

# OVL15A / OVL30A

## Over-Voltage Limiter - Linear

### Product Manual

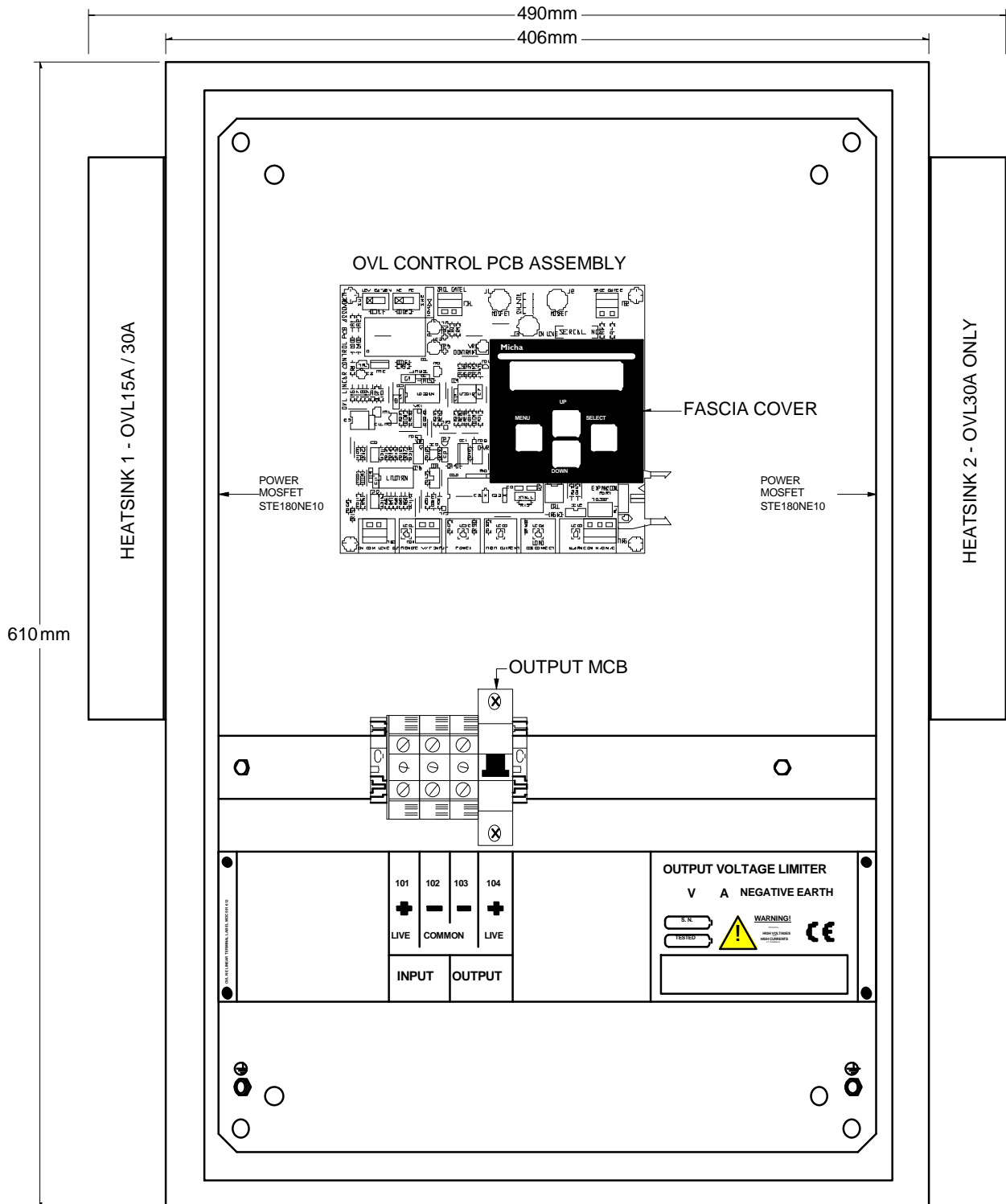
#### Issue 4



1. Introduction

The OVL15A and OVL30A are linear voltage regulators which limit the voltage at the output terminals to a preset maximum to prevent excessive voltages from being applied to the load equipment. Although primarily designed for PV systems, is capable of operating with any stable DC power source. The units are available in two output current versions: 15A and 30A and in two input voltage versions: 12V, 24-48V.

1.1. General Arrangement of the OVL15/30A



**1.2. OVL15/30A Product Overview**

Unit	Output Current	Painted Steel Enclosure IP66	Stainless Steel Enclosure IP66
OVL15A	15A	610 x 406 x 205	610 x 406 x 205
OVL30A	30A	610 x 406 x 205	610 x 406 x 205

Voltage regulation is achieved by the use of one (OVL15A) or two (OVL30A) parallel connected, high power MOSFETS which are mounted to heat sinks fitted to one (OVL15A) or both (OVL30A) sides of the enclosure.

The OVL Control PCB Assembly is supplied in one of two versions: 12-24V operation or 24-48V operation.

Control PCB Assembly Part Number	System Voltage	Control PCB Assembly Description
401 257	12V	OVL 12V Linear Micro Control PCB Assembly
401 258	24-48V	OVL 24-48V Linear Micro Control PCB Assembly

**1.3. Control PCB assembly**

The Control PCB Assembly incorporates it's own isolated DC-DC converter allowing it to operate on both positive and negative earth systems. The control circuit monitors the output voltage and compares it to a preset limit set by multi-turn potentiometer and controls the MOSFET(s) to ensure that the voltage seen by the load does not exceed the set preset limit.

When the battery voltage is less than the preset limit then the control circuit turns the MOSFETS fully on such that they present a very low resistance (approximately 5mΩ). As the battery voltage increases above the preset limit then the control circuit causes the resistance of the power MOSFET(s) to increase to prevent the voltage applied to the load equipment from exceeding the preset limit.

The control circuit senses both output voltage and output current and incorporates over current and over voltage protection facilities which can be set to automatically disconnect the load in the event of a fault.

The control circuit features a Remote Input (volt-free contact) which can be programmed for various functions and an Alarm LED and Relay (with volt-free changeover contacts) which can be programmed to indicate various alarm conditions.

**2. Health and Safety****2.1. General**

Read this manual thoroughly BEFORE undertaking any work.

Potentially lethal voltages can be present at the terminals within the Controller. Capacitors, used in the smoothing circuits, can retain energy long after the unit has been isolated. Extreme care MUST be taken when performing any of the actions described in this manual.

Remove all metallic personal adornments from the hands, wrists and neck before commencing work on a live unit.

Ensure all tools are insulated.

Whenever a cable has to be disconnected it should be insulated with insulating tape and labelled to ensure correct reconnection.

**2.2. Earthing**

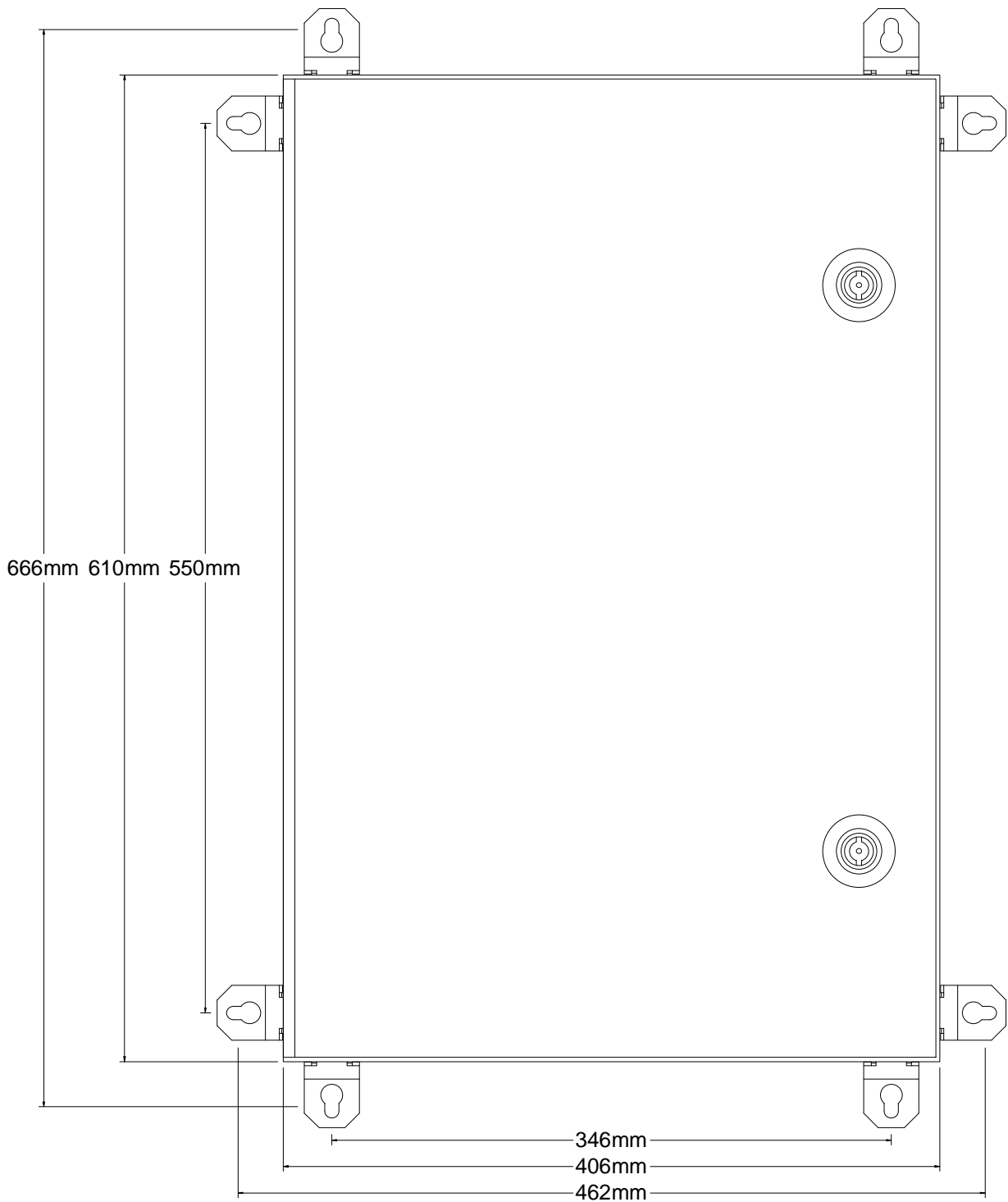
The OVL 30A Output Voltage Limiter has been pre-wired to the polarity specified. The unit can be reconfigured as a positive or negative common system on site (see Section 8).

As supplied, the enclosure and mounting plate are not connected to any part of the OVL15/30A circuit. Earth connection points are available on the mounting plate.

### 3. Installation

#### 3.1. Mounting and Position

The Controller should be installed using the four mounting feet provided and situated within 2 meters of the Charge Controller. Ensure that the fixing method employed is sturdy enough to support the weight of the unit. Position the unit so that it is shaded from direct sunlight, sheltered from extreme weather conditions and oriented so that the cable glands are pointing downwards.



### 3.2. Electrical Connections

The electrical connections can be made to the OVL15/30A once the Charge Controller has been mechanically installed on site. Before proceeding with electrical connections first ensure that the Charge Controller and OVL15/30A MCB's are in the OFF position.

### 3.3. Negative Earth System

Make the connections in the following order:

- 3.3.1. OUTPUT COMMON connect to the Input Negative terminal of the Load equipment
- 3.3.2. OUTPUT LIVE connect to the Input Positive terminal of the Load equipment
- 3.3.3. INPUT LIVE connect to the Positive terminal of the Charge Controller Load Output
- 3.3.4. INPUT COMMON connect to the Negative terminal of the Charge Controller Load Output

### 3.4. Positive Earth System

Make the connections in the following order:

- 3.4.1. OUTPUT COMMON connect to the Input Positive terminal of the Load equipment
- 3.4.2. OUTPUT LIVE connect to the Input Negative terminal of the Load equipment
- 3.4.3. INPUT LIVE connect to the Negative terminal of the Charge Controller Load Output
- 3.4.4. INPUT COMMON connect to the Positive terminal of the Charge Controller Load Output

### 3.5. Optional Feature Connections

- 3.5.1. Remote Input (Volt-free contact)
- 3.5.2. Alarm Relay output (Volt-free changeover contacts)

### 3.6. Method

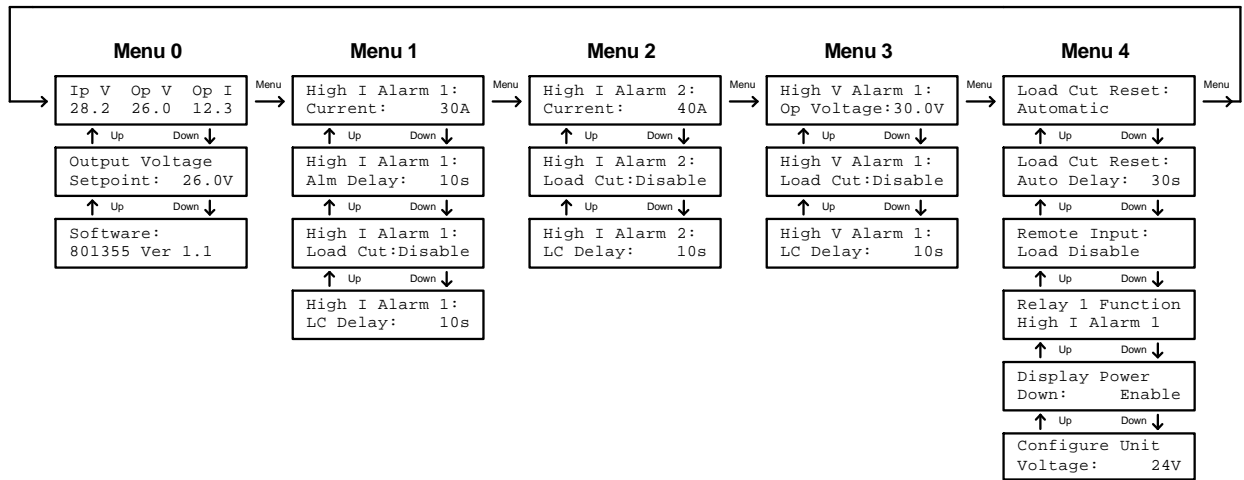
To make the electrical connections to the OVL 30A;

- 3.6.1. Strip back the sheath of the cable by at least 10 mm.
- 3.6.2. Slacken off the most suitable cable gland and thread the cable through.
- 3.6.3. Feed the cable into the appropriate terminal and tighten.
- 3.6.4. Tighten the gland to provide a weatherproof seal and strain relief to the cable.

## 4. Operational Menus

The OVL15/30A Over Voltage Limiter uses a microprocessor to provide control and diagnostic features in the unit. A 2x16 alphanumeric LCD Display is used to indicate parameters and set-points as described below. The following diagram describes the various screens available to the user:

OVL15/30A Software Menu Guide:



### 4.1. Menu Navigation

Navigating the menus is done by using the Menu, Up and Down switches while the Select switch will activate various functions. Pressing Menu and Down together will take the user back to Menu 0 Screen 0 (Home).

Pressing the Menu switch at any screen in Menu 0 will change the display to show the top screen of Menu 1. In a similar manner, the user can move to Menus 2, 3 and 4 and back to Menu 0, by pressing the Menu switch repeatedly.

The Up and Down Switches will move the user up and down within a menu.

To adjust settings: at the appropriate screen, press SELECT and the parameter will flash. Use the UP or DOWN switches to select the desired value. Press SELECT again to accept and store the value in non-volatile memory.

### 4.2. High Current Alarm 1

If the output current exceeds the High Current Alarm 1 setting (Menu 1 Screen 0) for longer than the Alarm Delay period (Menu 1 Screen 1) then the High Current Alarm 1 function will be activated. If the Load Cut function is Enabled (Menu 1 Screen 2) and the output current continues to exceed the High Current Alarm 1 setting for the Load Cut Delay period (Menu 1 Screen 3) then the load will be disconnected.

### 4.3. High Current Alarm 2

If the output current exceeds the High Current Alarm 2 setting (Menu 2 Screen 0) then the High Current Alarm 2 function will be activated. If the Load Cut function is Enabled (Menu 2 Screen 1) and the output current exceeds the High Current Alarm 2 setting for the Load Cut Delay period (Menu 2 Screen 2) then the load will be disconnected.

### 4.4. High Voltage Alarm 1

If the output voltage exceeds the High Voltage Alarm setting (Menu 3 Screen 0) then the High Voltage Alarm will be activated. If the Load Cut function is Enabled (Menu 3 Screen 1) and the output voltage exceeds the High Voltage Alarm setting for the Load Cut Delay period (Menu 3 Screen 2) then the load will be disconnected.

### 4.5. Load Cut Reset

The Load Cut function may be reset Automatically or Manually (Menu 4 Screen 0).

If “Automatic” is selected, then when the load is disconnected it will be reconnected after the Automatic Reset Delay period (Menu 4 Screen 1).

If “Manual” is selected, then when the load is disconnected Screen 0C will be displayed (see section 4.10) and the user must press the SELECT switch in order to reconnect the load. Alternatively, if the Remote Input is set to “Load Cut Reset” (Menu 4 Screen 2) then the load may be reconnected using the remote input.

**4.6. Remote Input**

A volt-free closed contact will activate the Remote Input Function. The Remote Input Function can be set (Menu 4 Screen 2) to “Load Disable” (to disconnect the load) or to “Load Cut Reset” (see section 4.5).

If there is no Alarm Function Enabled or active, then the Remote Input Function, if set to “Load Disable”, will instantly Disable or Cut the Load if active and restore the Load if in-active.

**4.7. Alarm Relay 1**

Alarm Relay 1 can be programmed (Menu 4 Screen 3) to indicate any one of the following functions:

High Current Alarm 1 / High Current Alarm 2 / High Voltage Alarm

Load Cut / Common Alarm / System Normal (reverse function of Common Alarm).

**4.8. LCD Display Power Down**

To lengthen the life of the LCD Display it will be powered down 240 seconds after the last keypad switch press. The user may disable this feature (Menu 4 Screen 4).

**4.9. Menu 0 – Status**

Menu 0	Screen	Description
<pre>Ip V  Op V  Op I 28.0  26.0  12.3</pre>	Screen 0 (Home)	Ip V = Input Voltage / Op V = Output Voltage / Op I = Output Current
<pre>Output Voltage Setpoint:  26.0V</pre>	Screen 1	Output Voltage Setpoint: This value is set by potentiometer VR2 on the OVL Control PCB
<pre>Software: 801355 Ver 1.0</pre>	Screen 2	Software Program Number and Version

**4.10. Menu 0 Screen 0 - Home Screen**

Screen 0 normally displays the Input Voltage, Output Voltage and Output Current as shown in Screen 0A below.

If the High Current Alarm 1 condition is true then line 2 of the screen will flash as shown in Screen 0B below.

If the Load Cut is active, the display will show either Screen 0C or Screen 0D below depending on the Load Cut Reset parameter selection.

<pre>Ip V  Op V  Op I 28.0  26.0  12.3</pre>	Screen 0A	Ip V = Input Voltage / Op V = Output Voltage / Op I = Output Current (If Load is Disabled then “-LD-“ appears under Op V)
<pre>Ip V  Op V  Op I High I Alarm</pre>	Screen 0B	High Current Alarm – flashes on line 2
<pre>Load Cut Active: Reset --&gt; Select</pre>	Screen 0C	Load Cut Activated Press Select to Reset (for Manual reset)
<pre>Load Cut Active: Auto Reset:  xxs</pre>	Screen 0D	Load Cut Activated Display of Automatic Load Cut Reset in xx seconds

**4.11. Menu 1 – High Current Alarm 1**

Menu 1	Screen	Description
High I Alarm 1: Current: 30A	Screen 0	High Current Alarm 1: Set Alarm Current level from 5 to 40A (Default = 30A)
High I Alarm 1: Alm Delay: 10s	Screen 1	High Current Alarm 1: Set Alarm Delay period from 5 to 120 seconds (Default = 10s)
High I Alarm 1: Load Cut:Disable	Screen 2	High Current Alarm 1: Set Load Cut = Enable or Disable (Default = Disable)
High I Alarm 1: LC Delay: 10s	Screen 3	High Current Alarm 1: Set Load Cut Delay period from 5 to 120 seconds (Default = 10s)

**4.12. Menu 2 – High Current Alarm 2**

Menu 2	Screen	Description
High I Alarm 2: Current: 40A	Screen 0	High Current Alarm 2: Set Alarm Current level from 10 to 60A (Default = 40A)
High I Alarm 2: Load Cut:Disable	Screen 1	High Current Alarm 2: Set Load Cut = Enable or Disable (Default = Disable)
High I Alarm 2: LC Delay: 1s	Screen 2	High Current Alarm 2: Set Load Cut Delay period from 1 to 20 seconds (Default = 1s)

**4.13. Menu 3 – High Voltage Alarm 1**

Menu 3	Screen	Description
High V Alarm: Op Voltage:30.0V	Screen 0	High Voltage Alarm: Set Alarm Voltage level from 10.0 to 60.0V (Default = 15 / 30 / 60V)
High V Alarm: Load Cut:Disable	Screen 1	High Voltage Alarm: Set Load Cut = Enable or Disable (Default = Disable)
High V Alarm: LC Delay: 10s	Screen 2	High Voltage Alarm: Set Load Cut Delay period from 1 to 20 seconds (Default = 10s)



4.14. Menu 4 – Various

Menu 4	Screen	Description
Load Cut Reset: Automatic	Screen 0	Load Cut Reset: Automatic or Manual (Default = Automatic)
Load Cut Reset: Auto Delay: 30s	Screen 1	Load Cut Reset: Set Automatic Reset Delay period from 5 to 120 seconds (Default = 30s)
Remote Input: Load Disable	Screen 2	Remote Input Function: Set as either Load Disable or Load Cut Reset (Default = Load Disable)
Relay 1 Function High I Alarm 1	Screen 3	Relay 1 Function: Set which function activates relay (Default = High Current Alarm 1)
Display Power Down: Enable	Screen 4	LCD Display Power Down 240 seconds after last keypad switch press Set as Enable (power down) or Disable (always on) – (Default = Enable)
Configure Unit Voltage: 24V	Screen 5	The unit is configured in the factory as a 12V, 24V or 48V unit.

## 5. Commissioning

### 5.1. General

- 5.1.1. Check that the enclosure for mechanical defects and that the enclosure fixings are secure.
- 5.1.2. Check that all screw terminals are tight and secure.
- 5.1.3. Check that all cable glands are tight and provide a weatherproof seal.
- 5.1.4. Check that all cables have adequate strain relief.
- 5.1.5. Check that the unit has been connected in accordance with the wiring instructions (see Section 3).

### 5.2. System Voltage

- 5.2.1. Ensure that the output MCB is in the Off position.
- 5.2.2. Ensure that the System Voltage indicated on the OVL Control PCB Assembly is as required for the system in which it is being used.
- 5.2.3. Turn on the Load Output from the connected Charge Controller to activate the OVL15/30A Unit.

### 5.3. Output Voltage Setting

- 5.3.1. Navigate to the Output Voltage Set-point Screen (Menu 0 Screen 1) and note the setting given there. This is the voltage at which the unit will limit the output. Ensure that this is set correctly for the specifications of the load equipment. This may have to be adjusted.
- 5.3.2. Note: the LCD Display indicates the output voltage setting and output voltage to an accuracy of  $\pm 2\%$ .
- 5.3.3. To set the Output Voltage to a higher degree of accuracy, use a calibrated DVM to measure the Output Voltage at the OVL15/30A output terminals and adjust VR2 (Set Output Voltage) on the OVL Control PCB Assembly to the desired value.

### 5.4. Over Current / Voltage Protection

- 5.4.1. The unit features over-current and over-voltage protection alarms which may be enabled to cut the load (see sections 4.2, 4.3 and 4.4). The user must enable these features if they are required. These features allow for over-current surges of short duration.

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## 6. Maintenance

### 6.1. Procedure

Check the enclosure for flaws in the paint finish. Touch up any defects with appropriate touch up paint.

- 6.1.1. Ensure that the door gasket has not been attacked by pests resulting in loss of weatherproofing.
- 6.1.2. Check all external cables for any signs of damage or deterioration of the outer sheath. Verify that cables are adequately secured and that all cable glands give a weatherproof seal.
- 6.1.3. Ensure that the terminal block is free from corrosion and that all terminals are tight.
- 6.1.4. Verify the correct operation of the controller following the procedure as outlined in Section X.
- 6.1.5. Clean any small particles (e.g. sand, dust) from the enclosure using a small soft brush.
- 6.1.6. Ensure that the enclosure is shaded from direct sunlight and weathering at all times.

### 6.2. Replacement of the OVL Control PCB Assembly

- 6.2.1. Turn off the Charge Controller and OVL15/30A.
- 6.2.2. Ensure the cables to J1, J2 and J3 on the OVL Control PCB Assembly are clearly marked before disconnecting them.
- 6.2.3. Ensure the cables connected to the 2-part terminal blocks are also clearly marked or identified.
- 6.2.4. Disconnect J1, J2 and J3 and all the 2-part terminal blocks from the PCB Assembly
- 6.2.5. Unscrew the four M4 PCB retaining screws.
- 6.2.6. Remove the PCB Assembly and replace with one of the same type.
- 6.2.7. Reconnect all wiring ensuring that each connection is wired as before (see wiring diagrams – section 8).
- 6.2.8. Secure the board into place using the four M4 PCB retaining screws.

### 6.3. Replacement of Power MOSFETS

The power MOSFETS are bolted to the heat sink and can be replaced by first removing (and identifying) the cables connected to them and then unbolting the MOSFET from the heat sink and replacing with a new device of the same type. Note the orientation of the device before replacing it with another device in the same orientation. Thermally conductive paste should be applied to the MOSFET base before fitting.

### 6.4. Installation / Replacement of the MCU

Ensure that anti-static precautions are taken to avoid damage to the Micro-controller when handling (i.e. touch a conductor that is connected to earth before carrying out the following):

Turn off all power to the Unit by turning off the output MCB of the connected charge controller.

Remove the Fascia Cover on the PCB Assembly using the two plastic thumbscrews. Identify IC10 (40 pin integrated circuit) on the PCB Assembly. Carefully lever out any Microcontroller presently located there by using a small flat screwdriver on both ends equally. Do this carefully.

Identify the device to be installed. Carefully handle the device without touching the legs of the device. NOTE the orientation of the semi-circular notch out of one end of the device. NOTE which end of IC10 has a notch in the PCB socket. Now insert the Microcontroller into the IC socket so that the notch in the device is at the same end as the notch in the socket. Before pressing down on the device to mate it fully in its socket, check that all pins are properly lined up with the pins in the PCB socket. Press the device fully into the socket and check that no leg has been bent or missed its socket.

Replace the Fascia Cover on the PCB Assembly using the two plastic thumbscrews.

Restore power to the Unit by turning on the output MCB of the connected charge controller.

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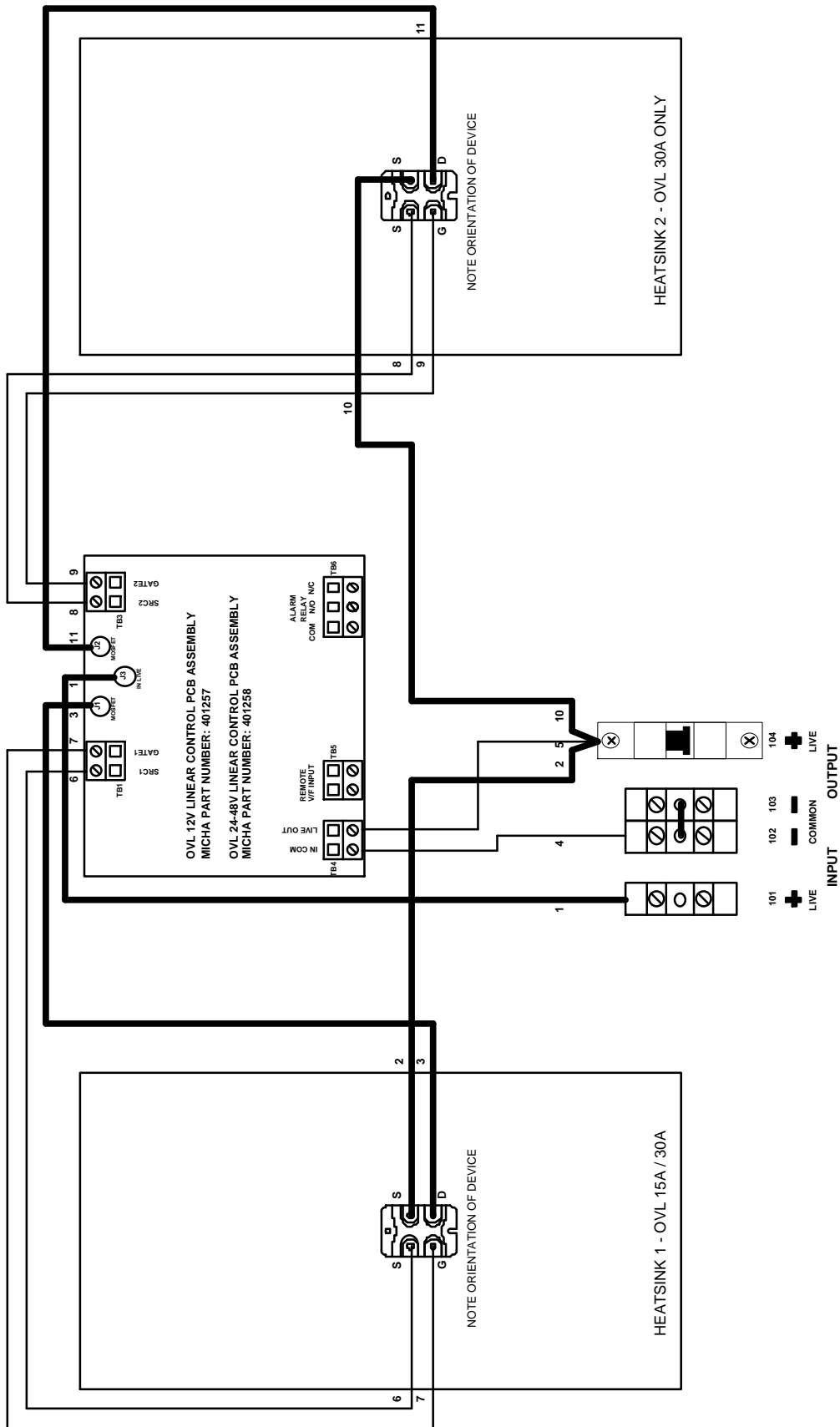
## 7. Software

### 7.1. Software History

Software Version	Date Released	Product Manual	Comments
801 355 Ver 1.0	28-Mar-2007	801 285 Issue 2	Production Issue
801 355 Ver 1.1	19-Dec-2007	801 285 Issue 3	Software bug fixed: (Bug: for the first minute after power up, the High Alarm 1 and High Alarm 2 screens show the default settings – after 1 minute the screens show the programmed settings).
801 355 Ver 1.1	19-Dec-2007	801 285 Issue 4	18 <sup>th</sup> August 2011: Listed Default Values in Screen Descriptions Corrected Control PCB Layout in Wiring Diagrams

8. Unit Wiring Diagrams

8.1. OVL15/30A Negative Earth Unit Wiring Diagram



8.2. OVL15/30A Positive Earth Unit Wiring Diagram

