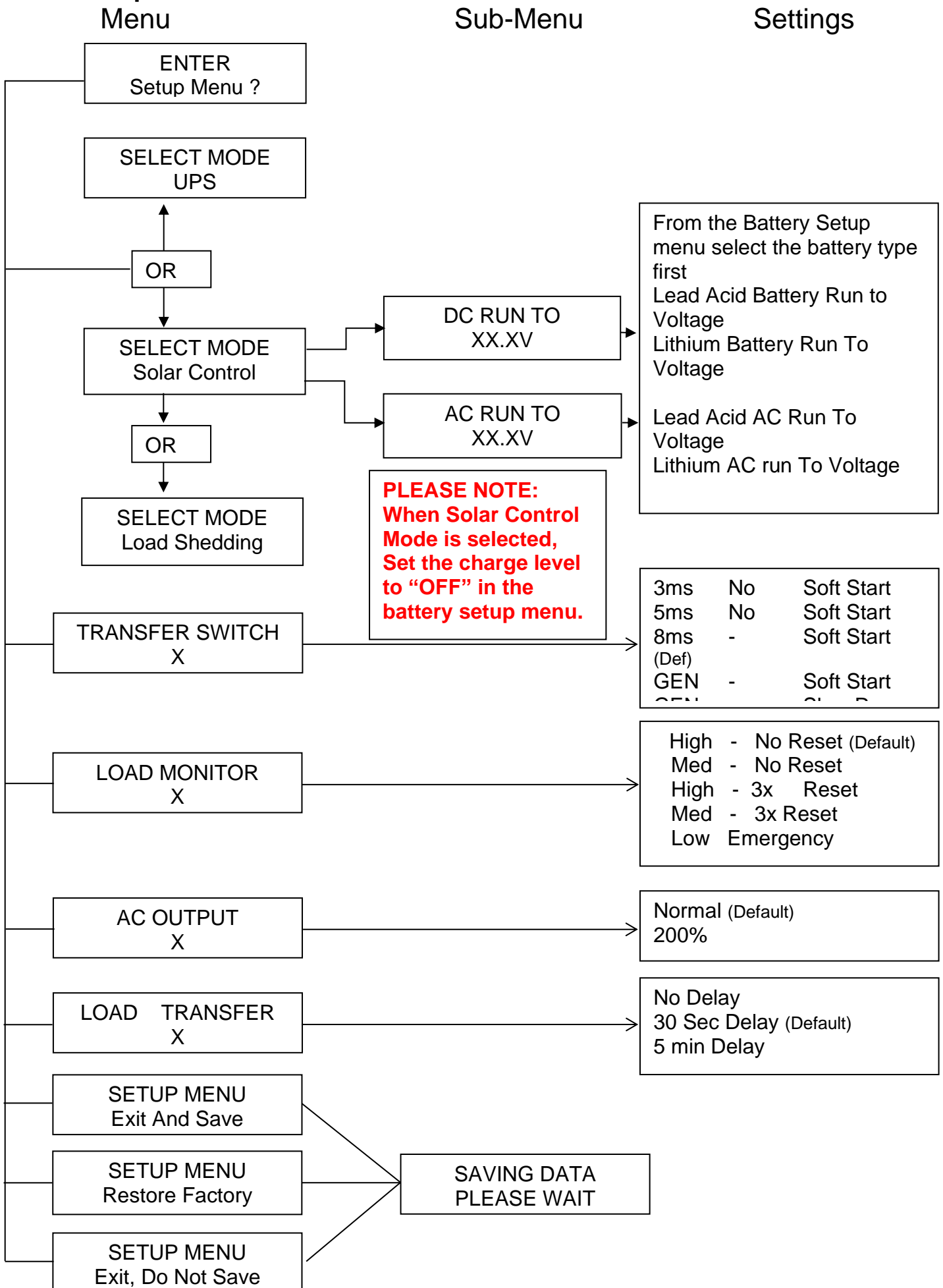
**SAVING DATA
PLEASE WAIT**

If the changes to the settings need to be **saved** Press **ENTER**,
When the enter button is pressed then the inverter will show:

If no entry is made for 1 minute the display will return to the main menu and the back light will turn off

10. SETUP MENU SETTINGS


10.1 Setup Menu - Quick Reference Guide




10.2 Setup Menu Settings

Press  OR  until the **ENTER SETUP MENU** appears

**ENTER
Setup Menu ?**

Press  to enter the **SETUP** menu.

To menu changes to Normal Sense

By Pressing  you can select whether the inverter runs in NORMAL SENSE or SOLAR CONTROL mode

10.3 Normal Sense

**SELECT MODE
UPS**

When to select Normal Sense?


UPS application – “The load is connected to the Grid most of the time”

- The grid “ESKOM” is the primary energy source and the system switches to inverter mode when disconnected from the grid eg: “load shedding”.
- As soon the Grid is restored, the load re-connects to the GRID.
- The batteries will only charge when the Grid is present.

OR

Off-Grid application – “No Grid connection is available”

- The battery bank is the primary energy source and the inverter “**IS NOT**” connected to the grid.
- Renewable energy is used to charge the batteries.
- A generator can be connected to supply the system when needed.

If normal sense is required, press , the menu changes to **Transfer Switch Time, section 11.7**

If Solar Control Mode is required press , the menu changes to **Solar Control Mode**

10.4 Solar Control Mode

**SELECT MODE
Solar Control**

SOLAR CONTROL MODE EXPLAINED

When to select Solar Control Mode?

- The batteries are the primary energy source and the inverter “**IS**” connected to the grid.
“Grid assisted solar power system”
- The system uses renewable energy to charge the batteries.
- If the system is correctly sized the inverter will run mostly in inverter mode and will only connect to the grid when the batteries are discharged to a set level.
- The system will run from the batteries for as long as the batteries can be sustained.
- When the battery voltage reaches the set “Battery Run To Voltage”, the inverter connects the load to the grid.
- When the battery reaches the set “AC Run To” voltage, the inverter transfers back to inverter mode.
- The inverter charger should be switched off in order for the battery bank to be effectively charged from the renewable energy source.

For Solar Control Mode the following setting must also be changed from the battery setup menu:


Refer to section 10.4. Charging Rate

Battery Charging Rate
TURNED OFF - 0% of charge rate

**CHARGE RATE
Off**



Please note: Do not connect a generator when operating in the solar control mode.

To change the Menu, press , the menu changes to: Batt Run To

10.5 Load Shedding Mode

When to select the “Load Shedding Mode”

When load shedding is anticipated.



SELECT MODE
Load Shedding

Explanation:



Selecting this mode ensures that the load is supplied from the Grid and that Battery Power is reserved for load shedding.

The load Shed Menu can also be selected from the Main Display Screen.

How to select Load Shed Mode.

Press and hold the  button for 2 seconds then press the  button to switch to “Load Shedding Mode”.

How to revert back to Solar Control Mode.

Press and hold the  button for 2 seconds then press the  button to switch to “Solar Control Mode”.

NOTE: When in Load Shedding Mode, the inverter battery charger is turned off and locked.

10.6 Battery Run To Voltage

“This setting only applies for Solar Control Mode”

DC RUN TO
XX.XV

This allows the user to set the level the battery discharges to before switching to mains power.

Press  to change the Battery “Run To Voltage”.

Battery Run To settings can be changed as follows:

Table 11-1:
Lead Acid Battery Run to Voltage settings

48V System	
46	
47	
47.5	
48	Default Lead Acid
48.5	
49	
49.5	

Table 11-2:
Lithium Battery Run to Voltage settings

48V System	
46.8	
47.6	
48.0	
48.8	
49.6	
50.3	
51	Default Lithium


To change the Menu, press , the menu changes to AC Run To

10.7 AC Run To Voltage

"This setting only applies for Solar Control Mode"

**AC RUN TO
XX.XV**

This allows the user to set the level the solar regulator will charge the battery to before the inverter switches back to battery power.

Press  to change the AC Run To Voltage,

The **AC Run To** settings can be changed as follows:

AC Run to Settings

Table 10-3:

Lead Acid AC Run to Voltage settings

48 V System	
50	
51	
52	
52.5	
53	
53.5	Default Lead Acid
54	

Table 11-4:

Lithium AC Run to Voltage Settings

48V System	
50.8	
51.4	Default Lithium
51.8	
52.6	
53.4	
53.8	
55	

To change the Menu, press , the menu changes to Transfer Switch Time

10.8 Transfer Switch Time

To change the **Transfer Switch Time** settings press .

**TRANSFER SWITCH
X**

The inverter uses a transfer relay to switch between the Grid and Inverter Mode.

The transfer time can be changed. In most applications the default vale will suffice.

For applications where Servers, Desktop Computers, DSTV are connected to the inverter, change the transfer time to "5mS NO SOFTSTART".

The Menu settings can be changed as follows

Table 11-5: System Setup - Transfer Switch time settings

3mS NO SOFTSTART	3 milli second transfer time and will restart load instantly - with mains fail prediction.
5mS NO SOFTSTART	5 milli second transfer time and will restart load instantly - with mains fail prediction.
8mS + SOFTSTART*	(Default) 8 milli second transfer time and will ramp the RMS voltage up in less than 1 second - with mains fail prediction. Default Setting
GEN + SOFTSTART	8 milli second transfer time and will ramp the RMS voltage up in less than 1 second - with no mains fail prediction.
GEN + SLOW RAMP	8 milli second transfer time and will ramp the RMS voltage up in 3 seconds - with no mains fail prediction.

To change the Menu, press , the menu changes to Load Monitoring

10.9 Load Monitoring

To change the **Load Monitoring** settings press .

LOAD MONITOR
X

The sensitivity of the **SHORT CIRCUIT TRIP** may be changed by 5 different settings.

The settings in Table 4 below will determine how the inverter reacts to a short circuit or overload.

- The RED LED lights up and the internal buzzer sounds.
- The inverter switches off if this overload or short circuit persists.
- You can restart the inverter after the overload or short circuit is removed.
- Pressing the Enter button clears the trip, buzzer and the RED Led switches off.
- To start the inverter Press and hold both the **Enter-key** and the **MENU UP-key** for up to 3 seconds.

The Menu settings can be changed as follows

Table 11-6: System Setup – Load monitoring settings

HIGH NO RESET*	High sensitivity to short circuits - will trip the inverter after a short delay time period. Default Setting.
MED NO RESET	Medium sensitivity to short circuits - will trip the inverter after a medium delay time period.
HIGH 3x RESET	High sensitivity to short circuits - will trip the inverter after a short delay time period, with soft start to prevent in rush current.
MED 3x RESET	Medium sensitivity to short circuits - will trip the inverter after a short delay time period, with soft start to prevent in rush current.
LOW EMERGENCY	Low sensitivity to short circuits - will trip the inverter after a long delay time period. Only to be Used in Emergency Situations.

To change the Menu press , the menu changes to Inverter Output Power

10.10 Inverter Output Power

To change the **Inverter Output Power** settings press .

AC OUTPUT
X

For UPS operation, either select AC Output = NOR or AC Output =200%

For Off-Grid operation, select AC Output = NOR.

For Grid Assisted operation, select AC Output = NOR or AC Output = 200%.

10.10.1 AC Output = Normal

- When the Grid supply is available, the inverter allows the GRID to supply the load at the rated inverter power.
- When the Grid Supply is not available, the INVERTER supplies the load at the rated inverter power.
- A 5Kw Inverter can only supply 5kw of Power. If the load exceeds the rated inverter power, the inverter shuts down due to overload

10.10.2 AC Output = 200%

Selecting AC output = 200% for UPS operation

- When the Grid supply is available, the inverter allows the GRID to supply a load up to 200% for a short period of the rated power inverter power.
- Eg: A 10Kw Inverter allows the GRID to supply 10kW of power to the load.

- If the grid fails and the load is exceeding 200% of the rated inverter power, the inverter will shut down due to overload

Selecting AC output = 200% for Grid Assisted operation

When the Grid supply is available in “Solar Control Mode”, the inverter allows the Grid to supply a load up to 200% of the rated inverter power for a short period..

When the load is powered from the batteries “Inverter mode” and the load exceeds 100% of the rated inverter power, the inverter will re-connect the load to the GRID.

The load stays connected to the GRID.

The inverter switches back to Inverter Mode when the load is reduced to 80% of the rated inverter power.

To change the Menu, press , the menu changes to Load Transfer

10.11 Load Transfer Time

To change the **Load Transfer Time** settings press .

**LOAD TRANSFER
X**

This setting applies when the system is connected to the grid.

- When the grid connection is lost eg: Load shedding or any other unforeseen grid loss, the load will be connected to the battery powered inverter.
- When the grid is restored the inverter delays the connection from battery to the grid.
- Transfer time can be set as in Table 11-7.

The settings available are as follows:

Table 11-7: System Setup - Load Transfer Time

NO DELAY*	As soon as Grid power is available the Inverter will synchronise and switch from battery to Grid. Default Setting.
DELAY = 30Sec	30 seconds after Grid power is available the Inverter will synchronise and switch from battery to Grid.
DELAY = 5 Min	5 minutes after Grid power is available the Inverter will synchronise and switch from battery to Grid.

To change the menu Press , the menu changes to the following

10.12 Save/Restore/ Do Not Save Menu

Pressing  will give you 3 options to **SAVE** the changed data. The display will show:

**SETUP MENU
Exit And Save**

OR

**SETUP MENU
Restore Factory**

OR

**SETUP MENU
Exit, Do Not Save**

If the changes to the settings need to be **saved** Press **ENTER**,

When  is pressed then the inverter will show:

**SAVING DATA
PLEASE WAIT**

If no entry is made for 1 minute the display will return to the main menu and the back light will turn off.

11. LOGS

Press  OR  until the **ENTER LOG MENU** appears

Press  to enter the **LOG** menu.

ENTER LOG	MENU
----------------------	-------------

11.1 Battery Voltages

Displays the max (Vm) and min (Vn) DC battery voltage.

Press  to view the next log.

Battery Voltages	
Vm: 39.6	Vn: 37.6

11.2 Battery Currents

I – Displays the Max Battery Discharge Current.

I + Displays the Max Battery Charge Current.

Press  to view the next log.

Battery Currents	
I – 25.3 I + 7.8	

11.3 Grid Voltage


Displays the max (Vm) and min (Vn) Grid AC voltage.

Press  to view the next log.

Grid	Voltage
Vm: 245	Vn: 220

11.4 Grid Current

Displays the max (Im) and min (In) AC Load Current.

Press  to view the next log.

Grid	Currents
Im: 4.0	In: 3.5

11.5 UPS Voltages


Displays the max (Vm) and Min (Vn) UPS Voltage.

Press  to view the next log.

UPS	Voltages
Vm: 231	Vn: 228

11.6 UPS Current

Displays the Inverter Max (Im) and Min (In) AC Load Current.

Press  to view the next log.

UPS	Currents
Im: 52.5	In: 58.7

11.7 Thermal Log

Press  to view the next log.

Thermal Log	
24.4	deg/celMax

11.8 Total Run Time

Press  to view the next log.

Total Run Time	
0D	0H

11.9 Run Time On Battery

Press  to view the next log.


Run	Time on Batt
0D	0H 4M

11.10 Time on Battery

Press  to view the next log.

Time on Batt (R)	
0D	0H 4M

11.11 No of Overloads

Press  to view the next log

No of Overloads	
0 counts	

11.12 No of Short Circuits

Displays the Short Circuit counts.

Press  to view the next log.

No of Short Circ
0 counts

11.13 Forced Shutdown Counts

Displays the Forced Shutdown counts due to

Forced Shutdown
0 counts

11.14 Power Failure Counts

To change the Inverter Output Power settings press.

Press  to view the next log

Power Failure (R)
4 counts


11.15 Reset a few logs

To change the Inverter Output Power settings press.

Press  to view the next log.

Reset (R)
Recorded Logs?


11.16 Exit Recorded Log

To Exit the recorder log screen press .

Exit
Recorded Log ?

11.17 Delete All Logs

Press  OR  until the ENTER LOG MENU appears

Push and hold  until the buzzer sounds.

ENTER LOG
MENU ?

12. TROUBLESHOOTING

Symptom	Possible Cause	Remedy
Inverter not charging	The unit is inverting or not connected to the grid	Connect inverter input to AC Source
Inverter not charging	The unit is connected to the grid but is in a mode or stage that does not use the charger such as Solar Control mode	
Inverter not charging	The unit is connected to the grid but the charger has been turned off	Enable charging in the Battery setup menu.
Inverter not switching on	Batteries are discharged to a low level	Recharge the batteries
Inverter not switching on	Battery breaker turned off	Turn the breaker on
Inverter inverting all the time In UPS mode	Grid disconnected	
Inverter fan runs all the time	Charging above 50% of rated charge rate or the Load is above 60% of rated	Switch off some loads
	Inverter capacity	
Inverter Inverting all the time	Solar Control mode, battery in limits	
Inverter not switching on	Fuse blown	Replace fuse

13. SPECIFICATIONS OF INVERTERS

13.1 48 V Inverter Specifications

Model		10kW48V	15kW48V
Capacity	Watt	10000	15000
DC Input	Nominal Voltage	48 VDC	48 VDC
	Acceptable Voltage Range	40-60 VDC	40-60 VDC
	Maxi Input Amps	250A	375A
	Standby Power	100W	150W
AC Output	Voltage	230 VAC	
	Amps	70A (115A @ 200% Output)	90A (160A @ 200% Output)
	Voltage Regulation	< 3 % RMS for entire battery voltage range	
	Frequency	50Hz	
	Frequency Regulation	± 0.1Hz	
	Power Factor	1	
	Wave Form	Pure Sine Wave	
	Efficiency	90%	
	Hardware Protection	Circuit Breaker	
	Overload Protection	Programmable Overload levels and Auto Retry	
Charger	Float Voltage	Refer to Section 9.7	
	Boost Voltage	Refer to Section 9.6	
	Boost Time	Selectable 1, 2, 3 hours	
	Maximum Current	100A	100A
	Generation Mode	Depending on the generator power available.	

14. MICROCORE LIMITED CARRY- IN WARRANTY

The following Warranty is conditional that the relevant Microcare product has been installed by an approved Microcare Installer, the required paperwork has been submitted to Microcare and that the Client is in receipt of our acknowledgement of this. Our products are innovative pieces of equipment and incorrect installation has been the overriding cause of failure in the past. No exception to this condition will be considered.

Microcare warrants its full range of products against defects in workmanship and materials, fair wear and tear accepted, for a period of three years (Inverters manufactured from the 1st July 2020 onwards carry a five year warranty) from the date of collection for all equipment and is based on a carry-in basis. Where the installation of the product makes it impractical to carry-in to our workshops, Microcare reserves the right to charge for travel time and kilometres travelled to and from the site where the product is installed.

During this warranty period, Microcare will, at its own discretion, repair or replace the defective product free of charge. This warranty will be considered void if the unit has suffered any physical damage or alteration, either internally or externally, and does not cover damages arising from improper use such as, but not exclusive to:

- Reverse of battery polarity.
- Inadequate or incorrect connection of the product and/or of its accessories.
- Mechanical shock or deformation.
- Contact with liquid or oxidation by condensation.
- Use in an inappropriate environment (dust, corrosive vapour, humidity, high temperature, biological infestation)
- Breakage or damage due to lightning, surges, spikes or other electrical events.
- Connection terminals and screws destroyed or other damage such as overheating due to insufficient tightening of terminals.
- When considering any electronic breakage except due to lightning, reverse polarity, over-voltage, etc. the state of the internal control circuitry determines the warranty.

This warranty will not apply where the product has been misused, neglected, improperly installed, or repaired by anyone else than Microcare. In order to qualify for the warranty, the product must not be disassembled or modified. Repair or replacement are our sole remedies and Microcare shall not be liable for damages, whether direct, incidental, special, or consequential, even caused by negligence or fault. Microcare owns all parts removed from repaired products. Microcare uses new or re-conditioned parts made by various manufacturers in performing warranty repairs and building replacement products. Microcare repairs or replaces a part of a product; its warranty term is not extended. Removal of serial numbers may void the warranty.

All remedies and the measure for damages are limited to the above. Microcare shall in no event be liable for consequential, incidental, contingent or special damages, even if having been advised of the probability of such damages. Any and all other warranties expressed or implied arising by law, course of dealing, course of performance, usage of trade or otherwise, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited in duration to a period of three years (five years for Inverters manufactured from the 1st July 2020 onwards) from the date of purchase.

Life Support Policy

As a general policy, Microcare does not recommend the use of any of its products in life support applications where failure or malfunction of the Microcare product can be reasonably expected to cause failure of the life support device or to significantly affect its safety or effectiveness. Microcare does not recommend the use of any of its products in direct patient care. Microcare will not knowingly sell its products for use in such applications unless it receives in writing assurances satisfactory to Microcare that the risks of injury or damage have been minimised, the customer assumes all such risks, and the Liability of Microcare is adequately protected under the circumstances.

Caution

While all care is taken by us to dispatch goods with adequate packaging, Microcare is not responsible for any damaged caused to products after they have left our premises. Semi-sealed batteries have to be transported

upright and must not be put on their side. Please ensure that your transport company or delivery team is aware of the sensitivity of the products they are collecting.

Goods return policy

The following terms apply to returns of items purchased from Microcare, and we require the following information:

1. Details of the item(s) you would like to return.
2. Our invoice number.
3. The reason for the return.
4. Microcare must be notified within 7 days of your intention to return the goods which were purchased.
5. All items returned will be inspected prior to refund. If our technicians are not immediately available, the goods will have to be left with us until such time as a technician is available to check the items.
6. Proof of purchase is required for all returns.
7. The price paid by the customer is the price on which the refund is based.
8. Items purchased can be returned for a refund, replacement or exchange, provided proof of purchase is provided and subject to all other conditions as set down here.
9. All returns may be subject to an administration and handling fee of 10% of purchase price plus VAT.
10. Returns are based on a carry-in basis.
11. Returns will be refused in the following circumstances:
 - a. Where an item has been tampered with, altered or damaged in any way, or
 - b. Where a return is deemed unreasonable, this will be referred to management.

Severability

If a part of the terms and conditions set out above is held invalid, void, or unenforceable due to any particular national or international legislation, it shall not affect other parts of the terms and conditions remaining.

15. REGISTRATION OF MY MICROCARE PRODUCT

Product Serial Number:

Product Description:

Date Purchased

Where was the Inverter Purchased?

Company Name

Contact Person

Contact Number

E-mail Address

Installation Company Information:

Company Name

Contact Person

Contact Number

E-mail Address

Details of Product Owner

Name & Surname

Address

City & Province

Contact Number

E-mail Address

Date Installed

Microcare: 15 Swartkops Str, Norh End, Port Elizabeth
P.O.Box 7227, Newton Park, 6055
Tel: 041 453 5761, Fax: 041 – 453 5763
Technical Support e-mail: support@microcare.co.za
Website: www.microcare.co.za

Registration by fax: 041 – 453 5763

Registration by e-mail: support@microcare.co.za

Online Registration: www.microcare.co.za/register-my-product