

THE POWER OF

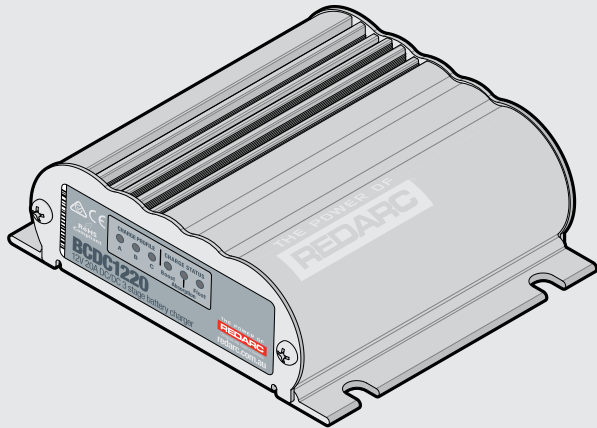
**REDARC**®

# BCDC®

Dual Input Multi-Stage  
In-Vehicle Battery Charger

MODEL:

- BCDC1220
- BCDC1220-IGN

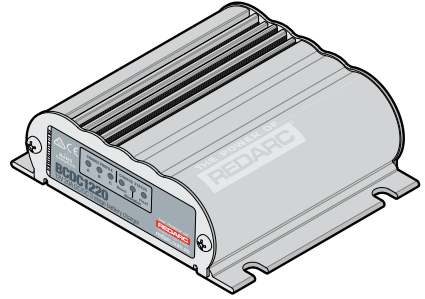


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# 1 PRODUCT OVERVIEW

The BCDC1220(-IGN) In-Vehicle Battery Charger features technology designed to charge your batteries to 100%, regardless of their type or size. By providing a unique charging profile to each specific battery type, the BCDC1220(-IGN) In-Vehicle Battery Charger is able to achieve and maintain an optimal charge in your auxiliary battery, at all times. The BCDC1220 is designed to work with either fixed voltage or temperature compensating alternators while the BCDC1220-IGN is designed to operate with variable voltage alternators.



# 2 WARNINGS AND SAFETY INSTRUCTIONS

**SAVE THESE INSTRUCTIONS** — This manual contains important safety instructions for the BCDC1220 and BCDC1220-IGN Battery Charger.

Do not operate the Battery Charger unless you have read and understood this manual and the Charger is installed as per these installation instructions. REDARC recommends that the Charger be installed by a suitably qualified person.

**Disclaimer:** REDARC accepts no liability for any injury, loss or property damage which may occur from the improper or unsafe installation or use of its products.

## SAFETY MESSAGE CONVENTIONS

Safety messages in this manual include a signal word to indicate the level of the hazard as follows:

### ⚠ WARNING

Indicates a potentially hazardous situation which **could result in death or serious injury to the operator or to bystanders.**

### ⚠ CAUTION

Indicates a potentially hazardous situation which **may result in moderate or minor injury to the operator or to bystanders.**

### NOTICE

Indicates a situation that **may cause equipment damage.**

### ⚠ WARNING

**Risk of explosive gases: Working in vicinity of a Lead-Acid battery is dangerous. Batteries generate explosive gases during normal operation. For this reason, it is of utmost importance that you follow the instructions when installing and using the Charger.**

## **⚠ CAUTION**

1. The Battery Charger should not be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they are supervised or have been instructed on how to use the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the Battery Charger.
2. Do NOT alter or disassemble the Battery Charger under any circumstances. All faulty units must be returned to REDARC for repair. Incorrect handling or reassembly may result in a risk of electric shock or fire and may void the unit warranty.
3. Only use the Battery Charger for charging Standard Automotive Lead Acid, Calcium Content, Gel, AGM, SLI or Deep Cycle type 12V batteries.
4. Check the manufacturer's data for your battery and ensure that the 'Maximum' voltage of the profile you select does not exceed the manufacturer's recommended maximum charging voltage. If the 'Maximum' voltage is too high for your battery type, please select another charging profile.
5. Check the manufacturer's data for your battery and ensure that the 'Continuous Current Rating' of the Charger does not exceed the manufacturer's recommended maximum charging current.
6. The Battery Charger is not intended to supply power to a low voltage electrical system other than to charge a battery.
7. Cable and fuse sizes are specified by various codes and standards which depend on the type of vehicle the Battery Charger is installed into. Selecting the wrong cable or fuse size could result in harm to the installer or user and/or damage to the Battery Charger or other equipment installed in the system. The installer is responsible for ensuring that the correct cable and fuse sizes are used when installing this Battery Charger.
8. NEVER smoke or allow a spark or flame in vicinity of battery or engine. This may cause the battery to explode.

## **PERSONAL SAFETY PRECAUTIONS**

9. To assist with the safe operation and use of the Battery Charger when connected to the battery:
  - a. Wear complete eye protection and clothing protection. Avoid touching eyes while working near a battery.
  - b. If battery acid contacts your skin or clothing, remove the affected clothing and wash the affected area of your skin immediately with soap and water. If battery acid enters your eye, immediately flood the eye with running cold water for at least 10 minutes and seek medical assistance immediately.

### 3 SPECIFICATIONS

<b>Part Number</b>	<b>BCDC1220 and BCDC220-IGN</b>		
<b>Continuous Current Rating</b>	20A		
<b>Vehicle Input Fuse Rating</b>	40A (Not Supplied)		
<b>Output Fuse Rating</b>	REDARC FK40 recommended		
<b>Output Power</b>	300W		
<b>DC Input Voltage Range<sup>*1</sup></b>	9 to 32VDC $\overline{=}$		
<b>Output Battery Type</b>	Standard Lead Acid, Calcium content, Gel or AGM type only		
<b>Charging Profile</b>	<b>A</b>	<b>B</b>	<b>C</b>
<b>Maximum Voltage<sup>*1</sup></b> (refer to <a href="#">Table 2.2.1 on page 6</a> )	14.6V	15.0V	15.4V
<b>Float Voltage<sup>*1</sup></b>	13.3V		
<b>No Load Current</b>	< 100mA		
<b>Standby Current</b>	< 5mA		
<b>Ambient Temperature</b>	-20°C to +80°C (-4°F to +176°F)		
<b>Minimum O/P Battery Volts*1</b>	4V		
<b>Weight</b>	450g (15.9 oz)		
<b>Dimensions</b>	100 × 120 × 37 mm (3.9" × 4.75" × 1.5")		
<b>Warranty</b>	2 years		
<b>Standards</b>	CE,C-Tick, AS/NZS CISPR11:2004		

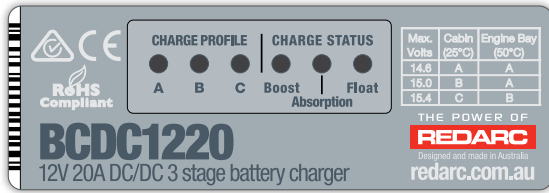
\*1 Voltages Specified are  $\pm$  100 mV

## 4 PRODUCT FUNCTION

The BCDC1220(-IGN) is a three-stage, 12V, 20A DC-DC Battery Charger that operates from an input of either 12V or 24V nominal. The input voltage of the BCDC1220 can be above, below or equal to the output voltage, making it ideal for charging from a 24V vehicle or charging an auxiliary 12V battery where the distance from the main battery may cause a significant voltage drop. The BCDC1220-IGN is also designed to isolate the main battery from the auxiliary battery, to avoid over-discharging the main battery. The BCDC1220-IGN operates almost identically to the BCDC1220 but is designed to operate from an ignition trigger to allow operation in vehicles with Variable Voltage or Smart Alternators.

### 4.1 DISPLAY PANEL

The front panel features 6 LEDs that display the Charge Profile and Charge Status.



**BCDC1220 Front Panel**

When blinking, the flash duty-cycle of the 'Charge Status' LED will increase to reflect the amount of current being supplied. If the LED is ON solid, the Unit is applying full power (e.g. 20A).

Table 1: Charge Profile and Status		
LED State	Charge Profile LED	Charge Status LED
Off		Unit has no power
Blinking		Unit is in Standby
On		Unit is on and can supply power

## 4.2 CHARGING PROCESS

### BOOST

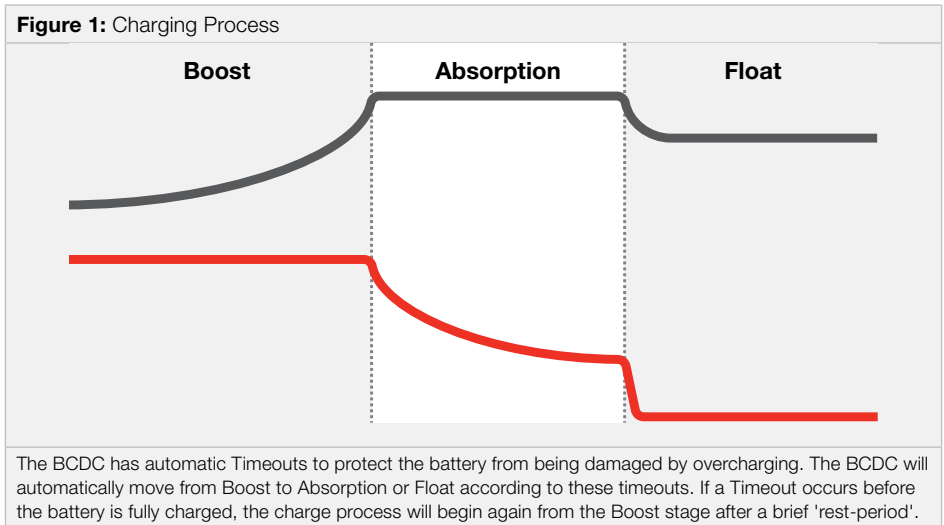
The Boost stage maintains a constant current until the battery voltage reaches its Absorption Voltage. The current in Boost stage may vary during operation in order to maintain safe operating temperature, or to limit the difference between input and output voltages.

### ABSORPTION

The Charger will then move to Absorption stage which maintains a constant voltage level for a predetermined period of time or until the current being drawn by the output battery drops to less than 4A for 30 seconds; after which the Charger will enter Float stage.

### FLOAT

Float stage maintains 13.3V\* on the output battery, keeping the battery topped up. This counteracts the battery's self discharging or loads applied to the battery. When the battery loses charge, the Charger will automatically move back into the Boost stage.



\*Voltages Specified are  $\pm 100$  mV.

### 4.3 TURN ON/OFF THRESHOLDS

		12V BCDC1220	BCDC1220-IGN	24V BCDC1220 & BCDC1220-IGN
<b>Input Open Circuit Low voltage conditions</b> <sup>*1</sup>	Turn ON above	12.9V	12.0V	With Ignition
	Turn OFF below	12.7V	11.9V	With Ignition
<b>Input Loaded Low voltage conditions</b> <sup>*2</sup>	Turn OFF instantly below	8V		
	Turn OFF after 20 secs below	9V		
<b>Input Over voltage shutdown</b>	Turn ON below	32V		
	Turn OFF instantly above	32.5V		
	Turn OFF after 20 secs above	32.1V		
<b>Output Under voltage shutdown</b>	Shutdown if Output Battery < 4V			

Voltages Specified are ±100mV.

\*1 Tested every 100 seconds.

\*2 Constantly tested.



# 5 INSTALLATION

## 5.1 INSTALL LOCATION

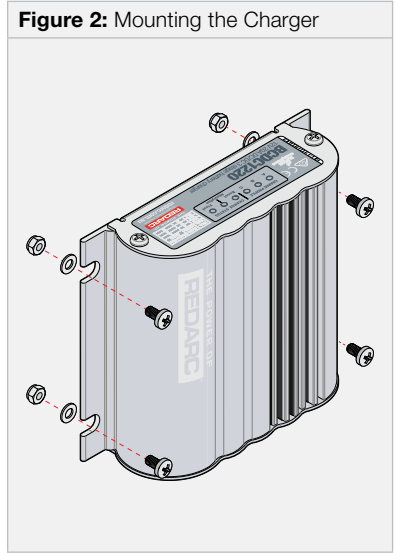
Mount the Battery Charger to a flat surface in close proximity to the auxiliary battery and away from any heat sources. The BCDC1220(-IGN) has five wires and should be installed as described over the following pages.

The Charger operates in any orientation (but it is recommended that the front of the decal be visible). Mount using the 4 mounting tabs provided on the heatsink with suitable M6 fasteners.

**NOTE:** The Unit will operate optimally below 55°C (130°F) with good airflow. At higher temperatures the Unit will de-rate output current.

**NOTE:** Appropriate connections must be made to the wires with a continuous current rating of at least 20 A for the BCDC1220(-IGN). Failure to do so may cause damage to the Unit and vehicle.

**Figure 2:** Mounting the Charger



## 5.2 CABLE SIZING

Below is a table outlining the required cable size for a given cable install length. Always choose a wire cross sectional area equal to or greater than what is specified below.

Part Number	Cable Install Length		Wire Cross Sectional Area	Nearest Equivalent BAE, B&S, AWG
	1 – 3 m	3' – 10'		
<b>BCDC1220 and BCDC1220-IGN</b>	1 – 3 m	3' – 10'	≥ 3.5 mm <sup>2</sup>	6 mm auto
	3 – 5 m	10' – 16'	≥ 5.7 mm <sup>2</sup>	8 B&S
	5 – 9 m	16' – 30'	≥ 10.2 mm <sup>2</sup>	8

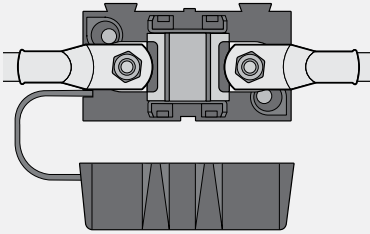
## 5.3 FUSING

REDARC recommends using MIDI style bolt down fuses as they ensure a low resistance connection. The REDARC FK40 fuse kits are recommended.

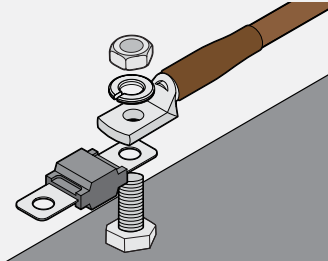
Blade type fuses are not recommended as they can result in a high resistance connection which causes excess heat and may damage the fuse holder and/or the wiring.

Self-resetting circuit breakers are not recommended as they may trip prematurely due to the heat generated by the current flowing through the wires.

**Figure 3:** MIDI Style Bolt-Down Fuse



**Figure 4:** MIDI Fuse Assembly



## 5.4 CABLE CONNECTIONS

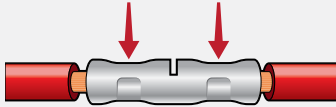
**⚠ CAUTION:** Cable and fuse sizes are specified by various codes and standards which depend on the type of vehicle the Battery Charger is installed into. Selecting the wrong cable or fuse size could result in harm to the installer or user and/or damage to the Battery Charger or other equipment installed in the system. The installer is responsible for ensuring that the correct cable and fuse sizes are used when installing this Battery Charger. Cabling is recommended to be away from heat sources and in protected areas, especially when installing or routing in the engine bay.

The wires on the BCDC1220 and BCDC1220-IGN Unit carry peak currents of up to 30 Amps and it is important to make a good, low resistance, electrical connection that will not degrade over time. Failure to make a good, reliable contact may result in breakdown of the wire insulation and cause a short circuit, or worst case a fire. REDARC recommend that this activity be undertaken by an appropriately trained person.

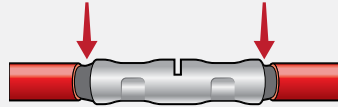
REDARC recommends using a soldered butt slice crimp connection that is covered with heat-shrink (see "[Figure 5: Ensuring a good wiring connection](#)"). REDARC does not recommend using standard red/blue/yellow blade connections, as they are not rated for either the current required or gauge of wire supplied on the Unit.

Crimping provides good mechanical connection, soldering provides a long lasting electrical connection and forming of the heat-shrink will prevent any shorting/contact with your vehicle chassis.

**Figure 5:** Ensuring a good wiring connection



**Crimp** both wires to the butt splice using single-indent type crimpers. Fold the cable over before inserting into the butt-splice as required. Single-indent crimpers should also be used on any lugs used.



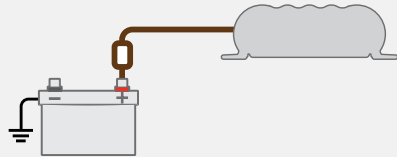
**Solder** the wires to the butt splice. Ensure that a good connection is made. Keep heatshrink away until after soldering is complete and has cooled.

## 5.5 AUXILIARY BATTERY POSITIVE – BROWN WIRE

The **BROWN** wire should be connected to the auxiliary battery positive terminal of the auxiliary battery.

Ensure the cable length is at maximum 1 m (3.9') from the Unit and the MIDI fuse is mounted in within 100 mm (3.9") of cable length from the auxiliary battery. See "[Specifications](#)" on [page 5](#) for appropriate size fuses.

**Figure 6:** Connecting the **BROWN** wire

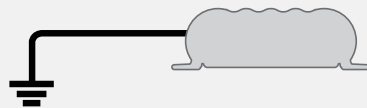


## 5.6 COMMON GROUND – BLACK WIRE

The **BLACK** wire should be connected to a ground point that is common to both the start battery and the auxiliary battery to be charged.

This point may be on the chassis of the vehicle, on the chassis of the trailer / camper / caravan or directly wired to both batteries, depending on your installation requirements.

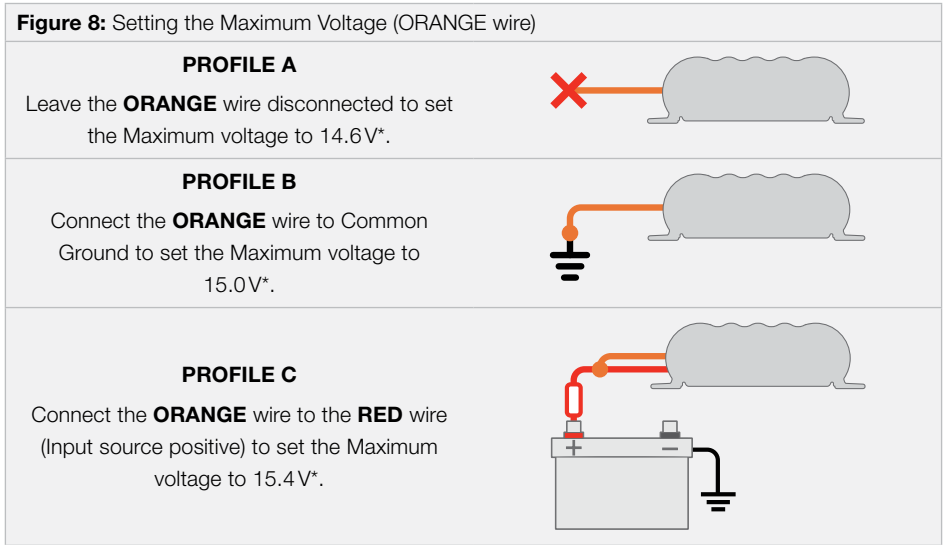
**Figure 7:** Connecting the **BLACK** wire



## 5.7 CHARGE PROFILE SELECTION – ORANGE WIRE

Connect the **ORANGE** wire to set the Maximum output voltage to suit your selected Charge Profile.

**Figure 8:** Setting the Maximum Voltage (ORANGE wire)



**⚠ CAUTION:** Check the manufacturer's data for your battery and ensure that the Maximum voltage of the Charging Profile you select does not exceed the manufacturer's recommended maximum charging voltage. If the Maximum voltage is too high for your battery type, select another Charging Profile.

**Table 3:** Charge Profile Selection

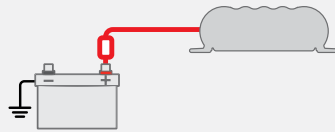
Maximum Battery Voltage Specification	Auxiliary Battery Location	
	Cabin Install (25°C / 75°F)	Engine Bay Install (50°C / 120°F)
14.6V	A	A
15.0V	B	A
15.4V	C	B

\*Voltages Specified are  $\pm 100$  mV.

## 5.8 INPUT POSITIVE – RED WIRE

The **RED** wire should be connected to the positive input from the vehicles start battery, see "Specifications" on page 5 for appropriate fuse sizes.

**Figure 9:** Connecting the **RED** wire



## 5.9 INPUT TRIGGER SETTINGS – BLUE WIRE

The **BLUE** wire is provided to select the Units input trigger behaviour, this wire must be monitored at all times.

### BCDC1220 BLUE WIRE CONNECTION

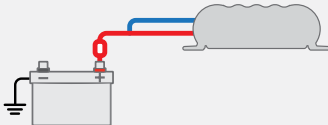
To charge from a 12V alternator simply connect the **BLUE** 'input trigger' wire to the **RED** 'input positive' wire. Alternatively, the **BLUE** 'input trigger' wire can be connected to the vehicle ignition.

**NOTE:** To charge from a 24V alternator, the **BLUE** input trigger wire must be connected to the vehicle ignition.

**Figure 10:** BCDC1220 **BLUE** wire with the

#### 12V Starter Battery

Connect the **BLUE** wire to the **RED** wire



#### 12V or 24V Starter Battery

Connect the **BLUE** wire to vehicle ignition.



### BCDC1220-IGN BLUE WIRE CONNECTION

To charge from either a 12V or 24V Variable Voltage or Smart Alternator system, the **BLUE** 'input trigger' wire must always be connected to the vehicle ignition.

**Figure 11:** BCDC1220-IGN **BLUE** wire

#### 12V or 24V Starter Battery

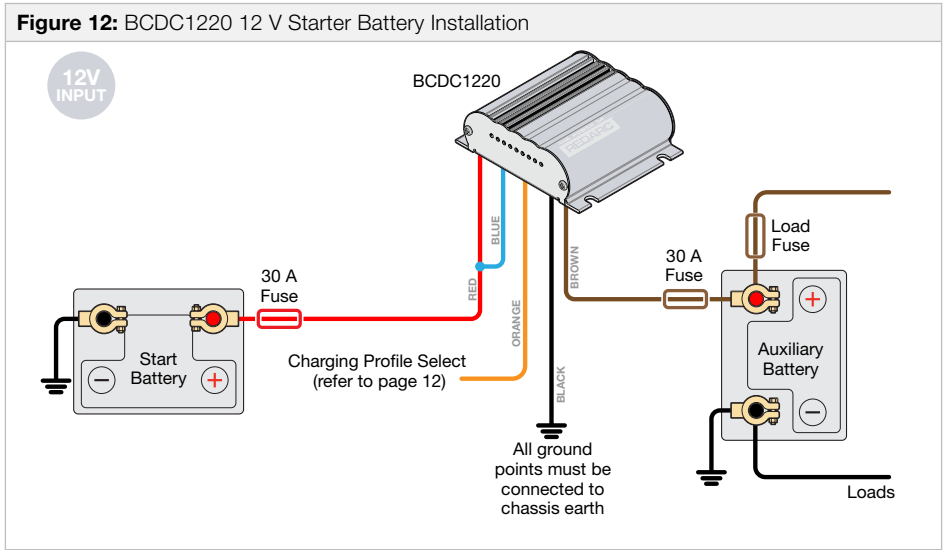
Connect the **BLUE** wire to vehicle ignition.



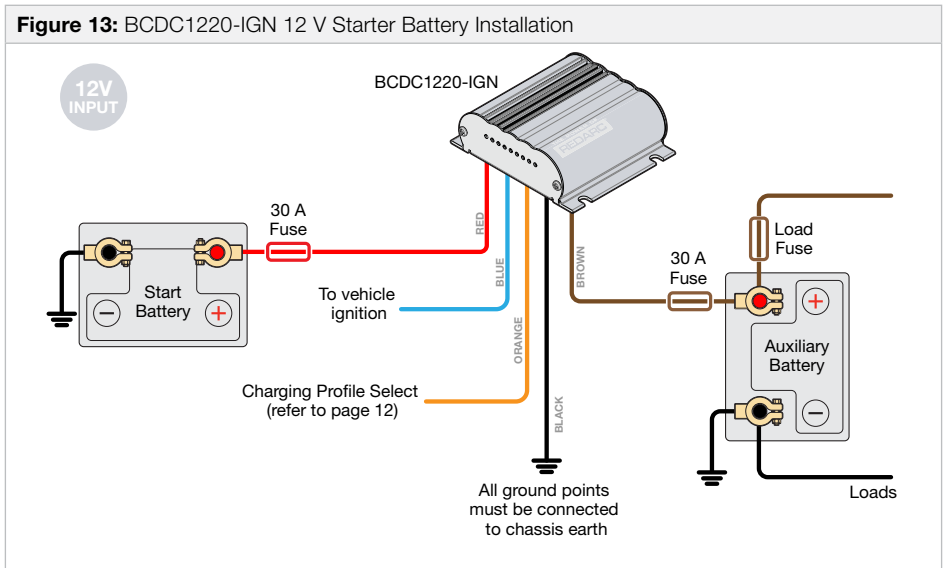
## 5.10 TYPICAL SETUPS

REDARC recommends that the Charger be installed by a suitably qualified person.

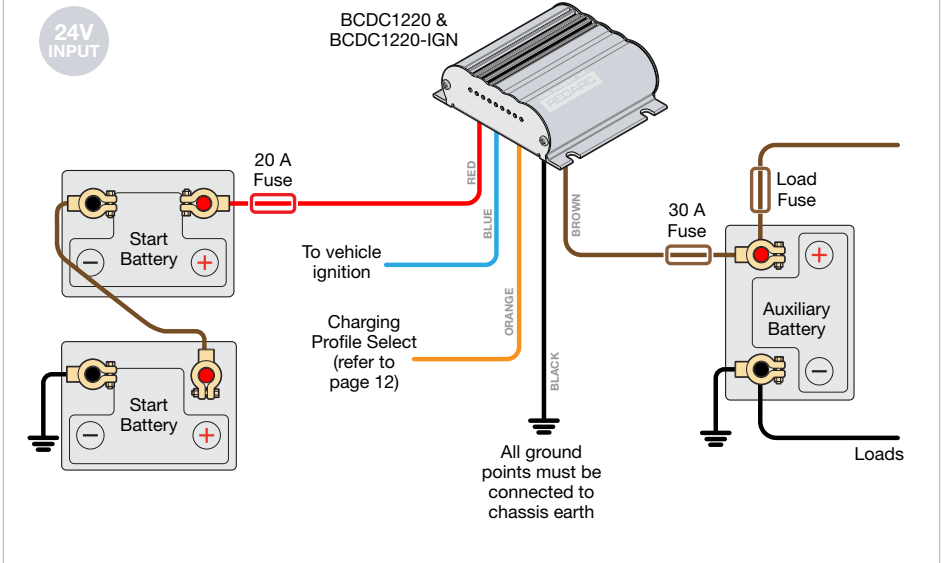
**Figure 12:** BCDC1220 12 V Starter Battery Installation



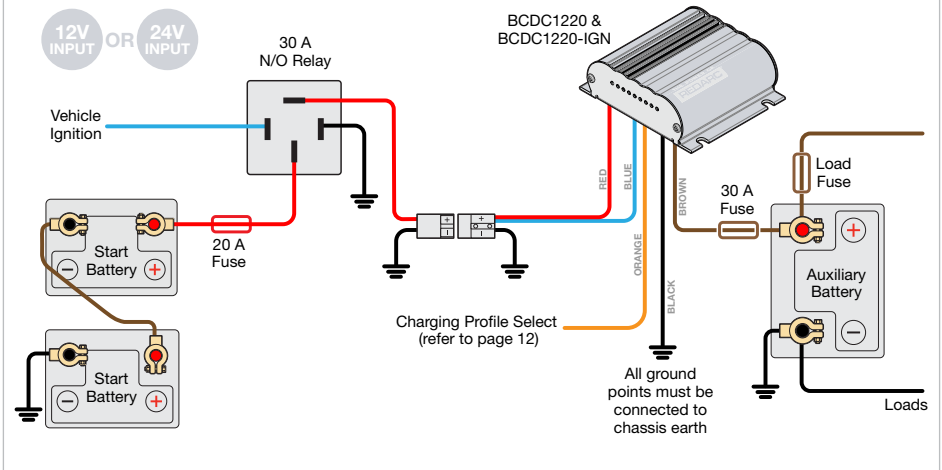
**Figure 13:** BCDC1220-IGN 12 V Starter Battery Installation



**Figure 14:** BCDC1220 and BCDC1220-IGN 24 V Installation



**Figure 15:** Standard Setup for a 24 V Starter Battery using Relay for Ignition Switch



## 6 FREQUENTLY ASKED QUESTIONS

### **The BCDC1220(-IGN) turns on at 12.9 V (12 V) and OFF at 12.7 V (11.9 V), but it can also operate down to 9 V, explain?**

The BCDC1220(-IGN) will turn OFF for a split second every 100 seconds to measure the unloaded voltage at the battery. When the BCDC1220(-IGN) turns off it is not drawing any load from the start battery, no load means that there is no voltage drop over the cable run. This allows the BCDC1220(-IGN) to measure the actual battery voltage, or the voltage at the battery. If this actual battery voltage is below 12.7 V (11.9 V) the BCDC1220(-IGN) will turn OFF. At any other time during the charging process, if the voltage at the BCDC1220(-IGN) drops below 9 V the BCDC1220(-IGN) will turn OFF.

### **How does the BCDC charge an Auxiliary battery at 14 V when it only gets 9 V in?**

The BCDC can act as both a reducer and a booster, so it can operate from a voltage of above, equal to or below the desired output voltage. The Unit is also microprocessor controlled allowing it to output a REDARC proprietary charging algorithm independent of the input. This allows the Unit to charge specific to the battery type even if the input voltage is low due to voltage drop.

### **Where should I mount the BCDC Unit?**

The BCDC should be mounted as close as possible to the battery being charged (generally called the Auxiliary or House battery). If the Auxiliary battery is located under the bonnet, pick a location for the BCDC that is close to the battery and away from any direct engine heat. If the BCDC is to be mounted into a caravan or camper, near or in the battery compartment is generally the best position. It is also a good idea to mount the BCDC to a metal surface if possible to ensure optimal heat dissipation, though this is not crucial.

### **What does the Charger do if the temperature around it rises above its operating temperature?**

As the temperature of the BCDC rises above a certain level the current capacity of the output is decreased gradually in order to protect both the battery and the BCDC Unit.

### **If I use the BCDC to charge my auxiliary battery do I still need to install a battery isolator?**

The BCDC incorporates the functionality of a battery isolator, it will turn ON and start charging when it senses that the vehicle has started and similarly it will turn OFF when the vehicle is turned OFF.

### **Can I charge two batteries of different chemistries from the same source? Will I have any problems charging my AGM or Gel auxiliary battery from my Lead Acid start battery?**

The BCDC does not 'link' the batteries together like a battery isolator does, it is a DC-DC Battery Charger. The output from the Unit is tailored specifically to the selected output battery type and therefore allows the optimal charging of the auxiliary battery, no matter what chemistry your start battery is.



# 7 WARRANTY

## LIMITED WARRANTY

For full warranty terms and conditions, visit the Warranty page of the REDARC website:

[www.redarcelectronics.com/warranty](http://www.redarcelectronics.com/warranty)

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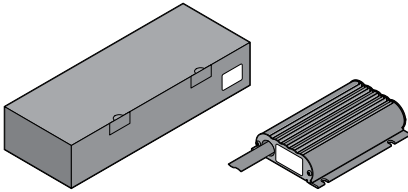
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## CHECKING THE PRODUCT SERIAL NUMBER

The Product Serial Number is located on the Main Unit and on the product packaging.



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