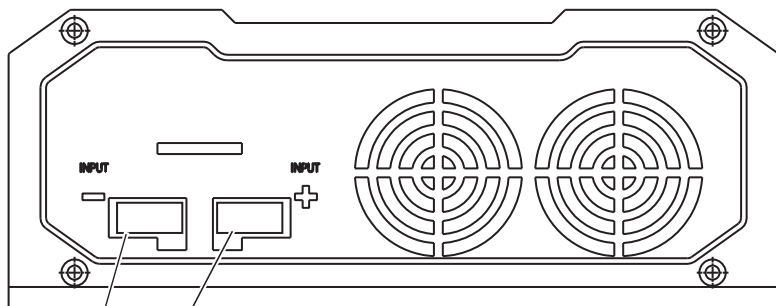


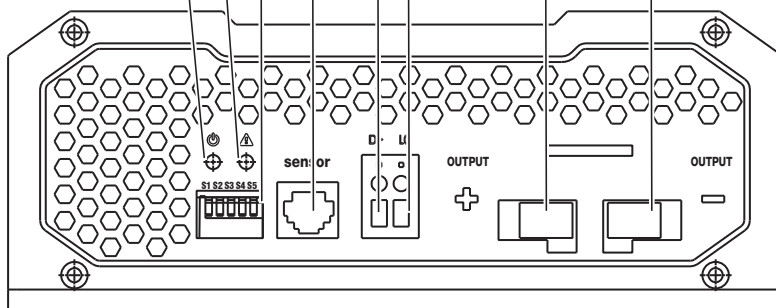
DC-DC Multifunctional Charger

Installation and Operating Manual

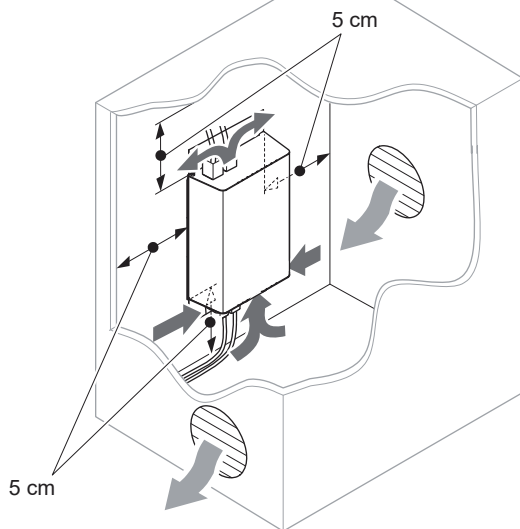
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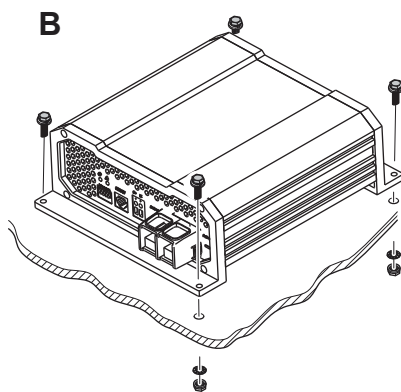
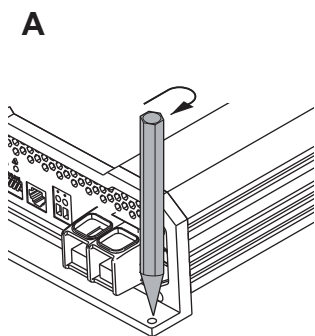
1 2 3 4 5 6 7 8 9 10



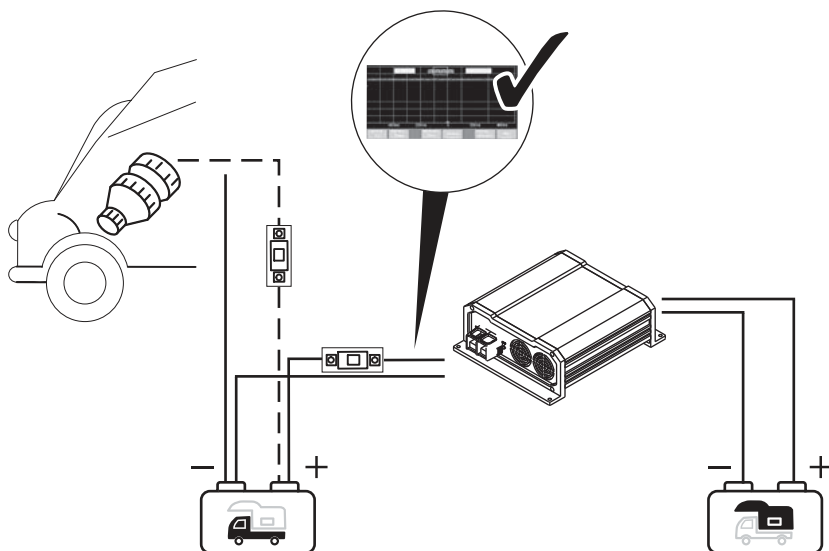
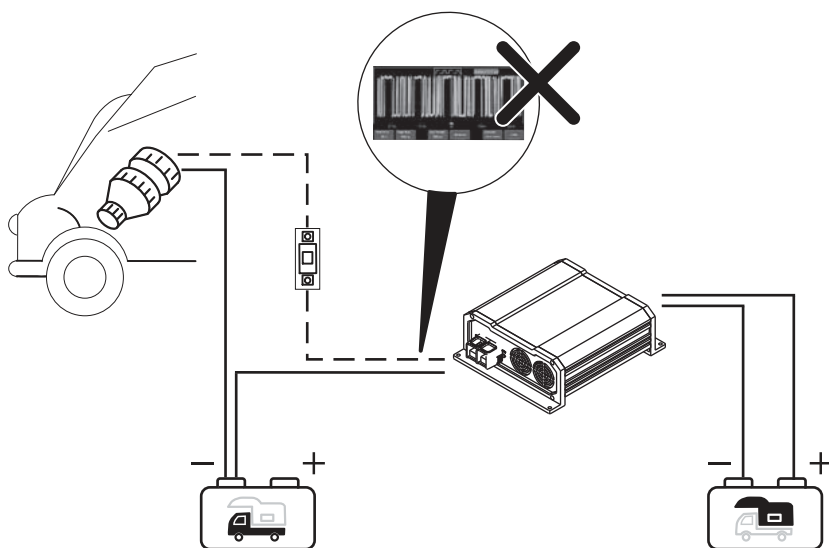
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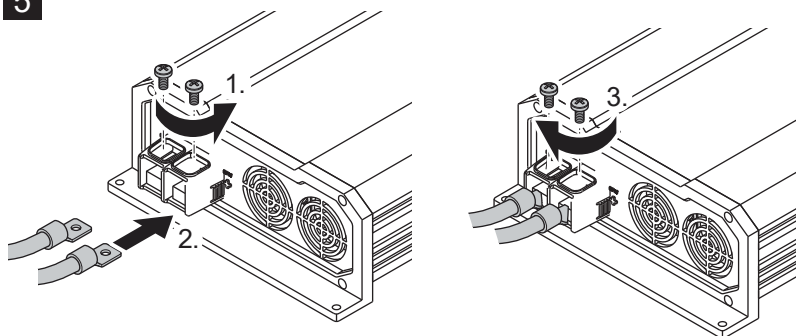
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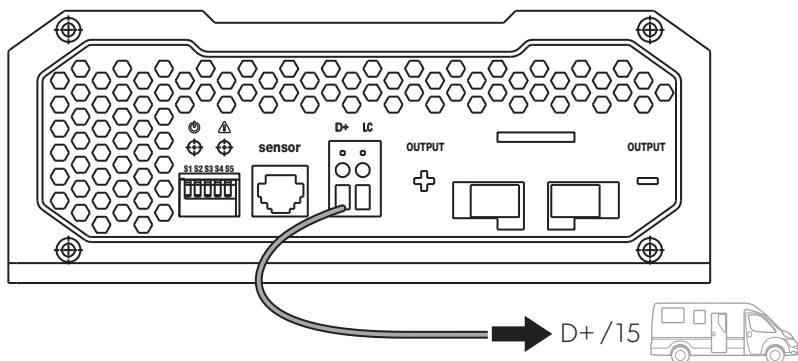
4



5



6



Please read this instruction manual carefully before installation and first use, and store it in a safe place. If you pass on the product to another person, hand over this instruction manual along with it.

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1 Description of symbols



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.

2 General safety instructions

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 express 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

2.1 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)
- If you disassemble the product:
 - Detach all connections.
 - Make sure that no voltage is present on any of the inputs and outputs.
- 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.

2.2 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.

2.3 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.
- Do not pull on the cables.

2.4 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.

2.5 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.

3 Package includes

Description	
1	Battery charger
–	Installation and operating manual

4 Accessories

Available as accessories (not included in the package):

Description	Ref. no.
Temperature sensor TS-1	RNG-DCC-TS

5 Target group for this manual

The chapter “Connect charging converter” on page 18 chapter is solely intended for qualified professionals who are familiar with the relevant VDE regulations.

All other chapters are intended for the users.

6 Intended use

The DCC battery chargers can charge batteries used on board vehicles or boats while driving, or supply them with a maintenance voltage for power generation. Additionally, the devices can be used as a stable power supply.

The DCC battery chargers are used for continuous charging of supply or on-board batteries (body batteries):

- 12 V==Charger:DCC-1212-20, DCC-1212-40, DCC-1212-60

The DCC battery chargers are used to charge the following battery types:

- Lead acid batteries
- Lead gel batteries
- Fleece batteries (AGM batteries)
- Lithium Batteries



NOTICE!

Check the charging requirements from the battery manufacturer before charging your battery.

Do not use the device **under any circumstances** to charge other types of batteries (ex. NiCd, NiMH, etc.).



WARNING! Danger of explosions!

- Do not charge batteries with a cell conclusion. The oxyhydrogen they produce can cause explosions.
- Do not charge lead acid batteries in unventilated rooms. The oxyhydrogen they produce can cause explosions.
- Do not charge NiCd batteries or non-rechargeable batteries with this device. The sleeves of these batteries can explode.

7 Technical description

Because of its low weight and compact design, the charging converter can easily be installed in RVs, commercial vehicles, or motor and sailing yachts. While driving, it charges batteries that are used on-board vehicles or boats to generate power or supplies them with a retention voltage so that they do not unload.

The 12 V $\overline{\text{AC}}$ voltage from a vehicle or boat battery is transformed into a stable 12 V $\overline{\text{DC}}$ voltage.

The isolation of the input and output voltages means the output voltage can be kept stable without interference from the input circuit.

The charging converter is switched on via a 12V signal:

- D+ signal
- alternator signal (terminal 15)
- a switched input signal



NOTICE!

When terminal 15 is used, the starter battery may discharge even when the engine is off, if the ignition is set to "ON".

The battery charger has various protective mechanisms:

- **High-voltage shutdown:** The battery charger shuts itself off when the voltage exceeds the cut-off value. It restarts when the voltage returns to the restart value.
- **Low-voltage shutdown:** The battery charger shuts itself off when the voltage sinks below the cut-off value. It restarts when the voltage rises to the restart value.
- **High-temperature shutdown:** The battery charger switches off when the temperature inside the device exceeds a cut-off value. It restarts when the voltage rises to the restart value.
- **Protection against short circuit:** The LED on the battery charger signals a malfunction if a short circuit has been generated. The device fuse must be replaced by a professional after it has been triggered by excess current.

**NOTE**

The individual values are found in chapter "Protective devices" on page 27.

The battery charger can be adapted to different battery types via DIP switches.

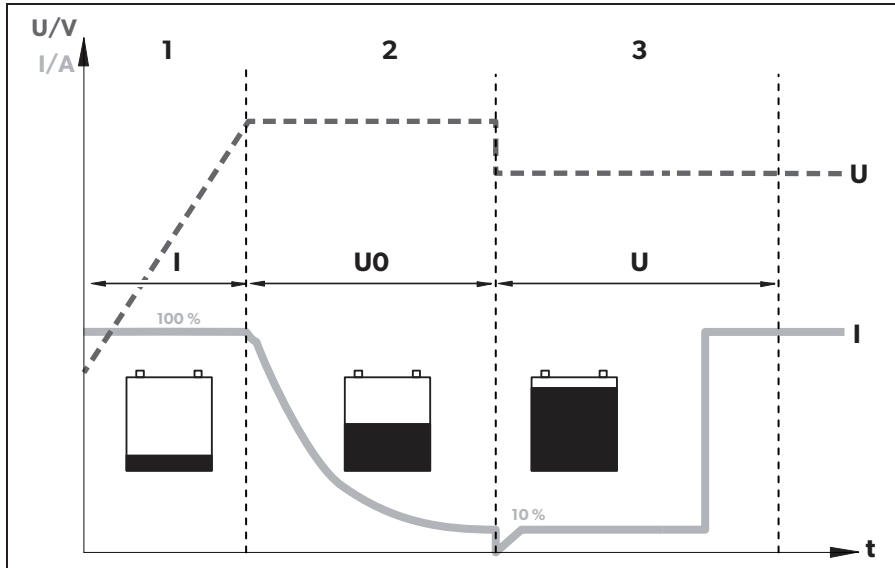
When a TS-100 temperature sensor is connected, the charging converter adjusts the charging voltage according to the measured temperature, see chapter "Technical data" on page 24.

7.1 Connections and controls

Item in fig. 1, page 3	Description
1	Input terminals (–) of starter battery
2	Input terminals (+) of starter battery
3	Power Indicator light
4	LED display
5	DIP switch, see chapter "Adjust charging converter" on page 20
6	RJ11 terminal: Connection of a temperature sensor (accessory)
7	Control cable (I1) for turning on the vehicle with on-board voltage (D+ or terminal 15 (ignition))
8	Power regulation (I2) to limit the charging current to 12.5 %
9	Output terminals (+) to the body battery
10	Output terminals (–) to the body battery

7.2 Battery charging function

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).

8 Mount charging converter

8.1 Tools required

For the **electrical connection** you will need the following tools:

- Crimping tool
- 4 flexible connection cables: + and – for the starter battery, + and – for the body battery. 1 flexible signal cable for connection to D+ or the ignition. The required cross-section can be found in the table chapter “Connect charging converter” on page 19.
- Cable lugs and conductor sleeves

For **fastening** the battery charger, you will need the following tools:

- Machine bolts (M4) with washers and self-locking nuts or self-tapping screws or wood screws.

8.2 Installation instructions

When selecting the installation location, pay attention to the following instructions:

- 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 5 cm (fig. **2**, page 4).
- The battery charger air inlet and air outlet must remain free.
- At ambient temperatures higher than 40 °C (ex. in engine or boiler rooms, direct sunlight), the battery charger may switch off, although the power of the connected loads is below the rated load (derating).
- The device must be installed on a level and sufficiently sturdy surface.

8.3 Charging converter



NOTICE!

Before drilling any holes, make sure that no electrical cables or other parts of the vehicle can be damaged by drilling, sawing, and filing.

- Pay attention to the distance specifications (fig. **2**, page 4).
- Mount the charging converter as shown (fig. **3**, page 4).

9 Connect charging converter



WARNING!

Do not reverse the polarity. Reverse polarity of the battery connections can cause injury and damage the device.



CAUTION!

- Avoid coming into contact with the battery fluid under any circumstances.
- Batteries with a cell short circuit should not be charged as explosive gases may form due to the battery overheating.

NOTICE!

Tighten the nuts and bolts with a maximum torque of 12 – 13 Nm. Loose connections may cause overheating.

Observe the following instructions when connecting the battery:

- Make sure the battery poles are clean when connecting the terminals.
- Make sure the plug connector is fitted securely.
- Select a sufficient cross-section for the connection cable.
- Lay the cables in accordance with VDE 100 .
- Connect the negative cable directly to the negative terminal of the battery, and **not** to the chassis of a vehicle or boat.
- Use the following cable colors:
 - Red: positive connection
 - Black: negative connection

Determine cable cross-section



NOTE

Keep the distance to the body battery as short as possible.

The minimum cable cross-section depends on the maximum cable length:

Cable length		Minimum cable cross-section/Fuse			
		2.5 mm ² / 30 A	4 mm ² / 40 A	6 mm ² / 60 A	10 mm ² / 80 A
DCC-1212-20	to the starter battery	≤ 7 m	≤ 11 m	≤ 16 m	–
	to battery structure	≤ 2 m	≤ 3.5 m	≤ 5 m	–
DCC-1212-40	to the starter battery	–	≤ 5.5 m	≤ 8 m	≤ 14 m
	to battery structure	–	≤ 1.5 m	≤ 2.5 m	≤ 4 m
DCC-1212-60	to the starter battery	–	–	–	≤ 7 m
	to battery structure	–	–	–	≤ 2 m

9.1 Connect charging converter



NOTICE!

The charging converter must not be connected directly to the alternator.

- Connect the charging converter as shown:
 - Correct connection diagram: fig. **4**, page 5
 - Connecting the batteries: fig. **5**, page 6
 - Connect control line (I1): fig. **6**, page 6

9.2 Connect accessories

NOTE - Performance regulation

To limit the output current of the charging converter to 5 A, a positive control signal must be present at contact "I2" (fig. **1** 5, page 3).

- Connect the accessory to the following contacts:
 - Performance regulation (I2): fig. **1** 5, page 3
 - Temperature sensor: fig. **1** 6, page 3

10 Use charging converter

10.1 Switch charging converter on/off

The charging converter turns on automatically as soon as it receives a positive control signal. The status LED glows blue.

The charging converter switches off automatically when the control signal is no longer present.



NOTE

If the control signal of the charging converter is switched via the ignition, the starter battery can discharge if the engine is not started in a timely manner.

10.2 Adjust charging converter



NOTE

Take the values for the charging end voltage and maintenance charge voltage of your battery from the battery manufacturer's specifications.

You can adjust the device using the DIP switch (fig. **1**7, page 3).

Set switchover voltage/constant voltage

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

S1	S2	Switchover voltage/constant voltage
		12 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
OFF	OFF	

Set charging mode



WARNING! Danger of explosions!

Use only the charging mode appropriate for your battery type. If necessary inquire at a specialist workshop.

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

Set Charging mode voltage of Lithium-ion 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

S3	S4	Voltage
ON	ON	14.6 V
OFF	ON	14.4 V
ON	OFF	14.2 V
OFF	OFF	14.0 V

12 Troubleshooting

**WARNING!**

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 data, please contact the manufacturer (addresses on the back of the instruction manual).

LED does not glow

- Check the electric connections.
If you cannot find an error, contact customer service.

13 Warranty

The statutory warranty period applies. If the product is defective, please contact the manufacturer's branch in your country (see the back of the instruction manual for the addresses) or your retailer.

For repair and guarantee processing, please include the following documents when you send in the device:


- A copy of the receipt with purchasing date
- A reason for the claim or description of the fault

14 Disposal

- Place the packaging material in the appropriate recycling waste bins wherever possible.



If you wish to finally dispose of the product, ask your local recycling center or specialist dealer for details about how to do this in accordance with the applicable disposal regulations.

	DCC-1212-20	DCC-1212-40	DCC-1212-60
Transformation:	12 V → 12 V		
Nominal input voltage:	12 V $\overline{=}$		
Input voltage range:	8 V – 16 V		
Charging current:	20 A	40 A	60 A
Charging voltage:	13.2 V – 14.7 V		
Output:	250W	500W	750W
Residual ripple of output voltage at rated current:	< 50 mV _{eff}		
Efficiency up to:	90 %		
Idle power consumption:	< 0.4 A		
Ambient temperature for operation:	–20 °C to +50 °C		
Ambient humidity:	≤ 95% Non-condensing		
Dimensions (W x D x H):	211*175*68 mm	261*175*68 mm	311*175*68 mm
Weight:	1.33kg	1.88kg	2.40kg
Inspection/certification:			

Protective devices

	12V
Input:	High-voltage, low-voltage, reverse polarity protection (internal fuse)
Low-voltage cut-out:	8 V
Low-voltage restart:	10 V
High-voltage shutdown:	16 V
High-voltage restart:	15.5 V
Temperature:	Shutdown
Short-circuit protection:	yes, I _{pk}

Temperature compensation



NOTE

The temperature compensation is only effective if a RNG-DCC-TS temperature sensor is connected **and** the IU0U charging mode is selected.

