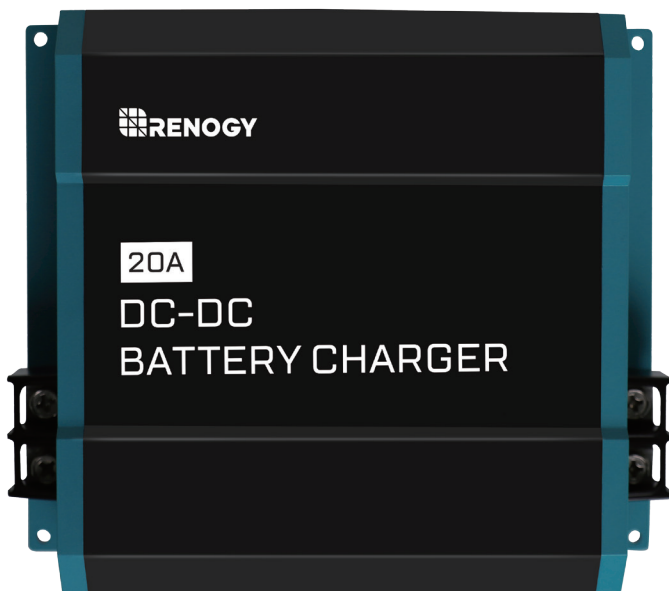


DC-DC

ON-BOARD BATTERY CHARGER

DCC1212-20 | 40 | 60

Version 1.2



Important Safety Instructions

Please save these instructions.

This manual contains important safety, installation, and operating instructions for the charge controller. The following symbols are used throughout the manual to indicate potentially dangerous conditions or important safety information.

DANGER

Safety instruction: Failure to observe this instruction will result in fatal or serious injury.

WARNING

Safety instruction: Failure to observe this instruction can result in fatal or serious injury.

CAUTION

Safety instruction: Failure to observe this instruction can lead to injury.

NOTICE

Failure to observe this instruction can cause material damage and impair the function of the product.

NOTE

Supplementary information for operating the product.

The manufacturer accepts no liability for damage in the following cases:

- Faulty assembly or connection
- Damage to the product resulting from mechanical influences and excess voltage
- Modification of the unit without expressed permission from the manufacturer.
- Use for purposes other than those described in the operating manual

For protection, pay close attention to the following basic safety information when using electrical devices:

- Electric shock
- Fire hazards
- Injury

■ General safety

DANGER

- In the event of fire, use a fire extinguisher that is suitable for electrical devices.

WARNING

- Only use the product as intended.
- Ensure that the red and black terminals **never** come into contact with each other.
- Disconnect the product from the battery
 - each time before cleaning and maintenance
 - before a fuse change (only by specialists)
- The product may not be used if the product itself or the connection cable is visibly damaged.
- If the power cable for this product is damaged, it must be replaced by the manufacturer, customer service, or a similarly qualified person in order to prevent safety hazards.
- This product may only be repaired by qualified personnel. Inadequate repairs may cause serious hazards.
- This product can be used by children ages 8 years or over, as well as by persons with diminished physical, sensory, or mental capacities, or those who lack experience and knowledge, providing they are supervised or have been taught how to use the product safely and are aware of the resulting risks.
- **Electrical devices are not toys.**
Always keep and use the product out of the reach of children.
- Children must be supervised to ensure that they do not play with the product.

NOTICE

- Before start-up, check that the voltage specification on the type plate is the same as that of the power supply.
- Ensure that other objects **cannot** cause a short circuit to the contacts of the product.
- Store the product in a dry and cool place.

■ Safety when installing the product

⚠ DANGER

- Never mount the product in areas where there is a risk of gas or dust explosion.

⚠ CAUTION

- Ensure a secure stand!
The product must be set up and fastened in such a way that it cannot tip over or fall down.

⚠ NOTICE

- Do not expose the product to any heat source (such as direct sunlight or heating). Avoid additional heating of the product.
- Set up the product in a dry location protected from splashing water.

■ Safety when connecting the product electronically

⚠ DANGER

Danger of fatal electric shock!

- For installation on boats:
If electrical devices are incorrectly installed on boats, this can lead to corrosion damage on the boat. Have the product installed by a qualified (boat) electrician.
- If you are working on electrical systems, ensure that there is somebody close at hand who can help you in emergencies.

⚠ WARNING

- Make sure that the lead has a sufficient cross-section.
- Lay the cables so that they cannot be damaged by the doors or the bonnet. Crushed cables can lead to serious injury.

⚠ CAUTION

- Lay the cables so that they cannot be tripped over or damaged.

⚠ NOTICE

- Use ductwork or cable ducts if it is necessary to lay cables through metal panels or other panels with sharp edges.
- Do not lay the AC cable and DC cable in the same conduit (empty pipe).

-
- Do not lay the cables so that they are loose or heavily kinked.
 - Firmly secure the cables, contact with each other.
 - Do **not** pull on the cables.

■ Safety when operating the product

WARNING

- If the product is used in facilities with open lead acid batteries, the room must be well-ventilated. These batteries give off explosive hydrogen gas that can be ignited by sparks on electrical connections.

CAUTION

- Do **not** operate the product
 - In salty, wet, or damp environments
 - In the vicinity of corrosive fumes
 - In the vicinity of combustible materials
 - In areas where there is a danger of explosions
- Before activating, ensure that the power supply line and plug are dry.
- Always disconnect the power supply when working on the product.
- Please be aware that parts of the product may still produce voltage even after activation of the safety guard (fuse).
- Do not disconnect any cables while the product is still in use.

NOTICE

- Make sure the air inlets and outlets of the product are not covered.
- Ensure good ventilation.

■ Safety precautions when handling batteries

WARNING

- Batteries may contain aggressive and corrosive acids. Avoid battery fluid coming into contact with your body. If your skin does come into contact with battery fluid, thoroughly wash that part of your body with water. If you sustain any injuries from the acids, contact a doctor immediately.

CAUTION

- When working on batteries, do not wear any metal objects such as watches or rings. Lead acid batteries can cause short circuits which can cause serious injuries.
- Danger of explosions!
Never attempt to charge a frozen or defective battery.
In this situation, place the battery in a frost-free area and wait until the battery has adjusted to the ambient temperature. Then start the charging process.
- Wear goggles and protective clothing when you work on batteries. Do not touch your eyes when working with batteries.
- Do not smoke and ensure that no sparks can arise in the vicinity of the engine or battery.

NOTICE

- Only use rechargeable batteries
- Use sufficient cable cross sections.
- Protect the positive conduit with a fuse.
- Prevent any metal parts from falling on the battery. This can cause sparks or short circuit the battery and other electrical parts.
- Make sure the polarity is correct when connecting.
- Follow the instructions of the battery manufacturer and those of the manufacturer of the system or vehicle in which the battery is used.
- If you need to remove the battery, disconnect it first from the ground connection. Disconnect all connections from the battery before removing it.

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General Information

The DC-DC Series battery chargers are the most effective way to charge your auxiliary or house batteries from the alternator/starter battery. Compatible with a multitude of alternator types, the DC-DC offers correct charging for AGM, Flooded, Gel, and even Lithium deep cycle batteries! Featuring a 3-stage battery charger and multiple electronic protections, owners can feel confident that their batteries are being charged optimally and automatically. Easily install the compact yet sturdy DC-DC on RV's, commercial vehicles, boats, yachts and many more applications.

Key Features

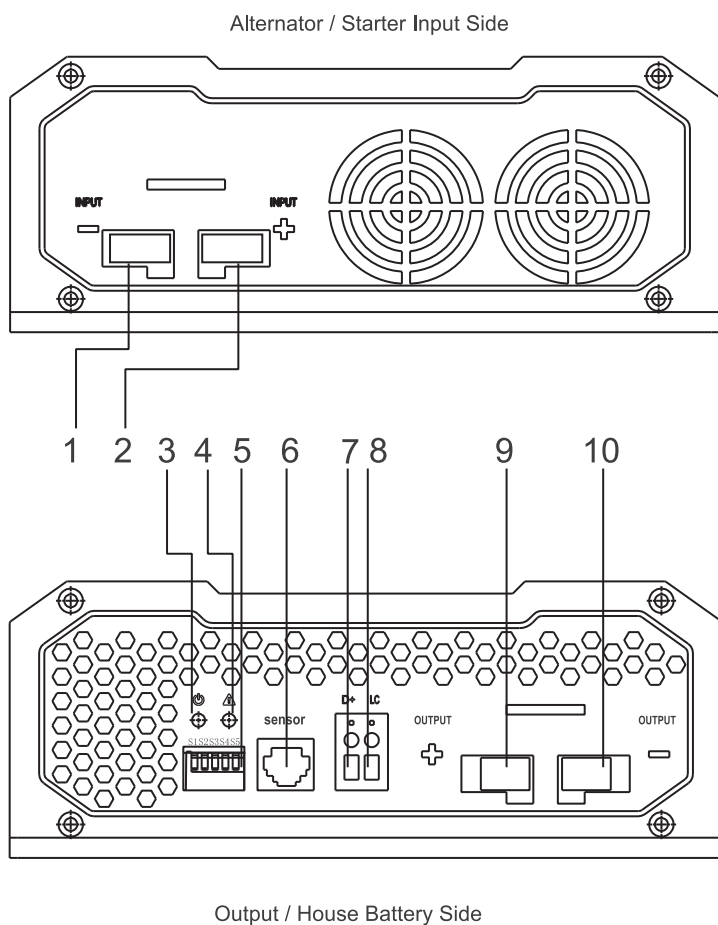
- Compatible with multiple 12V batteries: AGM, Flooded, Gel, and Lithium*
- Smart protections features including Over-voltage, Over-Temperature, and reverse polarity!
- Battery Isolation and Battery Charger in one
- Compact yet built tough for all conditions
- 3-Stage Battery Charger get your batteries to 100%

NOTE

Check the charging requirements from the battery manufacturer before charging your battery with this unit.

Product Overview

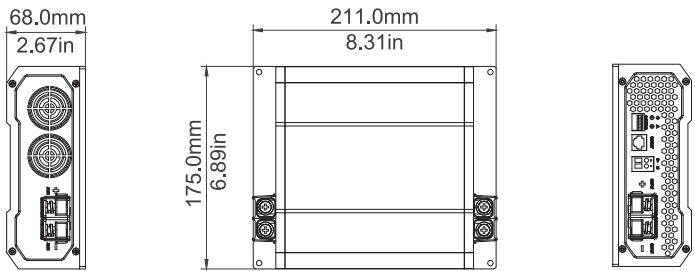
Identification of Parts



■ Key Parts

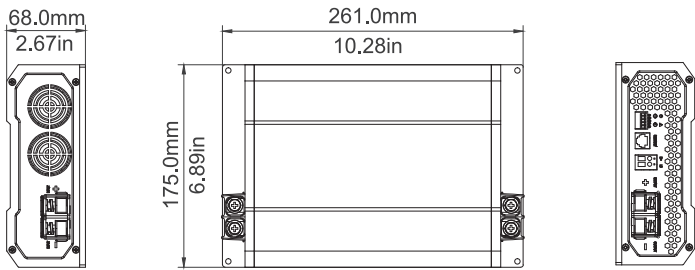
Key Part #	Labeling	Notes
1	Input (-)	Negative (-) Input Terminal of the Starter Input
2	Input (+)	Positive (+) Input Terminal of the Starting Source
3		DC-DC Power Indicator
4		DC-DC Fault Indicator
5	S1 S2 S3 S4 S5	DIP Switches (1-5) Set Charging Voltage and Float Voltage for Battery
6	RJ11	Battery Temperature Sensor (SKU: RTSDCC-G1) Port; uses this data for accurate temperature compensation and charge voltage adjustment
7	D+	Alternator Control terminal for turning on the vehicle with on-board battery or Ignition *Note requires wired to turn on DC-DC; 18-16AWG recommended.
8	LC	Current Limit: Limits the charging amperage to 12.5% of the rated input for the 20A and 40A models and limits the charging amperage to 50% for 60A models.
9	Output (+)	Positive (+) Output Terminal for House Battery
10	Output (-)	Negative (-) Output Terminal for House Battery

■ Dimensions



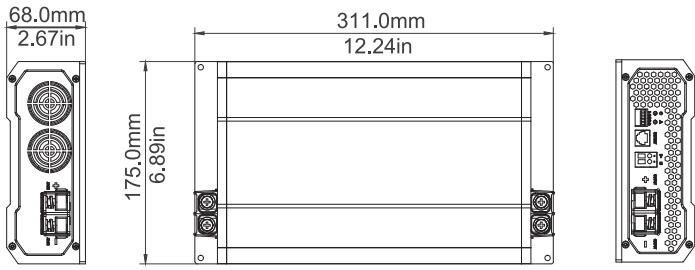
DCC1212-20

NOTE Dimensions in millimeters (inches)



DCC1212-25

NOTE Dimensions in millimeters (inches)



DCC1212-40

NOTE Dimensions in millimeters (inches)

■ Package Includes

1	DC-DC Battery Charger
2	Manual Please Note: You will find the most up to date manual at www.renogy.com under the download section.

■ Accessories

The following accessories are not included in the packaging, but available for purchase.
Battery Temperature Sensor (SKU: RTSDCC-G1)

Description	Length
Temperature sensor RTSDCC-G1	9.8ft

The proper battery charging voltage is important for optimum battery performance and longevity. This Remote Temperature Sensor measures temperature at the battery, allowing the DC-DC charger to use this data for accurate temperature compensation and charge voltage adjustment. Improve your battery charging system with a Renogy Temperature Sensor.

NOTE

No temperature compensation when charging lithium battery.

Installation

DANGER

- Never mount the product in areas where there is a risk of gas or dust explosion.

CAUTION

- Ensure a secure stand! The product must be set up and fastened in such a way that it cannot tip over or fall down.

NOTICE

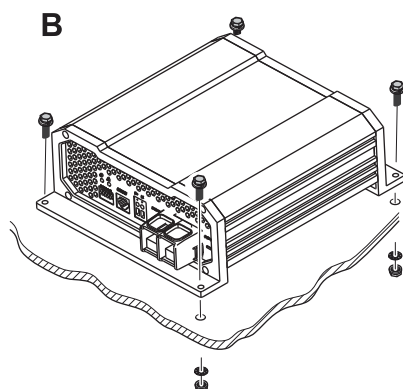
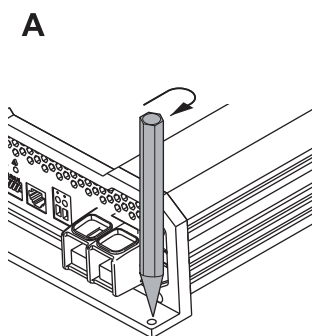
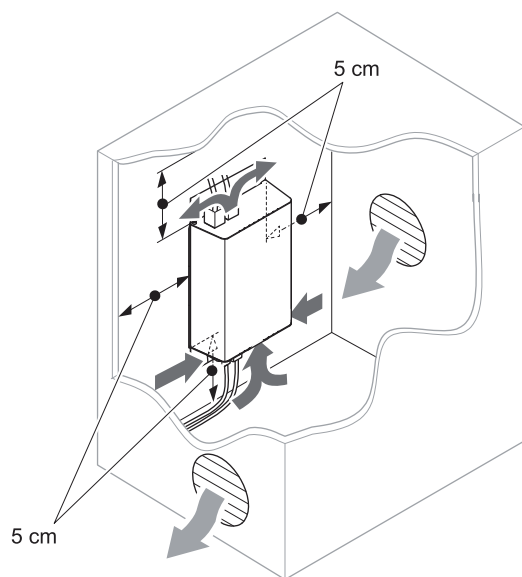
- Do not expose the product to any heat source (such as direct sunlight or heating). Avoid additional heating of the product.
- Set up the product in a dry location protected from splashing water.

Location Considerations

- The battery charger can be installed horizontally as well as vertically.
- The battery charger must be installed in a place that is protected from moisture.
- The battery charger may not be installed in the presence of flammable materials.
- The battery charger may not be installed in a dusty environment.
- The place of installation must be well ventilated. A ventilation system must be available for installations in small, enclosed spaces. The minimum clearance around the battery charger must be at least 5cm.
- The device must be installed on a level and sufficiently sturdy surface.

When selecting a location for the DC-DC, make sure that the unit is as close as possible to the battery you will be charging (auxiliary battery). The charger may be mounted on the cabin of the vehicle, along a chassis rail, the inner guard of a vehicle, behind the grille or headlight or even on the side of the radiator. However, you want to make sure that the area is not susceptible to moisture or other substances as well as potentially high temperatures. The DC-DC would operate best if there is some air flow.

■ Mounting Battery Charger



■ Cable Cross Section

*The following is a reference and may not cover all the unique applications that may exist. Consult your installer for further questions.

Important Note: When the battery charger is sending full amps, the input side will experience a higher draw.

	Cable	Cable Length/ Min AWG				Recommended Fuse
DCC-1212-20	To starter Battery (input)	2FT / 10AWG	8FT / 10AWG	16FT / 8AWG	32FT / 4AWG	30A
	To house Battery (output)	2FT / 14-12AWG	8FT / 14-12AWG	16FT / 10AWG	32FT / 6AWG	25A
DCC-1212-40	To starter Battery (input)	2FT / 6AWG	8FT / 6AWG	16FT / 6-4AWG	32FT / 4-2AWG	60A
	To house Battery (output)	2FT / 8AWG	8FT / 8AWG	16FT / 6AWG	32FT / 4AWG	50A
DCC-1212-60	To starter Battery (input)	2FT / 4AWG	8FT / 4AWG	—	—	90A
	To house Battery (output)	2FT / 6AWG	8FT / 6AWG	16FT / 4AWG	—	75A

NOTICE

- When charging converter is sending full charge, the amperage consumption will be 50% greater on the input side.
- The charging converter must not be connected directly to the alternator.

■ Connecting the Battery Charger

The DC-DC will not turn on without a D+ ignition cable. When connected, the DC-DC will turn on when the ignition is on. This means that even if your engine is not on, the starter battery will immediately be used to power the DC-DC and start charging the house battery. It is recommended to have the vehicle completely on.

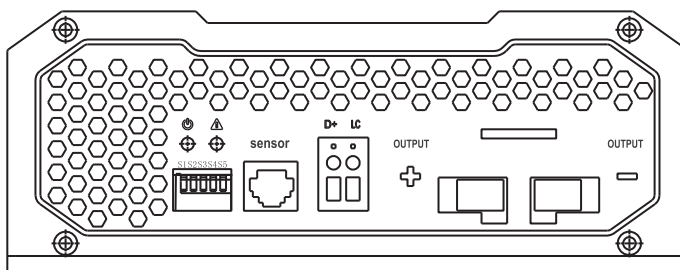
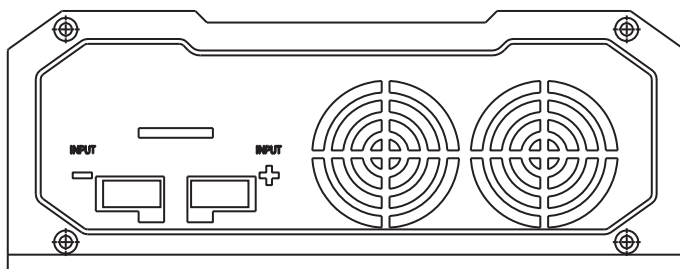
NOTE

battery charger has isolated input and output voltages, which means that the output voltage can be kept stable without interference from the input circuit. When connecting the signal wires, the battery charger will be on a stable 12VDC voltage.

1. Identify the correct side of the DC-DC corresponds to the correct battery. The Input side will be the Starting Source while the output side will be the Auxiliary/ House Battery side..

IMPORTANT: A D+ ignition cable is required to turn the unit on. Although the D+ terminal is in the output side, this will be connected to the positive line of the input ignition circuit.

Alternator / Starter Input Side



Output / House Battery Side

NOTE

The D+ Terminal will connect to the positive line of the input ignition circuit

-
2. Unscrew the terminals, connect the common negative and common positive wires from the starter battery to the input of the DC-DC in the appropriate negative and positive terminals. Then screw the terminals for a tight fit. Refer to Figure 3 and Figure 4.

Important Note: The Alternator will not be connected directly to the input of the DC-DC. The alternator must be integrated with the starter battery and this circuit is connected to the input starter source terminals on the DC-DC.

Figure 3

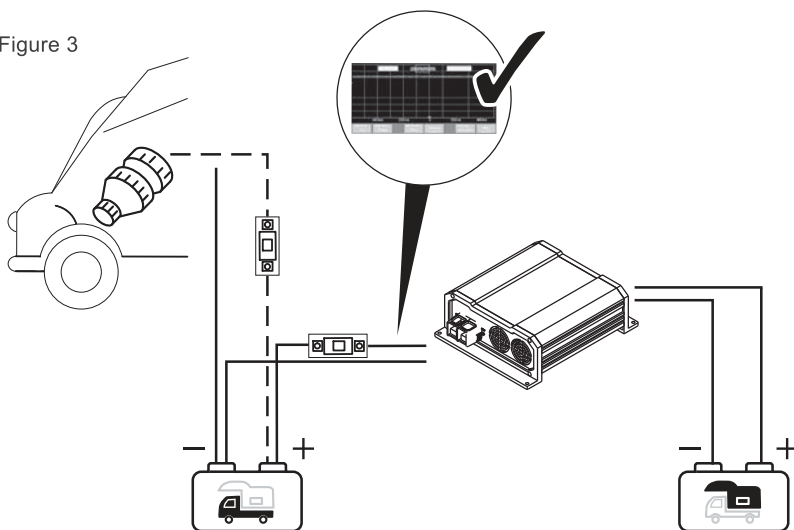
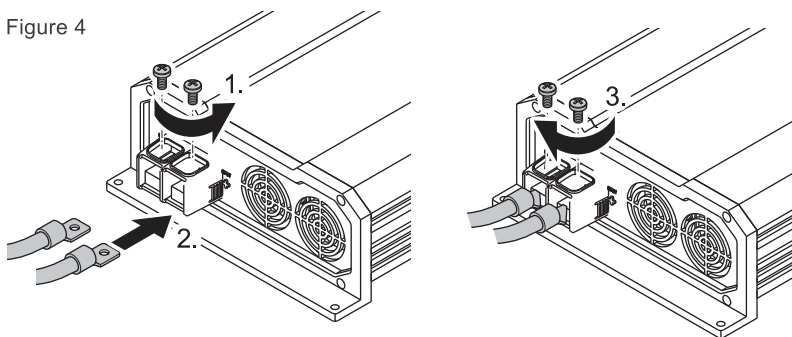


Figure 4

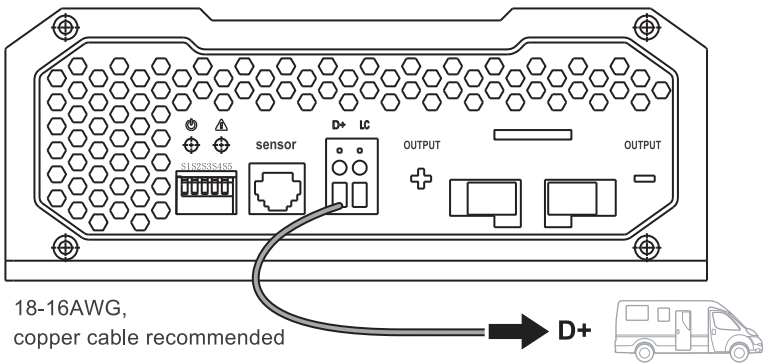


3. Connect a copper signal cable (not provided), 18-16AWG, to the D+ slot on the DC-DC output side and run the cable to the positive terminal of your starter input ignition circuit/starter battery common positive. Refer to figure 5. The unit should then turn on.

CAUTION

The DC-DC will turn on when the ignition is on. This means that even if your engine is not on, the starter battery will immediately be used to power the DC-DC and start charging the house battery. It is recommended to have the vehicle completely on.

IMPORTANT: A D+ ignition cable is required to turn the unit on. Although the D+ terminal is in the output side, this will be connected to the positive line of the input ignition circuit.



Operation

When the input and output batteries as well as the signal wire is connected, the DC-DC will power on with green LED.

IMPORTANT: The DC-DC will not turn on without a D+ ignition cable , Connected to the positive line of the input ignition circuit.

LED Indicator

Color, Behavior	Status	Description
Off	No Load	Unit is off; If abnormal, see troubleshooting for more detail.
Green	Operation Normal	
Red	Fault	There is an error in your system, see troubleshooting for more detail

■ Setting Battery Charger

The battery charger is for AGM, Sealed Lead Acid, Flooded, and Gel batteries. If using Lithium, the charger is for lithium-iron phosphate battery types with a built-in BMS system. Do not use the device under any circumstances to charge other types of batteries (ex. NiCd, NiMH, etc.)

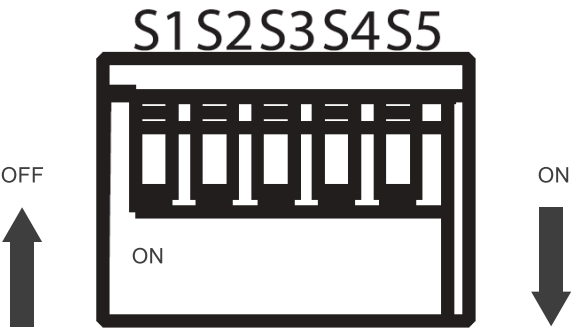
WARNING

Danger of Explosion! *Note: Check the charging requirements from the battery manufacturer before charging your battery with this unit.

NOTE

make sure to abide by the safety instructions in the beginning of the manual

The DC-DC is equipped with 5 DIP switches which determine the boost charge and float charge profiles, depending on your battery specifications. Refer to the diagram for ON/OFF position respectively.



DIP Switch	Description
S5	Determines whether the charging profile will be for Lithium batteries or for others battery types
S1, S2	Determines the Constant Voltage for your battery charging profile
S3, S4	Determines the Float Voltage for your battery charging profile *This will not be used for lithium batteries

Start with SW5 to determine whether you are charging a lead-acid battery or lithium

Set charging mode

You can set the charger mode using the S5 and switches.

S5	Charger Mode
ON	Charging mode of lead-acid battery
OFF	Charging mode of Lithium-ion battery

SW5 ON

If SW5 is set to ON, then you will follow the lead acid charging profiles in the following charts. SW1/SW2 will determine the desired absorption voltage and SW3/SW4 will determine the desired float voltage.

*Please note that the charging profile will automatically bulk before approaching the user-defined absorption and float stage.

Set Absorption Charge

You can use the DIP switches S1 and S2 to set the value of the end-of-charge voltage.

S1	S2	Switchover voltage/constant voltage12 V
ON	ON	14.4 V
OFF	ON	14.1 V
ON	OFF	14.7 V
OFF	OFF	

Set float voltage

You can use the DIP switches S3 and S4 to set the float voltage in the U phase (float).

S3	S4	Float voltage 12 V
ON	ON	13.8 V
OFF	ON	13.5 V
ON	OFF	13.2 V

SW5 OFF

If SW5 is set to OFF, then you will follow the lithium-iron phosphate charging profiles in the following charts. For lithium charging the switches will combine bulk/absorption charging voltages and omit float voltage. There will not be a float voltage that you set for your lithium battery as it is generally unnecessary for Lithium-Iron Phosphate batteries. Because of this, you will only use SW1/SW2 to determine LFP charging profiles.

Please Note: The battery charger is for lithium-iron phosphate battery types with a built in BMS system. Do not use the device under any circumstances to charge other types of batteries (ex. NiCd, NiMH, etc.).

Start by setting SW3/SW4 to ON position. This will disregard the Type 1 chart. Utilize the Type 2 Chart to select your lithium-iron phosphate battery charging profile using SW1/SW2

Set Charging mode voltage of Lithium battery
Type 1

S3	S4	Voltage/ Type Set
ON	ON	Set to Type 2. Exit Type 1
OFF	ON	13.0 V
ON	OFF	12.8 V
OFF	OFF	12.6 V

Type 2

S1	S2	Voltage
ON	ON	14.6 V
OFF	ON	14.4 V
ON	OFF	14.2 V
OFF	OFF	14.0 V

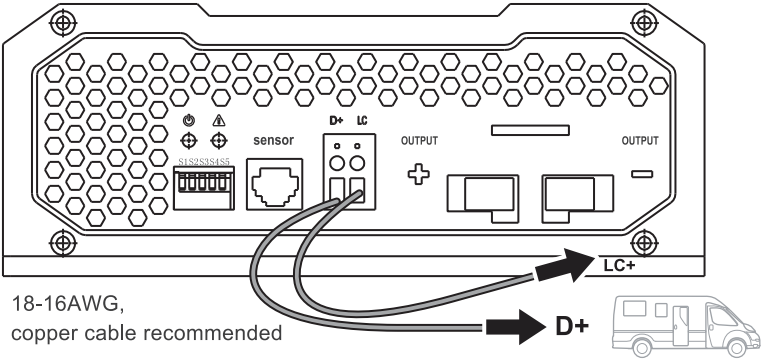
■ Current Limiting

The DC-DC chargers feature a current limiting option utilizing the LC port on the output side of the DC-DC.

Simply connect a copper signal cable (not provided), 18-16AWG, to the LC slot on the DC-DC output side and run the cable to the positive terminal of your alternator/starter battery common positive.

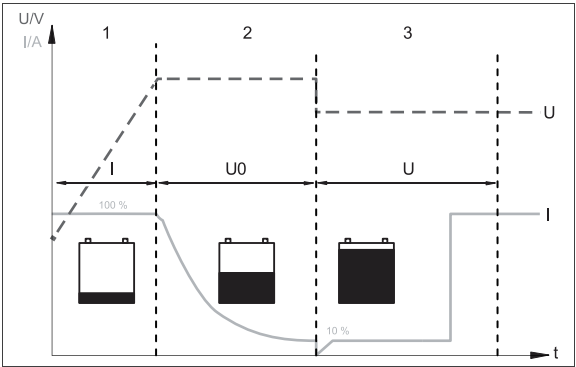
IMPORTANT: The DC-DC will not turn on without a D+ ignition cable so you will still need to have this connected when and if utilizing the LC terminal.

Although the LC terminal is in the output side, this will be connected to the positive line of the Input Starter Side.



■ Battery Charging Logic

The charging characteristics are referred to as IU0U characteristics.



1: I phase (bulk)

At the beginning of the charging process, the flat battery is charged with a constant current (100 % charge current) until the battery voltage reaches the charging end voltage. The charging current decreases when the battery has reached this charging level.

2: U0 phase (absorption)

Now the absorption charging process (U0 phase) begins, where the duration depends on the battery. The voltage remains constant (U0).

This phase is limited to a maximum of 3 hours to prevent overcharging the battery while driving.

3: U phase (float)

After the U0 phase, the battery charger switches to the conservation charging function (U phase).

Troubleshooting

The manufacturer accepts no liability for damage in the following cases:

- Faulty assembly or connection
- Damage to the product resulting from mechanical influences and excess voltage
- Alterations to the product without expressed permission from the manufacturer
- Use for purposes other than those described in the operating manual

CAUTION

Do not open the device. You risk exposing yourself to an electric shock by doing this.

NOTE

If you have detailed questions about the battery charger, please contact our customer support (addresses on the back of the instruction manual).

Behavior	Troubleshoot Steps
Green LED not turning on, but the batteries are connected	1.Check the D+ signal wire and make sure it is connected to the input alternator/battery positive and the D+ port on the DC-DC
	2.Make sure the Input starter source is connected to the input terminals of the DC-DC and the house battery is connected to the output terminals on the DC-DC.
	3.Check to make sure your connections are tight and secured and that it is connected to the correct terminals.
	4.There may be a break in your connection so Inspect all wires for tears or breaks and if all is well on the surface, then conduct a continuity test using a multi-meter to check for adequate flow. This will depend on your model.
	5.Use a multi-meter to check that the both the starter and house batteries are within the DC-DC voltage specification. It should not be under 8V or over 16V.
	6.Use a multi-meter to also verify whether your poles are reversed. Setting your multi-meter to DC Volts, probe the positive line onto the positive battery terminal and probe the negative line to the negative battery terminal. If the DC reading is negative, your poles are reversed.
	7.You may need to conduct a battery test at your local auto shop
Unit was working, but then shutdown.	If the DC-DC is not functioning properly, it may be undergoing an automatic protection function. This does not mean the DC-DC is defective, but it requires some adjustments to commence normal system operation. The red indicator may or may not be on, depending on the circumstance.

Protection Function / Fixes

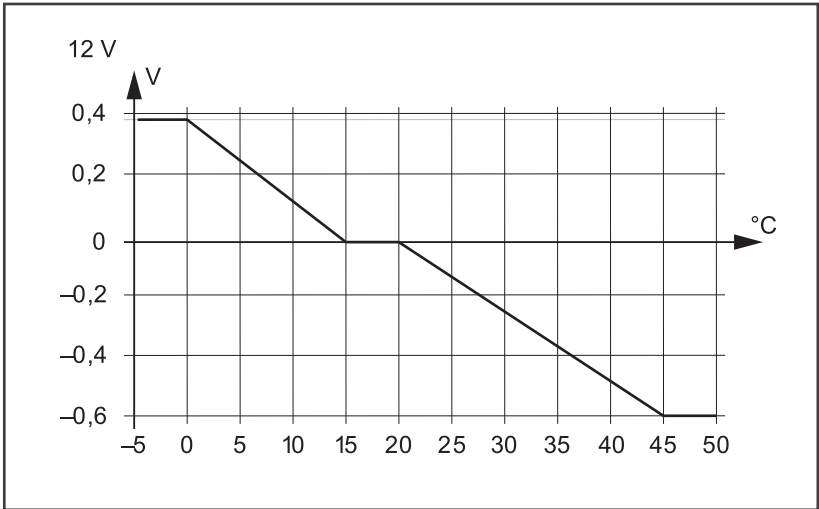
LED is Red, what do I do?	
Protective Function	Potential Fixes
Over-Voltage Protection; Under-Voltage Protection	1. Use a multi-meter to check the voltage of the battery bank to confirm whether the starter battery or house battery is above specification (16V) or below the specification (8V)
	2. If above the voltage specification, disconnect all loads and chargers from the battery and allow the battery to stabilize. This may take a few hours.
	3. If below the voltage specification, you will need an external charger to bring the battery voltage to the minimum set point on the DC-DC. The under-voltage protection may not be showing an indicator light.
Reverse-Polarity Protection	1. Use a multi-meter to also verify whether your poles are reversed. Setting your multi-meter to DC Volts, probe the positive line onto the positive battery terminal and probe the negative line to the negative battery terminal. If the DC reading is negative, your poles are reversed.
	2. Switch the poles to resume normal operation
High-Temperature Protection	1. If voltage checks out fine, then the installation area may be too hot for the DC-DC to operate.
	2. Turn off any loads from the DC-DC and if you have a temperature sensor, measure the temperature to make sure it is not outside of working specification 50(degree) C.
	3. Ventilate the installation area, or let the unit sit until it has cooled down via temperature sensor or your touch.
	4. The high-temperature protection is automatic and will resume normal operation upon detecting lower temperatures/operational temperatures.
Short Circuit Error	If the troubleshooting steps or protection function steps are ineffective at fixing the DC-DC, then it may be experiencing an internal short circuit error. The LED will be permanently on and cease to function, by which it will need to be replaced.

Technical Specifications

	RNG-DCC1212-20	RNG-DCC1212-40	RNG-DCC1212-60
Transformation	12 V → 12 V		
Nominal input voltage	12 VDC		
Input voltage range	8V ~ 16VDC		
Rated Charging Current	20 A	40 A	60 A
Charging Voltage Range	13.2V – 14.7V, depending on DIP Switch		
Max Rated Output Power	250W	500W	750W
Residual ripple of output voltage at rated current	< 50 mV @20A / 40A / 60A		
Efficiency	up to 90 %		
Idle power consumption	< 0.4 A		
Operational temperature	-20 °C ~ +50 °C \ -4°F ~122°F		
Temperature Compensation (with sensor)	-3mV/C@/2V (See Chart)		
Humidity	≤95 % Non-condensing		
Dimensions (W x D x H):	211 x 175 x 68 mm 8.31 x 6.89 x 2.68in	261 x 175 x 68 mm 10.28 x 6.89 x 2.68in	311 x 175 x 68 mm 12.24 x 6.89 x 2.68
Terminal Size	M8 x 10mm, 1mm thread pitch		
Weight	1.33 kg. 2.93 lbs.	1.88 kg 4.14 lbs.	2.40 kg 5.29 lbs.
Inspection / certification			

Temperature Compensation

Please Note: The temperature compensation is not to be used with lithium batteries.



Protective Function Specifications

@ Input	High-Voltage, low-voltage, reverse polarity, high-temperature, short-circuit
Low-voltage cut-out	8V
Low-voltage restart	10V
High-voltage shutdown	16V
High-voltage restart	15.5V

Renogy reserves the right to change
the contents of this manual without notice.

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