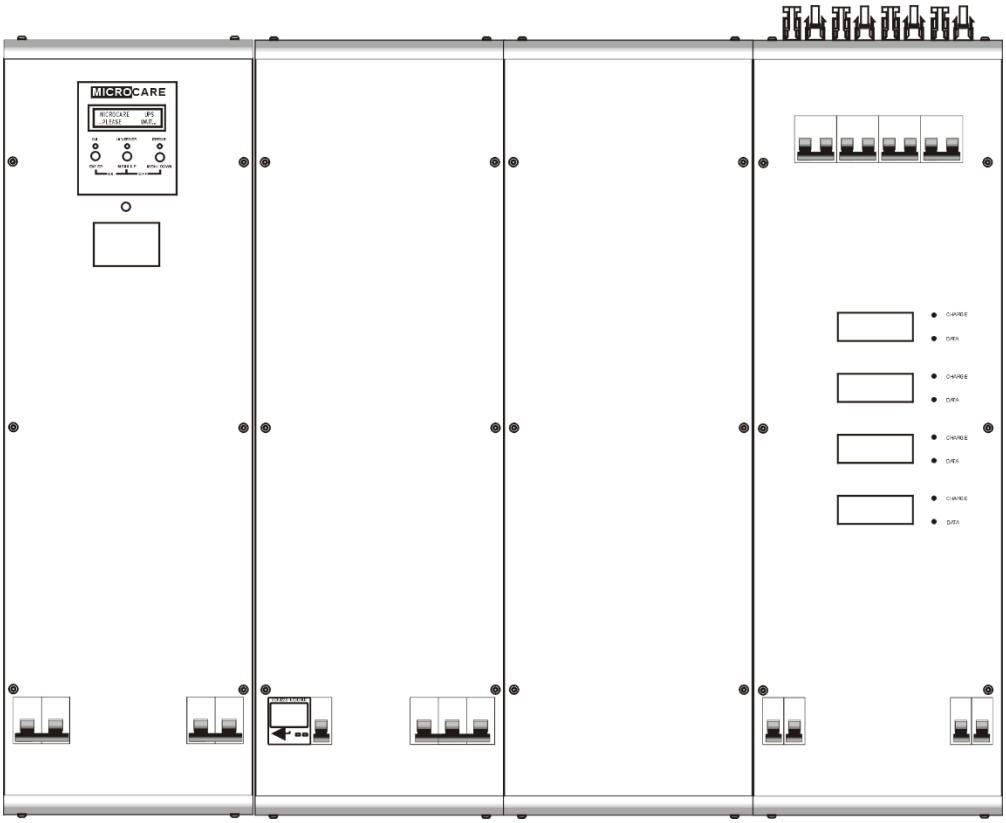
Mini-Grid 30kW 3PH

Installation Manual



The installation must be followed as described in the manual.

Manual Version: Mini-Grid-30kW-3PH-2021-1

Table of Contents

Unpacking and Inspection

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

Qty	Description	Qty Received

Please Note:

This Mini-Grid 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 Control Unit accordingly.

Glossary of Terms

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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 Mini-Grid's 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 system 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 Mini-Grid should be installed indoors, in a ventilated and dry area.
- The mounting surface should be able to support the weight of the Mini-Grid.
- Mount the units vertically.
- Do not install the Mini-Grid on a rugged or inclined surface.
- Do not install the Mini-Grid near water or in a damp environment.
- Do not install the Mini-Grid 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 Mini-Grid.
- Do not expose the Mini-Grid to any corrosive gasses.
- Install the Mini-Grid away from any explosive gasses.
- Ambient temperature: 0°C – 40°C
- The system must be used with a battery supply of nominal voltage that matches the Mini-Grid.
- Sketches are intended for illustrative purposes only and are not intended to provide an electrical design.
- Do not disconnect the batteries while the Mini-Grid is switched on.
- When shutting down the system, disconnect the load first, then disconnect the Grid and then power down the Mini-Grid as described in the manual.

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.

⚠ WARNING

High AC voltage present and capable of causing severe injury.

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2. INTRODUCTION

2.1 General Description

Microcare has developed and designed a Modular Mini-Grid Solution. This locally manufactured product is the perfect solution for your energy requirements.

This unique solution is rated in kW not KVA for maximum power, giving all the advantages of a parallel system (redundancy, being modular) without any of the disadvantages of a traditional parallel system (complicated installation, design, programming, unbalanced systems, slow changeover, load distribution throughout the Inverters, difficult DC wiring).

Advantages include:

- Easy and flexible Solar PV Integration (AC coupling, DC coupling or both are possible).
- With the addition of an Energy Management System both DC & AC can be supported at the same time.
- No de-rating for temperature.
- Easily scalable.
- No reprogramming or reconfiguration in case of individual inverter block failure.
- The inverter can continue to run even after multiple module failures without the need to shut down.
- Fastest changeover possible.
- 100% phase unbalance is possible.
- HV MPPT per string.
- Connection on same DC bus, built-in surge, fuse & isolator.

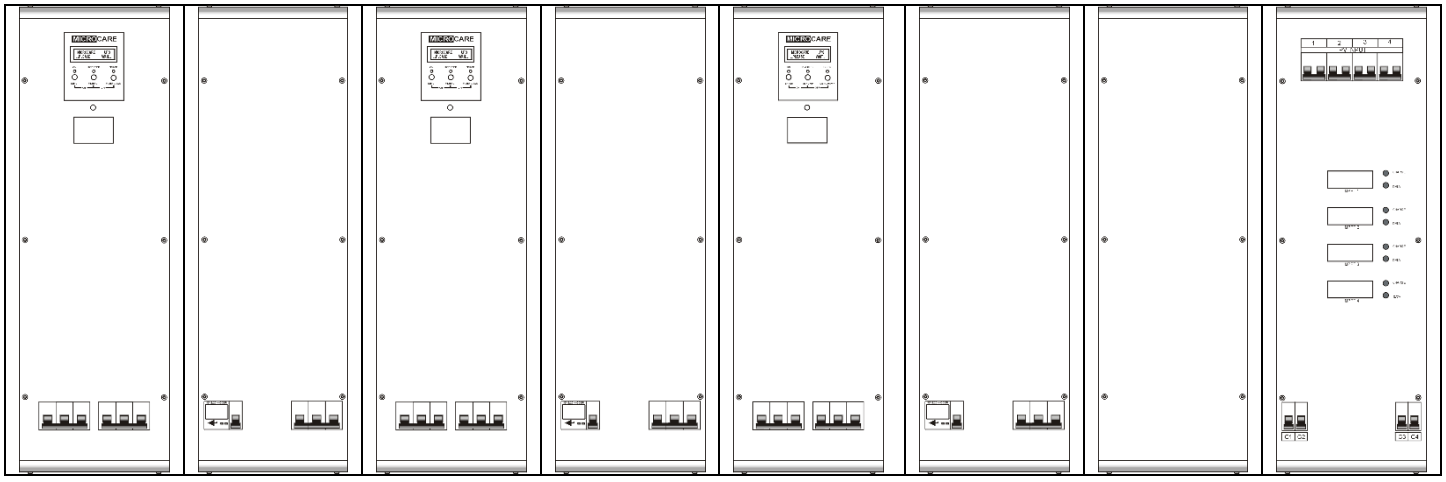
2.2 Key Features.

- 5kW Output power per Inverter.
- High surge capacity for motor start.
- Timed overload capacity with auto shutdown.
- 3-Attempt auto restart with short circuit protection.
- Built-in, high-rate, two-stage battery charger.
- Minimum local service turnaround time.
- Fan cooling for optimum performance and component longevity.
- Audible buzzer indicating faults, overload and status.
- Inverter Output power is de-rated at high ambient temperature.

3. MINI-GRID OVERVIEW

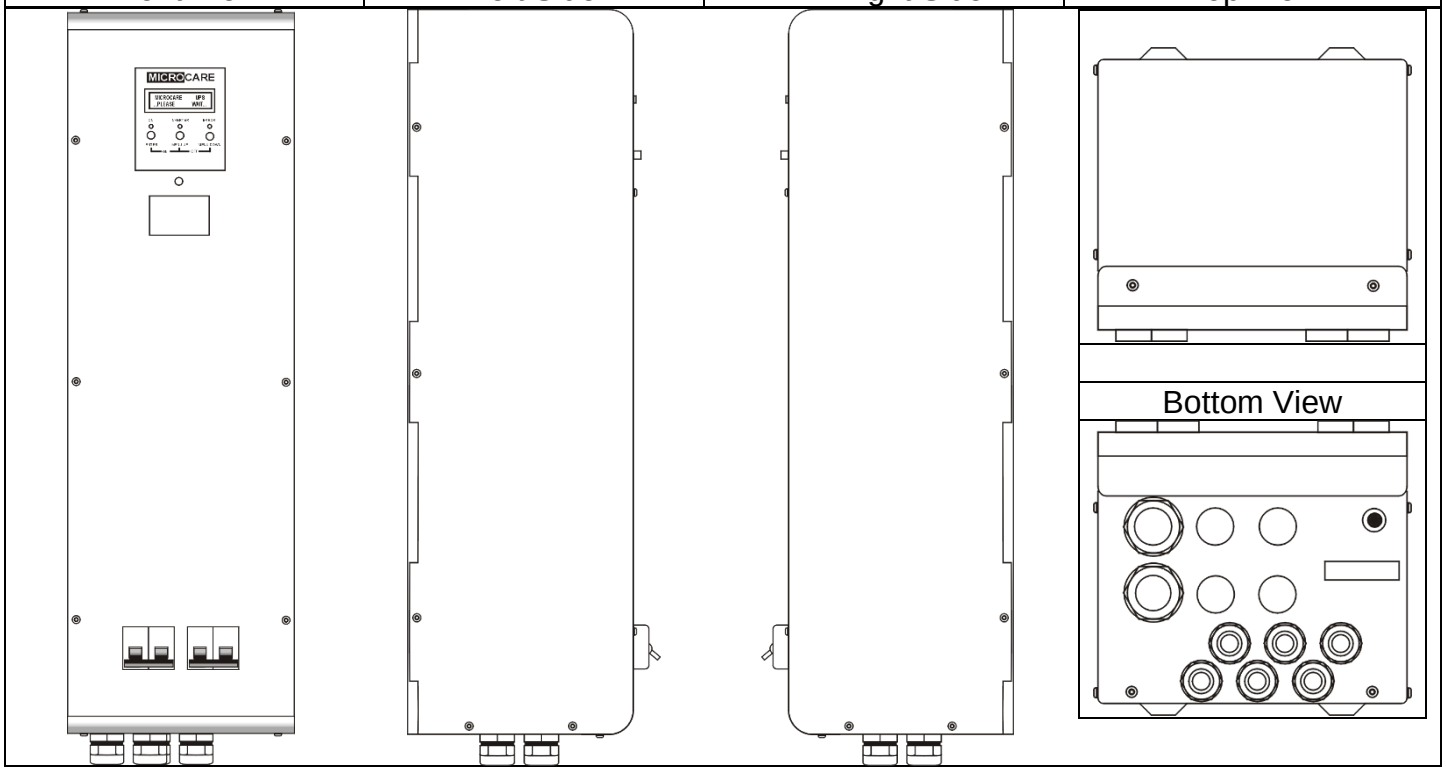
3.1 30kW System

Control Unit 1	Inverter 1 & 2	Control Unit 2	Inverter 3 & 4	Control Unit 3	Inverter 5 & 6	Battery Box	MPPT 1 & 2 etc



3.2 Control Unit

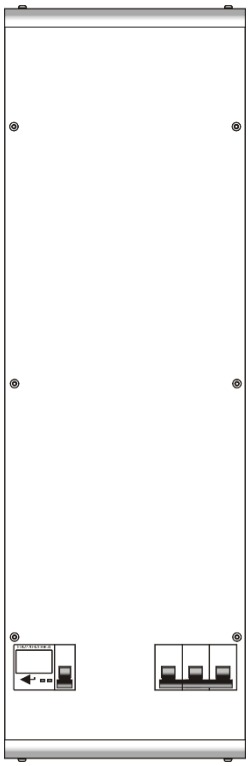
Front View	Left Side	Right Side	Top View

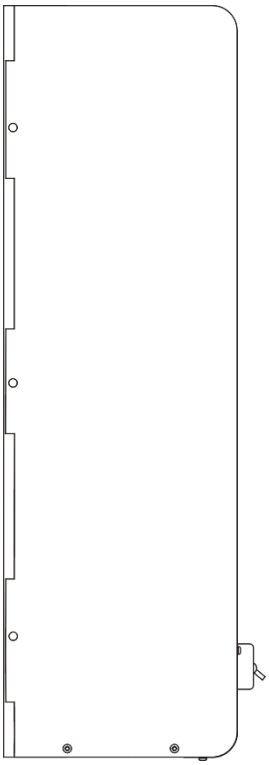


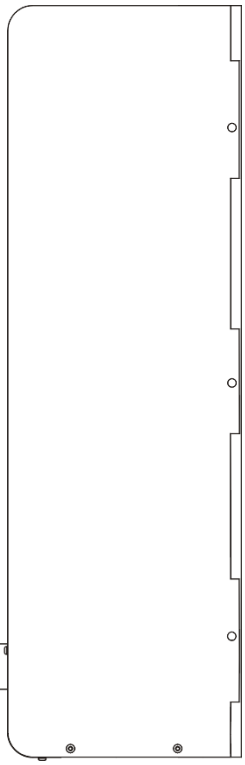
Bottom View

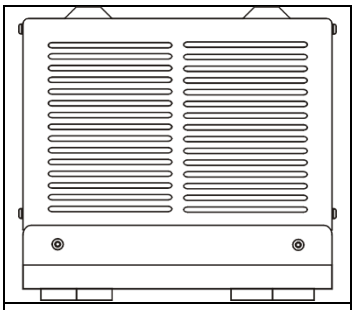
3.3 Inverter

Front View	Left Side	Right Side	Top View

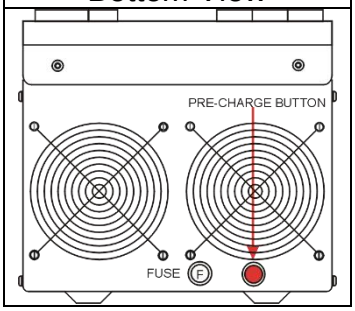






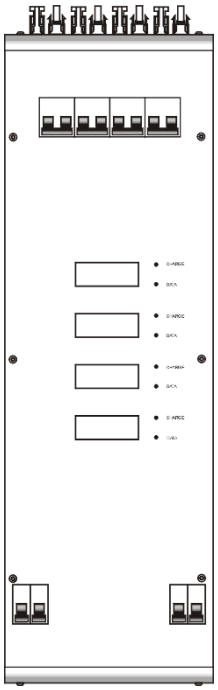


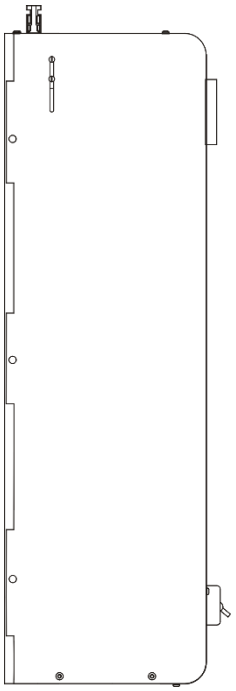
Bottom View

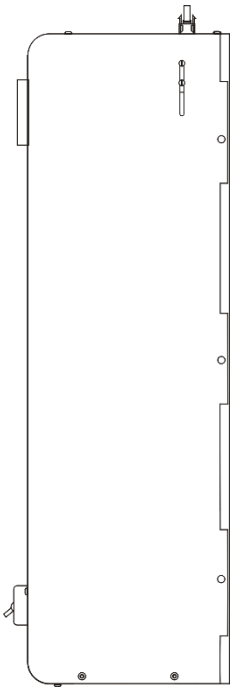


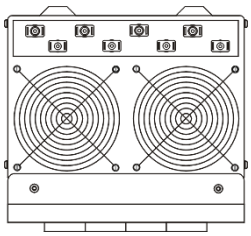
3.4 MPPT

Front View	Left Side	Right Side	Top View

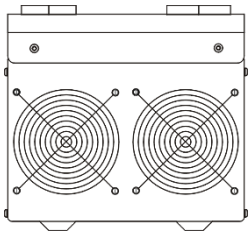






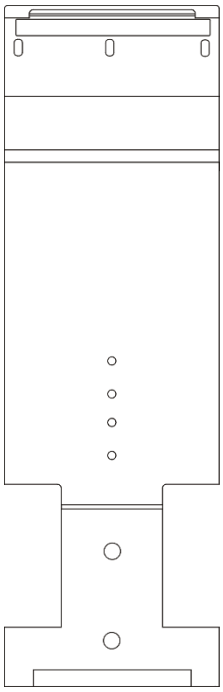


Bottom View



3.5 Mounting Brackets

Bracket Front View	Bracket Left View	Bracket Right View



4. MINI-GRID INSTALLATION

Consider the following when installing the inverter.

4.1 Planning the Installation

Location

- The mounting surface must be strong enough to support the complete system.
- Install the Inverter indoor in a dry protected location away from any sources of moisture.
- Find a suitable temperature resistant surface to mount the inverter.
- Provide enough space for the routing of external wiring, Sub DB board and additional accessories.
- Exposure to saltwater is particularly destructive.
- Do not mount the Mini-Grid in a closed container unless proper ventilation is provided.
- Unrestricted airflow is required for the inverter to operate at optimal efficiency.
- >600-900 mm unrestricted clearance at bottom of the installed units.
- >300 mm unrestricted clearance at top of the installed units
- Locate the Mini-Grid 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

The units must be mounted in a **"VERTICAL POSITION**" against the wall.

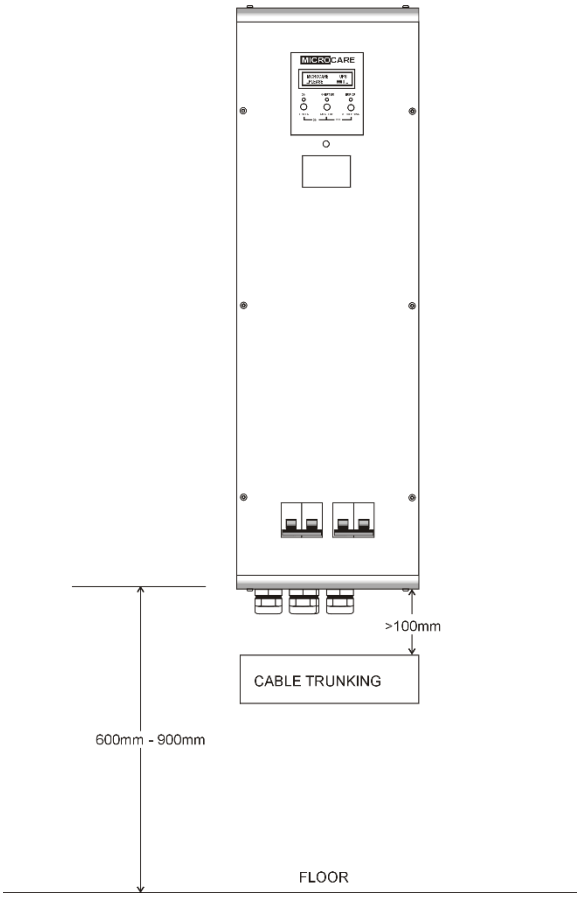
Temperature

Away from sources of high temperature.

Height

Install the units so that the display is at eye level.

Fig 6-1: Minimum clearance distances



4.2 Tools Required

Spirit level	Tape Measure	Masonry Drill & Drill Bits
Screwdrivers Set	Socket Set	Set Hex Allen Keys
Spanner Set	Torque Wrench	Side Cutter
Blower	Multi Meter	AC/DC Clamp Meter
Cable Cutter	Bootlace Ferrule Crimper	Hex Lug Crimper

4.3 Installing the Wall Plates

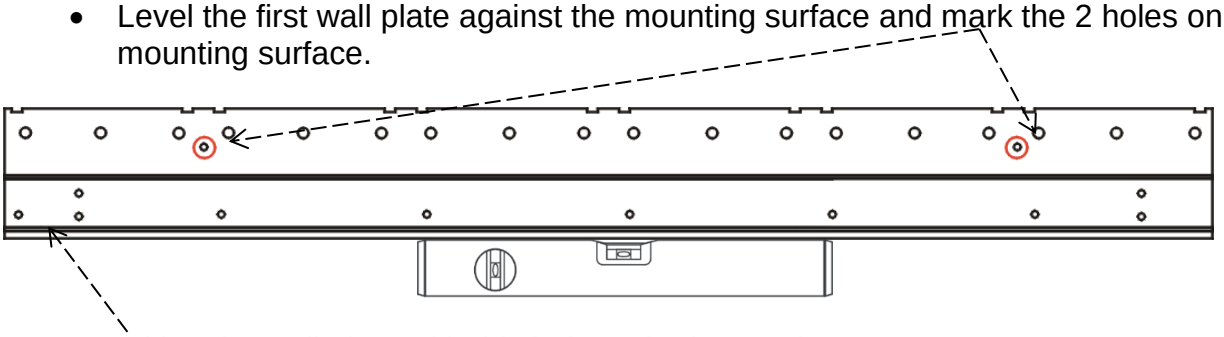
Note: All the wall plates are identical

Tools and hardware required:

- 4mm Pop rivets.
- 1 x Pop rivet Gun.
- Check for existing electrical or plumbing prior to drilling holes in the walls.
- With the use of spirit level or laser mark a straight plum line on the wall as to position the wall plate against the wall at a height where the top of the inverter is at eye level.
- Ensure a 300mm unrestricted clearance at the top and bottom of the system.

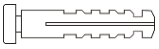
Step 1: Mark the 1st wall plate mounting holes.

- Level the first wall plate against the mounting surface and mark the 2 holes on the mounting surface.



Note: Position the wall plate with this hole at the bottom left.

Step 2: Drill the mounting holes.
Method 1:

- Drill the 2 holes into the wall and secure the wall plate by means of correctly sized rawl plugs. 

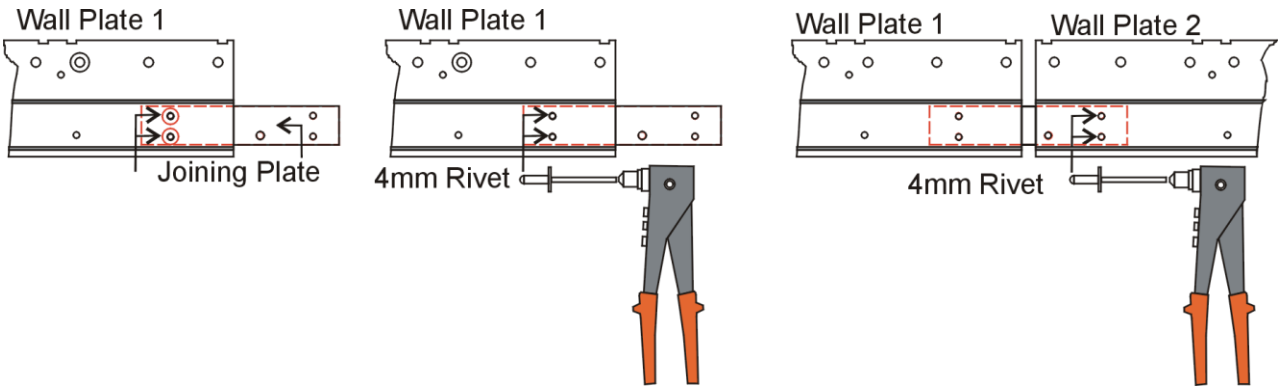
Method 2:

- Drill the left hole first, secure with a rawl plug  , level the wall plate, drill the second hole and secure the wall plate with a rawl plug.

Step 3: Check if the bracket is level and make any adjustments if necessary.

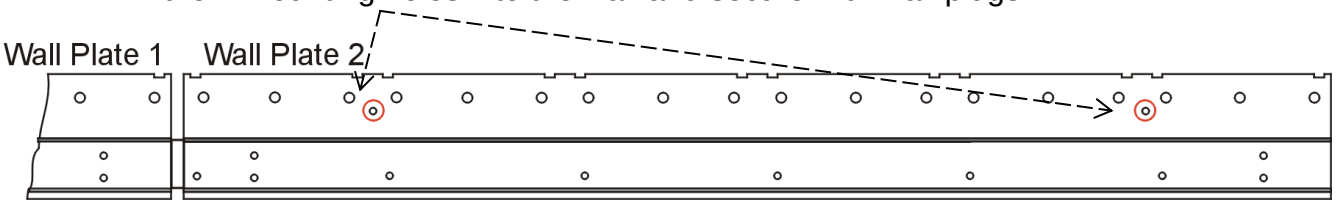
Step 4: Fit the joining plate.

- Place the joining plate behind the wall plate and align the holes as shown below.
- Secure the joining plate to the 1st wall plate with 2 pop rivets.
- Place the 2nd wall plate on the wall and secure to the joining plate with 2 pop rivets.



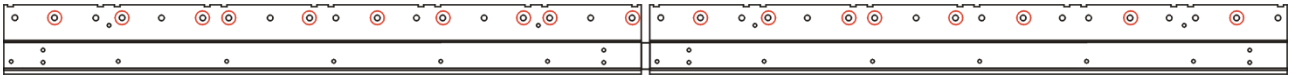
Step 5: Secure the 2nd Wall plate.

- Align the 2nd wall plate against the plumbline and make sure it is level.
- Drill the 2 mounting holes into the wall and secure with wall plugs.



Step 6: Drill Support Holes

- Make sure that the wall plates are level.
- Tools required - Hammer drill, 13mm Masonry drill bit, M8 Rawl Bolts.
- Drill the holes circled in red below into the wall using the 13mm masonry drill bit.
- Insert the rawl bolt bodies into the holes.
- Do not insert or tighten the bolts as yet.
- Remove all the drilling dust and clean the hanging brackets.



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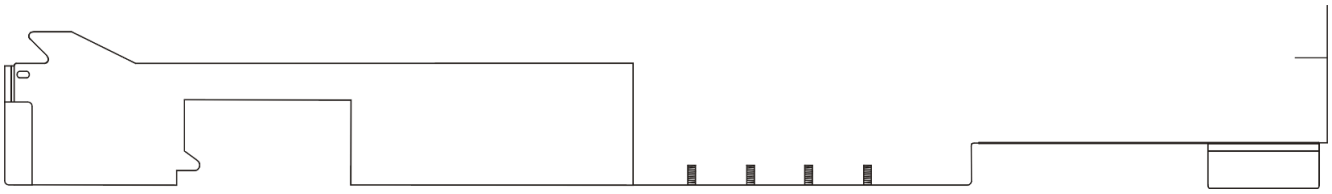
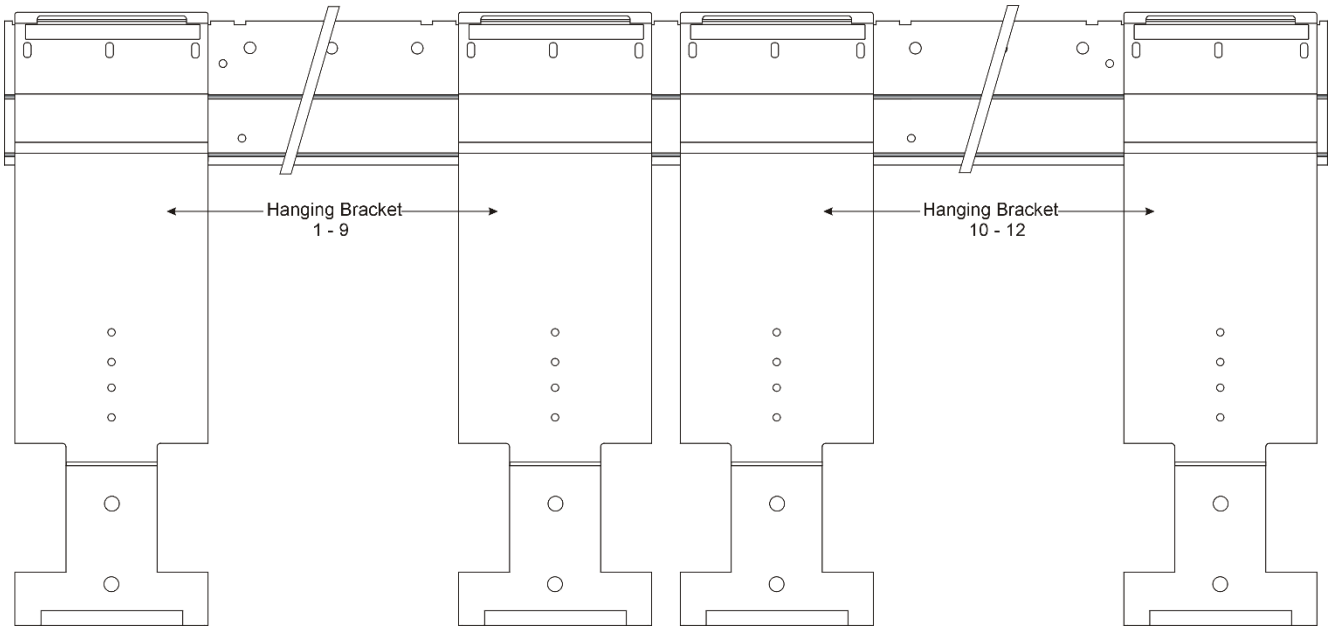
4.4 Preparing the Wall Brackets

Hanging Bracket Identification

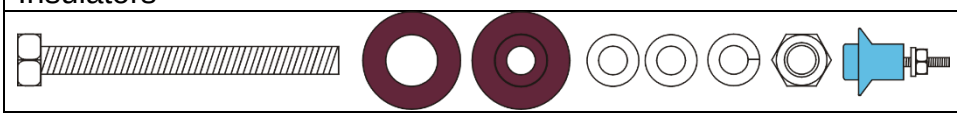


The Mini-grid system consists of 12 Wall Brackets. All the brackets are identical but fitted with different hardware.

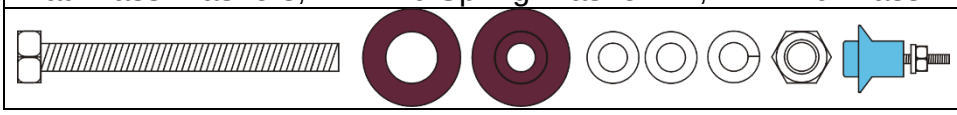


Hanging brackets 1 – 12 are assembled using the hardware below.

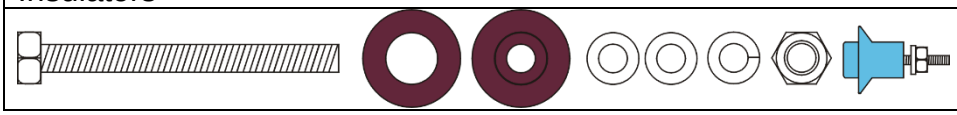
Hanging Bracket 1-3

Each of the hanging brackets 1-3 require the following
2 x M10 x 95mm Brass Bolt, 2 x Male Tufnol Insulator, 2 x Female Tufnol Insulator, 4 x M10 Flat Brass Washers, 2 x M10 Spring Washer ZP, 2 x M10 Brass Nut, 4 x Blue Insulators


Hanging Bracket 4-6

Each of the hanging brackets 4-6 require the following
2 x M10 x 95mm Brass Bolt,2 x Male Tufnol Insulator, 2 x Female Tufnol Insulator, 4 x M10 Flat Brass Washers, 2 x M10 Spring Washer ZP, 2 x M10 Brass Nut, 3 x Blue Insulators


Hanging Bracket 7-9

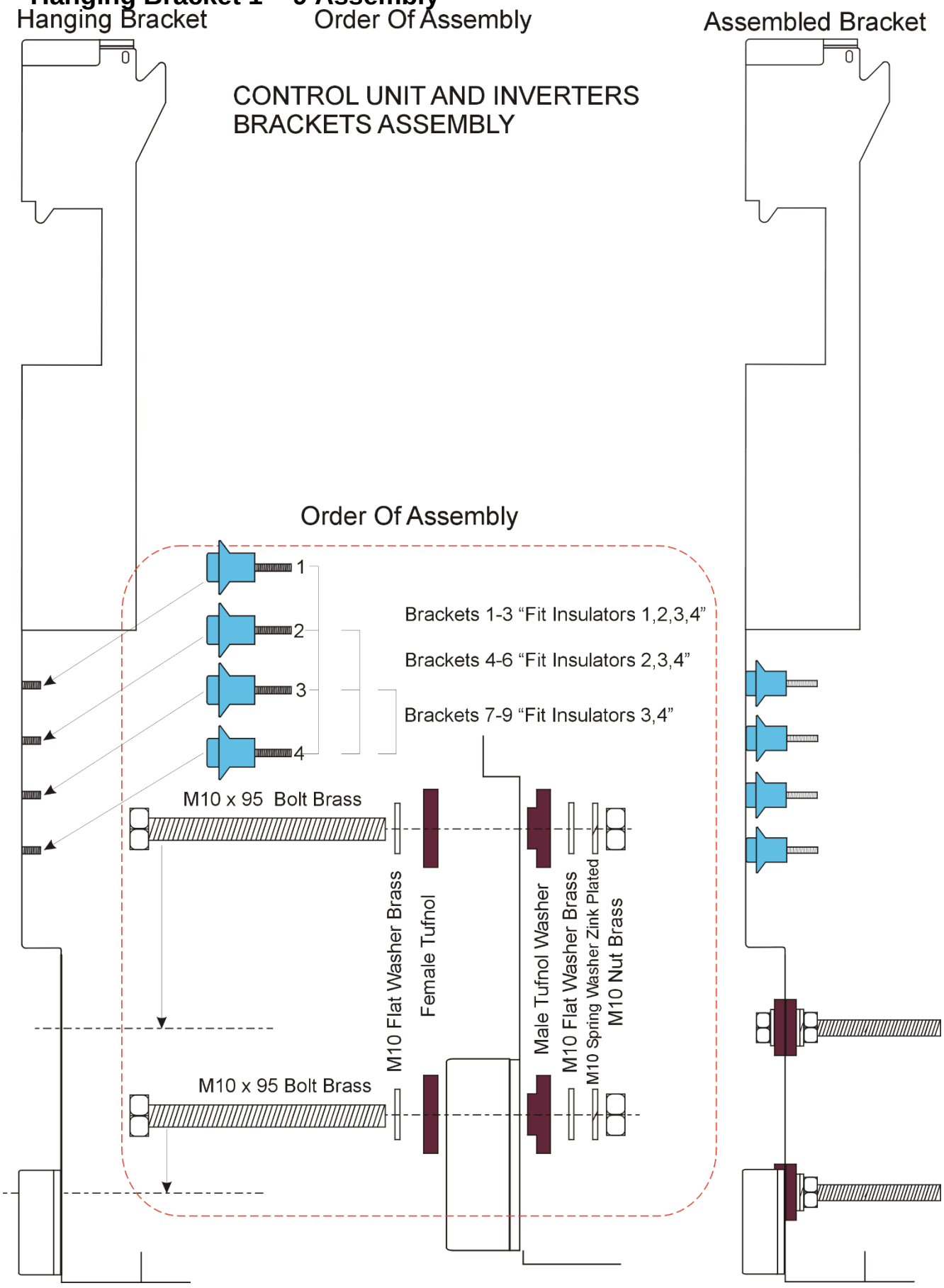
Each of the hanging brackets 7-9 require the following
2 x M10 x 95mm Brass Bolt, 2 x Male Tufnol Insulator, 2 x Female Tufnol Insulator, 4 x M10 Flat Brass Washers, 2 x M10 Spring Washer ZP, 2 x M10 Brass Nut, 2 x Blue Insulators


Hanging brackets 10-12 are assembled using the hardware below.

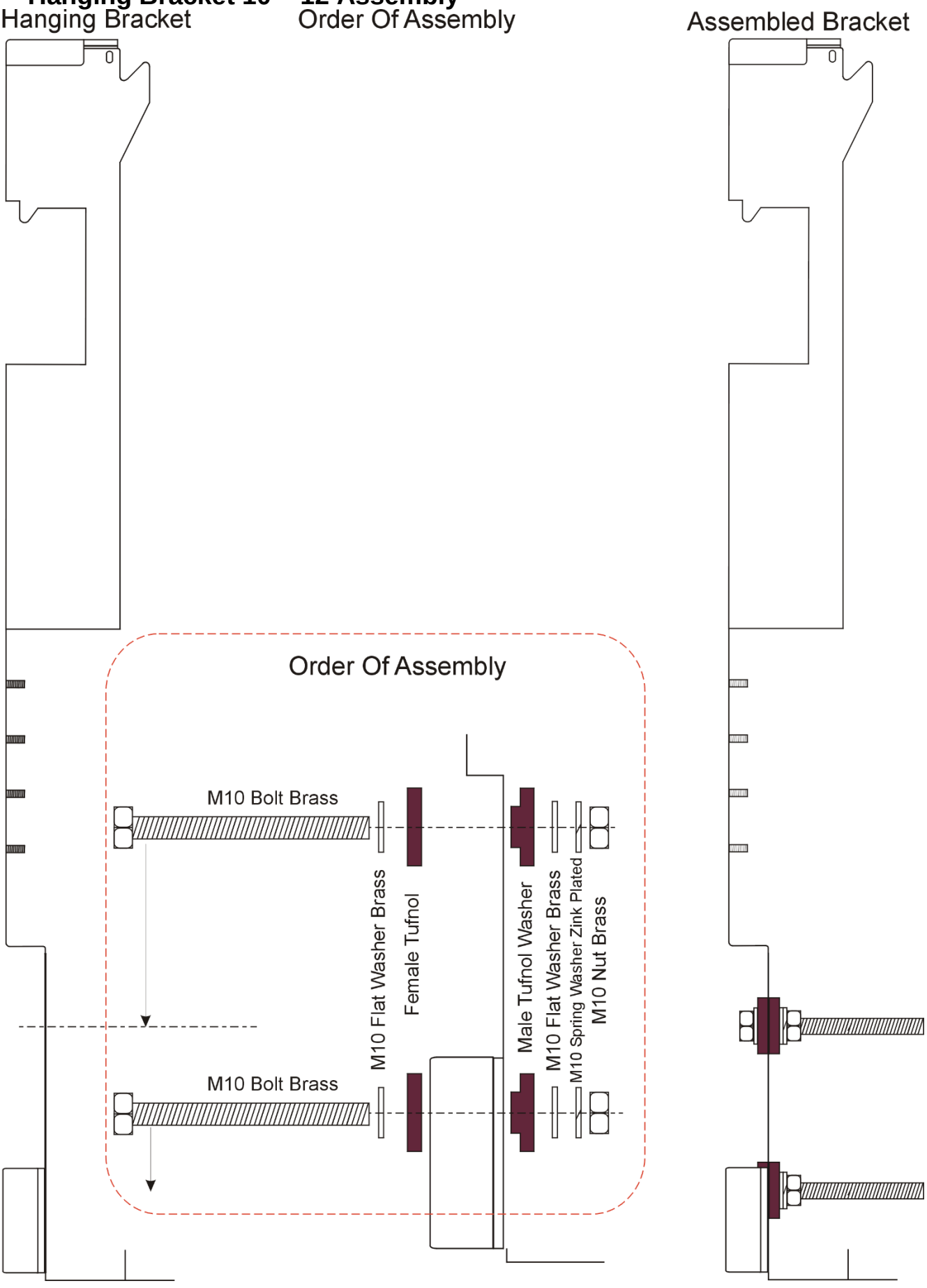
Hanging Bracket 10-12

Each of the hanging brackets 10-12 require the following
1 x M10 x 95mm Brass Bolt, 1 x Male Tufnol Insulator, 1 x Female Tufnol Insulator, 2 x M10 Flat Brass Washers, 1 x M10 Spring Washer ZP, 1 x M10 Brass Nut


4.5 Hanging Bracket 1 – 9 Assembly



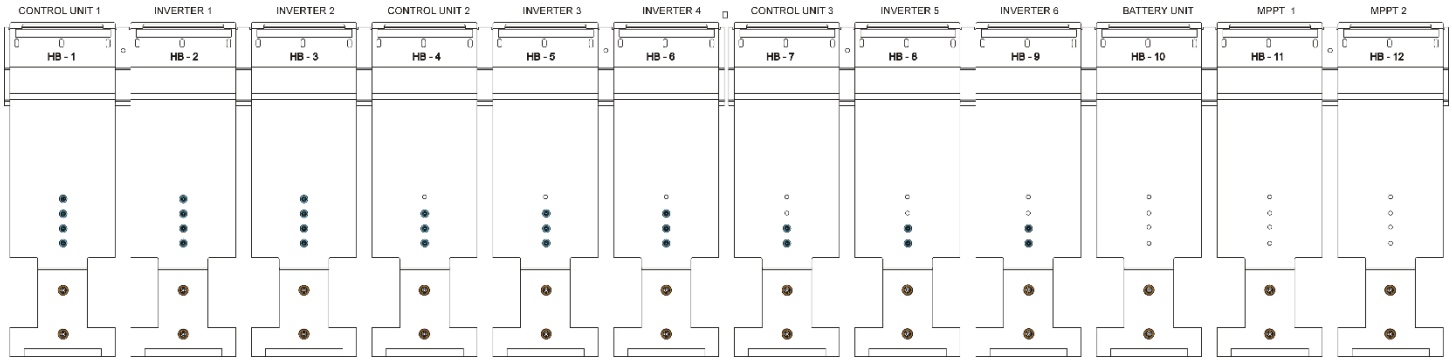
4.6 Hanging Bracket 10 – 12 Assembly



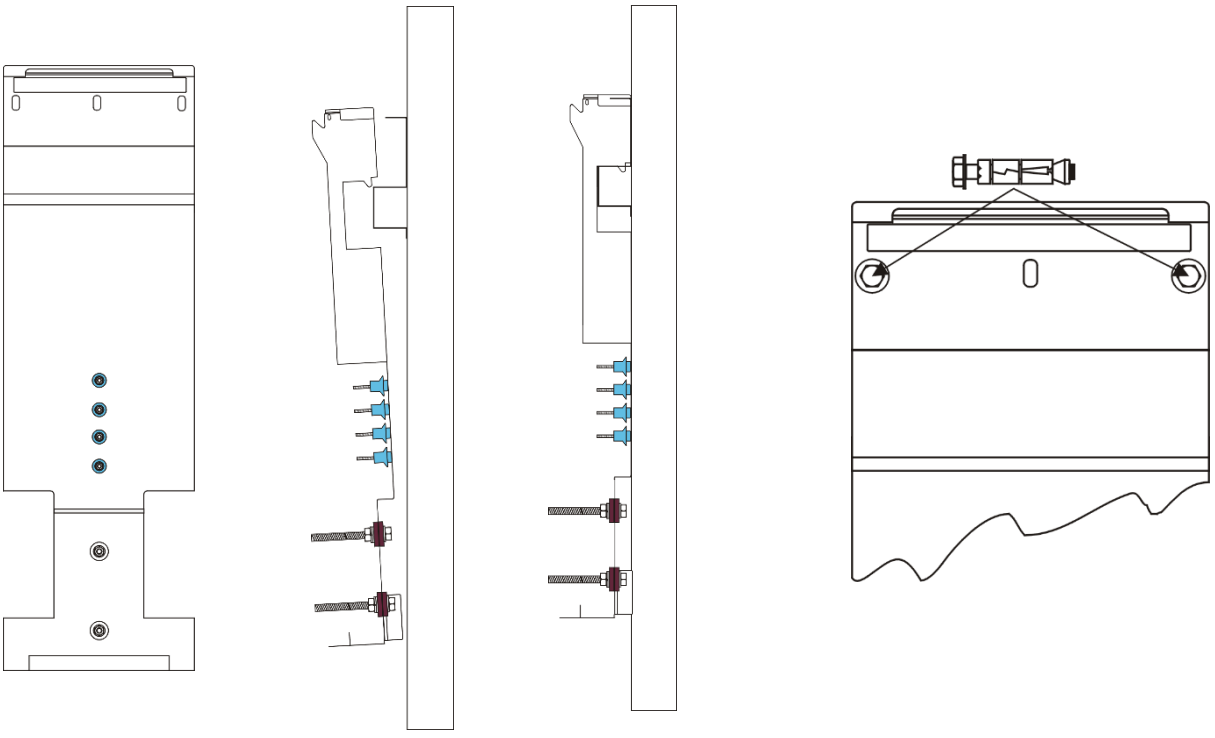
4.7 Installing The Hanging Brackets

Install the brackets in the following order:
Note:
Hanging Brackets 1 – 9 are fitted with Blue Insulators.
Hanging brackets 10 – 12 are not fitted with Blue Insulators.

Hanging Brackets order of installation.
Brackets 1-9 Brackets 10 - 12



Step1: Starting from the left using hanging brackets HB-1 to HB-12	Step 2: Hold the bracket at an angle	Step 3: Position into the slot and push downwards	Step 4: Insert the rawl bolt bolts. Do not tighten the rawl bolts until the busbars are in position.



Step 5: Hang and secure the balance of the brackets as described in Step 4.

5. BUSBAR PREPARATION & FITMENT

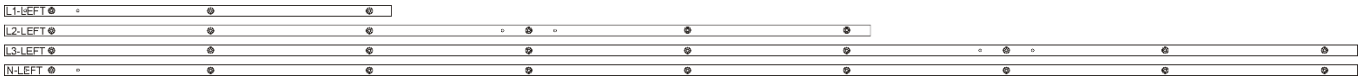
The busbar kit consists of:

- 4 x AC Busbars
- 2 x DC Busbars

5.1 AC Busbar Preparation

The AC Busbar system consists of:

L1 Busbar, L2 Busbar, L3 Busbar and Neutral Busbar are labelled accordingly.



Remove the 20 x 10mm AC busbars from the packaging.

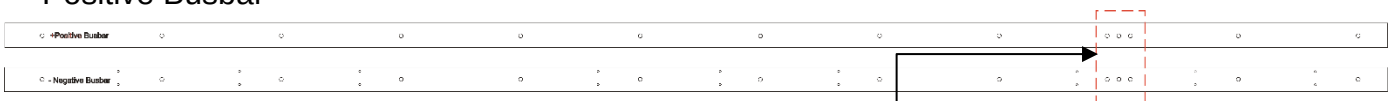
5.2 DC Busbar Preparation

The busbar kit consists of:

- 1 x DC Positive Busbar
- 1 x DC Negative Busbars

Both DC busbars are the same in length, but the drilling pattern is different.
Remove the 60 x 12 mm DC busbars from the packaging.

Positive Busbar



Negative Busbar

Fit the bolts, washers and nuts to busbars as indicated for the Pos and Neg busbars.

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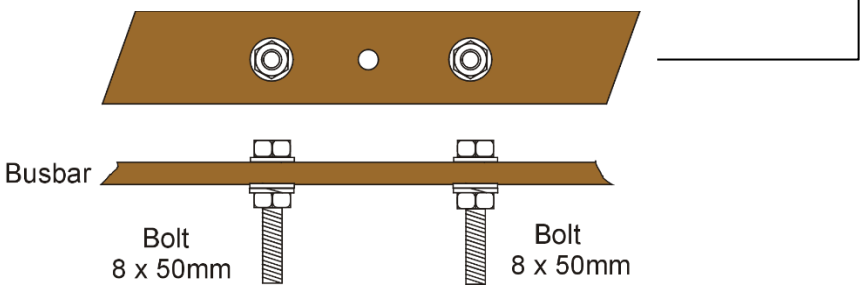
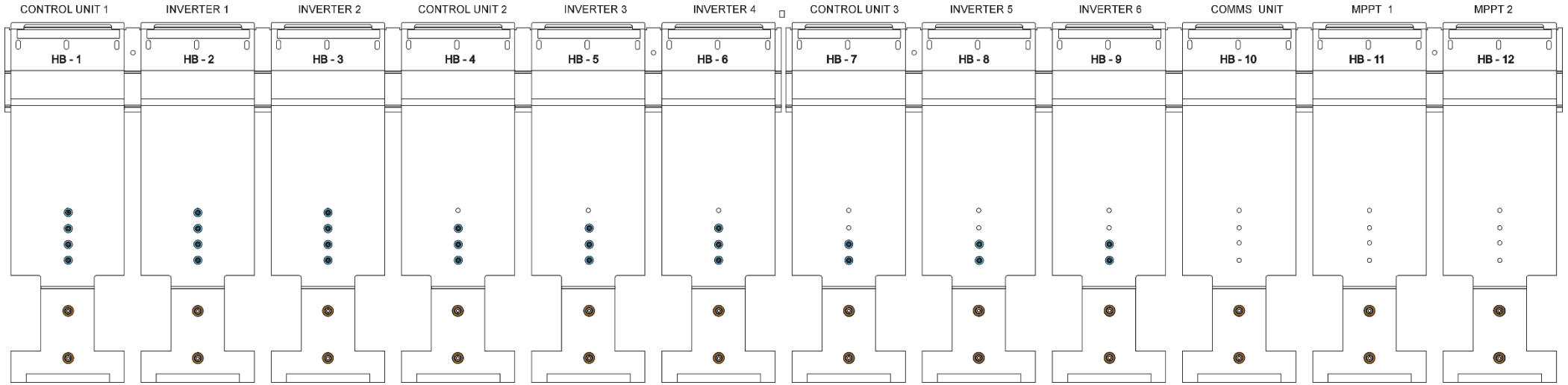


The next few steps explain the rest of the busbar and fasteners fitment procedure.

Before the busbars are fitted ensure that all the hanging brackets were fitted in the correct order HB-1 TO HB-12.

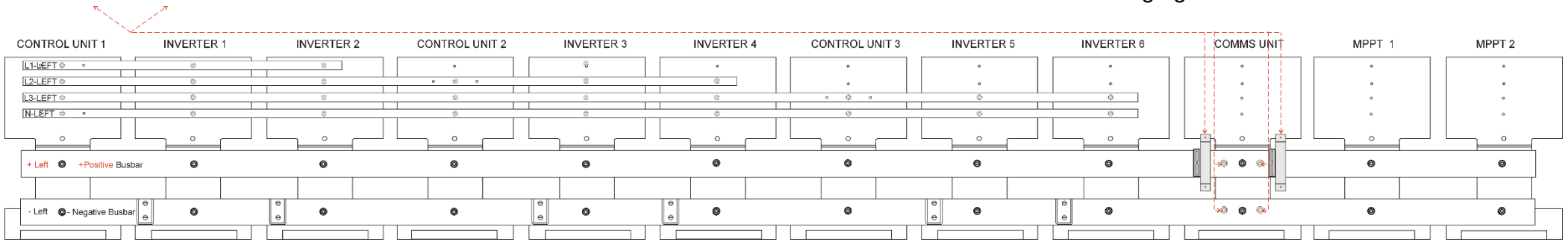


5.3 Busbar Layout

Familiarize yourself with the busbar layout below before you attempt the busbar assembly process.

The busbars are fitted from top to bottom in the following order. AC Busbars: L1-L2-L3-N and the DC Busbars: Positive-Negative.

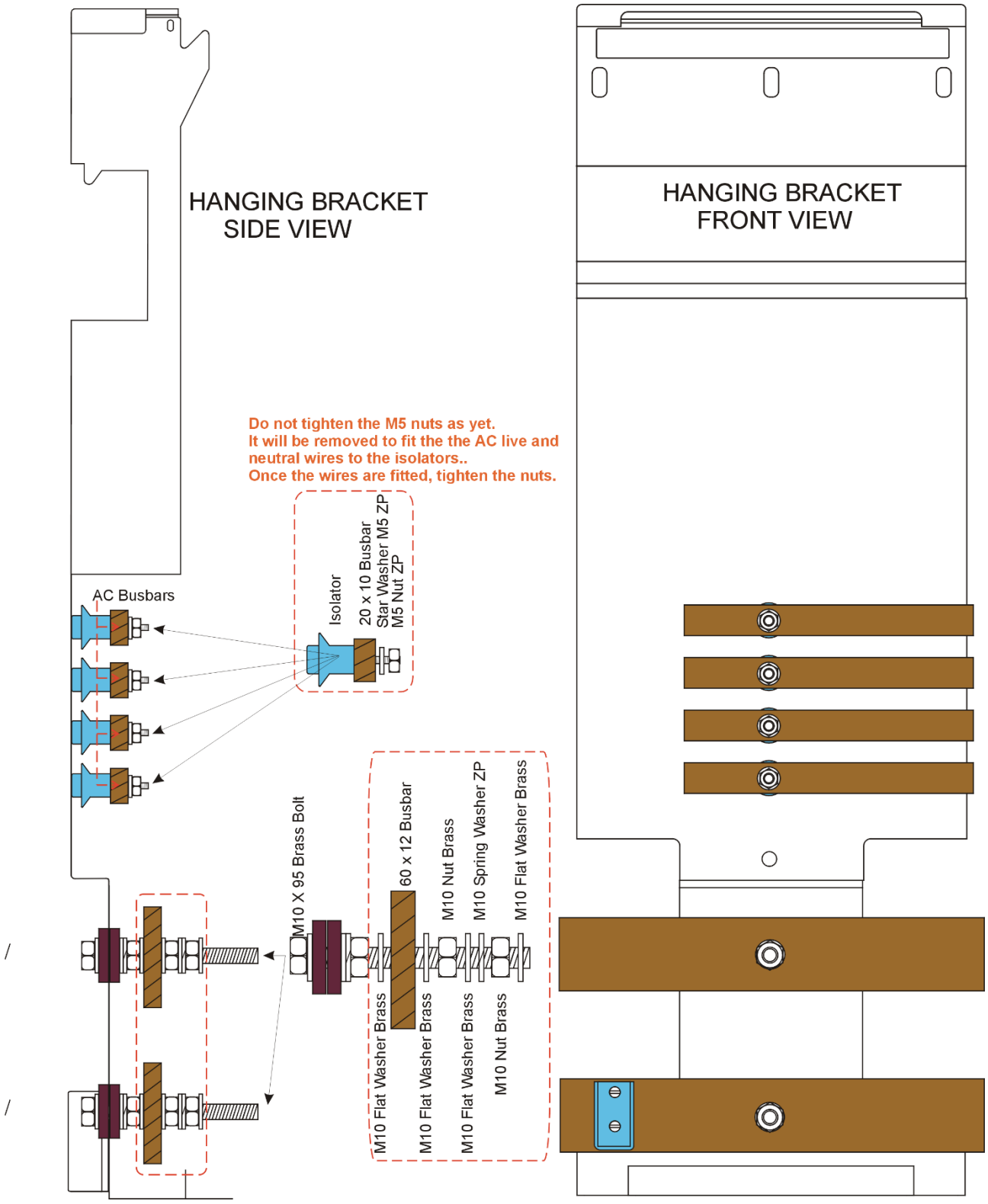
The “Bolts and LEM current sensors” as indicated must be fitted before the DC Busbars are fitted to the hanging brackets.



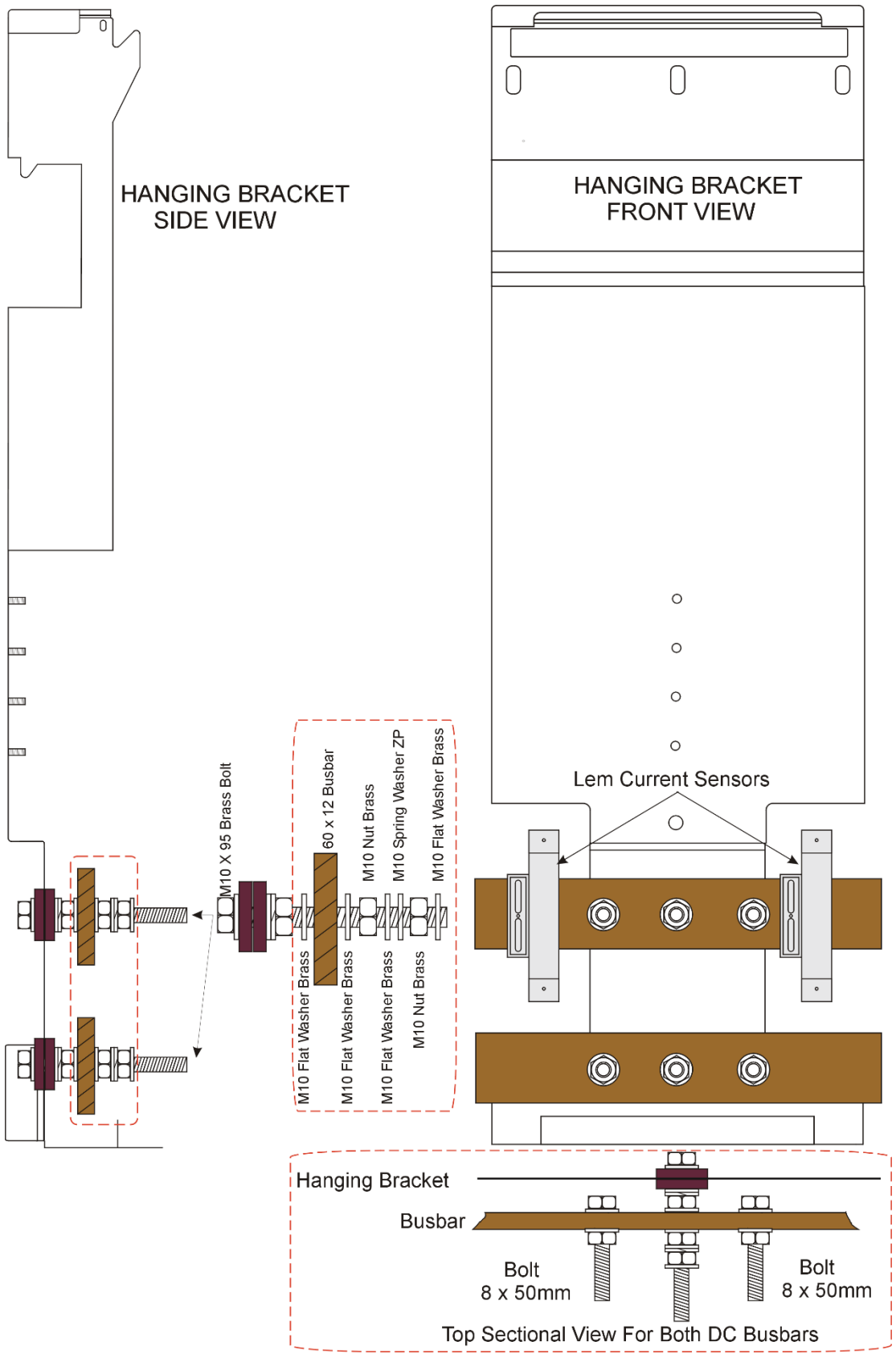
The next sections explain the Busbar Assembly in detail.

5.4 Busbar Assembly: Control Unit 1 – 3 and Inverters 1 – 6

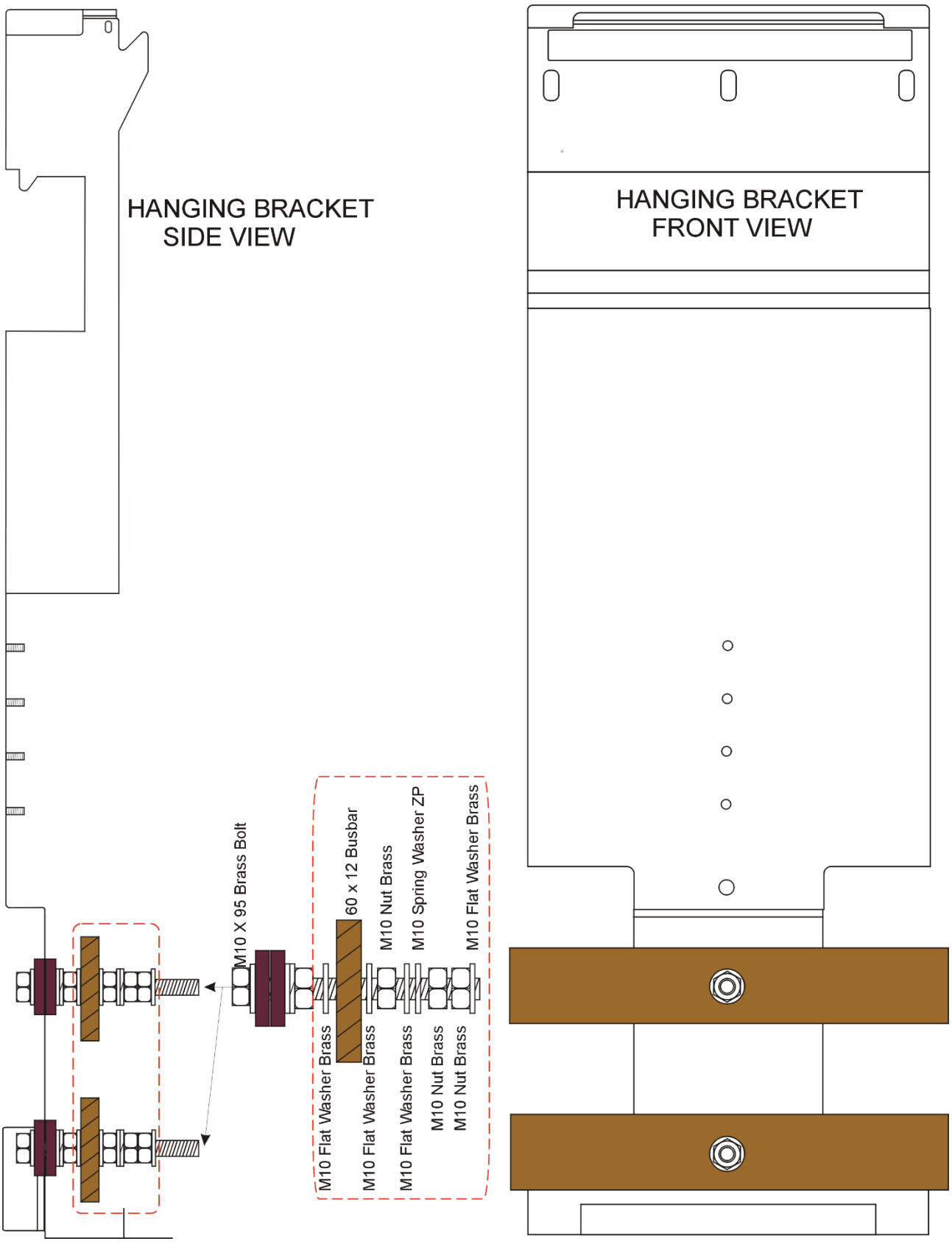
The busbars are fitted to the hanging brackets.



5.5 Busbar Assembly: Comms Unit



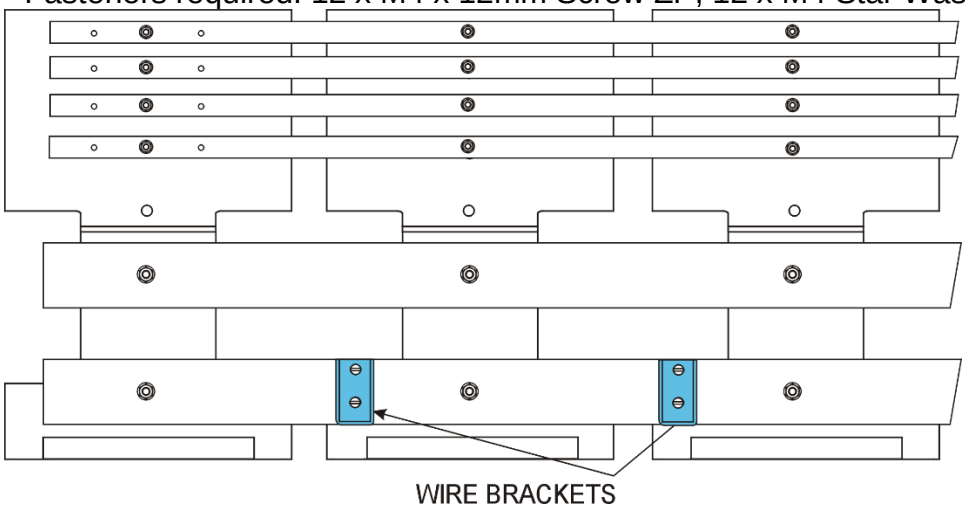
5.6 Busbar Assembly: MPPT's



5.7 Connecting the Inverter Live and Neutral Wires

Secure the 6 Wire Brackets to the Negative DC Busbar.

Fasteners required: 12 x M4 x 12mm Screw ZP, 12 x M4 Star Washer ZP.



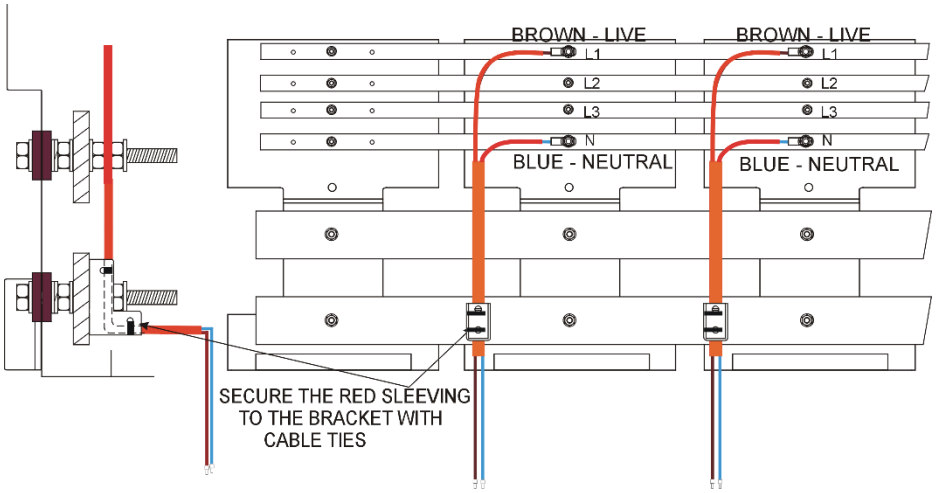
5.8 Connect the AC Neutral and Live Busbar Wires

- Sleeve the 6 x Blue and Brown 6sqmm wire sets with the sleeving as provided.

- Sleeve each wire with a short piece of red sleeving towards the 6mm lug.

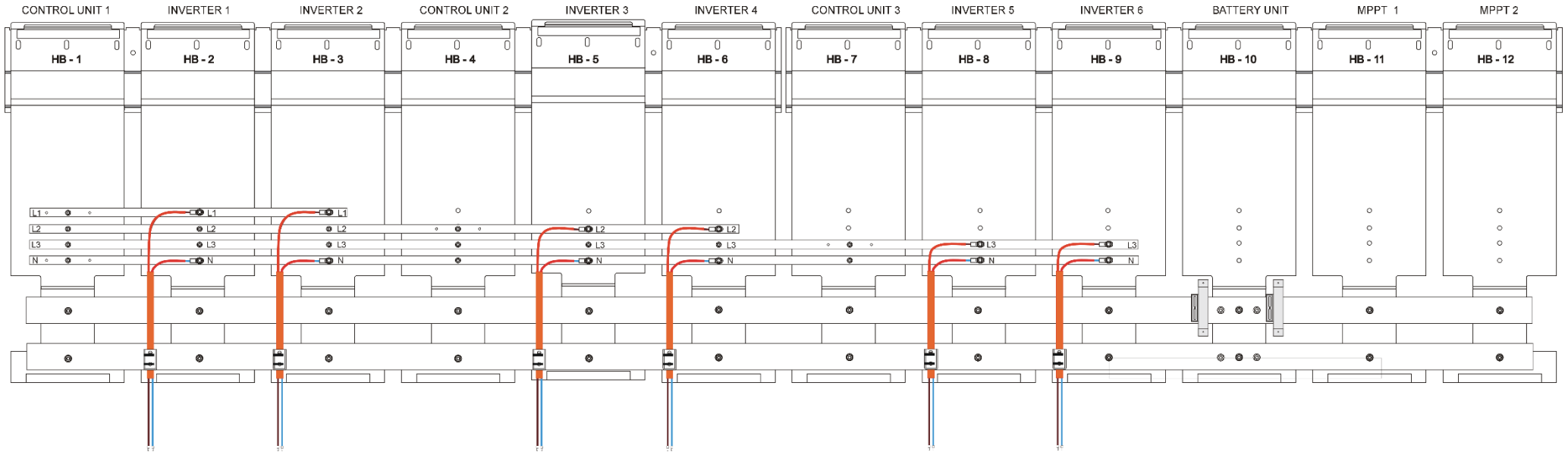
- Sleeve both wires with one piece long red sleeving.

- Remove the M5 Nut and Star Washer form both form the Live and Neutral busbar.
- Hook the Brown wire's wire lug over the live busbar's threaded stud.
- Secure with the star washer and M5 nut and tighten firmly.
- Hook the Blue wire's wire lug over the neutral busbar's threaded stud.
- Secure with the star washer and M5 nut and tighten firmly.
- Cable-tie the wire sleeve to the wire bracket.
- Repeat the process for the all the wires.



Refer to the next page for this section's full system wiring layout.

Inverter Wiring Layout Live and Neutral Connections



Notes:

6. MOUNTING OF THE CONTROL UNITS, INVERTERS ETC

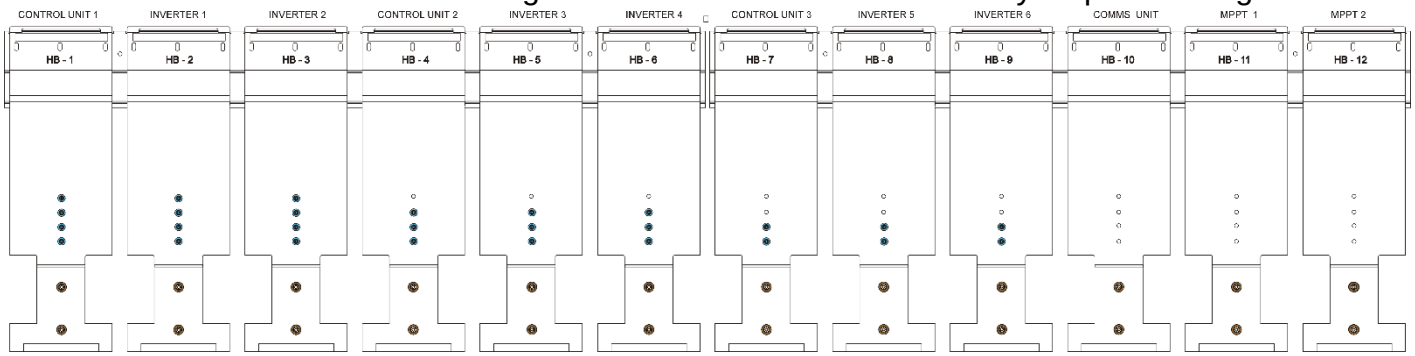
The boxes are marked Control Unit 1, Inverter 1 etc

All the units are labelled on top of each unit. Control Unit 1, Inverter 1, Inverter 2 etc.

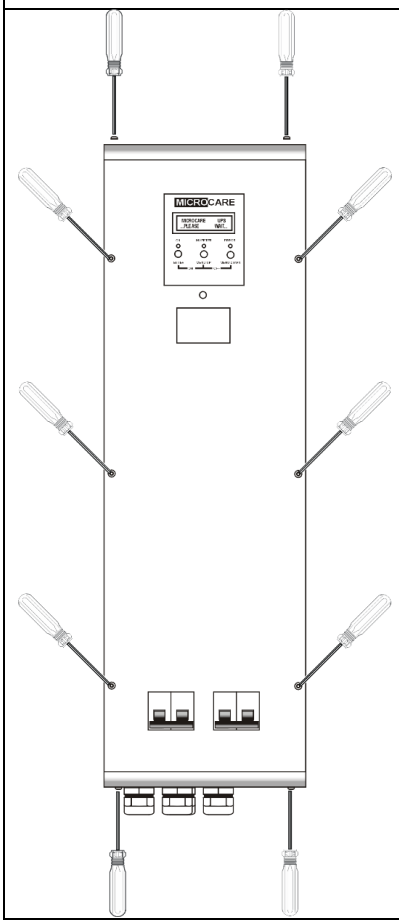
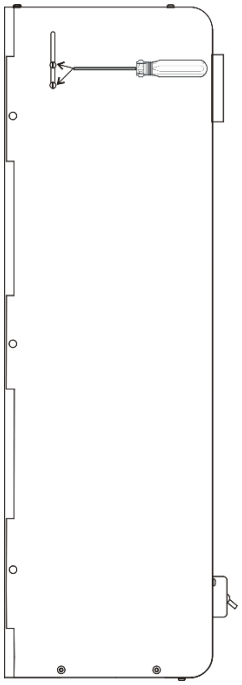
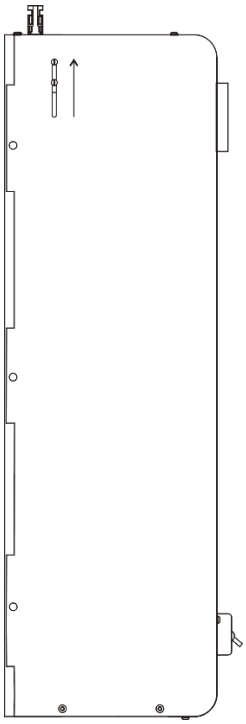
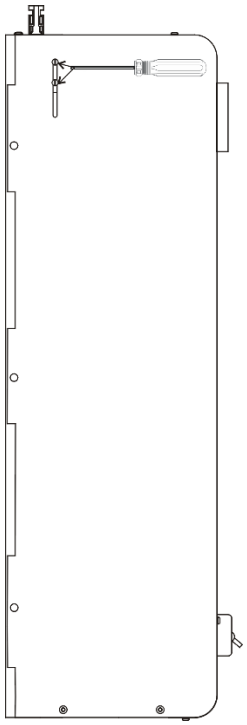
Hint 1: Unpack all the units and position them on their backs on the working surface, in the same order they are to be installed onto the mounting brackets.

Hint 2: Mount the Inverters First.

The units cannot be interchanged and need to be installed exactly as per the diagram below.

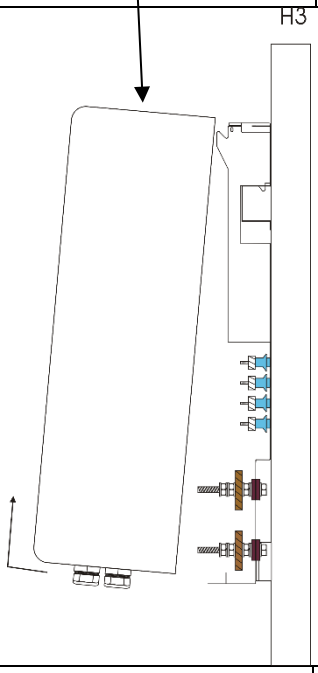


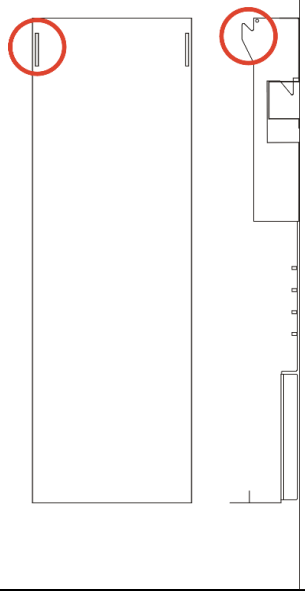
Ensure that all the circuit breakers are turned off.

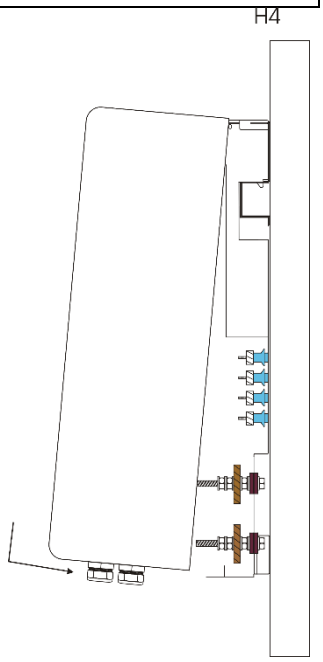
Step1: Remove the Front Covers by removing the screws as indicated below	Step 2: Loosen Both screws on either side of the MPPT's	Step 3: Pull the PV connectors assembly upwards	Step 4: Tighten both screws on either side
			

The Inverter modules are heavy and if dislodged from the mounting bracket can cause damage to external wiring and can cause bodily harm.

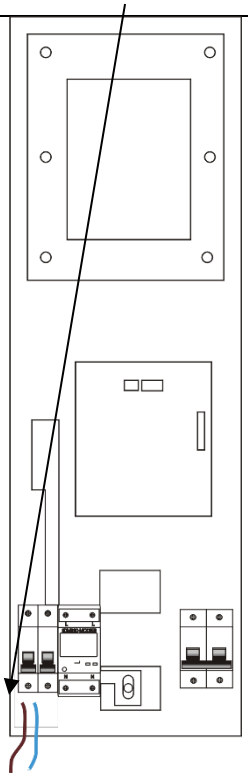
Step 5: Lift the Inverter, etc from the bottom, taking care not to damage the ventilation grills. Tilt the unit backwards towards the bracket hooks as shown below.	Step 6: Align the slots at the back of the unit with the hooks of the installed wall bracket.	Step 7: Drop the unit slowly downwards until the unit seats in the slots.

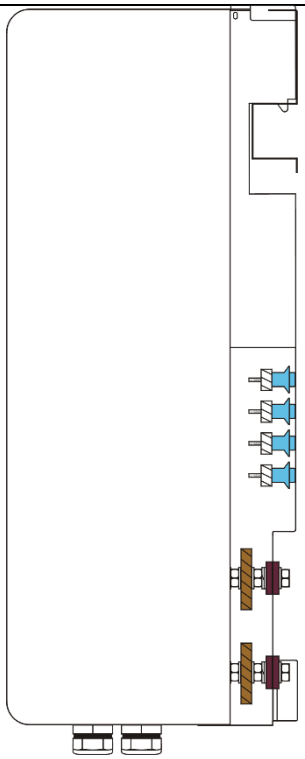


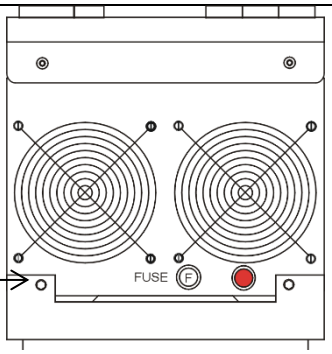




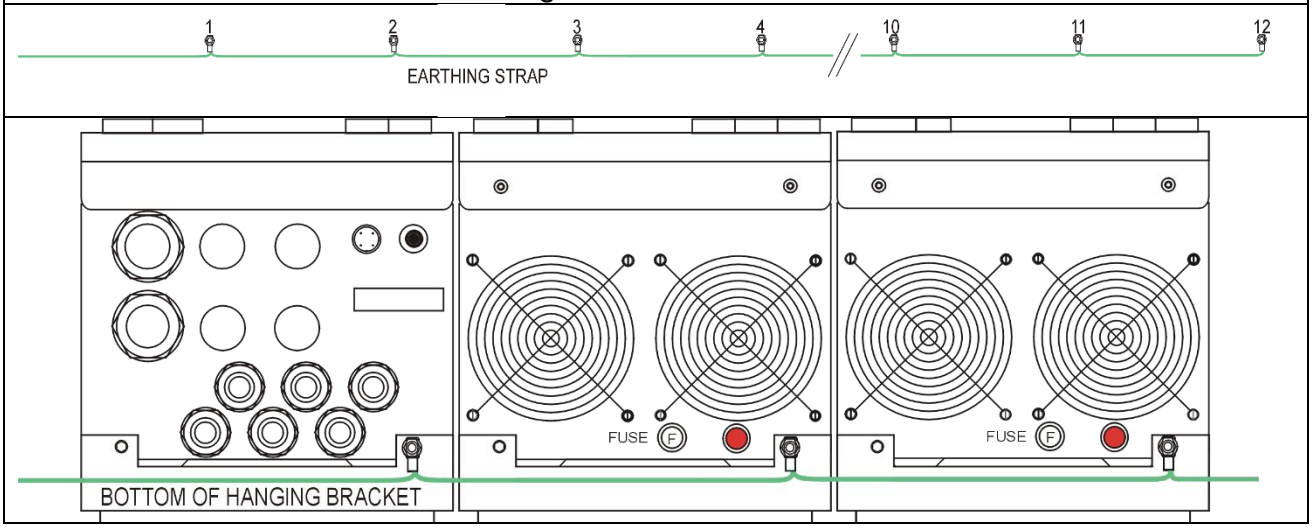
Step 8: Feed the AC wiring form the busbar through the slot below.	Step 9: Push the inverter towards the bracket. Ensure that the negative busbar bolt mates with the inverter aluminium busbar.	Step 10: Secure the hanging brackets to the bottom of the Inverters etc with a M4X10 Cheese Head screw on the bottom left side of each unit.







Step 11: Secure the earth strap to the hanging brackets and inverters with a M4X10 Cheese Head screw on the bottom right side of each unit.



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.

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.

If the Mini-Grid is not earthed; warranty will be null and void.

7. GENERAL WIRING INFORMATION

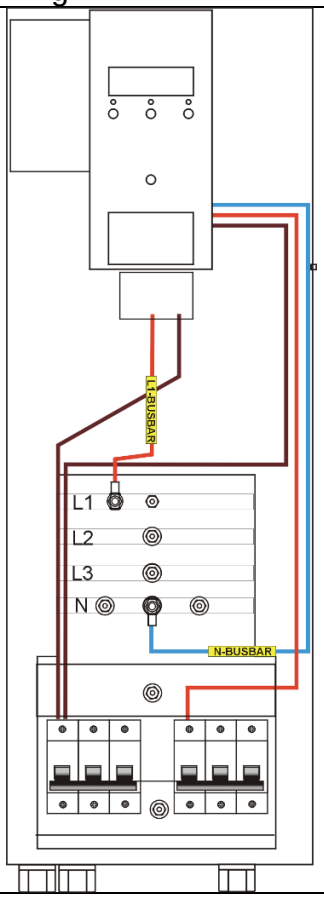
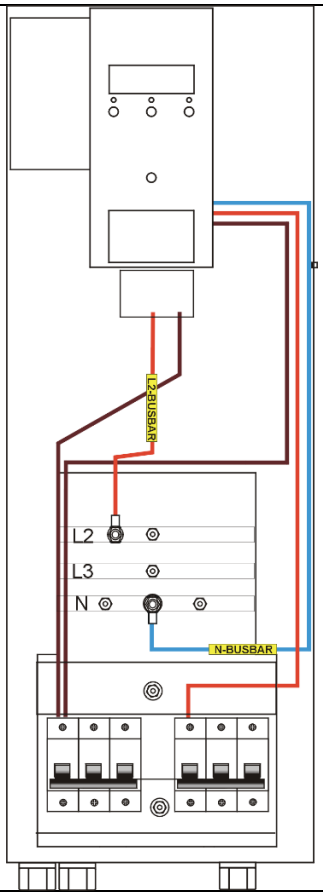
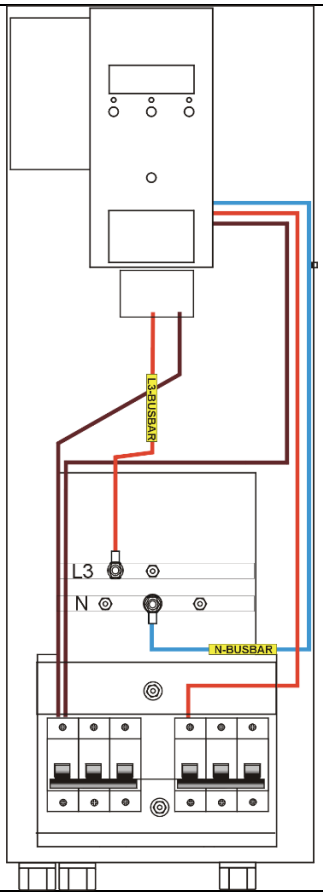
- Wiring must be performed by qualified personnel / certified electrician. 
- Familiarize yourself with the content of the manual before commencing with the wiring
- The line voltage “AC” applied must comply with the inverter’s specified input voltage.
- The AC connections are located at the bottom of the control unit.
- Do not connect the AC output of the inverter directly to another AC source. 
- The system 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’s AC output and not on the AC source input line.
- Make sure that all the circuit breakers are turned off on the Mini-Grid modules before attempting any wiring.
- Battery interconnection cables must be sized correctly and be as short as possible.

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

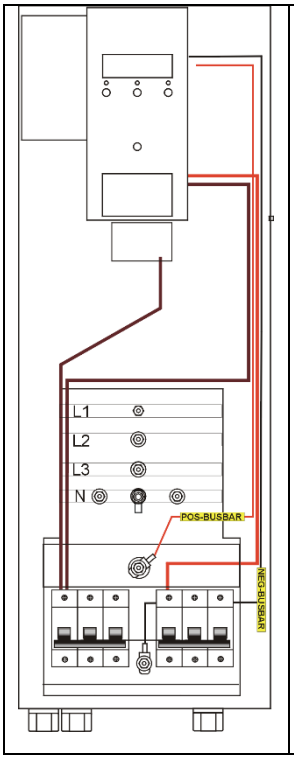
Reverse polarity will damage the unit!!

7.1 Wiring Control Units

7.1.1 Control Units – AC Wiring

Control Unit 1 - AC Wiring	Control Unit 2 - AC Wiring	Control Unit 3 - AC Wiring
		
Connect the wire labelled L1-Busbar to the L1 Busbar. Connect the wire labelled N-Busbar to the Neutral busbar.	Connect the wire labelled L2-Busbar to the L2 Busbar. Connect the wire labelled N-Busbar to the Neutral busbar.	Connect the wire labelled L3-Busbar to the L3 Busbar. Connect the wire labelled N-Busbar to the Neutral busbar.

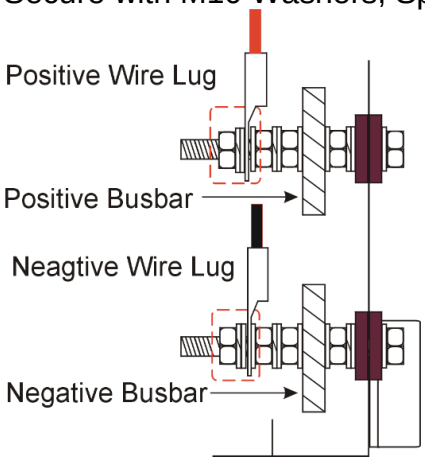
7.1.2 Control Units – DC Wiring



Positive Wire:

Connect the wire marked Pos-Busbar, lug to the Positive Busbar.

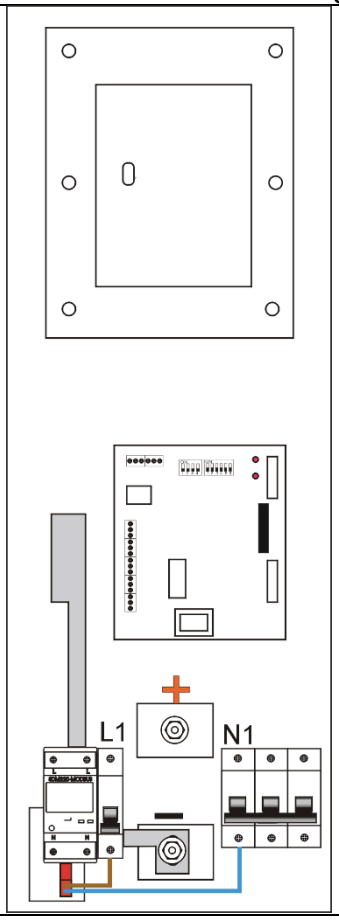
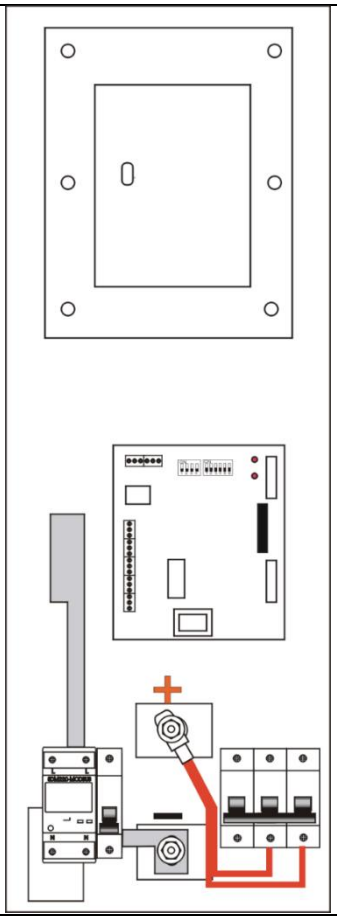
Secure with M10 Washers, Split Washer and M10 nut to stud



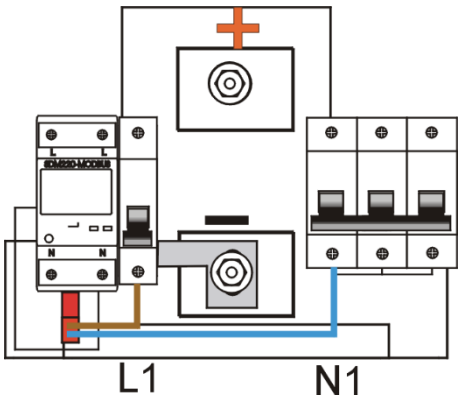
Negative Wire:

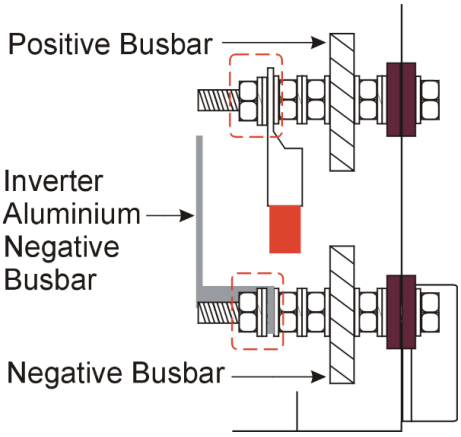
- Connect the wire marked Neg-Busbar, lug to the Negative busbar.
- Secure with M10 Washers, Split Washer and M10 nut to stud.

7.2 Inverters AC & DC Wiring

<table>
<tr><th>Inverter 1 - 6 AC Wiring</th><th>Inverter 1 – 6 DC Wiring</th></tr>
<tr><td> 
</td><td>  </td></tr>
<tr><td>Connect the brown Live wire to the bottom of the 1st circuit breaker.

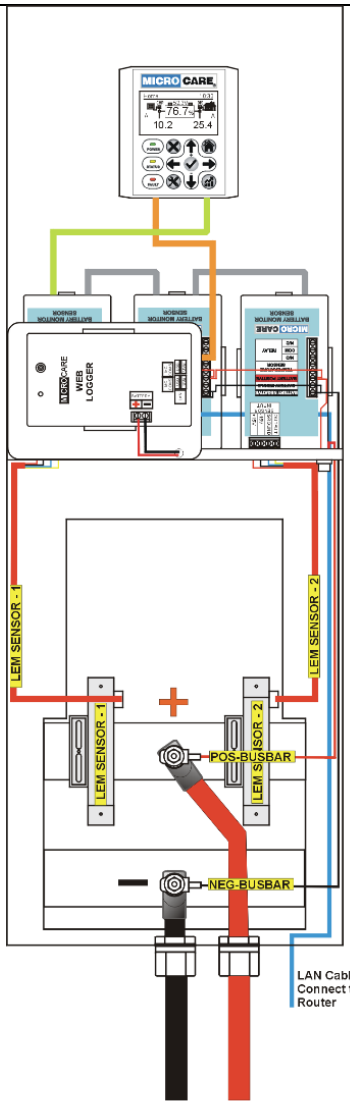
Connect the blue Neutral wire to the bottom of the 2nd circuit breaker.

 
</td><td>Connect the Positive wire lug to the Positive Busbar. Secure with M10 Washers, Split Washer and M10 nut to stud.

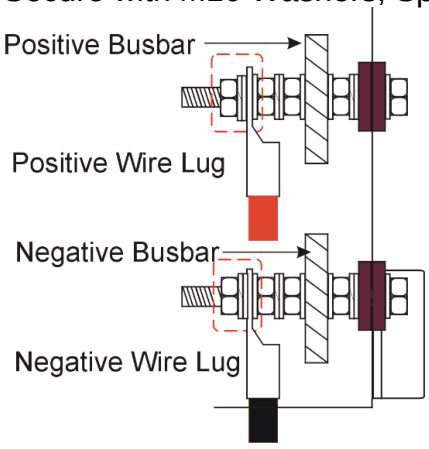
 

• Connect the Negative aluminium busbar to the Negative busbar.
• Secure with M10 Washers, Split Washer and M10 nut to stud.</td></tr>
</table>

7.3 Comms Unit Wiring



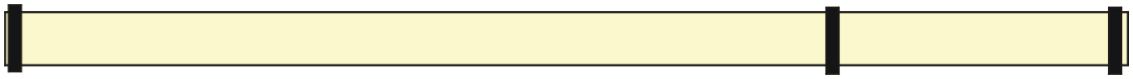
Connect the **Positive** wire from the battery bank to the Positive Busbar.
Secure with M10 Washers, Split Washer and M10 nut to stud.



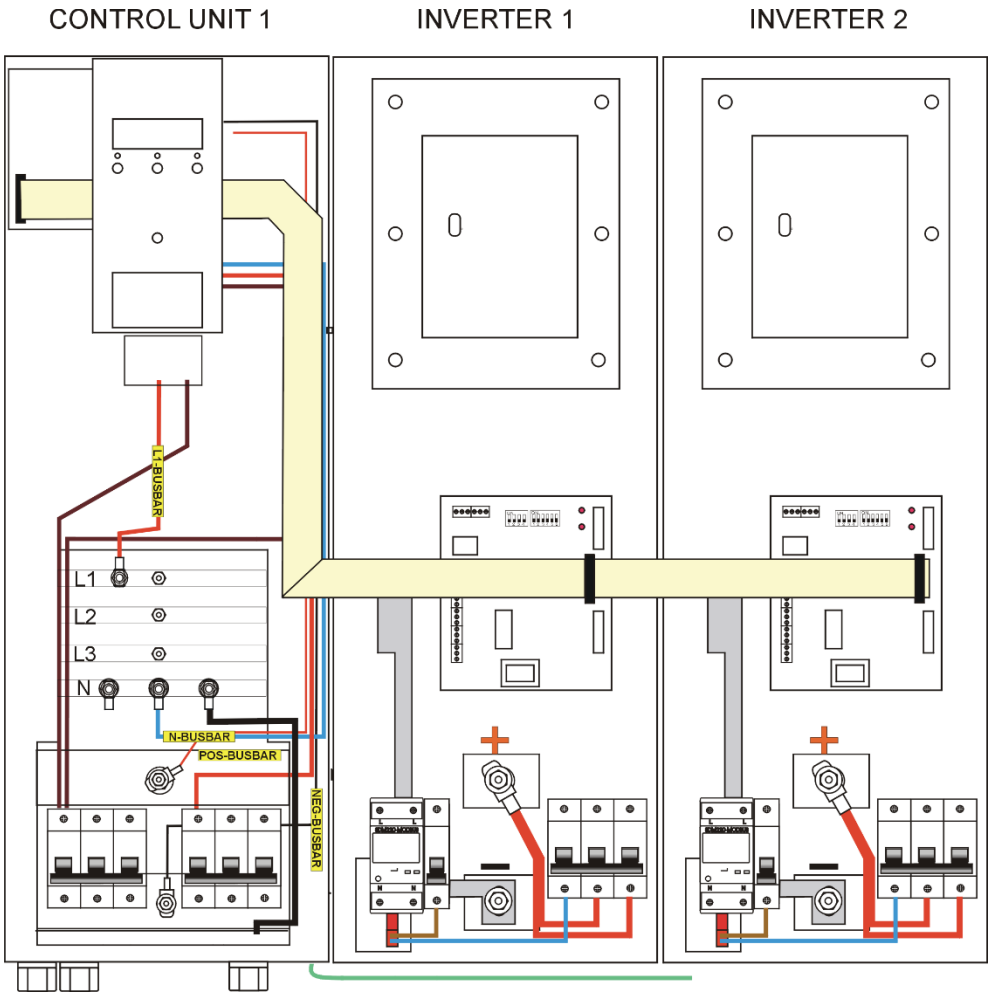
Connect the **Negative** wire from the battery bank to the Negative busbar.
Secure with M10 Washers, Split Washer and M10 nut to stud.

7.4 Communications Wiring

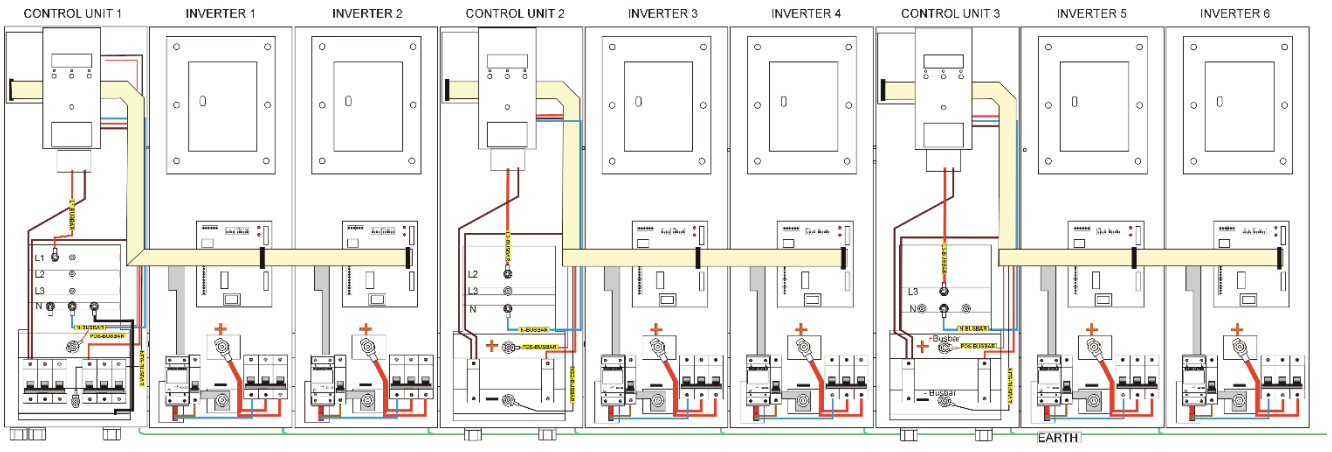
The communications cable is connected between:



- Control Unit 1 and Inverters 1 & 2.
- Control Unit 2 and Inverters 3 & 4.
- Control Unit 2 and Inverters 3 & 4.

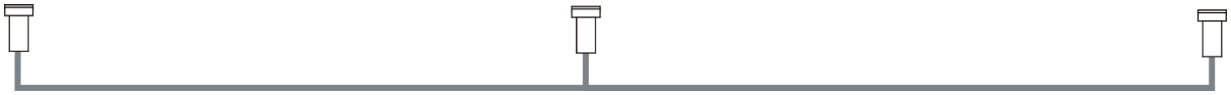


Complete Communications wiring for all Control Units and Inverters



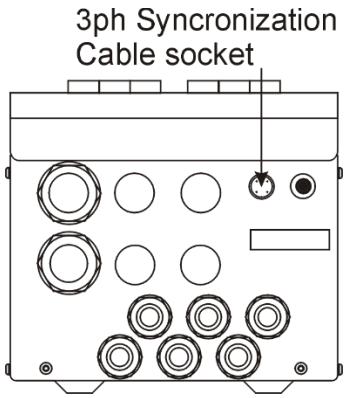
7.5 Synchronization Cable Wiring

The communications cable is connected between:

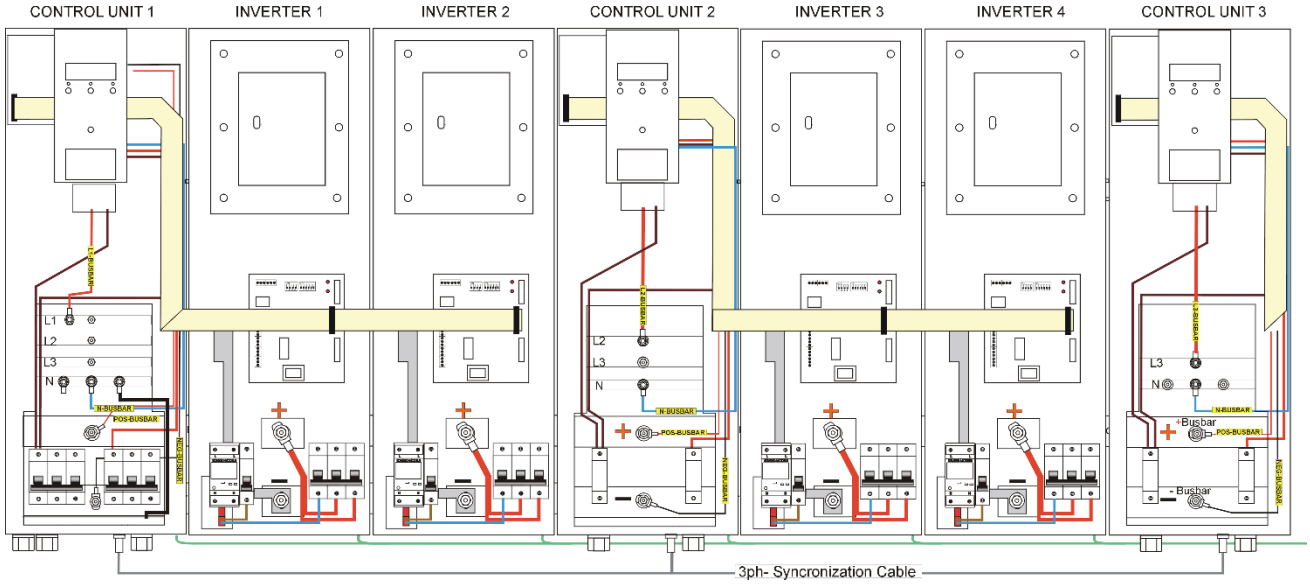


- Control Unit 1, Control Unit 2 and Control Unit 3.

Control Unit Bottom View

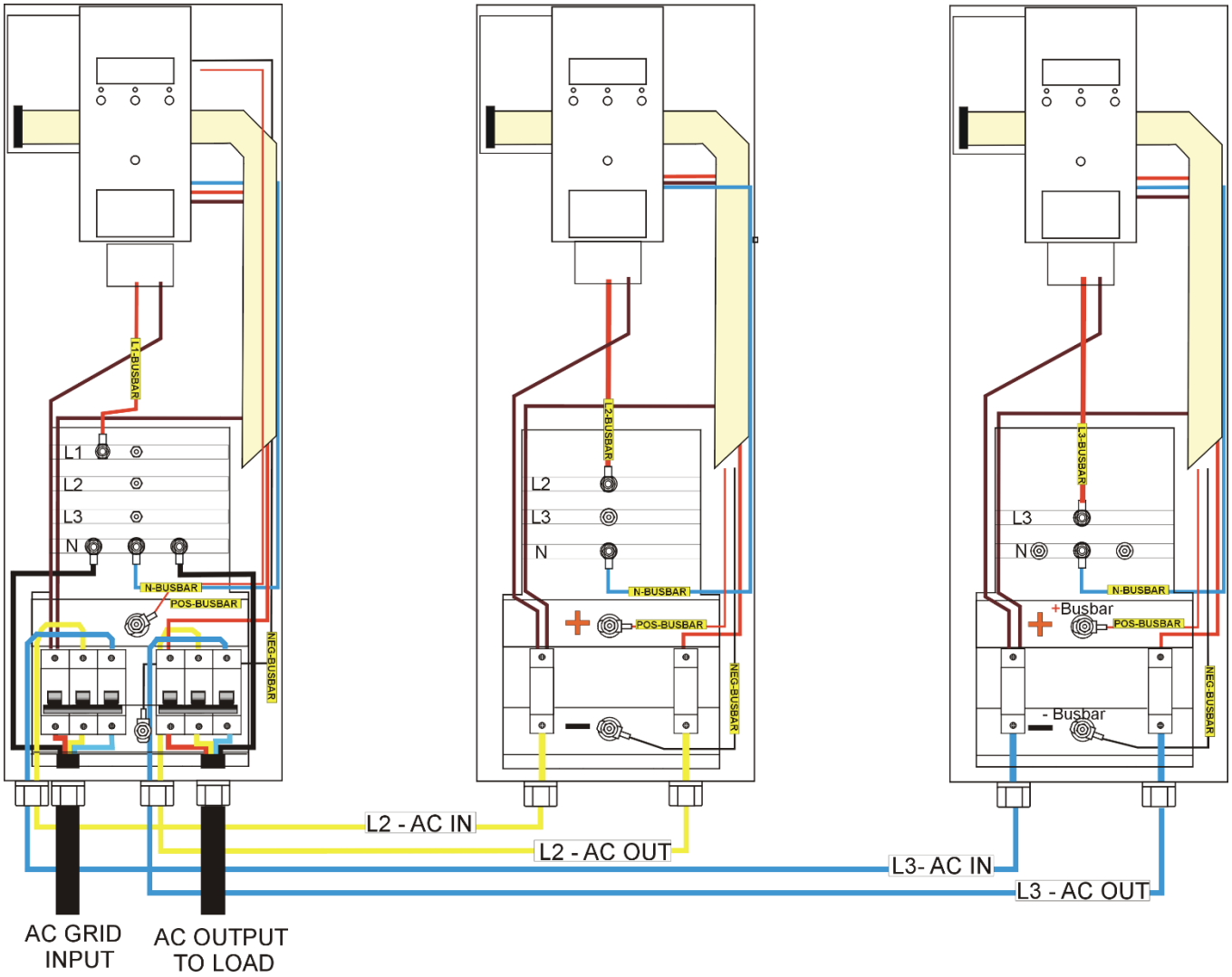


Complete Synchronization cable wiring between the 3 Control Units



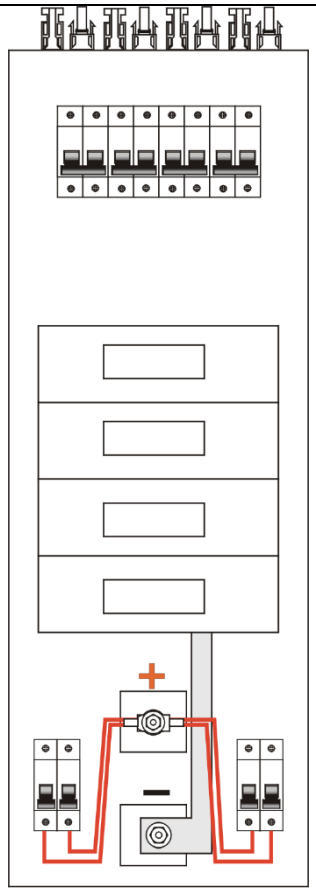
7.6 External AC Wiring

External wiring showing AC wiring between the 3 Control Units

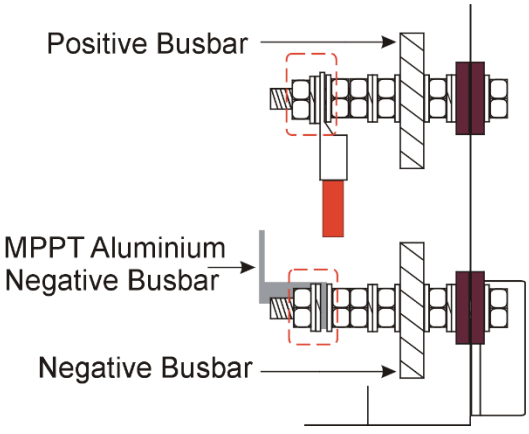


All the external AC wiring needs to be rated for the correct ampacity.

7.7 MPPT Wiring



Connect the 2 Positive wire lugs to the Positive Busbar.
Secure with M10 Washers, Split Washer and M10 nut to stud.



Connect the Negative aluminium busbar to the Negative busbar.
Secure with M10 Washers, Split Washer and M10 nut to stud.

7.8 Maintenance and service

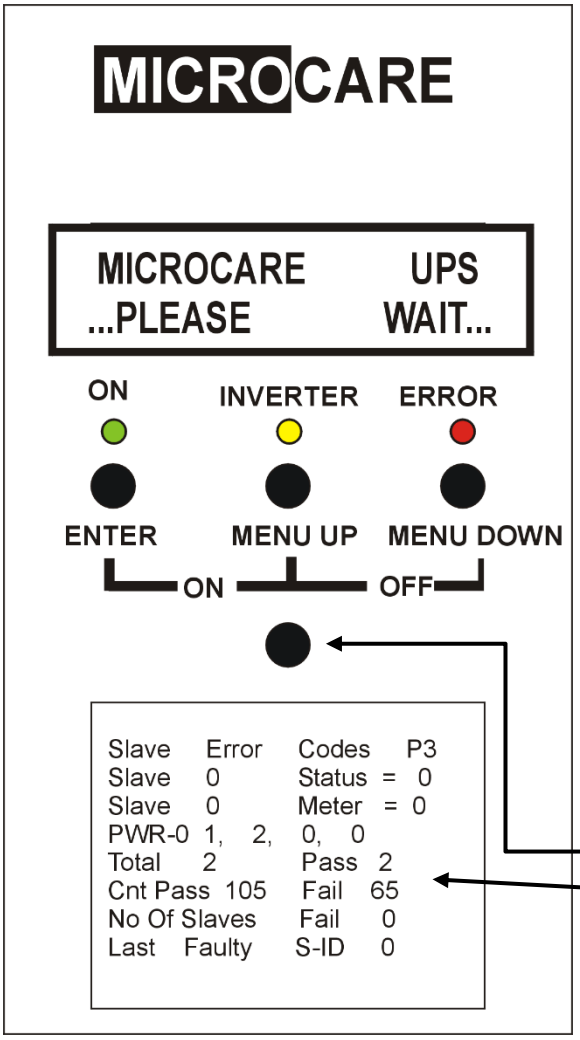
Caution – Risk of Electric Shock.
Batteries may cause electric shock and have a high short-circuit current.
Please take the precautionary measures specified below and any other measures necessary when working with batteries.
Remove wristwatches, rings and other metal objects.
Use only tools with insulated 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.

8. INVERTER OPERATION

8.1 Front Panel LCD Display/Keypad and Description

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.



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
Line Send	Navigates through the Line Send Screens.

For the ease of operation:

Enter =

Menu Up =

Menu Down =

Line Send Menu Button

Controller Extended Menu Button
Controller Extended Information Display

8.2 Controller Main Display Menu Button Operation

Press and hold both ↑ ↓ turns the inverter "OFF"

Press and hold both ↵ ↑ turns the inverter "ON".

Press and hold both ↑ ↓ turns the inverter "OFF"

Press the Extended Menu Button, toggles extended menu screens.

8.3 Controller Extended Information Display

The extended information displays 5 Menus, P1-P5

8.3.1 P1 - System Performance Overview

Active slaves 2		(Number of Inverters present)
System	OK	(Refer to the list the Error Codes “P1” list below)
System	Vol	(System Voltage)
System	PR	(Total Power)
System	Del	(Difference between Max/ Min Power)
System	KV*A*	(Total KVA)
System	PF	(Power Factor)

Error Codes (P1)

0	=	All is ok
1	=	Lost coms with a slave
2	=	Over temp Transformer only
3	=	Overloaded a slave (Watts)
6	=	A slave lost coms with its meter
7	=	AC bus voltage bus error
8	=	Power factor error

8.3.2 P2 - Slave Maximum and minimum parameters

	ID=Max	**ID=Min**	
TF	2=45	1=27	(Max/MinTemp) Inverter with max temp = ID2 Inverter With min temp = ID1
FET	1=53	2=27	
Pwr	1=900	2=870	(Max/Min Power) W
KVA	1=980	2=950	
PWR-0	1, 2, 0, 0		(INV ID’s With no Power output)

8.3.3 P3 - Slave Error Codes

Slave 0	Status = 0	Slave error codes from Inverter ID and status error code
Slave 0	Meter = 0	Slave error codes from Inverter ID and meter error code
PWR- 0	1, 2, 0, 0	(INV ID’s With no Power/Load)
Total 2	Pass 2	
Cnt Pass 185	Fail 65	(Comms packets received 185.. 65 not received)
No of Slaves	Fail	
Last Faulty	S-ID	

Status Error Code (P3)

0	=	Normal
1	=	Over temp FET
2	=	Over temp TF
3	=	Master coms lost

Meter error code (P3)

0	=	Normal
1	=	Overload W
2	=	Overload VA
3	=	Meter coms lost

8.3.4 P4 - Information

Firmware	V1R4		
Slaves	2		
TX Duty	106		
AC Sense	Yes		---AC Bus when inverter switched on---
Sys Trip	No		
Temperature	27		(Room Temp)

P5 - Controller Error Codes
Master Error Codes (List)

Now	=	All Clear (Current system status)
Log1	=	Error Logs
Log2	=	
Log3	=	

8.4 Inverter Status LED's Explained

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

8.4.1 Inverter ON and Grid Supplying the Load

Green LED = ON

		
ON	INVERTER	ERROR

8.4.2 Inverter ON and the Battery Supplying the Load "Inverter Mode"

Green and Yellow LED = ON

		
ON	INVERTER	ERROR

8.4.3 Inverter Displaying WARNING "Battery Low Battery Capacity"

Green, Orange and Red = ON

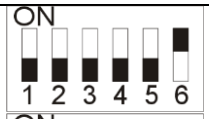
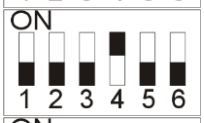
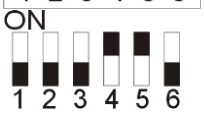
			**WARNING!!! LOW BATTERY CAPACITY** Steady "ON", Green , Yellow and Red LED Buzzer sounds continuously Press ↵ to clear the buzzer and warning
ON	INVERTER	ERROR	

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

			**UPS LOW/HIGH BATTERY** Steady "ON", Yellow and Red LED Buzzer sounds continuously
ON	INVERTER	ERROR	

8.5 Inverter Address Settings

The inverter address settings are set at the factory. The table is for reference purposes only.

Address Number	Dip Switch Setting
1	
2	
3	
4	
5	
6	

9. MINI-GRID STRART-UP PROCEDURE

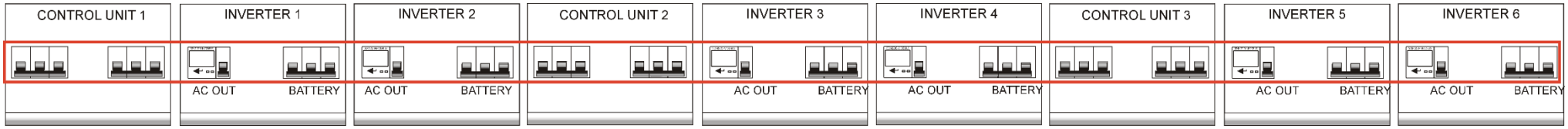
9.1 Checks Prior To Start-Up

- The Inverters/Control Unit and MPPT/s are secured.
- All DC circuit Breakers are turned off.
- All AC Input/Output breakers are turned off.
- AC supply to the Mini-Grid switched off.
- All battery breakers on the Mini-Grid turned off.
- Battery isolator is switched off.
- External AC Load circuit breaker is turned off.
- Check if the Input and Output cables are secured.
- Make sure that all the wire connections are secured and tightened at all the circuit breaker and wire connection terminals.
- Do not proceed if you do not have the test equipment.

Equipment Required:

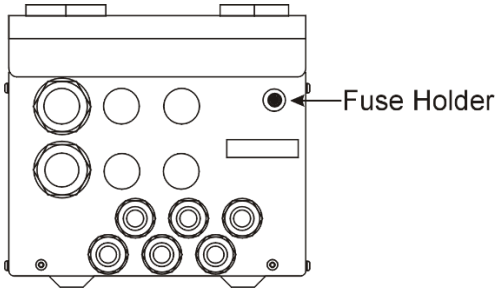
- Multi Meter
- AC/DC Clamp Meter

Step 1: Ensure that all the Mini Grid circuit breakers are in the “OFF” position.



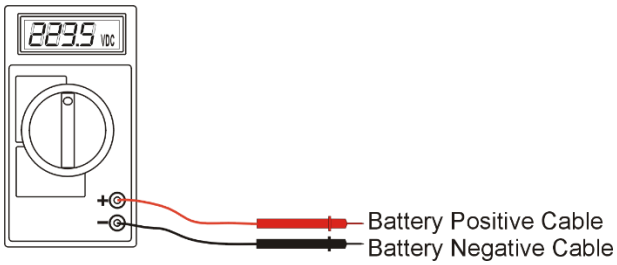
Step 2: Control Unit Fuse Removal

- Unscrew the fuse holder cap and remove each fuse from the 3 Control Unit fuse holders.
- The fuse is located at the bottom right.

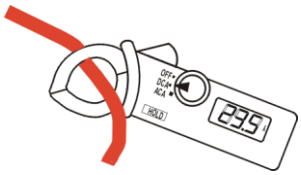


Step 3: Voltage and current check.

- Measure the battery voltage at the battery bank.
- Check if the battery polarity is correct at the battery isolator.
- The battery voltage should be in the specified range.
- If the batteries were fully charged when installed the battery voltage should be +/- 51V.

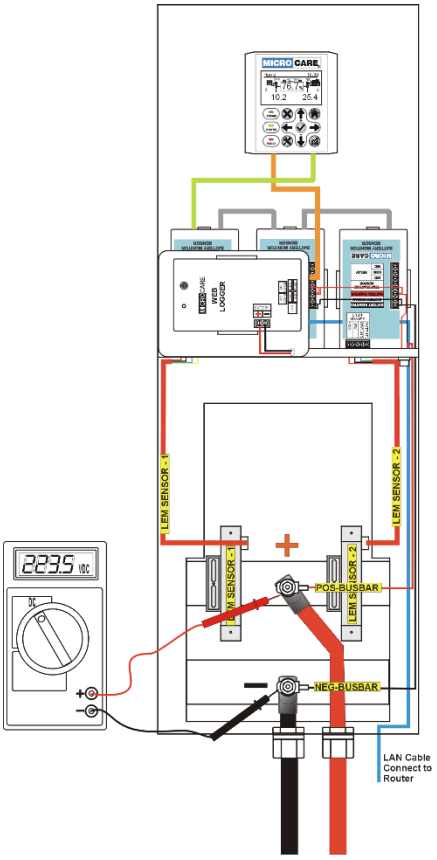


- Step 4: Connect a DC current clamp.
- Connect a DC current clamp around the Positive battery cable. If more than one Positive cable, clamp around both Positive cables.
- The current should read “0 Amps”.



Step 5: Turn the external battery isolator on.

- Measure the DC voltage on the DC Busbars inside battery connection unit.
- Check the polarity.
- Check the battery voltage.



Step 6: Turn off the battery isolator.
Re-fit the control unit fuses for all 3 Control Units.

Step 7: Turn the battery isolator “ON”.

Each control unit starts up and the display shows the following for each Control Unit.

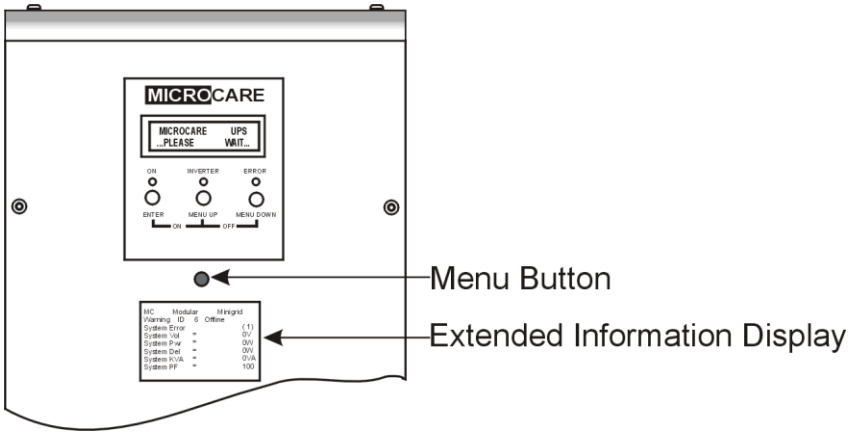
MICROCARE UPS **…PLEASE WAIT…**	**UPS TURNED OFF** **…CALIBRATING…**	**UPS TURNED OFF**

Press the ENTER Button on Control Unit once and the display changes to:

MICROCARE 10KW **OUTPUT = LOW**

Step 8: System status check

- The extended information display is located on the Control Unit of each phase.
- It displays most of the systems information.



- The Extended Information display shows the following on each control unit.
- Push the Menu Button to scroll to the next menu.

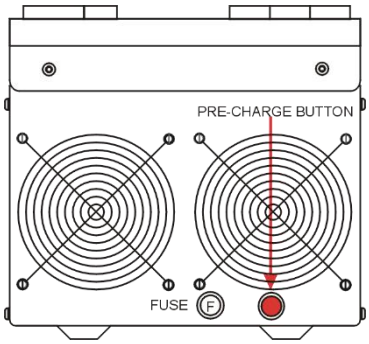
P1			P2						P3			
MC Modular Minigrid			Slave					P2	Slave Error Codes			P3
Warning ID 2 Offline				1D =	MAX	ID =		MIN	Status	Err = 0	ID	0
System Error		(1)	TF	1 =	0	1 =		0	Meter	Err = 0	ID	0
System Vol	=	0V	FET	1 =	0	1 =		0				
System Pwr	=	0W	Pwr	1 =	0	0 =		0	Total 2		Pass	0
System Del	=	0W	KVA	1 =	0	0 =		0	Cnt Pass 39		Fail	77
System KVA	=	0VA	PWR-0	0,	0,	0,	0		No Of Slaves		Fail	2
System PF	=	100							Last Faulty		S-ID	2

P4			P5		
Info		P4	Master Error Codes P5		
Firmware		V1R7	Error Code =		(0)
Slaves		2	Now = Coms Lost		
Control	Signal	1024	Log = Coms Lost		
AC	Bus	OFF	Lo3 = All clear		
Sys	Trip	NO	Lo3 = All clear		
Room	Temperature	25			
DIP:	0000				

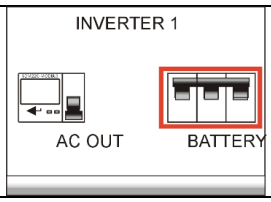
9.2 Pre-Charging the Inverters

WARNING

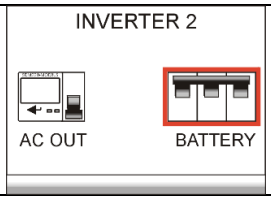
- Each inverter must be pre-charged before turning the inverters battery breaker “ON”.
- The following steps must be followed.
- Familiarize yourself with the location of each inverters pre-charge button as seen below.
- The pre-charge button is located at the bottom of each inverter.



Pre-Charge Inverter 1

Push the “PRE-CHARGE” button for 10 seconds. Turn “ON” Inverter 1 - Battery circuit breaker.	

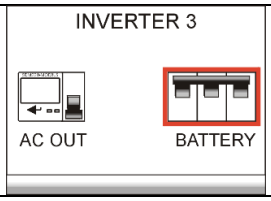
Pre-Charge Inverter 2

Push the “PRE-CHARGE” button for 10 seconds. Turn “ON” Inverter 2 - Battery circuit breaker.	

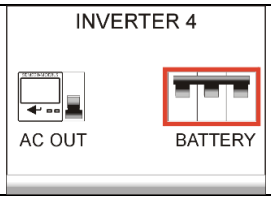
The Extended Information display ON Control Unit 1 shows the following.
Confirming that Inverters 1 and 2 are communicating with the Control Unit 1.

MC Active	Modular Slaves	Minigrid 2
System		OK
System Vol	=	1V
System Pwr	=	0W
System Del	=	0W
System KVA	=	0VA
System PF	=	0

Pre-Charge Inverter 3

Push the “PRE-CHARGE” button for 10 seconds. Turn “ON” Inverter 3 - Battery circuit breaker.	

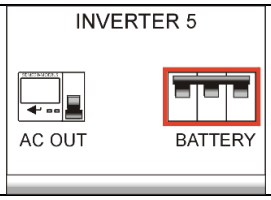
Pre-Charge Inverter 4

Push the “PRE-CHARGE” button for 10 seconds. Turn “ON” Inverter 4 - Battery circuit breaker	

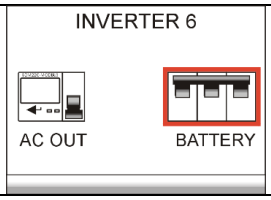
The Extended Information display ON Control Unit 2 shows the following.
Confirming that Inverters 3 and 4 are communicating with the Control Unit 2.

MC Active	Modular Slaves	Minigrid 2
System		OK
System Vol	=	1V
System Pwr	=	0W
System Del	=	0W
System KVA	=	0VA
System PF	=	0

Pre-Charge Inverter 5

Push the “PRE-CHARGE” button for 10 seconds. Turn “ON” Inverter 5 - Battery circuit breaker	

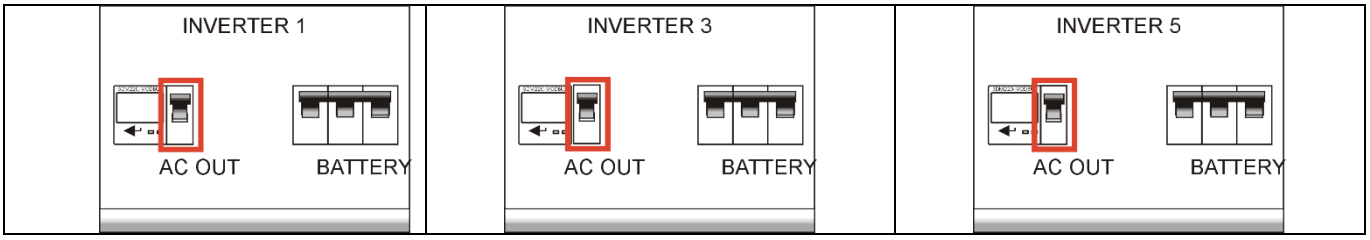
Pre-Charge Inverter 6

Push the “PRE-CHARGE” button for 10 seconds. Turn “ON” Inverter 6 - Battery circuit breaker	

The Extended Information display ON Control Unit 3 shows the following.
Confirming that Inverters 5 and 6 are communicating with the Control Unit 3.

MC Active	Modular Slaves	Minigrid 2
System		OK
System Vol	=	1V
System Pwr	=	0W
System Del	=	0W
System KVA	=	0VA
System PF	=	0

Turn “ON” the following “AC OUT” Circuit Breakers, “Inverter 1,3 and 5 only”.



9.3 Turning the Mini-Grid "ON"

The Mini-Grid is controlled via Control Unit 1

Press and hold both Control Unit 1 **and** **buttons** for up to 3 seconds.

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

MICROCARE	**10KW**
INVERTER	**ON**

All the control units will beep twice. On first start-up the slaves will beep continuously.

Push the once on Slave 1 and Slave 2. This clears the beeping noise.

It is important to scroll through the following screens.

Observe the Main Menu

Use the button to view the menu displays on the LCD screen explained below.

Power rating of the Mini-Grid

MICROCARE		**30KW**
OUTPUT	**=**	**LOW**

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

At this stage it is important that it shows Inverter = 0%

Due to no load connected to the inverter.

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.

Push the button.

Battery Volts and Amps

BATT VOLTS	**: 54.2**
BATT AMPS	**: LOW**

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

The battery BATT AMPS should be LOW.

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

The voltage

Push the button.

Output Volts and Amps

UPS VOLTS	**: 220**
UPS AMPS	**: LOW**

AC Output voltage and amps that the load is drawing.

In inverter mode.

The UPS AMPS should now be LOW.

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

Push the button.

Temperature

TEMPERATURE
26.3 Deg/Cel

Shows the internal temperature of the inverter.

Push the button.

Signal Strength

SIGNAL	**STRENGTH**
DISPLAY- UPS	**100%**

Shows the control cards have 100% communication.

Push the button.

Serial Number

Serial Number:
MCxxxxx

Shows the Serial number of the inverter.

Observe the following on the Extended Menu Display

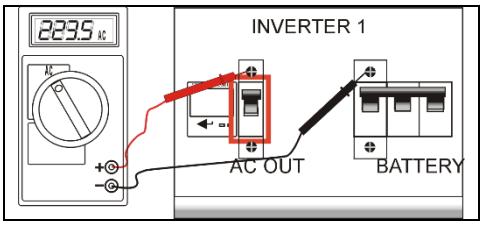
P1	P2	P3
MC Modular Minigrid Active Slaves 2 System OK System Vol = 22727V System Pwr = 0W System Del = 0W System KVA = 2VA System PF = 100	Slave P2 1D = MAX ID = MIN TF 1 = 24 2 = 0 FET 2 = 24 1 = 7 Pwr 1 = 0 0 = 0 KVA 2 = 5 0 = PWR-0 1, 2, 0, 0	Slave Error Codes P3 Status Err = 0 ID 0 Meter Err = 0 ID 0 Total 2 Pass 2 Cnt Pass 70 Fail 0 No Of Slaves Fail 0 Last Faulty S-ID 0
P4	**P5**	
Info P4 Firmware V1R5 Slaves 2 Control Signal 48 AC Bus LIVE Sys Trip NO Room Temperature 25 DIP: 0000	Master Error Codes P5 Error Code = (0) Now = All clear Log = All clear Lo3 = All clear Lo3 = All clear	

- Note the energy meters are now active and this indicates the Mini-Grid communication is present.
- The P1 Menu, System Vol “System Voltage” must be divided by 10. For the above System Vol = 22727V. Thus 22727/10= 227V

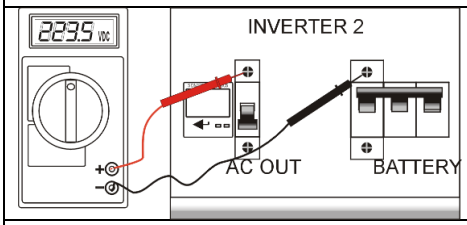
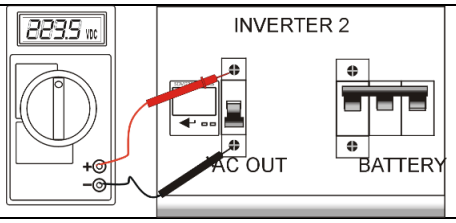
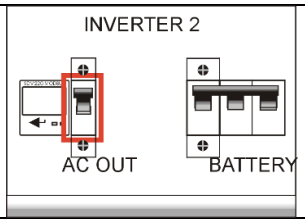
9.4 Test Measurements

Step 1: Measure Inverter 1 – Output Voltage

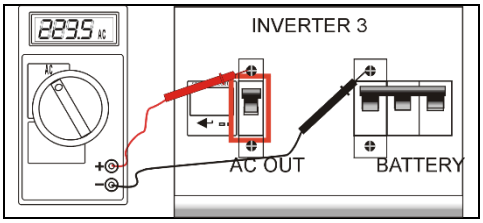
With Multi meter set to AC voltage:
Measure the voltage between the terminals as shown below on Inverter 1.
Should read +/-220V.



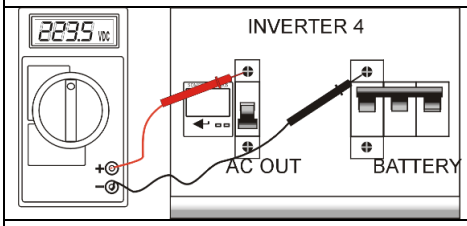
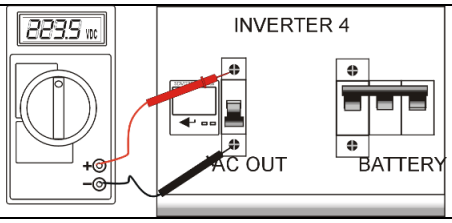
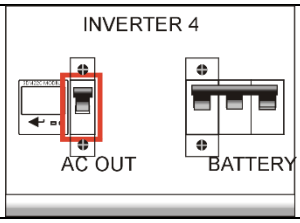
Step 2: Measure Inverter 2 – Output Voltage

Measure the AC voltage	Measure the AC Voltage	Turn on Inverter 2 - AC OUT Circuit Breaker
		
Voltage should be 220V	Voltage should be less than 5V	

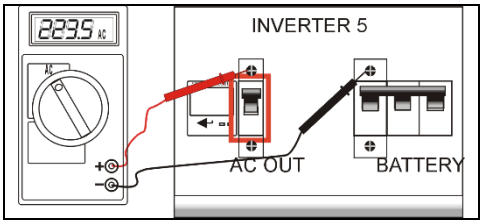
Step 3: Measure Inverter 3 – Output Voltage
Measure the voltage between the terminals as shown below on Inverter 3.
Should read +/-220V.



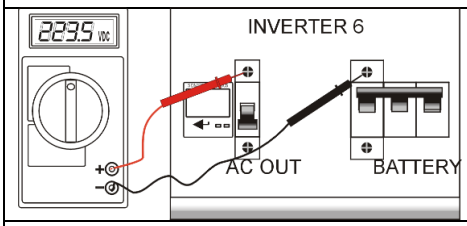
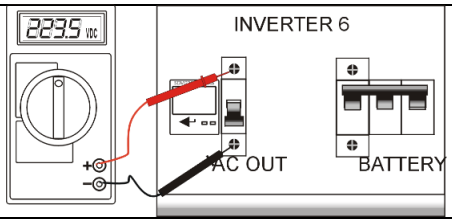
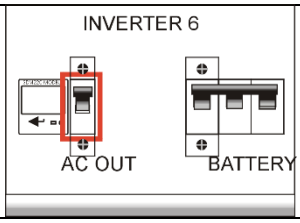
Step 4: Measure Inverter 4 – Output Voltage

Measure the AC Voltage	Measure the AC Voltage	Turn on Inverter 4 - AC OUT Circuit Breaker
		
Voltage should be 220V	Voltage should be less than 5V	

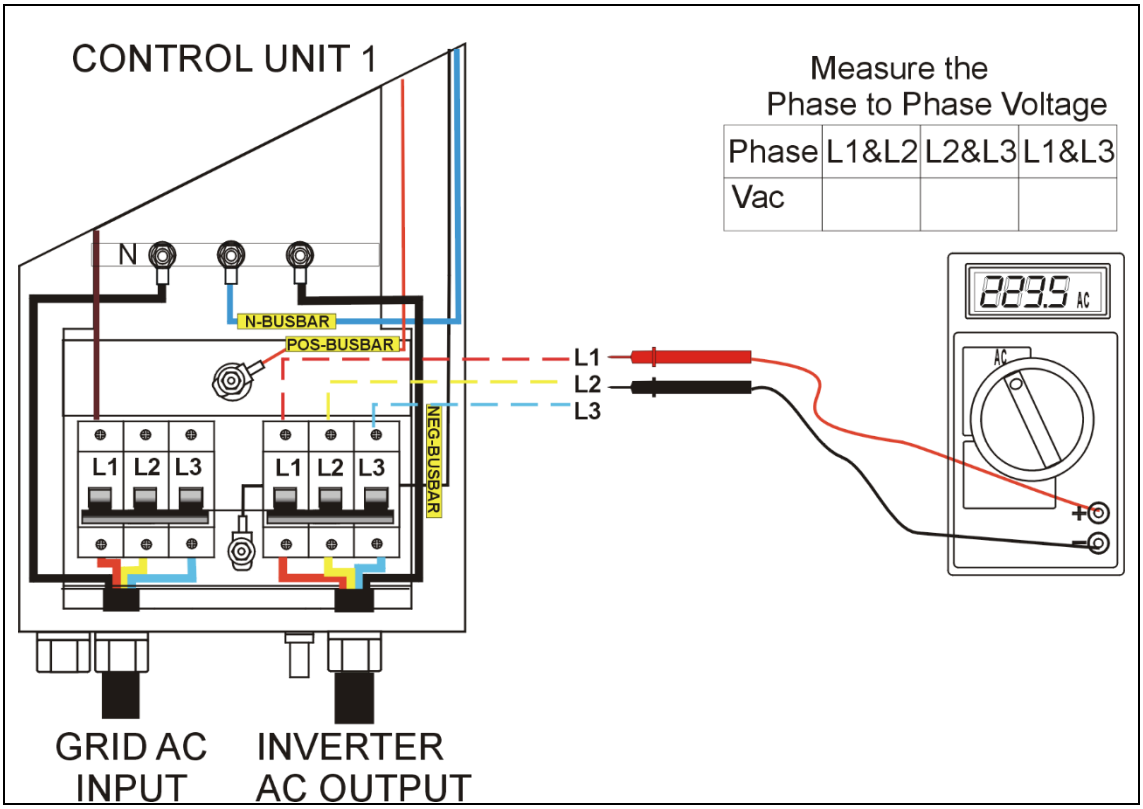
Step 5: Measure Inverter 5 – Output Voltage
Measure the voltage between the terminals as shown below on Inverter 5.
Should read +/-220V.



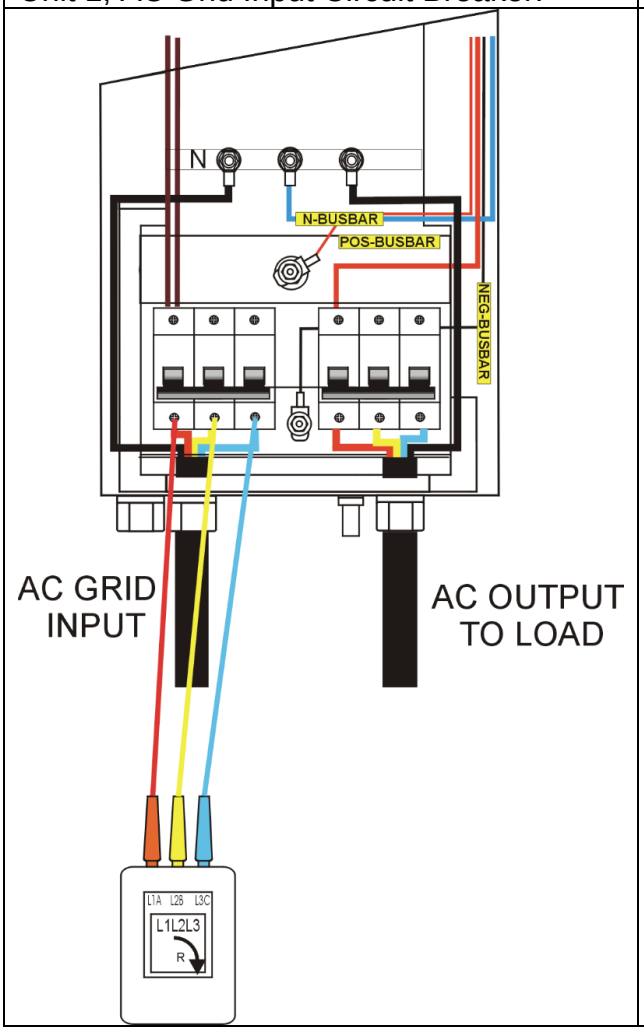
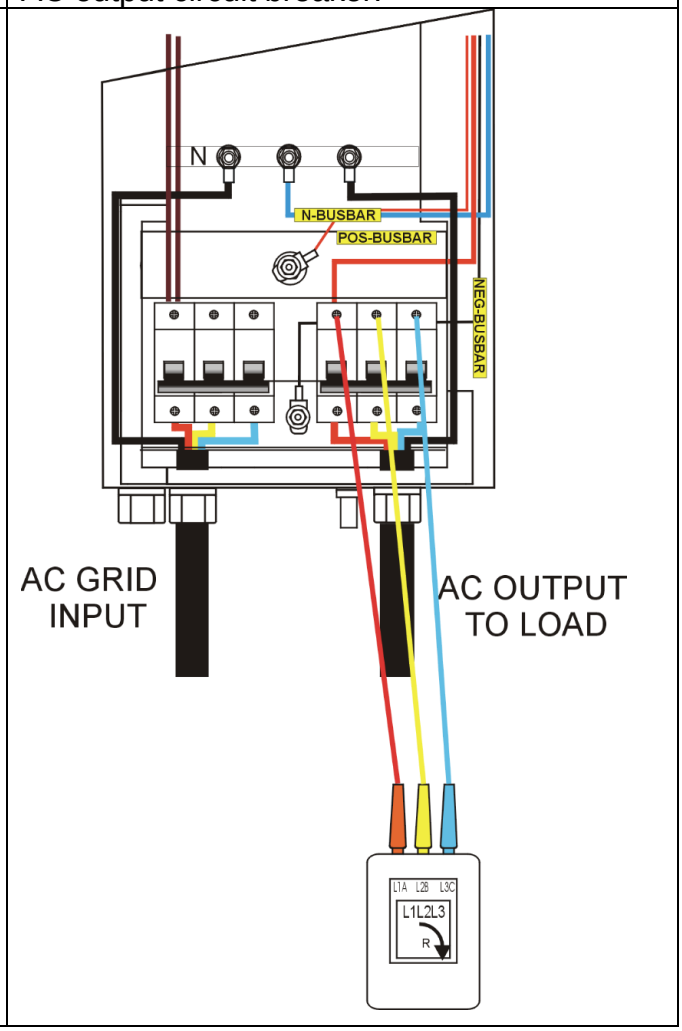
Step 6: Measure Inverter 6 – Output Voltage

Measure the AC Voltage	Measure the AC Voltage	Turn on Inverter 6 - AC OUT Circuit Breaker
		
Voltage should be 220V	Voltage should be less than 5V	

Step 7: Measure and record the 3-Phase Line-Line Voltages



9.5 Phase Rotation Test

Check the Phase rotation on the Control Unit 1, AC Grid Input Circuit Breaker.	Check the Phase rotation on Control Unit 1, AC output circuit breaker.
	

If the Phase rotation is the same on both circuit breakers, then proceed to testing the Mini-Grid as explained in the next section.
If the phase correction is not the same, Control Unit 2 and Control Unit 3 need to be re-programmed.
The Control units are factory programmed:

- Control **Unit 2** as **Slave 1.**
- **Control Unit 3** as **Slave 2.**

Refer to the Setup Settings Guide Section 14 and program:

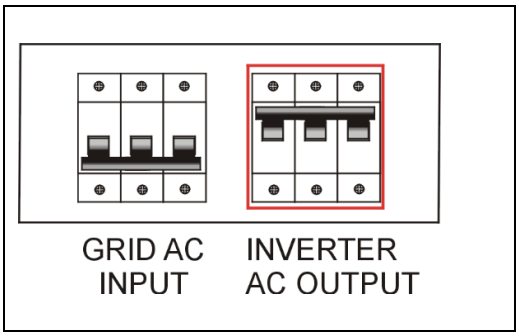
- Control **Unit 2** as **Slave 2.**
- **Control Unit 3** as **Slave 1.**

Check the phase rotation again. If the Grid phase rotation and the Mini-Grid phase rotation is the same, then proceed to testing the Mini-Grid as explained in the next section.

10. TESTING THE MINI-GRID

10.1 Load Test

Turn On Control Unit 1- INVERTER AC OUTPUT circuit breaker.



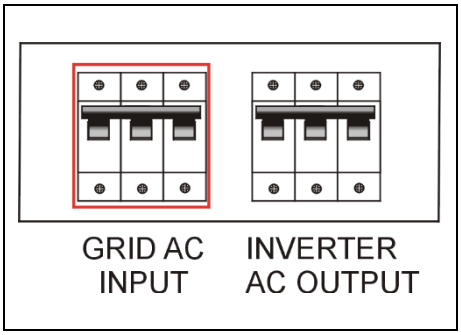
Connect a small single-phase load e.g.: 1kW to phase 1.
Observe the following on the Extended Menu Display from the relevant Control Unit.
Repeat the steps for Phase 2 and Phase 3.

P1			P2						P3				
MC	Modular	Minigrid	Slave					P2	Slave	Error	Codes	P3	
Active	Slaves	2		1D	=	MAX	ID	= MIN	Status	Err = 0	ID	0	
System		OK	TF	1	=	24	2	= 0	Meter	Err = 0	ID	0	
System Vol	=	22727V	FET	2	=	24	1	= 7					
System Pwr	=	1000W	Pwr	1	=	500	0	= 500	Total	2	Pass	2	
System Del	=	10W	KVA	2	=	500	0	= 500	Cnt Pass	70	Fail	0	
System KVA	=	1000VA	PWR-0	0,		0,	0,	0	No Of Slaves		Fail	0	
System PF	=	99							Last	Faulty	S-ID	0	

P4			P5			
Info		P4	Master	Error	Codes	P5
Firmware		V1R5	Error Code =			(0)
Slaves		2	Now = All	clear		
Control	Signal	48	Log = All	clear		
AC	Bus	LIVE	Lo3 = All	clear		
Sys	Trip	NO	Lo3 = All	clear		
Room	Temperature	25				
DIP:	0000					

10.2 Testing the Mains Change Over

Turn On Control Unit 1- INVERTER AC OUTPUT circuit breaker.



10.3 Grid Volts and Grid Amps Readings

Scroll to the Grid Volts and Amps section on each control Unit inverter display.
Grid Volts and Amps is displayed as on the right.
This status menu is displayed when running from the grid, the Green LED is on.

GRID VOLTS	**: 227**
GRID AMPS	**: 5.0**

10.4 Switching the Mini-Grid On & Off

10.4.1 Switching the inverter "ON"

MICROCARE UPS
…PLEASE WAIT…

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)

MICROCARE 30KW
INVERTER ON

10.4.2 Switching the inverter "OFF"

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

MICROCARE 30KW
INVERTER OFF

11. 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.

11.1 Power rating of the UPS

MICROCARE 30KW
INVERTER = 47%

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

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.

11.2 Battery Volts and Amps

BATT VOLTS : 54.2
BATT AMPS : 7.0

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.

11.3 Battery Charge Amps and Volts

BATT VOLTS : 54.2
CHGR AMPS : 10.0

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.

11.4 Output Volts and Amps

UPS VOLTS : 220
UPS AMPS : 7.0

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.

11.5 Grid Volts and Grid Amps

GRID VOLTS : 227
GRID AMPS : 10.0

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.

11.6 Temperature

Internal temperature of the inverter.

TEMPERATURE
26.3 Deg/Cel

11.7 Signal Strength

Control cards in the Inverter have 100% communication.

SIGNAL STRENGTH
DISPLAY- UPS 100%

11.8 Serial Number

Serial number of the inverter.

SERIAL NUMBER
MC:xxxxxxx

11.9 System Setup

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

ENTER
SETUP MENU?

11.10 Battery Setup

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

ENTER
BATTERY MENU?

11.11 Exit & Save

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

EXIT AND SAVE
SETUP MENU?

11.12 Restore Factory Settings

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

RESTORE FACTORY
SETUP MENU?

11.13 Exit Do Not Save

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

EXIT DO NOT SAVE
SETUP MENU?

12. BATTERY SETUP SETTINGS

12.1 Battery Setup Procedure

Note: Charging is only allowed from the Phase 1 inverters and is controlled with Control Unit 1.
If a Jimmy Box is installed charging must be disabled from Control Unit 1 – "Charge Level 1".
Charging from Slave 1 "Control Unit 2" and Slave 2 "Control Unit 3" must always be turned off.
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 Charge Rate

12.2 Battery Charging Rate

BATTERY	CHARGE
LEVEL (X)	SELECTED

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

LEVEL 1 - TURNED OFF
LEVEL 2 – 5% OF RATES CHARGE
LEVEL 3 - 25% OF RATED CHARGE
LEVEL 4 - 50% OF RATED CHARGER (Default)
LEVEL 5 - 75% OF RATED CHARGE
LEVEL 6 – 100% OFRATED CHARGE

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

Battery Charging rates

INVERTER	**Charging Rate (A)**				
30kW48V	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.
Overcharging and undercharging can reduce the life of the batteries.

Please Note:

This Mini-Grid 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.

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

12.3 AC Input Power From Generator

AC INPUT
POWER LEVEL (X)

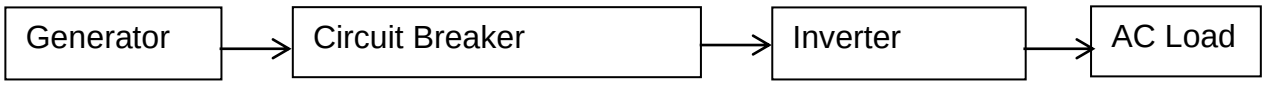
To change the **AC INPUT POWER** settings, Press ↵

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.



Circuit breaker must be placed within 1m from the Inverter

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

---

12.4 Battery Boost Voltage

BATTERY BOOST
BST = 58.4 V

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

This allows the user to adjust the **BATTERY BOOST** voltage.
The boost settings can be changed as below.

12.4.1 Battery Boost Voltage Settings

Battery Boost Voltage

48V System	
57.2	
58.4	
59.6	
60.8	
62	

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

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

12.5 Battery Boost Time

BATTERY BST TIME
BST FOR 2 HOURS

To change the **BATTERY BOOST TIME** settings, Press
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, 2 or 3 hours.

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

---

12.6 Battery Low Voltage Shut Down

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

BATTERY	**LOW**
OF AT	**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.

Battery Low Shutdown Voltage

48V System	
40	
42	
44	
46	
48	
50	

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

---

12.7 Force Charge

FORCE	**BAT**	**INTO**
AUTO		**CHARGE**

To change the **FORCAE BAT INTO** settings, Press
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.

EXIT AND SAVE SETUP MENU?	OR	**RESTORE FACTORY SETUP MENU?**	OR	**EXIT , DO NOT SAVE SETUP MENU?**

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

13. SETUP MENU SETTINGS

13.1 Setup Menu Settings

ENTER		
SETUP	MENU	?

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

Press ↵ to enter the **SETUP** menu.

The menu changes to UPS MODE

13.2 UPS Mode

UPS	MODE
MANUAL	SENSE

For 3-Phase Operation use **Manual Sense** Only.
Do Not change this setting unless the wrong UPS mode is selected.

To change the **UPS MODE** settings press ↵.
The UPS Mode settings can be changed as follows:

- Manual Sense – Only Select Manual Sense
- Auto Sense – Do Not Use
- Solar Control – Do Not Use

To change the next Menu, press ↑, the menu changes to: Inverter Cluster

---

13.3 Inverter Cluster

INVERTER	CLUSTER
MASTER	PHASE 1

To change the **Inverter Cluster** settings press ↵.
The Cluster settings can be changed as follows:
The Inverter Cluster setting for the Mini-Grid is pre-programmed at the factory.

- Control Unit 1 as Master Phase 1
- Control Unit 2 as Slave Phase 2
- Control Unit 3 as Slave Phase 3

Inverter Cluster Settings

- Master Phase 1
- Slave Phase 2
- Slave Phase 3
- Slave Parallel – Do Not use
- Stand Alone Inv – Do Not Use

To change to the next Menu, press ↑, the menu changes to: GTI Shift Freq

---

13.4 GTI Shift Freq

GTI	SHIFT	FREQ
SHIFT	TO	50HZ

For 3-Phase Operation the GTI Shift Freq = 50HZ
Do Not change this setting unless the wrong frequency is displayed.

To change the **GTI Shift Freq** settings press ↵.
The Menu settings can be changed as follows.

GTI Shift Freq Settings

- 50Hz – Only select 50Hz
- 52Hz – Do Not Use
- 52.5Hz – Do Not Use
- 52.7Hz – Do Not Use
- 53Hz – Do Not Use

To change to the next Menu, press ↑, the menu changes to: Mains Monitoring

13.5 Mains Monitoring

MAINS MONITORING
LEVEL 2 SELECTED

To change the **GTI Shift Freq** settings press ↵.
The Menu settings can be changed as follows.

Mains Monitoring Settings

- Level 1
- Level 2
- Level 3

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

13.6 Load Monitoring

LOAD MONITORING
HIGH NO RESET

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

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.

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 Save

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

EXIT AND SAVE SETUP MENU?

OR

RESTORE FACTORY SETUP MENU?

OR

EXIT , DO NOT SAVE SETUP MENU?

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

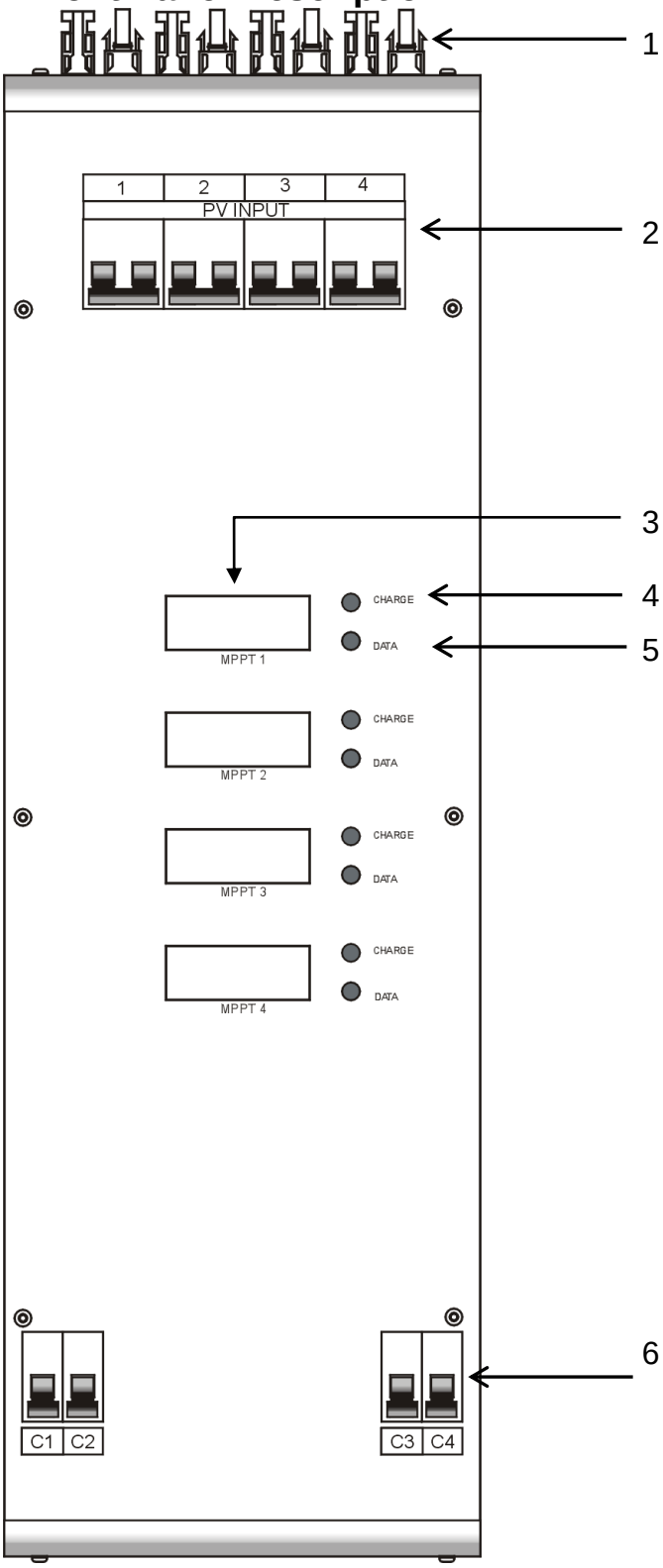
SAVING DATA PLEASE WAIT

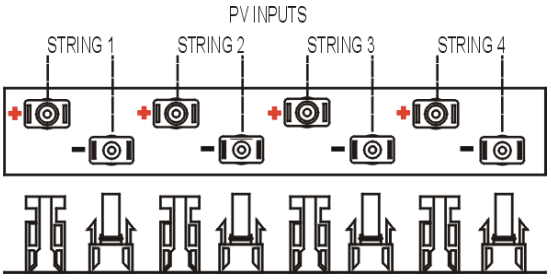
When ↵ is pressed then the inverter shows:

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

14. MPPT OVERVIEW

14.1 Front Panel Description





	Description
1	PV Inputs
2	Panel Circuit Breakers
3	LCD Display
4	Charge Button
5	Data Button
6	Battery Circuit Breakers

Button Function Description

Button Name	Function description
Charge	Stores selected programming values, selects charging modes
Data	Increment's programming values

14.2 Checks Prior To Start-Up

- Ensure the MPPT's are mounted vertically.
- Check if the input output cables are secured.
- Check if the polarity of the panels and battery are correct.
- Check if the Panel Voltage meets the MPPT rating required.

14.3 MPPT Start-up Procedure

- Always turn on battery breakers first.
- Wait until MPPT Display states that the MPPT is sleeping.
- Turn on Panel Breakers.
- MPPT will track the PV Panels.
- MPPT will start charging the batteries.

PLEASE BE AWARE:

WARRANTY WILL BE NULL AND VOID IF PANEL SURGE PROTECTION IS NOT INSTALLED WITH ALL LCD MPPT INSTALLATIONS

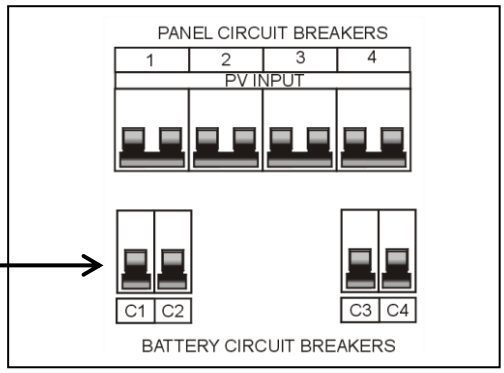
Please Note:
This MPPT is pre-programmed with a set of default values.
These settings might not be correct for your battery type.
Please contact your battery supplier for your battery specifications
"Battery Float Voltage, Boost Voltage, Boost to Float Time "Absorb Time".
and program the MPPT accordingly

15. LCD MPPT OPERATION

Please follow the instructions below for basic MPPT operation.

Turn ON the battery circuit breakers,

"C1, C2, C3 & C4



Please note:

Starting the MMPT

- Always turn "ON" the battery circuit breakers first.
- Then turn "ON" the panel circuit breakers.

Shutting down the MPPT

- Always turn the panel Circuit breakers "OFF".
- Then turn the Battery circuit breakers "OFF".

The following screen should appear:

This shows the name of the supplier, contact number and serial number

The screen changes to:

```
Supplied by
Supplier Details
Supplier Tel Number
Serial No = MC *****
```

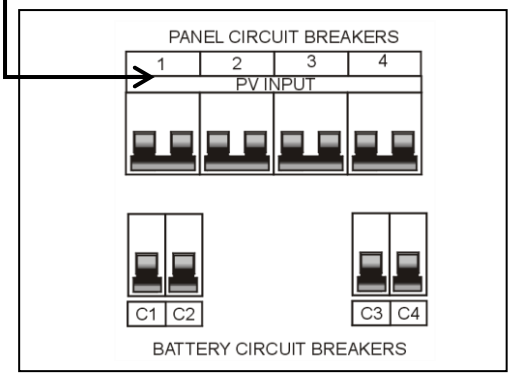
This shows the unit automatically measuring the batteries and displaying the result.
Should the battery voltage shown be incorrect it is possible to force the MPPT to accept a new battery value.

```
. . . Start up . . .
Checking Batteries
 48 volt system
.....
```

The screen changes to:

```
MICROCARE MPPT 40Amp
      Panel  is  LOW
 . . . MPPT   sleeping . . .
Battery              = 49.0V
```

Turn ON the Panel Circuit Breaker "1, 2, 3, 4"



Start Up Screen

The following screen should appear:

This shows the MPPT measuring the open circuit panel voltage and calculating the initial power point voltage.

The screen then changes to:

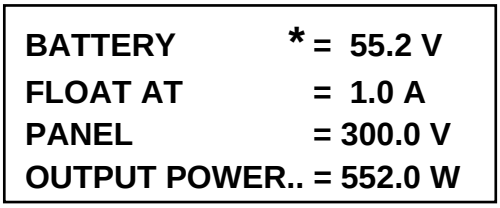
```
TRACKING
MAXIMUM POWER POINT
V power point...xxxV
```

This is the screen that will normally be displayed showing the system operating correctly.

```
BATTERY          = 49.0V
BOOST at  *      =  10.0A
PANEL            = 300.0V
OUTPUT POWER     = 490W
```

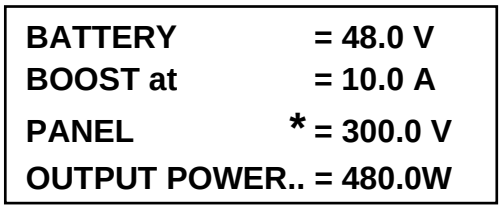
15.1 Float Mode

The * flashing next to the **BATTERY** indicates that the **MPPT is in FLOAT mode** and the batteries are full.



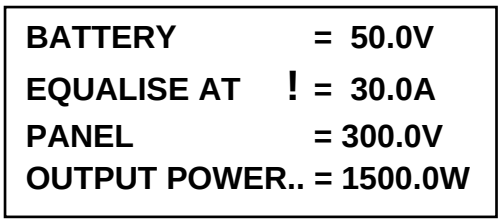
15.2 Panels Limiting Energy

The * flashing next to the **PANEL** indicates that the PV panels are limiting the amount of energy delivered to the MPPT to charge the batteries.

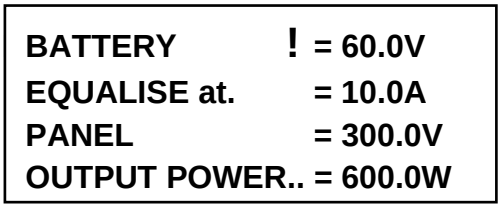


15.3 Equalise Mode

The! sign next to the **EQUALISE AT** line indicates that the batteries are being charged in the Equalise mode and the batteries have not reached the "**Equalise Voltage**", for every 12volt in the battery pack, system this would be 15 volts.

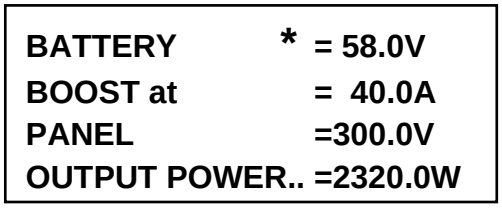


Once the batteries have reached the EQUALISE VOLTAG then the display will change to
This shows that the battery is at the **EQUALISE Voltage** and that the MPPT is in the 1-hour bulk charge mode.



15.4 Boost Charge Mode

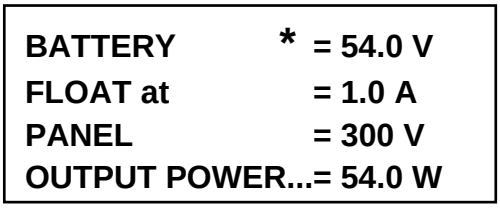
When this cycle is complete the MPPT switches to **BOOST** mode and will hold the voltage at the programmable value say 14.5 volts until the charge current has fallen below the programmable BOOST amps, say 5.0 amps When the charge current falls below the programmed value of say 5.0 amps,



The screen changes to

15.5 Float Mode

This shows that the **battery is in FLOAT mode** and is indicated by the flashing **'*'**at the end of the BATTERY line.



15.6 Checking the MPPT Firmware

To determine the MPPT's firmware, make sure the LCD display is at the main screen:

Now hold in the **<CHARGE>** button for 3 seconds and the following screen will appear for 2 seconds and then automatically revert to the main screen:

FIRMWARE V4.55
DOC'S AND SUPPORT at
www.Microcare.CO.ZA

Check the Microcare website for the latest firmware available for your specific MPPT. To request a firmware upgrade for the MPPT, visit Microcare at **www.microcare.co.za** and contact them via the online email.

15.7 Turning the MPPT OFF.

- Turn off the **panel breaker** first. (Never Turn Off the Battery Breaker First.)
- Wait until MPPT Display states that the MPPT is sleeping.
- Turn off the **battery breaker**.
- This will allow the MPPT to discharge any remaining power in the coil into the batteries and will eliminate the possibility of damage to the MPPT.

15.8 Data Logging Operation

By Pressing the **DATA** button, the following screen will appear:

This shows the energy accumulated since the charger started.
The 24Hr is the daily average for the no of days shown.
Should you wish to CLEAR the DATA hold the <**CHARGE>** button for 6 seconds and the values will reset to **0.**

0: 2.234 4: 0.000
1: 0.000 5: 0.000
2: 0.000 6: 0.000
3: 0.000 7: 0.000

To view the next 8 days of DATA LOGGING Press the **<DATA>** button and the screen will change to
Day 0 shows the power accumulated for the current day.
Up to 31 days of data is stored and may be viewed by pressing the **<DATA>** button.
To clear the screen, hold in the **<CHARGE>** button in for 10 seconds or until the data has been cleared.

8: 2.234 12: 0.000
9: 0.000 13: 0.000
10: 0.000 14: 0.000
11: 0.000 15: 0.000

To return to the main screen, the **<DATA>** button must be pressed until the end of the Data Log Menu has been reached. Alternatively, the MPPT will automatically revert to the normal charge display after 1minute.

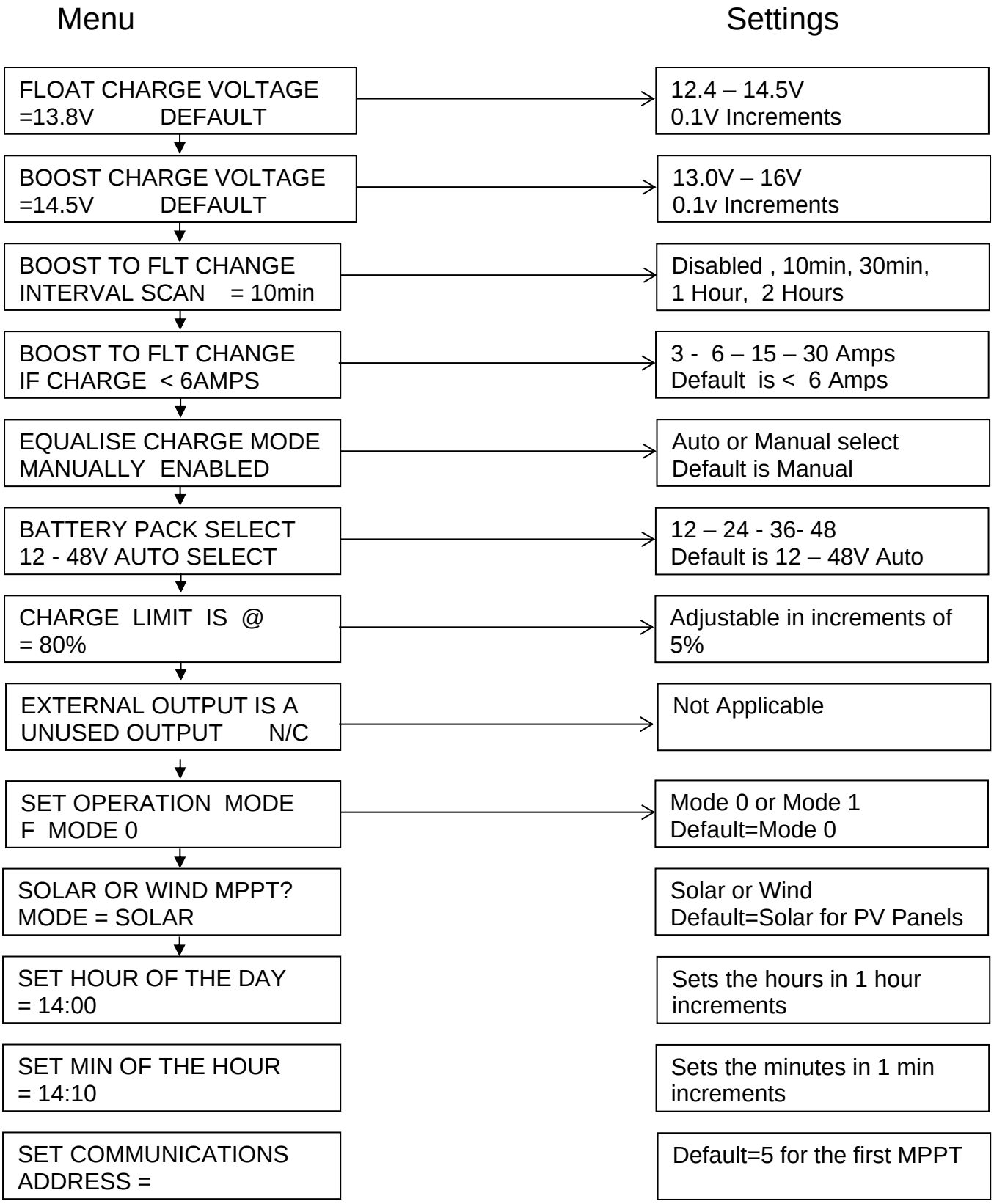
If a **Battery Temperature and Battery Voltage Sensor** is connected to the MPPT, the **<DATA>**button needs to be repeatedly pressed to return to the main screen.

Please Note:

This MPPT 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 MPPT accordingly

16. SETUP MENU SETTINGS



16.1 Programming the MPPT

All settings are for 12 Volt nominal systems.
Divide the required settings:
/ 2 for 24 Volt Systems. / 3 for 36 Volt Systems. / 4 for 48 Volt systems.

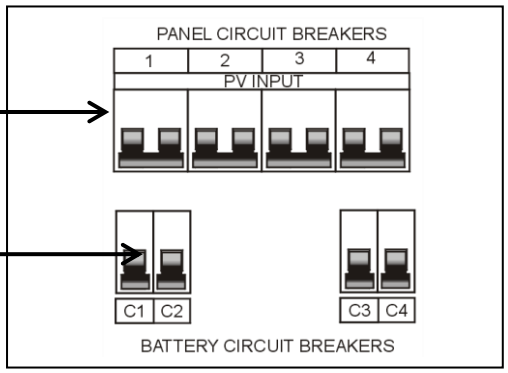
E.g.: If the float voltage for a 48V system is 54,2V, the setting on the MPPT = (54,2/4) =13,8V
Set the float voltage on the MPPT to 13,8V.
Please consult your battery supplier for the correct battery charging specifications before commencing with the MPPT programming. Incorrect charging can damage batteries. Make note of the following:
Battery float voltage, boost voltage and equalisation voltage. Note that some battery types cannot be equalised.

Programming mode

To enter the programming mode the MPPT must be

connected to the batteries:

The **Panel Circuit Breakers** must be turned **OFF.**
The **Battery Circuit Breaker**s must be turned **ON.**

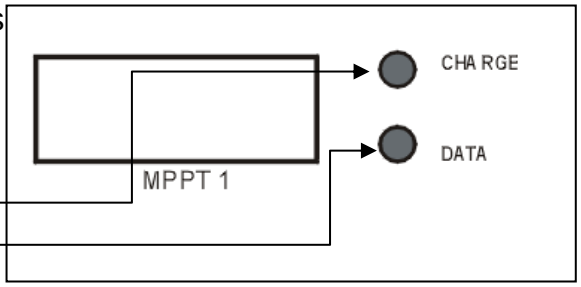


When the Panel circuit breaker is turned off the MPPT will enter the sleep mode and the MPPT must be in SLEEP MODE to enter the programming mode.

MICROCARE MPPT 40Amp
Panel is LOW
. . . MPPT sleeping . . .
Battery = 56.0V

Press and hold the <**CHARGE>** button for 8 seconds

The Screen in the next section will be displayed.



Each MPPT must be programmed with the same parameters.

16.2 Float Voltage

The Float voltage can be changed from 13.2 to 14.5 volts in 0.1 volt increments per 12V battery pack.
Default Value is 13.8V.
Obtain the correct float charge voltage from your battery supplier.
Example: For a 48V battery bank with a float voltage of 55.2V the setting on the MPPT must be set at 13,8V.

FLOAT CHARGE VOLTAGE
= 13.8V DEFAULT
press CHRG to save
press DATA to change

- Press the **<DATA>** button to change the battery FLOAT VOLTAGE
- Press **<CHARGE>** to save the selected FLOAT VOLTAGE

12V	48V
12,4	49,6
12,5	50,0
12,6	50,4
12,7	50,8
12,8	51,2
12,9	51,6
13,0	52,0
13,1	52,4
13,2	52,8
13,3	53,2
13,4	53,6
13,5	54
13,6	54,4
13,7	54,8
13,8	55,2
13,9	55,6
14	56
14,1	56,4
14,2	56,8
14,3	57,2
14,4	57,6
14,5	58

The screen changes to: BOOST CHARGE VOLTAGE

16.3 Boost Voltage

BOOST CHARGE VOLTAGE
= 14.5v DEFAULT
press CHRG to save
press DATA to change

The Boost voltage can be changed between 13.5 and 16.0 volts in 0.1 volt increments per 12V battery pack. Default Value is 14.5V.
Obtain the correct boost charge voltage from your battery supplier.

- Press the **<DATA>** button to change the battery BOOST VOLTAGE
- Press **<CHARGE>** to save the setting.

12V	48V
13,0	52,0
13,1	52,4
13,2	52,8
13,3	53,2
13,4	53,6
13,5	54
13,6	54,4
13,7	54,8
13,8	55,2
13,9	55,6
14	56
14,1	56,4
14,2	56,8
14,3	57,2
14,4	57,6
14,5	58
14,6	58,4
14,7	58,8
14,8	59,2
14,9	59,6
15	60
15,1	60,4
15,2	60,8
15,3	61,2
15,4	61,6
15,5	62
15,6	62,4
15,7	62,8
15,8	63,2
15,9	63,6
16	64

The screen changes to: BOOST TO FLOAT CHANGE

16.4 Boost to Float Voltage

BOOST TO FLT CHANGE
INTERVAL SCAN = 1Hr
press CHRG to save
press DATA to change

This screen changes the time that the BOOST mode takes to switch to FLOAT mode, once the batteries have reached the BOOST voltage level.
Default Value is 10 Min.

- The time can be set to Disabled, 10min, 30min, 1 hour, 2 hours.
- Press the **<DATA>** button to change the battery BOOST VOLTAGE.
- Press **<CHARGE>** to save.

The screen changes to: BOOST TO FLOAT CURRENT

16.5 Boost to Float Current

BOOST TO FLT CHANGE
IF CHARGE < 3 AMPS
press CHRG to save
press DATA to change

This changes the charge current at which the BOOST mode. After timing out, changes to FLOAT.
Default Value is < 6 Amps.

- This can be set to <**3 – <6 – <15 - <30** amps or disabled.

➢ Press the **<DATA>** button to change the battery BOOST TO FLOAT CURRENT VOLTAGE
➢ Press the **<CHARGE> button** to save the setting.

The screen changes to EQUALISE CHARGE MODE

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16.6 Equalise Charge Mode

EQUALISE CHARGE MODE
MANUALLY ENABLED
press CHRG to save
press DATA to change

In this mode the Regulator will automatically go into EQUALISE mode if the battery pack voltage falls below 10.8V.
This enables or disables the EQUALISE Charge mode.
Default Value is Manual Enabled.
Auto= 1 Every forth-night (+- 2 weeks).

- Manual = Disable (Selected by Pressing the charge Button)

The MPPT will automatically set the Equalisation.

- EQ: = 15V if boost voltage setting is 14,7V or lower
- EQ: = 16V if boost voltage setting is 14,8V or higher

➢ To change the battery, EQUALISE CHARGE MODE press the **<DATA>** button.
➢ To save the setting press the **<CHARGE> button.**

PLEASE NOTE: Some battery types cannot undergo an equalisation charge. Contact your battery supplier for the correct charging information.

The display changes to: BATTERY PACK SELECT

16.7 Battery Set Voltage

BATTERY PACK SELECT
12 – 48 AUTO SELECT
press CHRG to save
press DATA to change

This allows the MPPT to auto select the battery system or the MPPT can be PRESET.

- AUTO
- 6 cells 12 volts through to 24 cells 48 volt battery pack.
- Default Value is 12 – 48 AUTO SELECT.

➢ Press the **<DATA>** button to change the BATTERY PACK SELECT.
➢ Press the **<CHARGE> button** to save the setting.

The screen changes to: CHARGE LIMIT

16.8 Charge Limit

CHARGE LIMIT IS @
= 80%
press CHRG to save
press DATA to change

This allows the user to limit the MPPT current.
100 % will be 20 amps or if the limit must be 18 amps then set the % to 90 % for a 20Amp MPPT as an example.
The charge limit can be set in 5% increments. 0% - 100%.
This can be extended to any LCD MPPT type accordingly.
Default Value is 80%.

➢ Press the **<DATA>** button to change the battery CHARGE LIMIT
➢ Press **<CHARGE>** to save the setting.

The screen changes to: EXTERNAL OUTPUT

16.9 External Output Connections:

Not Used.

EXTERNAL OUTPUT IS A UNUSED OUTPUT N/C
press CHARGE to save
press DATA to change

The screen changes to: SET OPERATION MODE

16.10 Set Operation Mode

MODE 0 is the Low Frequency Setting – 34MHz.
MODE 1 is the High Frequency Setting – 77MHz.
MODE 2 – 5 Is Currently Not Used.
Default Value is MODE 0.

SET OPERATION MODE
F MODE0
press CHRG to save
press DATA to change

- Press the **<DATA>** button to change the OPERATION MODE
- Press the **<CHARGE> button** to save the setting.

The screen changes to: SOLAR OR WIND

16.11 Solar or Wind Settings

This Setting allows the MPPT to be changed between a solar MPPT and a Wind Turbine MPPT.
Please confirm that these settings are not adjusted as a standard.
Confirm with support before adjusting these settings.
Default Value is SOLAR

SOLAR OR WIND MPPT ?
MODE = SOLAR
press CHRG to save
press DATA to change

- Press the **<DATA>** button to change the SOLAR OR WIND SETTINGS
- Press the **<CHARGE> button** to save the setting.

The screen changes to: SET HOUR OF THE DAY

16.12 Change time settings

This allows the user to change the time settings of the MPPT.
The Hour of the day is changed in this screen through a 24hour time format with 1-hour increments.

SET HOUR OF THE DAY
= 14: 40
press CHRG to save
press DATA to change

- Press the **<DATA>** button to change the HOUR OF THE DAY SETTINGS
- Press the **<CHARGE> button** to save the setting.

The screen changes to: SET MIN OF THE HOUR

In this screen, the clock's minutes are adjusted in a similar way to that of the hour settings.

SET MIN OF THE HOUR
= 14: 40
press CHRG to save
press DATA to change

- Press <**DATA>** button to change the MIN OF THE HOUR SETTINGS
- Press the **<CHARGE> button** to save the setting.

Note: Time settings do not affect any MPPT operations and are purely for user convenience. Time settings are lost when the batteries are disconnected from the MPPT.

The screen changes to: SET COMMUNICATIONS ADRESS

16.13Communication Setting

SET COMMUNICATIONS
ADDRESS = 5
press CHRG to save
press DATA to change

Only to be adjusted when communicating with a Web Logger or our Battery Monitor system and using more than 1 x MPPT for communication.
Default Address = 5

5 for the 1st MPPT, 6 = 2nd MPPT, 7= 3rd MPPT etc.
Do not use Address 0 – 4, Address “5” will be the default for the 1st MPPT.

- Press the **<DATA>** button to Communication Address.
- Press the **<CHARGE> button** to save the setting.

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17. TROUBLESHOOTING

When Problems are experienced with the MPPT's please refer to this section to confirm the procedure to follow in order to correct the fault.

17.1 Panel Output Power Low

This would be the general error experienced when connecting the MPPT.

BATTERY	**= 55.2V**
BOOST at	**= LOW**
PANEL	**= 56.0V**
OUTPUT POWER	**= LOW**

This fault can be checked through any of the following tests on the MPPT:

- Turn off the MPPT Panel breaker and measure the voltage using a multi-meter.
- Turn on the Panel circuit breaker and confirm if the voltage is immediately dropping to the battery voltage or if the voltage is slowly decreasing.
- If the voltage is immediately dropping to the battery voltage, then the MPPT needs to be sent to Microcare for repair.
- If the voltage is not adjusting, then you need to open up the MPPT and check the internal cables to confirm if the circuit breaker attachments are tight.
- Tighten the circuit breaker internally and externally.
- If this does not solve the error, then you would be required to test your PV Panels independently to confirm if you have a Panel short circuit that is causing the PV voltage to be low.

17.2 High Panel Voltage

This error will display when the PV Voltage is exceeding the ratio between the battery voltage and the PV Panel Voltage used to charge the batteries. (Refer to List Below)

. . . WARNING . . .
HIGH PANEL VOLTAGE
V POWER POINT = xV

Battery Bank Size	PV Panel Voltage (VOC)
48V	400V
Remember that the MPPT will only support a max of 350VOC per PV array.	

Open Circuit Voltage Higher Than 400 VDC

Your PV Panel array is connected in series and is exceeding the 400Voc capacity of the MPPT.

ERR DETECTED! PANEL
OPEN CIRCUIT VOLTAGE
GREATER THAN 150 VDC
MPPT CHARGE DISABLED

17.4 Battery Voltage Higher Than 60Vdc

The Battery Voltage is exceeding the supported Voltage range of the MPPT.

ERR DETECTED! BATTERY
OPEN CIRCUIT VOLTAGE
GREATER THAN 60vDC
MPPT CHARGE DISABLED

Output Short Circuit

This error message will be displayed if the load being drawn from the batteries is exceeding the amount of power that the MPPT is capable of supplying.

ERR DETECTED!
MPPT OUTPUT
SHORT CIRCUIT
MPPT CHARGE DISABLED

If the load being drawn from the batteries is e.g.: 70A and you only have a 40A MPPT then this error will display on the MPPT.

If this error is detected, open up the MPPT and check the left ribbon cable and confirm that the ribbon cable is securely fastened between the Display and the power card.

If the Ribbon Cable is secure, then reduce the Load being drawn from the battery bank to clear the error. (Restart the MPPT once the load has been reduced.)

18. 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.
Only use tools with insulated grips and handles.
Only authorized personnel should perform maintenance, inspection, and replacement operations.
All wiring connections should be checked on a regular basis.

PLEASE BE AWARE:

Warranty Will Be Null and Void If Panel Surge Protection Is Not Installed with All Lcd MPPT Installations

19. MINI-GRID SHUT DOWN PROCEDURE

The following shutdown procedure must be followed.

1) Disconnect all the loads.
2) Switch off the Mini-Grid Master “Control Unit.
   Procedure: “Press and hold both **and** **buttons** for up to **3 seconds**, the Mini-Grid will turn **OFF** after two beeps.
   Note the master switches off Control Unit 1 and 2 as well.
3) Control Unit 1 - Turn off the Grid AC Input circuit breaker.
4) Control Unit 1 -Turn off the Mini-Grid AC Output Circuit breaker.
5) Turn off Inverter 1,2,3,4,5 and 6 AC Output Circuit breaker.
6) Turn off Inverter 1,2.3.4.5 and 6 Battery Circuit Breaker.
7) Turn off the MPPT panel circuit breakers.
8) Wait until the MPPT displays read sleeping.
9) Turn off the MPPT battery circuit breakers.

20. SPECICATIONS OF INVERTERS

48 V Inverter Specifications

Model		5kW48V
Capacity	Watt	5000
DC Input	Nominal Voltage	48 VDC
	Acceptable Voltage Range	40-60 VDC
	Maxi Input Amps	125 A
	Standby Power	60 W
AC Output	Voltage	230 VAC
	Amps	22 A
	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 10.7
	Boost Voltage	Refer to Section 10.6
	Boost Time	Selectable 5min, 1, 2, 3 hours
	Maximum Current	50 A
	Generation Mode	Depending on the generator power available.

21. LLP INVESTMENTS LIMITED CARRY- IN WARRANTY

LLP Investments warrants this Mini-grid range of inverters against defects in workmanship and materials, fair wear and tear accepted, for a period of 3 (three) years from the date of delivery/collection and is based on a carry-in basis. Where the installation of the product makes it impractical to carry-in to our workshops, LLP Investments 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, LLP Investments 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 LLP Investments or one of its authorised Qualified Service Partners. In order to qualify for the warranty, the product must not be disassembled or modified. Repair or replacement are our sole remedies. LLP Investments shall not be liable for damages, whether direct, incidental, special, or consequential, even caused by negligence or fault. LLP Investments owns all parts removed from repaired products. LLP Investments uses new or re-conditioned parts made by various manufacturers in performing warranty repairs and building replacement products. If LLP Investments repairs or replaces a part of a product, its warranty term is not extended. Removal of serial nos. may void the warranty.

All remedies and the measure for damages are limited to the above. LLP Investments 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 3 (three) years from the date of purchase.

Life Support Policy:
As a general policy, LLP Investments does not recommend the use of any of its products in life support applications where failure or malfunction of the LLP Investments product can be reasonably expected to cause failure of the life support device or to significantly affect its safety or effectiveness.

LLP Investments does not recommend the use of any of its products in direct patient care. LLP Investments will not knowingly sell its products for use in such applications unless it receives in writing assurances satisfactory to LLP Investments that the risks of injury or damage have been minimised, the customer assumes all such risks, and the Liability of LLP Investments is adequately protected under the circumstances.

Caution:
Our products are sensitive. While all care is taken by us to dispatch goods with adequate packaging, LLP Investments is not responsible for any damages caused to products after they have left our premises.

22. REGISTRATION OF MY MICROCARE PRODUCT

Product Serial Number: _____

Product Description: _____

Date Purchased _____

From Whom 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, North End, Port Elizabeth, 6001
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