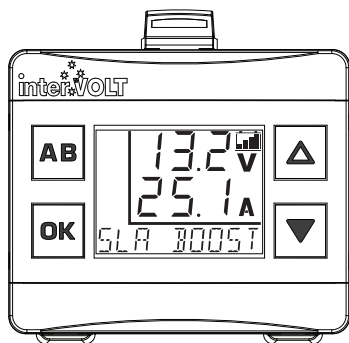


DCC Pro

**In-Vehicle DC-DC
Battery Charger
12VDC 25 AMPS**



INSTALLATION & OPERATION MANUAL

Thank you for choosing an interVOLT product...

We, at Amelec Australia Pty Ltd, are very pleased to announce the release of our first in-vehicle battery charging system – the DCC Pro.

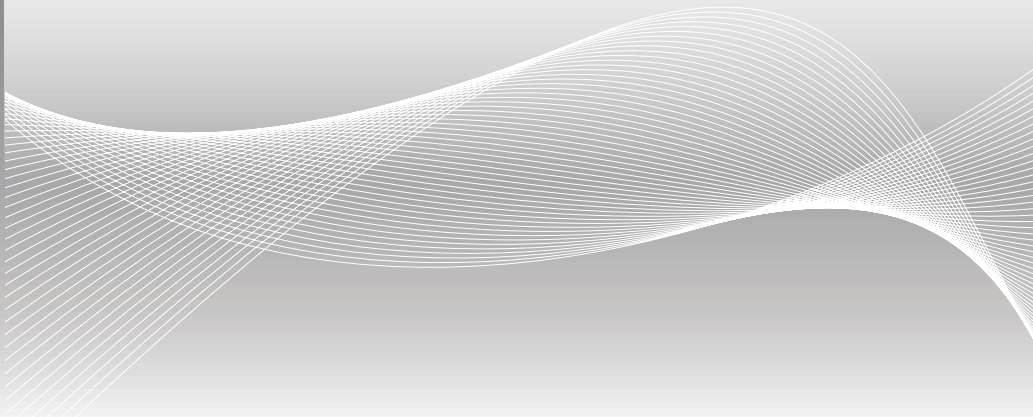
An in-vehicle or DC-DC charger is designed to charge a secondary battery using the main battery as the charging source independent of the vehicle's charging system. There are several features and benefits which set the DCC Pro apart from the current offerings on the market. An introduction to the unique and innovative DCC Pro can be found on the Overview page in this manual.

Amelec Australia Pty Ltd, a wholly owned and operated Australian private company, is the proud owner of the **interVOLT** brand, a trademark which is registered in over 20 countries worldwide. We have been producing specialised power conversion products for over 10 years. All our products are designed, developed and assembled in-house at our premises in Perth, Western Australia from both local and imported components.

Our design ethos is based on quality, performance and value and we are committed to product development in the DC power control and conversion field. With roots in the commercial marine, transport, alternate energy and allied industries, we are now expanding into the consumer market with dedicated products such as the DCC Pro.

InterVOLT products are designed to cope with the demands of the harshest applications in high temperature and high humidity environments. They are constructed of quality materials (marine grade where applicable) and designed to provide many years of continuous service.

Again, thank you for choosing an **interVOLT** product and supporting Australian innovation, technology and intellectual property.



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Introduction

In a standard dual or multiple battery arrangement, the system will consist of a starting (or main) battery and secondary (or auxiliary) batteries. For clarity and conciseness we will refer to these throughout the manual as the main and auxiliary batteries.

As a concept our vision for the DCC Pro was a device which would not only provide an autonomous charging method for any auxiliary battery, but would reliably, accurately and repeatedly provide feedback to the operator on the status of the charging and maintenance process. In order to provide this information it was necessary to integrate a visual display. The addition of a remote display also provided the opportunity for a level of operator input, allowing some control of the device, such as selection of battery types for example. The development of a true remote user interface enabled the concept to evolve into the product you have purchased today.

The DCC Pro consists of three main components. These form a complete 'plug and play' kit and are all that is necessary, aside from the external wiring, to implement a fully operational charging and maintenance system for one auxiliary battery. The components consist of:

1. The Charging Device. This is the power conversion component of the system. It is a high power, yet compact package which is designed to be installed in the engine bay of the vehicle.

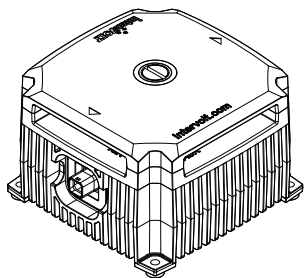
2. The Remote Display. This is the separate control and monitoring device which is designed to be installed in the vehicle cabin in easy view and reach of the operator. It has a backlit LCD display and four control buttons.

3. The Data Cable. This is the interconnect harness that enables the Charging Device and Remote Display to communicate information to each other.

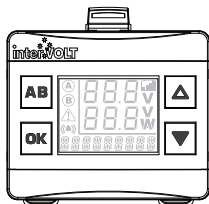
This manual contains comprehensive information on the installation, set-up and use of the DCC Pro and is applicable to this model only. Whilst every care has been taken in the preparation of this manual, Amelec Australia Pty Ltd offers no guarantee, express or implied, and accepts no liability for any inaccuracies, errors or omissions in its content. Specifications are subject to change without notice.

Kit Contents

You have purchased the DCC Pro retail package code number DCC1225ACK-RP. The package contains the components depicted below:



DCC Pro Charging Device
Code: DCC1225ACD



DCC Pro Remote Display
Code: DCC0001ARD



DCC Pro Printed Manual
Code: DCCAUTG1 R1-0



DCC Pro 3mtr Data Cable
Code: DCC3000CTR

All components are available separately, as are a number of optional purchases such as longer cables. In the event you wish to add in a second charger for example, it would not be necessary to purchase another display but simply order another Charging Device and Data Cable of the appropriate length.

The code numbers for the components are detailed below:

- **DCC1225ACD:** Automotive Charging Device 12 Volts DC 25 Amps
- **DCC0001ARD:** Automotive Remote Display complete with bracket
- **DCC3000CTR:** Data cable 3 metres charging device to remote display
- **DCC6000CTR:** Data cable 6 metres charging device to remote display
- **DCC9000CTR:** Data cable 9 metres charging device to remote display

Application

The DCC Pro is a solid state electronic device developed for the purpose of charging and maintaining an additional battery (or batteries), commonly termed an auxiliary battery in a dual or multiple battery installation where the main battery is used as the supply source.

The DCC Pro has been designed specifically for use in 4WDs, RVs, buses, coaches, caravans, campers or any vehicle with a 12VDC electrical system where there is a requirement to charge one or more auxiliary batteries.

It is not designed or warranted for use in marine applications.

The DCC Pro is designed for Australian conditions. Unlike many imported products, particularly those designed for the European market, it is designed to maintain output under the harshest of environments in the highest ambient temperatures.

The DCC Pro is a standalone power conversion device. It utilises the host vehicle's main battery as the sole source of power to develop its own output to charge a variety of different battery types according to their specific charging requirements. As no modification to the vehicle's original wiring is required this ensures the manufacturer's electrical system is not compromised in any way.

The DCC Pro is a highly capable device with many unique features, the principles of which, allow the operator to control and monitor the charging status from the comfort of the cabin.

The DCC Pro has the flexibility to adapt to almost any application in any vehicle, old or new, simple or complex with or without a CAN/LIN controlled electrical system.

In order to understand the complete functionality of the DCC Pro it is recommended that the contents of this manual are read in its entirety. To understand the basics however, it is only necessary to review the Installation and Operation pages. The step-by-step installation guide begins on page 17 and the operating brief on page 24. The Appendix section contains detailed information on the fundamentals of the DCC Pro and is optional reading.

Synopsis

As an autonomous device the DCC Pro is capable of charging and maintaining different battery types according to the specific chemistry. This ensures the battery is charged and maintained correctly resulting in greater performance and longer life.

The DCC Pro is pre-programmed with charging regimes available for a variety of battery types which can be selected in the configuration (set-up) process:

- **Standard Lead Acid – sealed and flooded cell versions**
- **Absorbed Glass Mat – aka AGM**
- **Gelified Electrolyte – aka GEL**
- **Lead Calcium**

In addition to the above there is also a constant voltage supply setting of **13.2V** which can be used as a 'float' only charging source. This can be utilised where the battery being charged is not cycled but is used as a back-up or support source such as a security system for example.

Although the DCC Pro utilises the vehicle's main battery as the primary charging source it is also fully solar enabled. A dedicated input is provided for direct connection to any compatible solar panel without the need for a separate regulator. The solar charging function uses sophisticated algorithms for maximum power point tracking (MPPT) to capitalise on any available solar power and optimise the charging process.

With ability to be voltage or ignition controlled, the DCC Pro has the flexibility to adapt to almost any application. Furthermore, the ignition control function allows for selection of normal or low ignition input to cater for traditional or ECU controlled electrical systems.

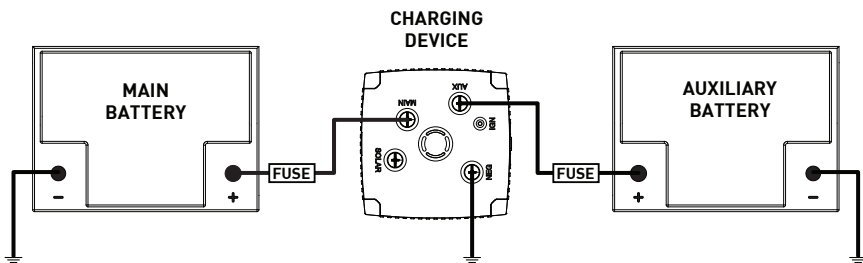
The information on the following pages details the functions of the DCC Pro and the settings which are best for your application/installation.

NOTE: It is not essential to use the Remote Display included. The DCC Pro is a standalone device and will operate with or without the Remote Display connected. It is necessary to use the Remote Display for programming purposes, that is, selecting battery type and control mode, however it is not necessary to permanently install the display if it is not required.

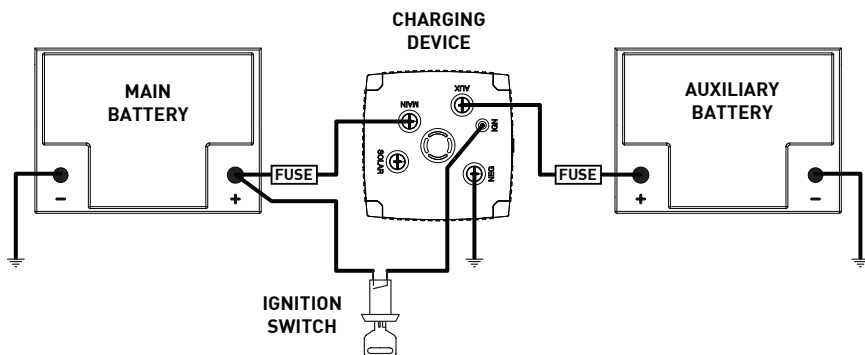
Charging Modes

There are two optional modes which control how the charging system operates. These modes are selectable in the initial set-up process when installing the device and control the charging process in different ways. The control modes can always be changed if necessary but the initial set-up and installation steps need to be repeated in order to do so. The control modes are defined and explained as follows:

Voltage Control Mode: Voltage mode is the default (factory) mode and allows the charging process to operate automatically, independent of the host vehicle. This mode is recommended for installations where it is not viable or necessary to use the host vehicle's ignition switch to enable/disable the Charging Device. Voltage mode would primarily be used where the Charging Device is located in a caravan or camper trailer for example, and thus a long way from a switched ignition source.



Ignition Control Mode: Ignition mode is selectable at the set-up stage of the installation process and is the alternative to Voltage mode. This mode is recommended for installations where the auxiliary battery is mounted in the host vehicle, in the engine bay or under the tray for example. In Ignition mode a control wire is permanently connected to the Charging Device from the vehicle's electrical system to allow dependent control via the host vehicle's ignition switch. In this mode the Charging Device can be enabled or disabled when the ignition switch is turned on or off respectively.

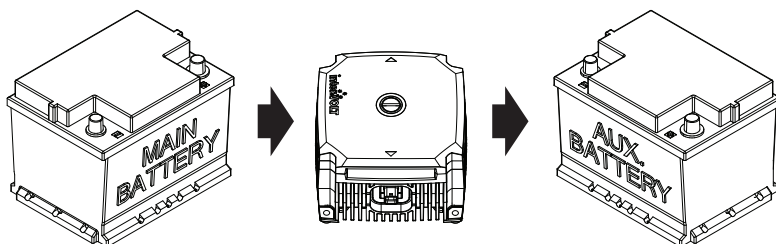


Charging Methods

There are two methods the DCC Pro utilises for charging an auxiliary battery. These methods are dictated by the charging source and function very differently. Both methods can be utilised at the same time thus providing a complete charging solution for your vehicle's auxiliary battery system.

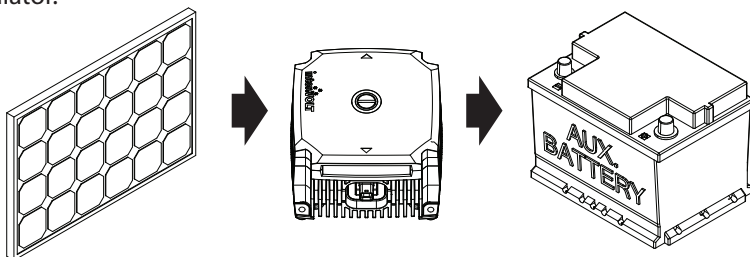
Battery to Battery Charging

This process is considered the principal charging method as it utilises the vehicle's main battery as the supply source. The battery to battery charging method can be controlled by either voltage or ignition mode as outlined previously. The DCC Pro is referred to as a three stage charger meaning there are three stages or cycles the device progresses through to achieve optimal charging of an auxiliary battery. There are many variants on the three stage design on the market but essentially the basic three stage concept is all that is required when properly implemented.



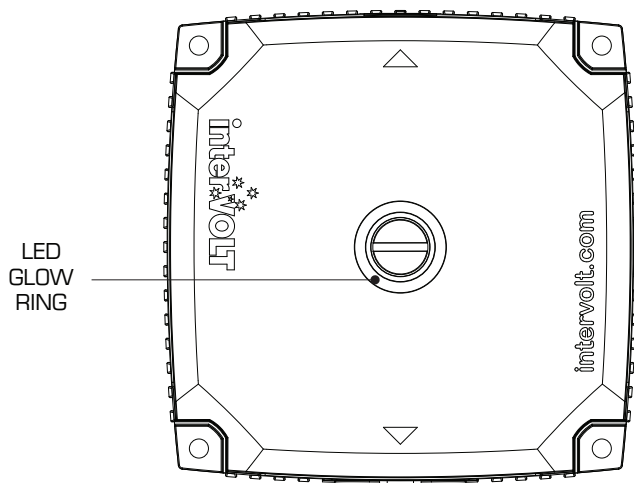
Solar to Battery Charging

The supplementary charging method is the solar to battery process. This method utilises a standard (17-27 OCV) solar panel as the supply source. It should be noted at this point that the solar panel is directly connected and should be **unregulated**. Use of a regulator will not allow the MPPT charging control to operate correctly and as a result will be detrimental to the charging and maintenance of your auxiliary battery. The MPPT function provides a benefit of up to 30% greater efficiency in performance than a standard (PWM) type regulator.

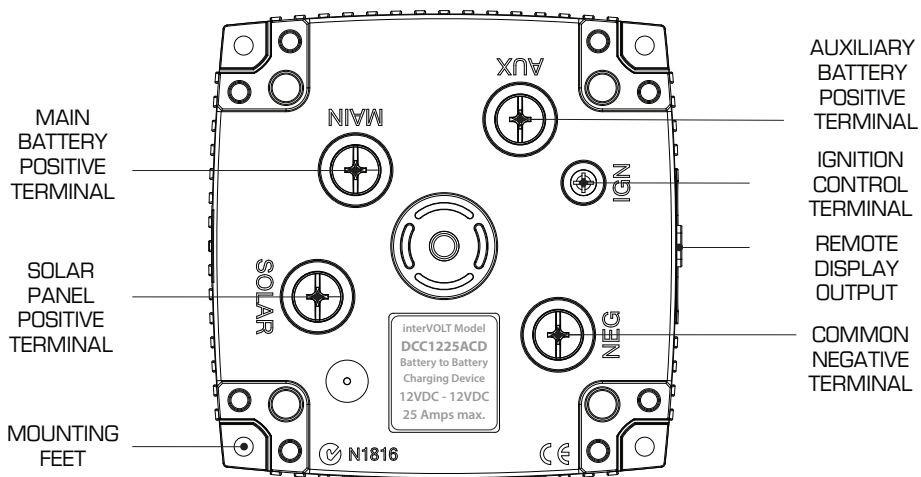


Layout - Charging Device

**Top View With
Terminal Cover**



**Top View Without
Terminal Cover**



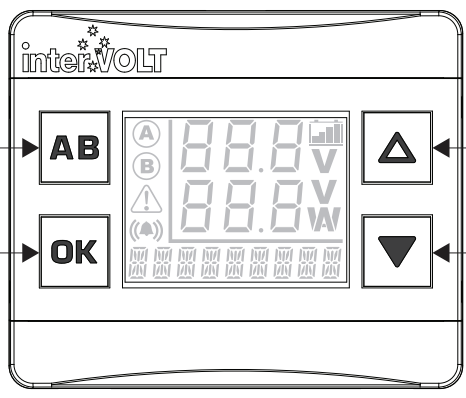
Note: Images above shown approximately half actual size.

Layout - Remote Display

Front View

FOR SWITCHING BETWEEN TWO CHARGING DEVICES. ALSO USED AS BACK AND EXIT BUTTON.

CONFIRMATION SELECTION BUTTON. ALSO USED TO SWITCH BETWEEN AUXILIARY AND MAIN BATTERY.



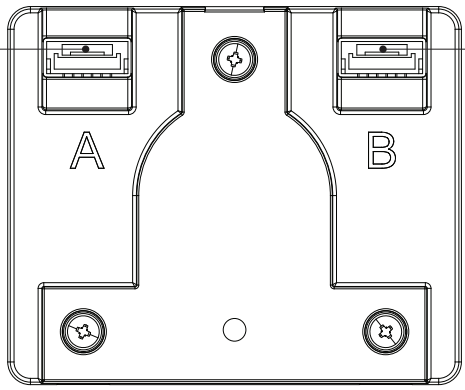
'UP' SELECTION OR HIGH BRIGHTNESS CONTROL.

'DOWN' SELECTION OR LOW BRIGHTNESS CONTROL. ALSO USED TO TURN OFF BACKLIGHT.

Back View

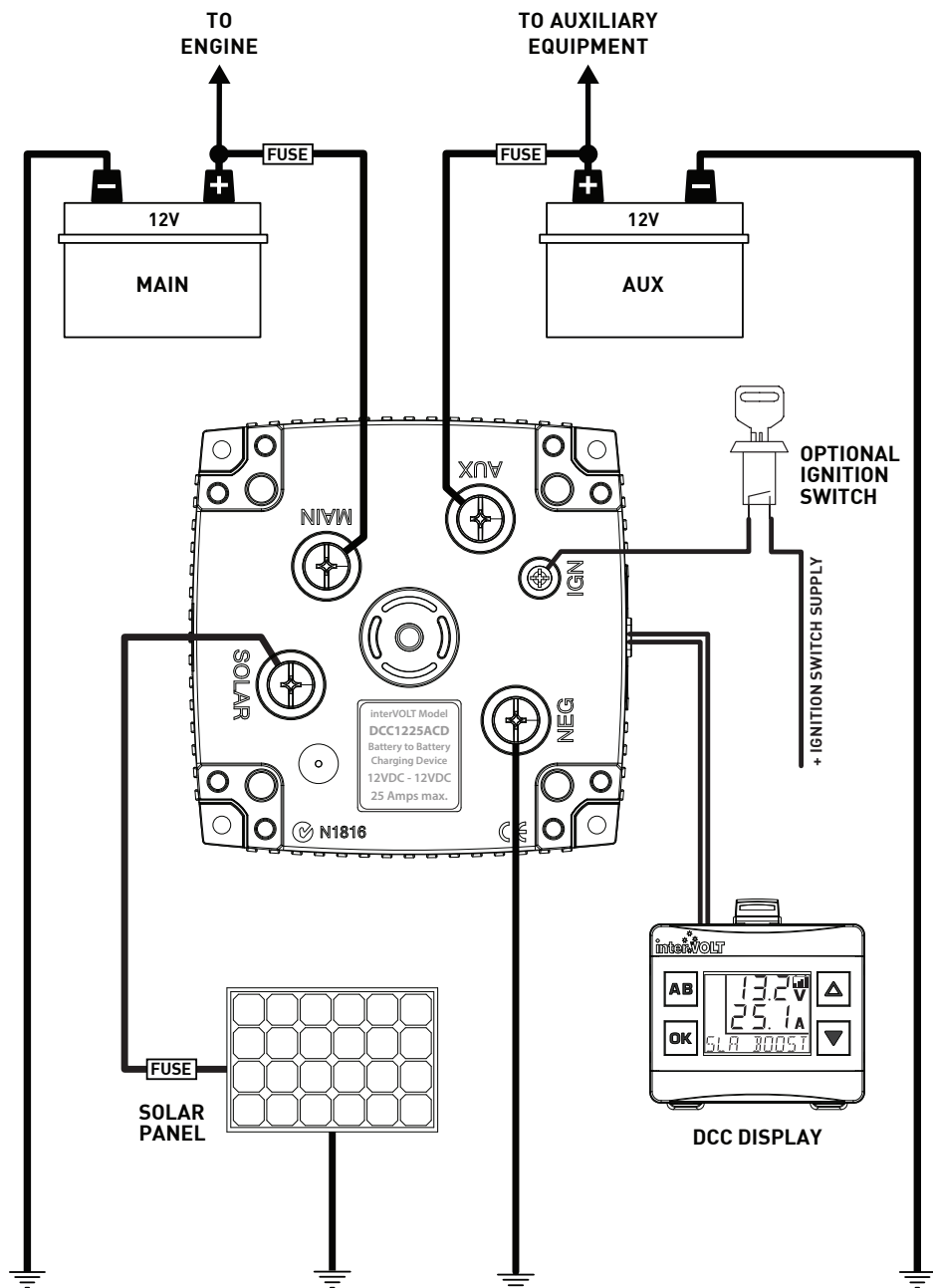
CHARGING DEVICE INPUT
A

CHARGING DEVICE INPUT
B

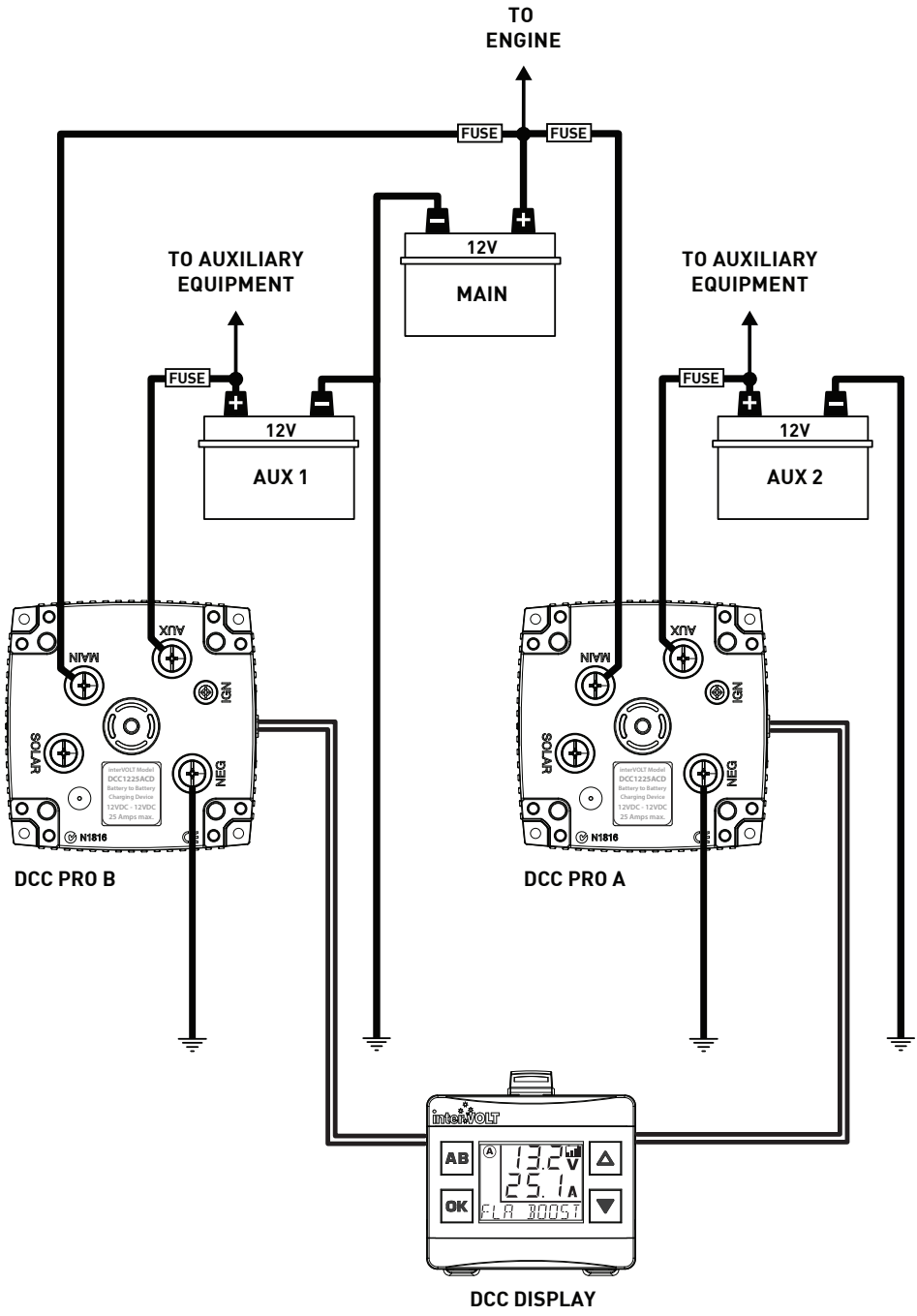


Note: Images above shown approximately actual size.

Standard Wiring Diagram



Wiring using two Charging Devices



Planning the installation

IMPORTANT: In order to ensure safety, high performance and long life the DCC Pro should only be installed by a suitably qualified tradesperson.

The DCC Pro consists of three main components, the Charging Device, the Remote Display and the Data Cable which connects the two. Due to the rugged design the Charging Device can be mounted in the vehicle's engine bay and the Remote Display in the cabin. The installation of these components is covered in the next few pages.

Plan the installation according to the location of the main and auxiliary batteries. The Charging Device can be situated anywhere in the circuit (subject to using the appropriate cable size) and does not need to be located directly next to either battery. Please consider the number of cables required when planning the install as the location could result in extra wiring. For example if the DCC Pro is required to charge a battery in a caravan it may be better to mount the Charging Device in the caravan itself rather than the vehicle but this may depend on where the Remote Display needs to be located.

Consideration should be given to the wiring layout. The DCC Pro has been designed so that cables can enter the device from any direction, even from one side only, without having to cross over. Crimp terminals are recommended over soldered lugs and should be terminated to automotive quality standards. Incorrect or poor crimping is not only a mechanical issue (wire separating from terminal) but will also cause voltage drop and potential overheating of the conductor as a result. Using the correct wire size for the application is imperative. The table on page 14 details the correct conductor size according to the run length.

For complete protection it is necessary to fuse each positive conductor. The fuse should be installed as close as possible to the power source. Fusing is required to protect the vehicle in the event of a short circuit – a cable coming off a terminal and contacting the chassis for example. The DCC Pro itself is fully protected by a range of internal protection devices. The fuse should be rated according to the load and should be no greater than the maximum current rating of the cable being used.

NOTE: All wiring should be terminated and routed but not connected to the Charging Device at this time. In order to configure the device the connection must be made in conjunction with the set-up steps depicted on pages 18–23.

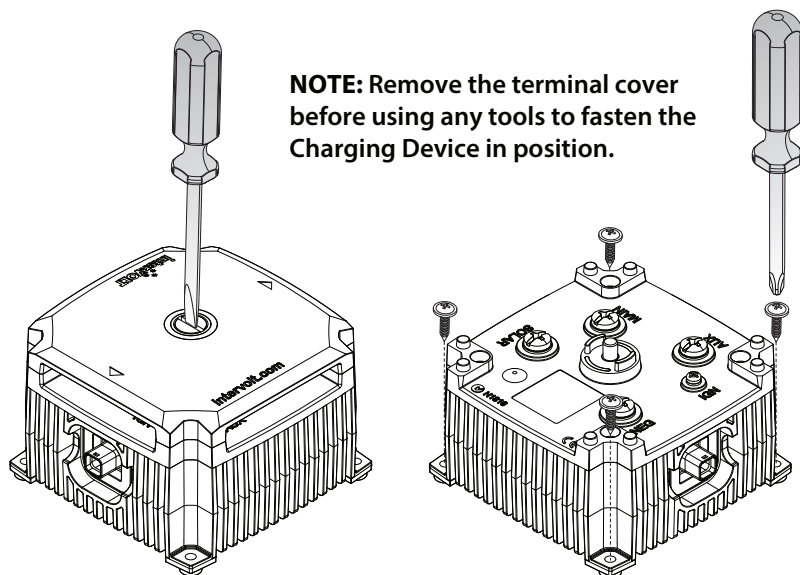
Installing the Charging Device

The DCC Pro Charging Device has been designed to cope with arduous conditions and can be installed in the vehicle's engine compartment. Care must be taken when performing the installation to ensure performance, longevity and of course, safety. Installing the device too close to a turbocharger for example may not only force the device into thermal shut down but could also result in catastrophic failure.

Select a suitable location where the Charging Device can be mounted ensuring adequate ventilation to the heatsink fins, free from excessive vibration and heat. Blocking the heatsink ribs could cause thermal shutdown. The electronics are enclosed in a sealed housing however the device, where possible, should be be installed in a protected environment. The Charging Device is NOT designed to be installed in a location where water can regularly 'short' between the terminals.

As it is of solid state design, the Charging Device can be mounted in any position vertically or horizontally. It should be oriented so that the LED Glow Ring indicator is clearly visible to the installer/operator. It must be installed on a hard flat surface – not an upholstered or insulated surface. Ensure at least 30mm of clearance all around from any other equipment.

The Charging Device should be fixed with appropriate fasteners ensuring all four anchor holes are utilised. The mounting hole diameter is 4.5mm and it is recommended that an M4 fastener installed into a rivet nut or with a locking nut is the best solution.



Wiring the Charging Device

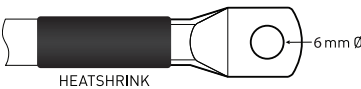
In a standard installation, the Charging Device should be wired according to the schematic on page 10. A standard installation consists of a Charging Device and Remote Display. If two Charging Devices are being installed please see page 11 for the alternate schematic.

Using the correct cable size for the job is paramount to performance and safety. Please refer the table below for the minimum recommended cable size (cross section) required in order to prevent voltage drop.

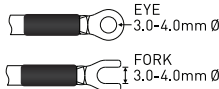
Cable Run Length	Minimum Conductor Size	Recommended SAE Equivalent
1-5 Metres	6 mm ²	8 B&S/AWG (7.91mm ²)
5-9 Metres	10 mm ²	6 B&S/AWG (13.56mm ²)

All cable lugs must be properly terminated using appropriate tooling in order to prevent poor contact which can result in overheating of the stud. An example of the correct method of termination is depicted below.

COPPER LUG FOR
MAIN TERMINATION



CRIMP LUGS FOR
IGNITION TERMINATION



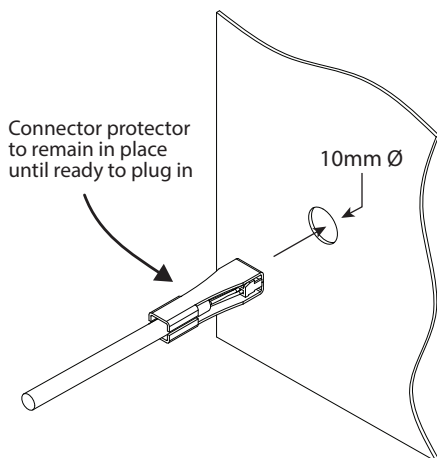
There are four large terminals, one each for the main and auxiliary batteries, one for the solar panel and one for the common negative connection. These terminals use a custom M5 threaded fastener with a 6mm diameter shoulder. A lug with a 6mm diameter hole should be used for terminating these four cables. There is a single, smaller, ignition terminal utilised when the optional Ignition Control mode is required. This uses a standard M3 fastener.

The Charging Device terminals are embossed for clarity and labelled as follows:

- MAIN (main battery)** – 12V main or starting battery connection
- AUX (auxiliary battery)** – 12V second or auxiliary battery connection
- SOLAR (solar panel)** – 12V solar panel connection
- IGN (ignition switch)** – ignition switch connection
- NEG (negative)** – 0V input for common negative connection
- LCD Display Input** – for DCC interconnect cable

Installing the Data Cable

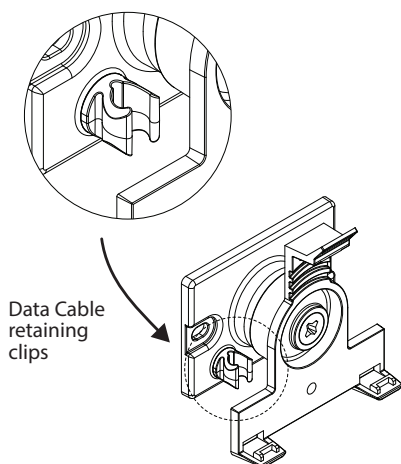
The Data Cable is the communication link between the Charging Device and the Remote Display. It has a sealed connection at the device end and unsealed connector at the display end. The Data Cable is fitted with a PVC 'clamshell' protector over the Remote Display connector plug. This is to protect the plug from damage when being routed into the vehicle cabin.



To install the Data Cable a 10mm diameter feed through hole must be drilled in the panel separating the Charging Device from the Remote Display (usually the firewall).

The Data Cable must be fed through the hole from the Charging Device side as the sealed connector will not pass through the hole. A rubber grommet is fitted to the cable and must be utilised to prevent damage from the sharp edges of the feed through hole.

After the Data Cable has been routed through any obstacles, the PVC protector can be removed. It is recommended that the protector only be removed when ready to plug into the Remote Display.



There are two plastic clips located on the mounting bracket base. These are provided for holding the Data Cable to relieve any strain on the connector and should be utilised wherever possible. The Data Cable simply pushes into the clip in the desirable position after the connector is plugged into the socket on the rear of the Remote Display.

Installing the Remote Display

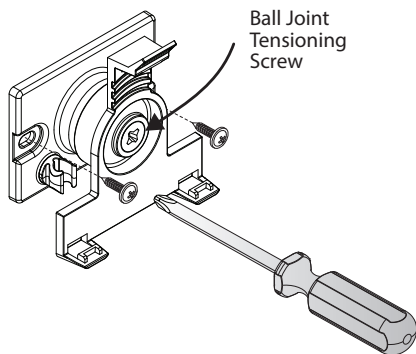
The DCC Remote Display is designed to be installed in the cabin of the vehicle, on the dash or console. It should be shielded from excessive heat and located away from direct sunlight if possible. The Remote Display is made up of two main sub-assemblies, the display housing itself and the mounting base.

Together the two are designed to be fixed in a position that is comfortably viewable and accessible to the operator. A user adjustable ball joint allows for the housing to swivel through a range of positions to best suit the operator. A tensioning screw in the centre of the mounting bracket can be utilised to adjust and maintain the Remote Display in the desired position. This screw should not be over-tightened.

There are two methods provided for fixing the mounting base to the surface, details as follows:

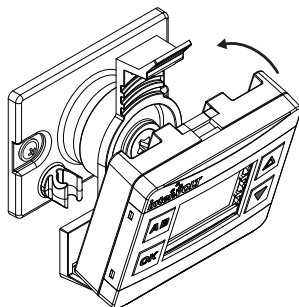
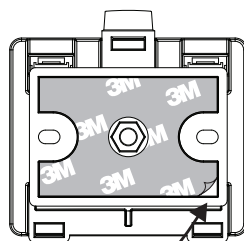
Option A - Screw Fixing:

This method utilises two suitable fasteners (not supplied) to attach the mounting base to the surface as per the diagram below.



Option B – Adhesive Fixing:

This method utilises the self-adhesive foam backing tape to adhere the mounting base to the surface as per the diagram below.



The mounting base is designed to hold the Remote Display. Place the display bottom first into the bracket and pinpoint the two location tabs provided. Tilt the display back until the top tab locates in position with an audible 'click'. The display can be removed at any time by pushing the thumb lever gently back and releasing the housing assembly.

Connection and Configuration

A step-by-step guide

In some applications, the DCC Pro can be installed and connected straight out of the box without any changes to the configuration. In other situations it is necessary to change these defaults, a different battery type for example, as detailed below (see Charging Modes section on page 6 for explanation). For safety reasons, the battery type and control mode can only be changed during set-up (configuration mode) before the auxiliary battery is connected. Of course, these selections can be changed at any time but the auxiliary battery must be disconnected in order to do so.

In default state the configuration is based on a standard battery to battery charging installation and assumes the following:

1. The auxiliary battery is a standard lead acid type (sealed or unsealed).
2. The system is not controlled by the vehicle's ignition circuit. This default mode is defined as voltage control as opposed to ignition control (see page 6 for an explanation).

The Remote Display is initially used for configuring the Charging Device upon installation. Most importantly the Remote Display allows for selection of different battery types (chemistries) and the control mode, Voltage Sense or Ignition Control (see explanation on page 6).

The following options are available for selection:

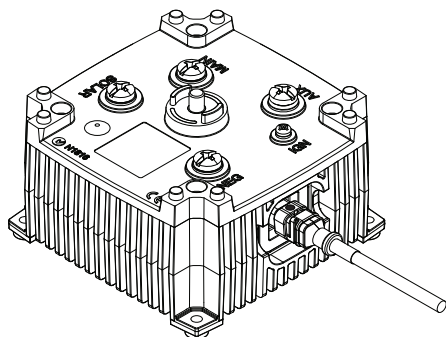
- **Standard Lead Acid** – displayed as 1 LEAD ACID on the Remote Display during set-up or SLA in short form.
- **Absorbed Glass Mat** – displayed as 2 AGM on the Remote Display during set-up and in short form.
- **Gelified Electrolyte** – displayed as 3 GEL on the Remote Display during set-up and in short form.
- **Lead Calcium** – displayed as 4 LEAD CALCIUM on the Remote Display during set-up or LCA in short form.
- **Constant Float** – displayed as 5 FLOAT on the Remote Display during set-up and in short form.

The following pages illustrate the step by step configuration process for installing the Charging Device and Remote Display. If there is a need to change the battery type and control mode, this process must be completed in the order depicted for the DCC Pro to operate correctly.

1

Connect the Data Cable to the Charging Device

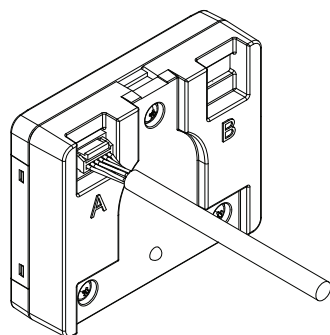
The Charging Device end of the Data Cable is fitted with a sealed 6-way connector plug. The plug is marked with a spot ● of identifying colour indicating the top of the connector. The plug should be gently pushed into the mating connector socket until it 'clicks' into position. To check the latch has engaged gently pull the connector – it should not move. If there is a need to remove the connector, please see page 23 for instructions.



2

Connect the Data Cable to the Remote Display (if utilised)

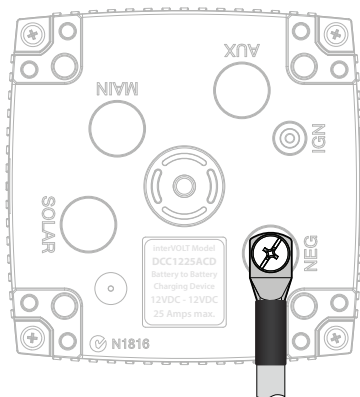
The Remote Display end of the Data Cable is fitted with an unsealed 6-way connector plug. The plug is fitted with a plastic clamshell to protect it from damage during installation. The clamshell is secured with tape and should now be removed for installation. The plug should be gently pushed into the mating connector socket until it 'clicks' into position. When using one Charging Device either socket can be utilised.



3

Connect the negative power cable to the Charging Device

The negative power cable should be connected to the Charging Device first. This should be fastened to the terminal marked **NEG** using the special screw provided. Connect the other end of the negative to the main battery negative (recommended) or directly to the chassis, ensuring the connection has good contact. Ensure the auxiliary battery negative is either connected to the **NEG** terminal of the Charging Device or the chassis.



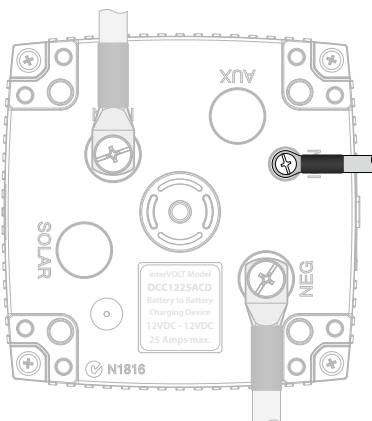
Connect the main battery cable to the Charging Device

The main positive power cable is the next to be connected. Check the in-line fuse is removed prior to connecting the cable. Connect the Charging Device end of the positive cable to the terminal marked **MAIN** using the special screw provided. Connect the other end of the cable to the main battery positive. Insert the fuse into the inline fuse holder. The Charging Device is now powered and the **LED indicators should be flashing white intermittently**.



Connect the ignition cable to the Charging Device (if utilised)

The ignition cable is the next to be connected, if the intention is to use Ignition Control Mode (see page 6). Keep in mind that the control mode setting is optional and, even if the ignition wire is connected, it does not necessarily need to be implemented in set-up mode.

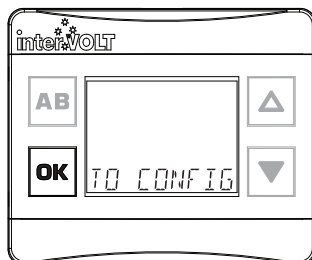


Configure the Charging Device: Initialising set-up mode

Configuring or 'setting up' the Charging Device is the next step in the sequence. To initiate set-up mode follow the steps below:

- I. Press and hold the **OK** button until an audible 'beep' is heard and a scrolling message reads 'TO CONFIGURE PRESS UP'. The LED Glow Ring will now indicate purple intermittently.
- II. Release the **OK** button.*
- III. Press the **△** button to initiate the set-up mode and continue to next step.

* If an error message is displayed please see page 33.

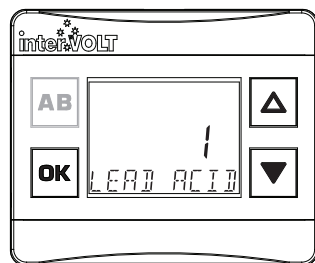


7

Configure the Charging Device: Selecting battery type

Following the last step (6) above the message 'BATT TYPE' will appear. To select the auxiliary battery type, follow the steps below:

- I. Press the **OK** button to enter the battery type selection menu.
- II. Use the **▲** and **▼** buttons to scroll and view the available options (as outlined on page 17).
- III. Once the desired battery type is visible, press the **OK** button to confirm and continue to next step.

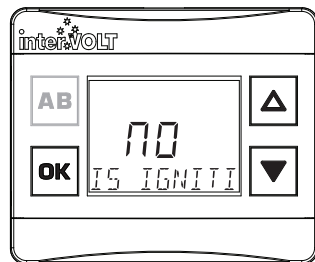


8

Configure the Charging Device: Ignition wire control

Following the last step (7) above the message 'IS IGN WIRE CONNECTED' will appear. You will need to answer this question to proceed. Use the **▲** and **▼** scroll buttons to select one of the two following options:

- I. If you **have not** connected the ignition control wire select **NO** and proceed to step 11.
- II. If you **have** connected the ignition control wire to the charging device select **YES**.
- III. Press the **OK** button to confirm and continue to next step.

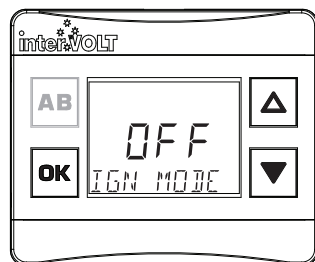


9

Configure the Charging Device: Ignition control mode



Following the last step (8) above confirm if you want to enable ignition mode. Use the **▲** and **▼** scroll buttons to select one of the two following options:


- I. To disable ignition mode select **OFF**
- II. To enable ignition mode select **ON**
- III. Press the **OK** button to confirm and continue to next step.

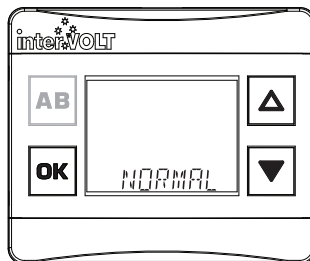


10

Configure the Charging Device: Ignition control setting

The next step is to confirm the ignition control setting. Use the  and  buttons to select one of the two following options:

- I. Select **NORMAL** for standard (non CAN/LIN) controlled charging system.
- II. Select **LOW** for ECU controlled electrical system.
- III. Press the  button to confirm and continue to next step.



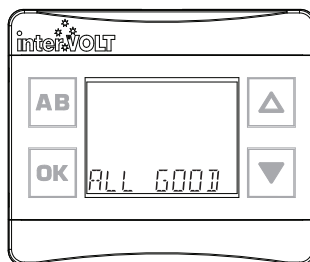
11

Configure the Charging Device: Confirming configuration

Upon successful completion of the above, the following confirmation message should appear:

ALL GOOD - this indicates your selections have been sent to the device and accepted. It does not confirm the integrity of your wiring installation.

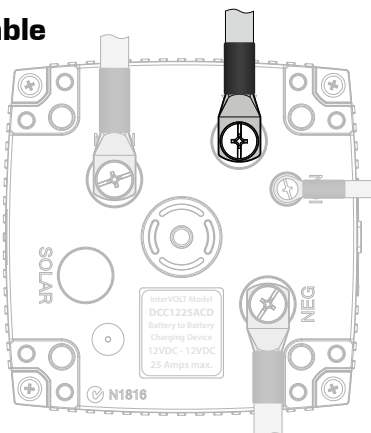
In the event a **SYS** message error is displayed, disconnect, then reconnect, the main battery positive cable and re-commence step 6. If the error persists re-check the Data Cable connection. If this does not resolve the problem, please refer to the troubleshooting information on page 33.



12

Connect the auxiliary battery cable to the Charging Device

The auxiliary positive battery cable should now be connected. Check the in-line fuse is removed prior to connecting the cable. Connect the Charging Device end of the positive cable to the terminal marked **AUX** using the special screw provided. Connect the other end of the cable to the auxiliary battery positive. Insert the fuse into the inline fuse holder and continue to next step.

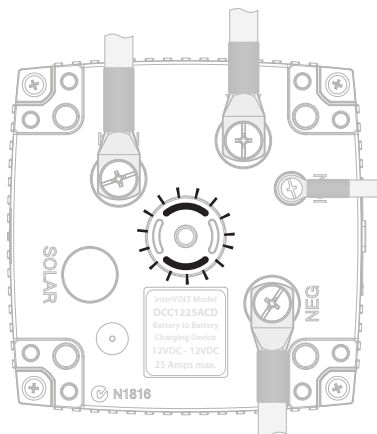


13

Confirming operation

The Charging Device should now be active. Subject to the state of the main and auxiliary batteries, the Charging Device will now enter standby mode or a charging stage. See pages 6-7 for more information.

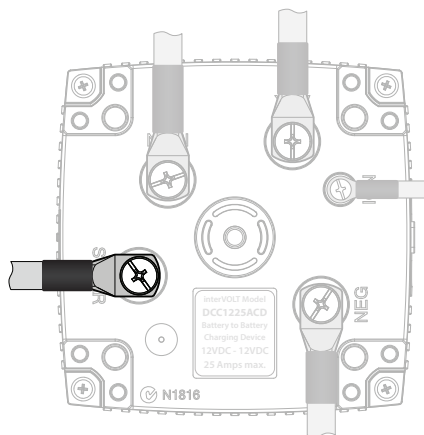
As a result the LED indicators will reflect the current stage, for example if the current stage is 'float' they will illuminate green continuously. If a solar panel is to be connected continue to next step. Otherwise continue to step 15.



14

Connect the solar panel power cable (if available)

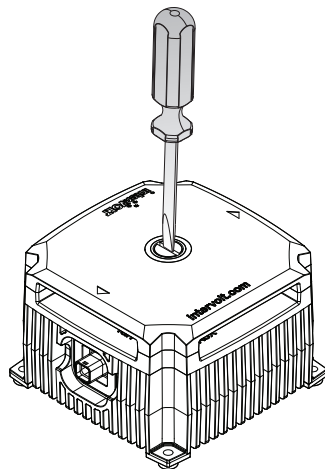
The solar panel positive power cable can now be connected. Check the in-line fuse is removed prior to connecting the cable. Connect the output positive cable from the solar panel to the terminal marked **SOLAR** using the special screw provided. Reinstall the fuse into the inline fuse holder. Subject to the state of the auxiliary battery, the Charging Device may enter solar mode. See page 7 for more information. Continue to next step.



15

Reinstall the terminal cover

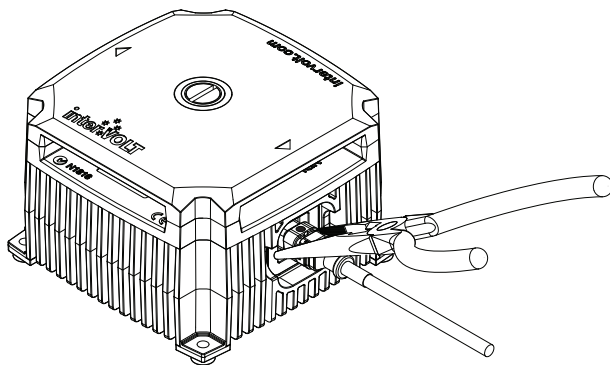
Locate the terminal cover according to the arrows. The cover is indexed and must fit into the locating pins in order for the Glow Ring to operate correctly. The installation is now complete, however if you have a second Charging Device to install please proceed to step 17.



16

Unplugging the Data Cable from the Charging Device.

Using a pair of needle nose pliers, apply a little pressure to the sides of the Data Cable plug and gently withdraw the plug assembly. As pressure is applied to the plug the locking tab momentarily deforms and is released from the mating recess.

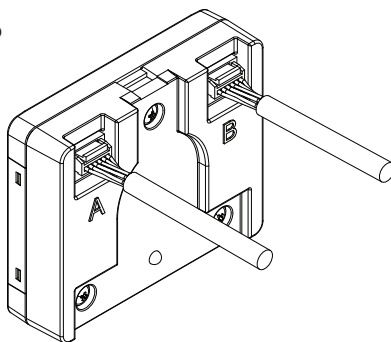


17

Connect a second Charging Device (if available)

If a second Charging Device is to be connected to the Remote Display please implement as follows:

- I. Unplug the data connector of the existing Charging Device for the Remote Display.
- II. To install the second Charging Device repeat steps 1 to 13.
- III. Once successfully installed reconnect the original data connector.
- IV. The two Charging Devices will now be displayed as **A** and **B** on the LCD screen. It is possible to switch between devices by toggling the **AB** button (see operation section).



NB

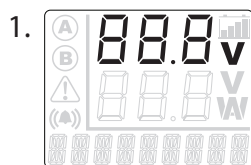
Notes

1. If the **OK** button is released before the audible buzzer sounds, a system error will be displayed. In this event you will need to wait 1 minute, until the LED indicators on the Charging Device stop flashing purple. At this point reinitialise by pressing the **OK** button and wait for the audible beep before entering set-up mode again.

Operating Brief

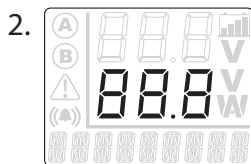
The DCC Pro is a fully self-contained charging device for in-vehicle battery to battery charging. The kit is supplied complete with the Remote Display and the Data Cable however, aside from initial programming of the operating mode and battery type, it is not essential to use the Remote Display if not required. In fact, for certain applications, the Charging Device is available separately as are all the other components. A fleet of vehicles may be an example where charging is required but monitoring is not. In this example, multiple Charging Devices could be purchased but only one Remote Display is required to program all.

The Remote Display provides valuable feedback to the operator on the charge state of the auxiliary battery and the status of the Charging Device as depicted below:



The upper numeric display

This is the top three digit numeric character set. In conjunction with the **V** icon, this indicates the auxiliary battery Voltage to one decimal place.



The lower numeric display

This is the bottom three digit numeric character set. This is a multi-function indicator which can be toggled in standard operating mode (not standby) to switch between auxiliary battery charging current/power and main battery voltage;



The Voltage icon

This indicates the main battery voltage; or



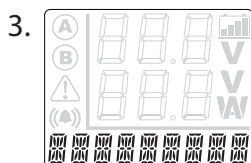
The Amperage icon

This indicates the current in Amps for battery to battery charging; or



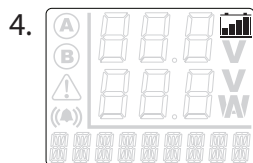
The power icon

This indicates the power in Watts for solar to battery charging.



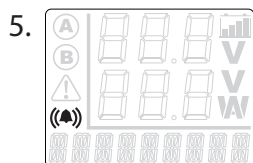
The message display

This is the multi-function nine digit alphanumeric character set which displays the pre-programmed battery type and the charging cycle status.



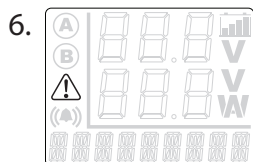
The battery icon

This indicates the auxiliary battery state of charge and charging cycle status. Please see page 29 for a detailed description of this function.



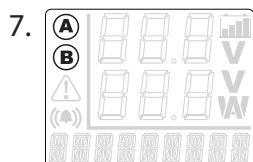
The audible alarm icon

This indicates the audible alarm is enabled. The audible alarm operates in conjunction with the DCC Pro's warning system and is enabled by default. The audible alarm can be disabled at any time. Please see page 26 for directions on configuring the audible alarm.



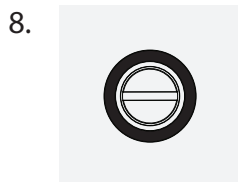
The alert icon

This indicates an alert condition. Please see page 32 for a detailed description of this function.



The Charging Device icons

These indicate which battery charging device is currently being displayed, when there are two charging devices in use. Toggling the **AB** button changes from one charging device to the other, displaying the **A** or **B** icon accordingly. If there is only one charging device connected, these icons will not be displayed.



The LED Glow Ring

This indicator is located on the top (terminal cover) of the Charging Device. The LED Glow Ring is an integral part of the DCC Pro's control and monitoring system, changing colour and state according to the status of the Charging Device. Please see page 31 for detailed information on the LED Glow Ring.

Operator Convenience Settings

The Remote Display also allows certain changes to be made at any time or 'on the fly'. There are three options which can be configured for operator convenience details as follows;

1) Option 1: The keypad beeper.



This option simply turns the keypad beeper, also known as 'button clicks', on or off. In default mode the keypad beeper is enabled and can be disabled at any time.



- i. Press and hold the **OK** button until an audible beep is heard and the text **KEY BEEP** appears.
- ii. Press the **OK** button again and the word **On** will appear above the text line.
- iii. Press **△** or **▽** to toggle between **On** or **OFF**.
- iv. Press the **OK** button to confirm your choice.
- v. Press the **AB** button to exit (or wait 5 minutes for timer to automatically exit).

2) Option 2: The audible alarm.



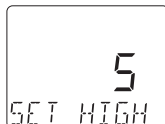
This option allows the operator to enable or disable the audible alarm which operates in conjunction with the warning system. By default the audible alarm is enabled and the (🔊) icon will be displayed on the main screen. The icon will disappear when the audible alarm is disabled. In the event of a warning condition the audible alarm can still be muted even if it is enabled. In any warning condition, pressing the **OK** button serves as acknowledgment of the problem and automatically mutes the audible alarm at the same time.

- i. Press and hold the **OK** button until an audible beep is heard and the text **KEY BEEP** appears.
- ii. Press the **△** or **▽** to toggle the selection until the text **AUD ALARM** appears.
- iii. Press the **OK** button again and the word **On** will appear above the text line.
- iv. Press **△** or **▽** to toggle between **On** or **OFF**.
- v. Press the **OK** button to confirm your choice.
- vi. Press **AB** button to exit.

3) Option 3: The backlight brightness.



This option allows the operator to adjust the backlight brightness for both high (HI) and low (LO) settings to enable the 'one touch' operation of both. Each setting allows the brightness to be adjusted over 5 increments. In HI setting, the range is 0 through 5 with 5 being the maximum and in LO, 0 through -5 with -5 being the minimum.



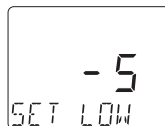
To select the maximum backlight brightness:

- i. Press and hold the **OK** button until an audible beep is heard and the text **KEY BEEP** appears.
- ii. Press the **▲** or **▼** to toggle the selection until the text **BACKLIGHT** appears.
- iii. Press the **OK** button again and the word **HI** will appear above the text line **SETTING**.
- iv. Press **OK** again and the text **SET HIGH** will appear.
- v. Press **▲** or **▼** to increase or decrease the backlight brightness.
- vi. Press the **OK** button to confirm your choice.
- vii. Press the **AB** button to exit.



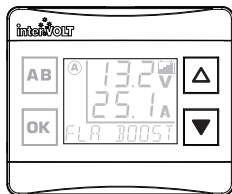
To select the minimum backlight brightness:

- i. Press and hold the **OK** button until an audible beep is heard and the text **KEY BEEP** appears.
- ii. Press the **▲** or **▼** to toggle the selection until the text **BACKLIGHT** appears.
- iii. Press the **OK** button again and the word **HI** will appear above the text line **SETTING**. Use the **▲** or **▼** to toggle to text **Lo**.
- iv. Press the **OK** button and the text **SET LOW** will appear.
- v. Press **▲** or **▼** to increase or decrease the backlight brightness.
- vi. Press the **OK** button to confirm your choice.
- vii. Press the **AB** button to exit.



Operator Control Functions

Backlight Brightness Control

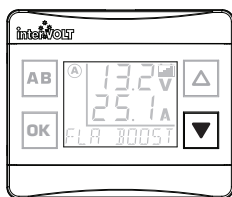


Once the backlight brightness settings have been selected (see page 27), controlling it becomes a convenient one touch process.

Press the button momentarily and the backlight will assume the highest pre-set brightness

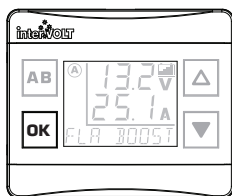
Press the button momentarily and the backlight will assume the lowest pre-set brightness

Backlight On/Off Control



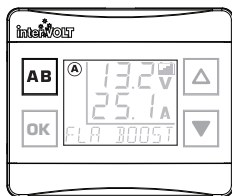
By default the backlight is always on when powered but it can be switched off at any time by pressing and holding the button for 2 seconds. It can be switched on again by pushing either the or button momentarily.

Toggle Between Auxiliary Battery Charging Current and Main Battery Voltage



The upper three digit character set always displays the auxiliary battery voltage but the lower character set can be toggled to display either the auxiliary charging current or the main battery Voltage. This function cannot be used when the charger is off or in standby mode. Momentarily press the button to toggle the character set. If battery to battery charging is active the display will indicate the current in Amps but if solar power is in use the display will indicate the charging power in Watts.

Toggle Between Two Charging Devices

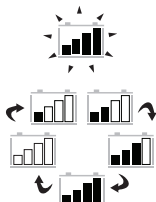


If two Charging Devices are installed and connected to a single display it is easy to toggle between both by momentarily pressing the button. The or will indicate the status of the device being monitored. If only one Charging Device is connected the or icons will not appear and pressing the button will result in a system error message. This does not cause any problems and the message will simply disappear after a few seconds.

Operator Monitoring Functions

Once installed and configured the DCC Pro Remote Display can be used to monitor a range of functions and provide valuable feedback to the operator on the status of the dual battery system.

The Battery Icon is a multi-function indicator used to display the different charging cycles and methods. It is a useful quick reference tool to know what the charging status is when the Remote Display is in dual voltage mode for example.



Solar charging

All bars in the battery icon are flashing intermittently.

Boost charging

When voltage level is below 13V all bars are continuously filling up in a cycle.

Boost charging

When voltage level is below 13.5V the first bar is filled and the rest are filling up in a cycle.

Boost charging

When voltage level is above 14V the first two bars are filled and the rest is filling up in a cycle.

Absorption/Float charging

If current is higher than 5A the first three bars are filled and steady and the last one is filling up.

Float charging

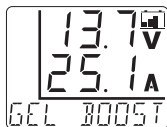
If current is lower than 5A all bars are filled and steady.



If the main battery voltage has reached the lower cut-out limit, the Charging Device output is switched off and the Remote Display is automatically disabled (sleep mode) to conserve power. The Remote Display can be 'woken' momentarily by pressing the **OK** button and will temporarily display the following:

- **Auxiliary Battery Voltage.** This is always displayed as the upper numeric set.
- **Main Battery Voltage.** This will be displayed as the lower numeric set.
- **Charging Device Status.** This is displayed as **STAND BY** on the multi-function character set.

In the above condition the Charging Device LED Glow Ring will illuminate white intermittently (every 8 seconds).



When battery to battery charging, the Remote Display will indicate the following:

- **Auxiliary Charging Voltage.** This will always be displayed as the upper character set.
- **Auxiliary Charging Current.** This is displayed by default as the lower character set but can be toggled using the **OK** button to display the Main Battery Voltage.
- **Main Battery Voltage.** This is displayed alternately as the lower character set and can be toggled using the **OK** button to display the Auxiliary Charging Current.
- **Selected Battery Type.** This is displayed using the first three letters of the multi-function character set and indicated as SLA, AGM, GEL or LCA. The first five letters are also used to display Constant Float operation as FLOAT.
- **Charging Cycle Status.** This is displayed using the last five letters of the multi-function character set and indicated as BOOST, ABSPN or FLOAT.

In the above condition the Charging Device LED Glow Ring will illuminate blue continuously for BOOST, blue/green alternately for ABSORPTION and green continuously for FLOAT.



When solar to battery charging, the Remote Display will indicate the following:

- **Auxiliary Charging Voltage.** This will always be displayed as the upper character set.
- **Auxiliary Charging Power.** This is displayed by default as the lower character set but can be toggled using the **OK** button to display the Main Battery Voltage.
- **Main Battery Voltage.** This is displayed alternately as the lower character set and can be toggled using the **OK** button to display the Auxiliary Charging Power.
- **Solar Charging Method.** This is displayed as SLT SOLAR or PRM SOLAR on the multi-function character set.











In the above condition the Charging Device LED Glow Ring will illuminate aqua green continuously for PRM SOLAR and aqua green intermittently for SLT SOLAR.

System Status

The DCC Pro has a number of protection and monitoring mechanisms built in to protect the product from application and installation issues as well as faults that may occur in exceptional circumstances. To assist with troubleshooting any problems that arise, the DCC Pro can indicate these issues in one of two ways, via the Charging Device itself or on the Remote Display (if connected).

The Charging Device incorporates the LED Glow Ring, a multi-colour, multi-function indicator which is illuminated according to the status of the device. The Glow Ring will reflect a range of conditions as a visual indication to the operator/installer.

The Remote Display can visually and audibly alert the operator to the same conditions as indicated by the LED Glow Ring with the advantage, as the name indicates, of being located away from the Charging Device. These conditions are detailed in the table below.

	Glow Ring Colour	Glow Ring Frequency	Status	Remote Display Indication	Condition	Charger State
	White	Intermittent (8 seconds)	Standby	STANDBY*	Normal	Off
	Aqua Green	Continuous	Primary Solar	PRM SOLAR	Normal	On
	Aqua Green	Intermittent	Silent Solar	SLT SOLAR*	Normal	On
	Purple	Intermittent	Set-up	TO CONFIG...	Normal	Off
	Blue	Continuous	Boost	BOOST	Normal	On
	Blue/Green	Alternate	Absorption	ABSPN	Normal	On
	Green	Continuous	Float	FLOAT	Normal	On
	Red	Intermittent	General Fault	CHRGF OFF	Alert ¹	Off
	Yellow	Intermittent	Low Voltage	BAT FAULT	Alert ²	Off
	Orange	Intermittent	High Temperature	OVERTEMP	Alert ³	Off

*Use the  button to 'awaken' the display for temporary viewing.

NOTE: For further information on alert conditions please refer to troubleshooting guide on following pages.

Alert Conditions

There are certain conditions that may arise in operation that could result in an alert condition. In an alert condition the output of the Charging Device will be automatically disabled and the alert symbol will be displayed. A message indicating the cause of the condition will be displayed on the multi-function character set.



If the main battery voltage is dropping but has yet to reach the lower cut-out limit, the Remote Display will indicate **CHRG OFF**. Please see Alert¹ condition in the table below for further information.



In the event the auxiliary battery is completely drained, open circuited or there is a connectivity issue the Remote Display will indicate **BAT FAULT**. Please see Alert² condition in the table below for further information.



In a situation where the Charging Device is subjected to extreme temperatures for a prolonged period, thermal protection will be activated. Please see Alert³ condition in the table below for further information.

Condition	Possible Explanation	Likely Solution
Alert ¹	Main battery Voltage is too low to continue charging (<12.4V).	Start engine to charge battery if possible. Manually charge with separate charger.
Alert ²	Auxiliary battery Voltage is too low, battery has expired or is disconnected.	If less than 5V charger will not initialise. Check and address connection integrity. Replace auxiliary battery.
Alert ³	Charging device has over heated.	Relocate device to cooler location. Wait for ambient temperature to drop.

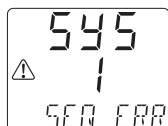
In the unlikely event that the LED Glow Ring on the Charging Device is not indicating please check and confirm the following before contacting support:

1. Check integrity of all connections between the main battery and the Charging Device.
2. Check the inline fuse between the main battery and the Charging Device.
3. If a multi-meter is available confirm the main battery voltage reads the same at the battery terminals as well as the Charging Device terminals.

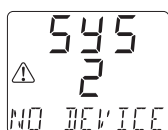
If the above checks are confirmed as OK please contact your vendor for further assistance.

Error Conditions

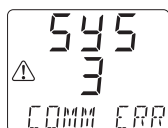
In addition there are certain conditions which may result as a communication issue between the Charging Device and Remote Display. These will be displayed in the form of a System Error on the Remote Display in one of four ways, details as follows:



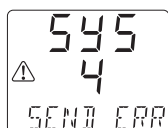
SYS 1 – In the event an input error is made when configuring the Charging Device (set-up) or if two Charging Devices are connected and the user attempts to program both simultaneously, a sequence error is detected and the Remote Display will indicate **SEQ ERR**.



SYS 2 – If only one Charging Device is connected and the **AB** button is pressed (to toggle between Charging Devices) a connectivity error is detected and the Remote Display will indicate **NO DEVICE**.



SYS 3 – If there is a data exchange issue between the Charging Device and the Remote Display, a damaged data cable for example*, a communications error is detected and the Remote Display will indicate **COMM ERR**. Please note that this error may also display when the Charging Device is in the process of changing states/cycles at the precise moment the button is pressed. Simply waiting a few seconds and trying the button again should result in a successful reading.

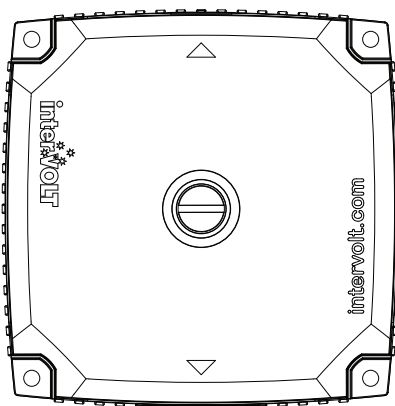


SYS 4 – In the event there is a transmission issue during the configuration procedure and the Charging Device cannot be programmed a corruption error is detected and the Remote Display will indicate **SEND ERR**. A transmission error is often caused by a fault with the Data Cable or the connections.*

* If SYS 3 or 4 errors persist it is most likely the result of an issue with the Data Cable. Disconnect and inspect both the Charging Device and Remote Display plugs and sockets. Check there are no bent or broken pins in the Charging device socket. Check there are no broken wires at the Remote Display end.

If the above checks are confirmed as OK please contact your vendor for further assistance.

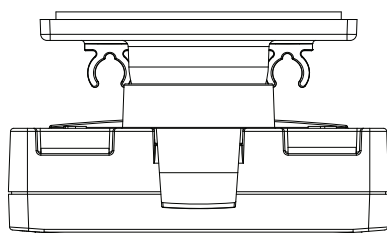
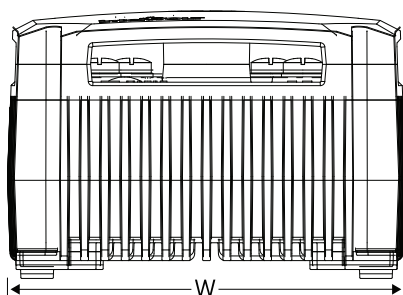
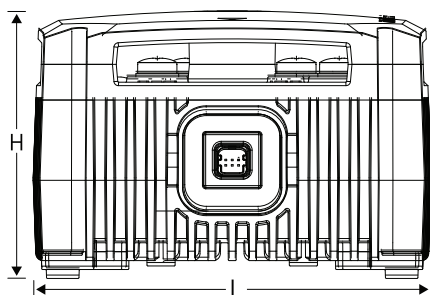
Input Voltage	
Main	9 – 17 VDC
Solar	27 VOC max. (open circuit – no load)
Solar Power	250 Watts nominal (300 Watts peak)
Continuous Rating	25 Amps @ 50°C
Current Draw	
Charging Device	Including LED indicator <10mA (in standby)
Remote Display	With backlight off: 10mA max With backlight on: 30mA max
Boost Voltage	
Standard Lead Acid	14.4 VDC Nominal
Absorbed Glass Mat	14.6 VDC Nominal
Gelified Electrolyte	14.2 VDC Nominal
Lead Calcium	14.8 VDC Nominal
Float Voltage	13.2 VDC Nominal
Electrical Protection	Thermal overload shutdown – auto reset Electrical overload shutdown – auto reset Under voltage disconnect – auto re-connect Over voltage disconnect – auto re-connect Reverse polarity protection of main terminals
Environmental Protection	
Charging Device	IP67 (internal components only)
Remote Display	IP40 (not dust or water resistant)
Operating Temperature	-20°C to +85°C
Operating Humidity	Up to 98%
Charging Device Materials	
Heatsink	E-Coated ADC-3 die cast aluminium
Blue Plastics	Temperature resistant PC/ABS alloy
Black Plastics	15% glass reinforced PBT
Transparent Plastics	Temperature resistant PMMA
Remote Display Materials	
Dark Grey Plastics	Temperature resistant PC/ABS alloy
Transparent Plastics	Temperature resistant PMMA
Terminal Material	Tin plated brass
Terminal Fasteners	304 stainless steel
Conformity	AS/NZS CISPR 11:2004 for EMC
Dimensions	
Charging Device	112 x 112 x 75mm (including terminal cover)
Remote Display	60 x 36 x 59mm (including mounting bracket)
Weight	
Charging Device	690 grams
Remote Display	55 grams



DCC Pro Charging Device

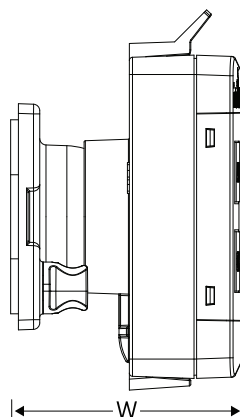
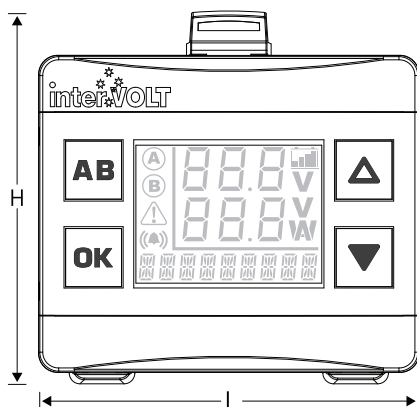
Length	Width	Height
112mm	112mm	75mm

Footprint Mounting Centres
95mm x 95mm



DCC Pro Remote Display

Length	Width	Height
60mm	36mm	59mm



Fundamentals in Detail

CHARGING FUNCTIONS

Soft start: This function is the initial phase of the boost stage cycle. In soft start the current is allowed to build gradually over time, effectively controlling the high inrush current normally experienced at 'switch on'. Controlling the inrush current reduces the risk of further damage if the battery is unserviceable and prevents potential issues with any equipment that may be powered from the battery at the time. Many manufacturers refer to a soft starting feature as an additional stage. In reality however it is simply another process used for controlling the boost cycle to properly manage the auxiliary battery. The soft start function is timed and under full load will allow the current to build to maximum, four minutes after initialising.

Thermal control: This function is enabled when the temperature of the Charging Device rises above a pre-determined limit. When the environmental temperature exceeds 50°C and the Charging Device is under full load (25 Amps), thermal control is initiated. When thermal control is activated it enters a pre-programmed control mode which allows current output to continue subject to temperature rise. As the temperature increases the current is reduced proportionally rather than immediately so that the charging process can still be maximised for the hottest of conditions. This process is directly inverse to the soft start function.

Input Voltage control: This function is incorporated to compensate for voltage drop caused by undersize cable, poor connections, improper termination, etc. by comparing the input voltage at the main battery terminal with the voltage at the Charging Device itself. It does this by momentarily disconnecting the auxiliary battery (every two minutes for 250ms), thereby removing the load. At this time it evaluates the voltage with and without load to determine the true voltage. It will then establish if the true Voltage is high enough to continue charging or to implement low voltage shut down. If the true Voltage is high enough, the charging current will be automatically adjusted according to the evaluation, this will prevent the Charging Device from cycling on and off.

CONTROL MODES

Voltage control mode: In Voltage control mode the charging control process is automatic and is based on voltage sensed at the input and output terminals of the Charging Device. When the main battery Voltage rises above 12.8V the Charging Device will commence operation. The charging cycle is determined by the auxiliary battery voltage and may enter BOOST or FLOAT stage depending on this figure (see Charging Methods on pages 37-40). If solar power is actively available, SOLAR stage may be initiated.

Ignition control mode: In this mode the DCC Pro has two optional settings. These settings allow the DCC Pro to be used in traditional vehicles with conventional charging methods or the new ECU controlled systems used in modern design. The NORMAL setting is provided for the former and the LOW for the latter. In ignition mode the start-up voltage is the same value in both NORMAL and LOW settings and is set to 12.5V (remember this is the voltage level of the main battery). In order to conserve power, the DCC Pro will NOT commence charging, even with the ignition ON if the main battery has a voltage level below 12.5V. The difference between the settings is the low voltage cut-out limit. These limits are set as follows:

1. NORMAL: 12.0VDC
2. LOW: 11.8VDC

If the main battery falls below these levels the DCC Pro will stop charging immediately in order to protect it from further discharge.

CHARGING METHODS - Battery to Battery

Boost: The boost stage, also known as bulk charge (and other pseudonyms) is the stage when the Charging Device is producing the heavy current required in order to re-charge a depleted battery as quickly as possible. The boost voltage is determined by the battery type selected in the initial set-up phase. The boost stage is controlled by an algorithm of time vs voltage vs temperature to ensure that the battery is charged optimally under the given conditions. In boost stage the charger is operating in constant current (CC) mode and will produce up to 25 Amps (maximum) subject to the aforementioned conditions. When the Charging Device is powered up and the auxiliary battery measures 12.0V or below the boost stage is then initialised. At this point the 'soft start' function is also enabled (see page 7 for detailed information) and current flows. The boost stage is completed or terminated under the following conditions:

- when the auxiliary battery reaches terminal voltage (pre-determined by the battery type selected) ; or
- the maximum boost time has expired before the battery has reached terminal voltage; or
- the charge current is reduced to less than 5 Amps (20% of maximum charge current).

In the instance where the boost time has expired before reaching terminal voltage, the charging process will skip the next (absorption stage) and progress directly to the final (float) stage. Generally this occurs when the auxiliary battery is damaged or no longer serviceable.

Continued...

In order to prevent further damage due to overcharging, the DCC Pro is programmed for the safest option which is to reduce the voltage by switching out of constant current mode into float stage. There is also the possibility that a heavy load permanently connected to the auxiliary battery is responsible for the charging cycle to time out in boost stage before terminal voltage is achieved. If this is the case the DCC will continue to monitor the voltage and if the voltage drops below 12.0V again, the boost cycle will re-initiate and the whole process will start over.

Absorption: The absorption stage, the next step in the charging cycle, is initialised when the boost stage is completed. In absorption stage the charger is operating in constant voltage (CV) mode and is also time limited. The time is calculated from the boost cycle and is based on a maximum of four times the actual boost time (subject to the battery type selected). As with the boost stage the current is limited to 25 Amps. The absorption stage is completed or terminated under the following conditions:

- the programmed time cycle has finished (pre-determined by the battery type selected) ; or
- the charge current is reduced below 4 Amps (approximately 15% of maximum charge current).

Float: The final process in the charging cycle is the float stage. In float stage the charger is operating in constant voltage (CV) mode. The float voltage is determined by the battery type selected in the initial set-up phase. The float stage is programmed to maintain and monitor the battery indefinitely and as such, allows the auxiliary battery to be connected permanently without any risk of overcharging. As with the boost and absorption stage the current is limited to 25 Amps.

CHARGING METHODS - Solar to Battery

It is important to note that solar power can only be utilised if it is required. In other words, if the batteries are fully charged and there is no load on the auxiliary battery, the power is therefore unusable. Accordingly the charging power displayed on the remote display may read zero Watts so do not be alarmed to see this result under these conditions. The solar charging method operates in two different ways depending on the control mode selected - voltage or ignition. These charging control modes are explained on page 6.

In **voltage sense** (default) mode the charging process will act according to the condition at the time. There are three basic scenarios that dictate how the charger operates in this mode, details as follows:

Scenario 1: The vehicle's main battery is below 12.8V and the DCC Pro is in Power Saving mode.

If solar power is actively available, the DCC Pro will implement silent solar charging. The LED Glow Ring will indicate aqua green intermittently. In this mode the main battery is ignored by the solar charging process and all available power is dedicated to charging the auxiliary. If there is a load connected to the auxiliary battery, a fridge for example, the DCC Pro will attempt to match the discharge rate from the auxiliary battery for as long as solar power is available. If the voltage on the auxiliary battery drops too low, the charge cycle will be terminated and the DCC Pro will revert to Power Saving mode. In silent solar mode the Remote Display is disabled in order to conserve power however pressing the **OK** button will 'awaken' the display and the monitor will indicate the auxiliary battery voltage, the charging power in Watts and display the text `SLT SOLAR`.

Scenario 2: The main battery voltage is above 12.8V and the DCC Pro is in a normal charging cycle (boost, absorption or float).

If solar power is actively available, the DCC Pro will override the current charging cycle stage and implement primary solar charging (providing there is sufficient power to do so). The LED Glow Ring will indicate aqua green continuously. In primary solar operation both the main and auxiliary batteries will be charged simultaneously. Once the main battery voltage has reached 14.5V (or predetermined maximum alternator Voltage) the DCC Pro will release the main battery and continue to charge the auxiliary battery only. In primary solar mode the Remote Display is automatically enabled and the monitor will indicate the auxiliary battery voltage, the charging power in Watts and display the text `PRM SOLAR`.

Scenario 3: The main battery is disconnected from the DCC Pro but remains connected to the auxiliary.

This scenario may occur when the DCC Pro is installed in a caravan or camper trailer for example, but unplugged from the tow vehicle thereby disconnecting the main battery supply. If this occurs, the DCC Pro will implement silent solar charging and it will perform as a stand-alone charging source complete with MPPT functionality. The LED Glow Ring will indicate aqua green intermittently. In silent solar mode the Remote Display is disabled in order to conserve power however pressing the **OK** button will 'awaken' the display and the monitor will indicate the auxiliary battery voltage, the charging power in Watts and display the text `SLT SOLAR`.

In **ignition control** mode the charging process is controlled differently because the operator is effectively directing the function of the device when they turn the key on or off. Although the process is effectively the same as it is under voltage control mode, the sequence is different. There are also three basic scenarios that dictate how the charger operates in this mode, details below.

Scenario 1: The ignition is on, the main battery voltage is above 12.0V and the DCC Pro is in a normal charging cycle (boost, absorption or float).

If solar power is actively available, the DCC Pro will implement primary solar charging of the main and auxiliary batteries simultaneously. When the main battery is fully charged (exceeds pre-determined maximum alternator voltage) it will then be released and the DCC Pro will continue to charge the auxiliary battery as long as required or until solar power is no longer available. In this mode the LED Glow Ring will indicate aqua green continuously. In primary solar mode the Remote Display is automatically enabled and the monitor will indicate the auxiliary battery voltage, the charging power in Watts and display the text `PRM SOLAR`.

Scenario 2: The ignition is on, the main battery is below 12.0V and the DCC Pro is in standby mode.

In this situation, the DCC Pro is monitoring the main battery and waiting for an increase in voltage (via the alternator when the engine is running or other charging method) in order to initiate the charge cycle. If solar power is actively available the Charging Device will charge the main battery until it reaches 12.5V at which point it will also commence charging the auxiliary battery, effectively maintaining both batteries. Switching off the ignition will isolate the main battery and silent solar will be initialised to take advantage of any available power and charge the auxiliary battery (if required). The LED Glow Ring will indicate aqua green intermittently. In silent solar mode the Remote Display is disabled in order to conserve power however pressing the button will 'awaken' the display and the monitor will indicate the auxiliary battery.

Scenario 3: The ignition is off and the DCC Pro is in standby mode.

With the ignition off, the main battery is isolated from the auxiliary battery and it therefore cannot be utilised for normal charging. If solar power is actively available, silent solar charging mode will be initiated and charge auxiliary battery only. The LED Glow Ring will indicate aqua green intermittently. In silent solar mode the Remote Display is disabled in order to conserve power however pressing the button will 'awaken' the display and the monitor will indicate the auxiliary battery voltage, the charging power in Watts and display the text `SLT SOLAR`.

interVOLT products are warranted for a period of 24 months against faulty materials and/or workmanship from date of purchase by the end user subject to proof of purchase. In the event proof of purchase is not provided, and at the discretion of the manufacturer, the warranty shall be 24 months from manufacturer's date of sale to the merchant from whom the product was purchased. Intervolt's 24 month warranty is subject to the following terms and conditions:

The goods must be installed and operated in accordance with the manufacturer's recommendations and instructions set out within this booklet.

In the event of a claim the goods are to be returned to the original point of purchase with a copy of the merchant invoice or the relevant merchant invoice number.

In the event of a claim any associated expenses including diagnosis, removal, and/or installation of the goods is the responsibility of the client including any freight costs.

The warranty shall be void where the goods have been used for a purpose for which they are not intended, or altered in any way that is detrimental, or opened or tampered with by an unauthorised party, or damaged by mechanical abuse, or contaminated by water or other substances (other than IP rated products), or damaged by incorrect application.

Save and except for the express warranty set out above and to the maximum extent permitted by law, all conditions and warranties which may at any time be implied by the common law, Trade Practices Act, Fair Trading Act or any other State or Federal Act are excluded. To the extent that these cannot be excluded and where the law permits, the manufacturer in respect of any such condition or warranty shall be limited at their option to the repair or the replacement of the goods or the supply of equivalent goods or refunding the cost of the goods.



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