SELFENERGY

ENGLISH


# Converty DC

## USER MANUAL

V03. Last update: March 2022

CE

- Please read these instructions carefully before installation and commissioning.
- Please keep it in a safe place.
- These instructions apply to all products in the Converty DC range.

## Content

# 1. General safety instructions

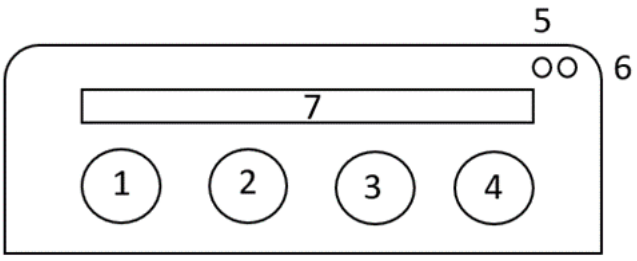
The manufacturer is not liable for damages in the following cases:

- installation or connection faults
- mechanical influences and overvoltages that have damaged the equipment
- changes to the product without the manufacturer's express permission
- use other than that described in the manual

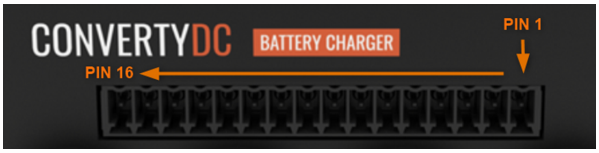
For your own protection, pay particular attention to the following basic safety instructions when using electrical equipment:

- electric shock,
- fire,
- injury.

# 2 - Product presentation




Converty DC – Front view




Legend:

1 : Motor Battery Input ( + )

2 : Motor Battery Input ( - )

3 : Auxiliary Battery Output ( - )

4 : Auxiliary Battery Output ( +)

5 : LED ( Power )

6 : LED ( Charging status )

7: Connector (Input/Output)*.

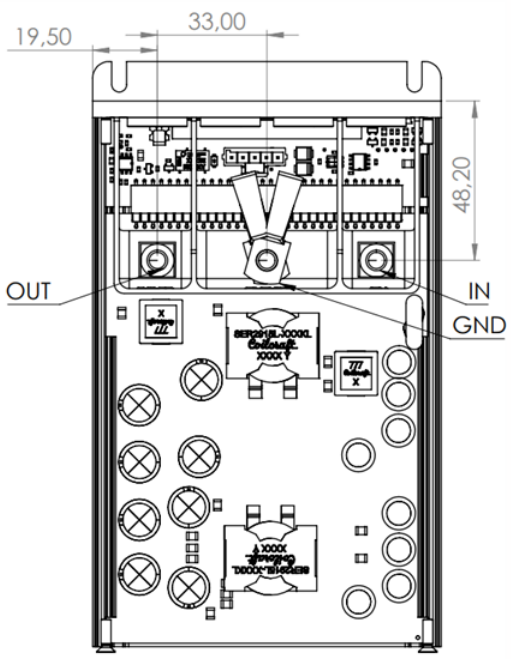
*This connector allows access via the counterpart to the different functionalities of the Converty DC:

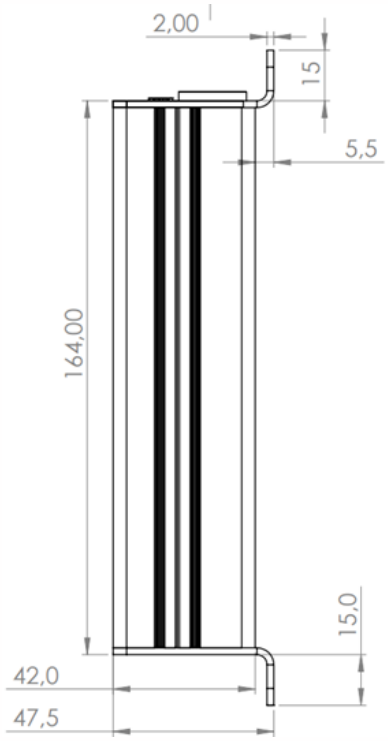
| PIN | Name | Type | Description |
|---|---|---|---|
| 1 | SW ON/OFF - | Passive | Dry contact to enable the system by connecting SW ON/OFF - to SW ON/OFF + |
| 2 | SW ON/OFF + | Passive | Dry contact to enable the system by connecting SW ON/OFF - to SW ON/OFF + |
| 3 | D+ | Input | Optionnal : D+ input to be connected to the alternator output (if D+ available) |
| 4 | Reserved | NA | NA |
| 5 | Vout | Power | Unregulated external voltage equal to highter voltage between Vin ou Vout (max : 500mA) |
| 6 | GND | Power | GND |
| 7 | CAN_L | Input / Output | Optionnal : CAN communication* |
| 8 | CAN_H | Input / Output | Optionnal : CAN communication* |
| 9 | CAN_H | Input / Output | Optionnal : CAN communication* |
| 10 | CAN_L | Input / Output | Optionnal : CAN communication* |
| 11 | GND | Power | GND |
| 12 | Relay NC | Passive | Optional : Dry contact making by relay to wake up the BMS**: Normaly closed contact |
| 13 | Relay Com | Passive | Optional : Dry contact making by relay to wake up the BMS**: Common point contact |
| 14 | Relay NO | Passive | Optional : Dry contact making by relay to wake up the BMS**: Normaly open contact |
| 15 | NTC+ | Input | Optional : Input for temperature sensor (only used with an input lead battery) |
| 16 | NTC- | Input | Optional : Input for temperature sensor (only used with an input lead battery) |

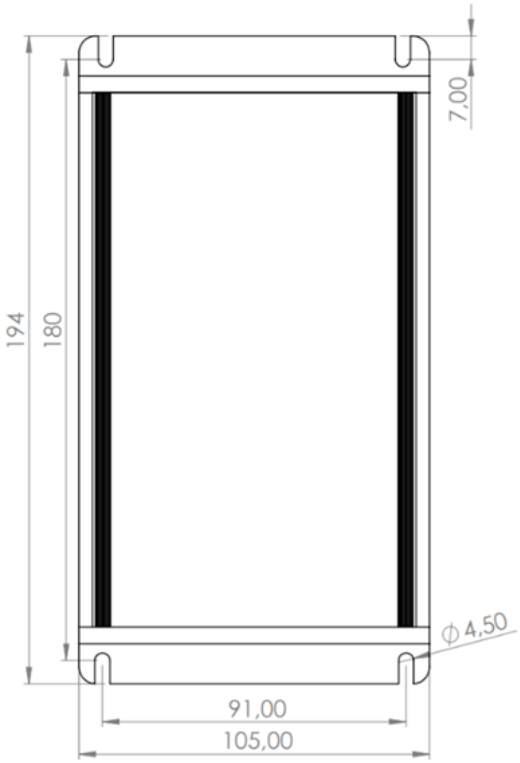
* No internal 120 Ω resistor, put external if necessary.

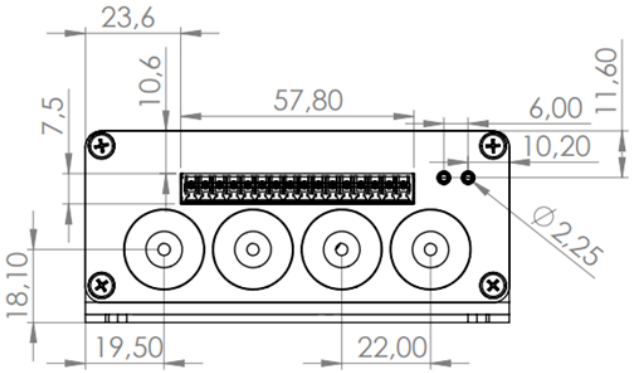
**Automatic relay management by the CONVERTY and possibility to drive it via CAN commands.

# 3 - Dimensioning



# 4 – General description

Selfenergy's battery chargers are designed in France on the sites of Mérignac and Pompignac (33). The Converty DC fulfills the role of a charger and a converter. The charging optimization is made possible thanks to a high frequency switching technology and is valid on the range from 12V to 48V (Input and/or Output). Our chargers allow you to extend the life of your batteries in various applications such as marine, recreational vehicles or industrial vehicles.
All our chargers are preconfigured at the factory for a quick installation, but you also have a configuration interface of our boxes to modify the information (see Interface part p. 18).

WARNING: This manual is standardized for the Converty DC range of products available on the shelves and not for products with modifications and custom designed products.

# 5 – Scope of delivery

- 1 Battery charger
- 4 Power lugs for cable + screws
- 1 Counterpart for the I/O connector
- 1 Instruction sheet for installation and use

# 6 – Technical data

The max power will be adapted according to the temperature of the system to protect it (derating).

## Converty DC 12

| Model | | Converty DC 12-12 | Converty DC 12-24 | Converty DC 12-36 | Converty DC 12-48 |
|---|---|---|---|---|---|
| Input | Input voltage model | 12 V | | | |
| | Max input current | 50 A | | | |
| | Input voltage range | 9 V to 34 V | | | |
| | Nominal input battery voltages | 11 V to 17 V | | | |
| Output | Output voltage model | 12 V | 24 V | 36 V | 48 V |
| | Max output current | 50 A | 40 A | 20 A | 20 A |
| | Output voltage range | 9 V to 18 V | 9 V to 34 V | 9 V to 59 V | |
| | Nominal output voltages of the battery | 10 V to 17 V | 18 V to 29 V | 30 V to 41 V | 42 V to 51 V |
| | Max output power | 850 W | 1000 W | 1000 W | 1000 W |
| Common | Insulation | Non isolé : GND commun | | | |
| | Battery charging mode | Bulk, Absorption, Floating, Maintenance | | | |
| | Efficiency max | 97% | | | |
| | Battery Type | Li-ion NMC, Li-ion FePO4, NiMH, Pb acide, Pb GEL, Pb AGM | | | |

## Converty DC 24

| Model | | Converty DC 24-12 | Converty DC 24-24 | Converty DC 24-36 | Converty DC 24-48 |
|---|---|---|---|---|---|
| Input | Input voltage model | 24 V | | | |
| | Max input current | 50 A | | | |
| | Input voltage range | 9 V to 34 V | | | |
| | Nominal input battery voltages | 18 V to 29 V | | | |
| Output | Output voltage model | 12 V | 24 V | 36 V | 48 V |
| | Max output current | 50 A | 40 A | 20 A | 20 A |
| | Output voltage range | 9 V to 18 V | 9 V to 34 V | 9 V to 59 V | |
| | Nominal output voltages of the battery | 10 V to 17 V | 18 V to 29 V | 30 V to 41 V | 42 V to 51 V |
| | Max output power | 850 W | 1000 W | 1000 W | 1000 W |
| Common | Insulation | Non isolé : GND commun | | | |
| | Battery charging mode | Bulk, Absorption, Floating, Maintenance | | | |
| | Efficiency max | 97% | | | |
| | Battery Type | Li-ion NMC, Li-ion FePO4, NiMH, Pb acide, Pb GEL, Pb AGM | | | |

## Converty DC 48

| Model | | Converty DC 48-12 | Converty DC 48-24 | Converty DC 48-36 | Converty DC 48-48 |
|---|---|---|---|---|---|
| Input | Input voltage model | 48 V | | | |
| | Max input current | 30 A | | | |
| | Input voltage range | 9 V to 59 V | | | |
| | Nominal input battery voltages | 42 V to 51 V | | | |
| Output | Output voltage model | 12 V | 24 V | 36 V | 48 V |
| | Max output current | 50 A | 40 A | 20 A | 20 A |
| | Output voltage range | 9 V to 18 V | 9 V to 34 V | 9 V to 59 V | |
| | Nominal output voltages of the battery | 10 V to 17 V | 18 V to 29 V | 30 V to 41 V | 42 V to 51 V |
| | Max output power | 850 W | 1000 W | 1000 W | 1000 W |
| Common | Insulation | Non isolé : GND commun | | | |
| | Battery charging mode | Bulk, Absorption, Floating, Maintenance | | | |
| | Efficiency max | 97% | | | |
| | Battery Type | Li-ion NMC, Li-ion FePO4, NiMH, Pb acide, Pb GEL, Pb AGM | | | |

## General Caracteristics for the all range

| | | |
|---|---|---|
| Environment | Working Temperature | -20°C / 60°C |
| | Storage Temperature | -20°C / 80°C |
| | Humidity | Tropicalized card |
| Communication | Entry D+ | Yes |
| | CAN Bus | Yes |
| | Temperature sensor | Yes (sensor in option) |
| | Charger detection | Dry contact (normally open and normally closed relay) for load detection in progress |
| | Customized parameterization at the factory or by CAN (via PC supervision software) | Autonomous/piloted mode, Safety voltages, Max powers, Max currents, Max temperatures, ... |
| | Data controllable in real time by CAN | Load voltage, Load current, Input current |
| | Information sent by CAN | Input and output voltages, Input and output currents, Input and output power, Temperatures, Alarms, ... |
| Others | Dimensions | 194 x 105 x 47,5 mm |
| | Weight | 600 g |
| | Protection | IP 43 |
| | Enclosure | Quick and easy wall mounting, 4 external points M4 |
| | Cooling | Passive (no fan) |
| Warranty | Product | 2 years |
| | Commercial durability | 10 years |

# 7 – Possible options

Even if our range is standardized, we have also developed general options for many applications:

- Remote ON/OFF button
- IP 66
- Remote display (working with CAN bus communication)
- Temperature sensor

Some of these options may lead to modifications on all the sections below:

- Installation
- Connection
- Setup

# 8 - Loading steps

During a typical battery charge, the Converty DC performs the following charging steps. The different parameters of voltages, currents and times depend on the characteristics of the batteries and can be set at the factory or through the supervision software.

### BULK Stage (constant current):

The battery is charged at constant current (maximum charge current) until the end-of-charge voltage is reached.

### Absorption Stage (constant voltage):

The battery is charged at a constant voltage with a current that gradually decreases to reach full charge. The minimum current can be less than 100mA, allowing lithium batteries to be balanced correctly.

### Floating Stage:

To guarantee a good battery life, the full charge voltage should not be maintained. Phase Floating keeps the voltage high enough to keep the battery charged without degrading it, while compensating for the consumption of the connected equipment. The DC converter can thus remain continuously connected to the battery.

### Maintenance Stage:

Automatically after several days or if the voltage decreases, the Converty DC restarts a Bulk-Absorption charge cycle to ensure that the battery remains fully charged.

# 9 – Protection mechanisms

The Converty DC has different protection mechanisms:

## Input and output short circuit protection:

The battery charge is cut off if a short circuit is detected in either input or output. Please note that in case of a short circuit, the external fuses may need to be replaced.

## Input and output overvoltage protection:

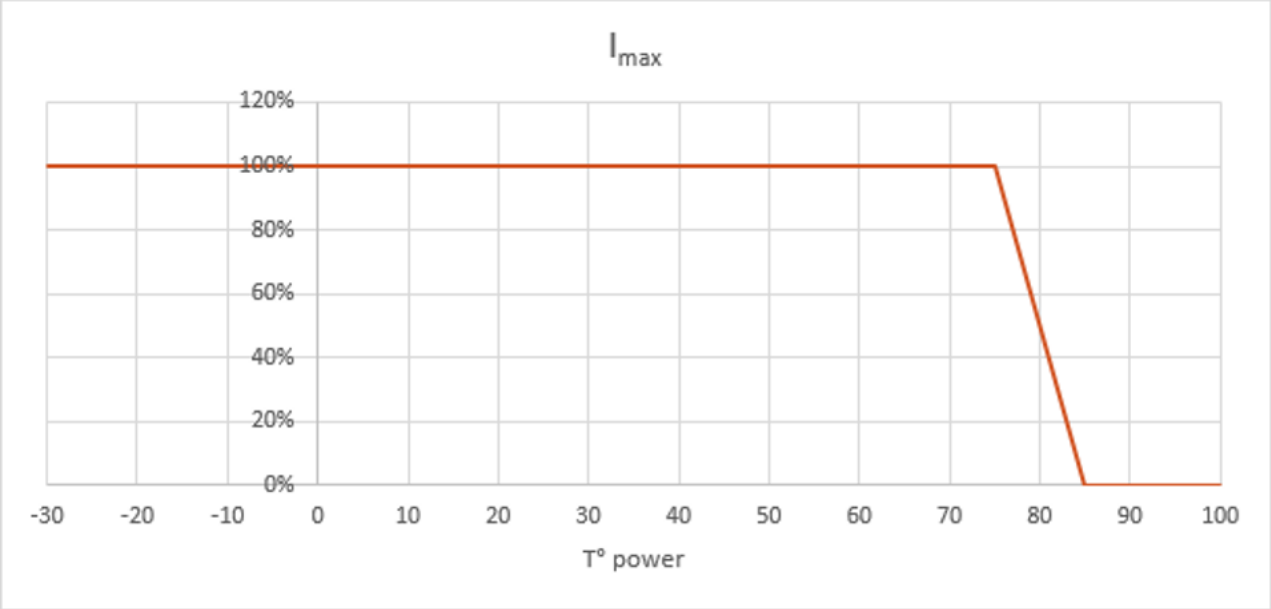
The battery charge is cut off when the input or output voltage rises above the respective cut-off thresholds. It restarts when the voltage drops to the restart value.

## Input and output undervoltage protection:

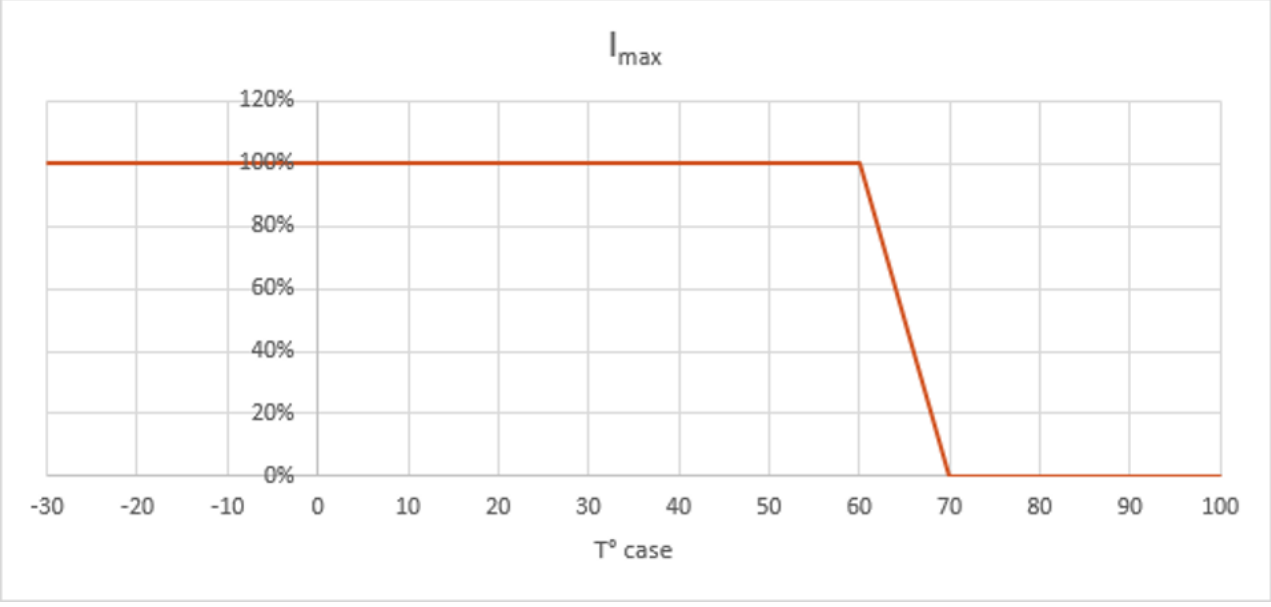
The battery charge is switched off when the input or output voltage falls below the respective shutdown thresholds. It restarts when the voltage rises to the restart value.

## Overheat protection:

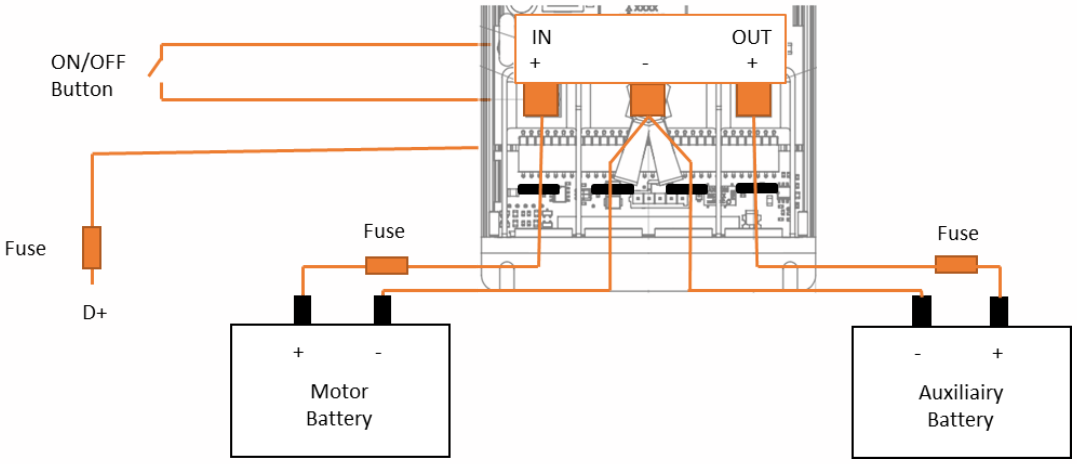
If the internal temperature of the enclosure is higher than 75°C the max current is attenuated and higher than 85°C the current is switched off.




If the external temperature of the enclosure **is higher than 60°C** the maximum current is attenuated and higher than 70°C the current is switched off. These values can be adjusted at the customer's request at the factory, or through the Selfenergy Supervisor.



# 10 - Installation




Converty DC – Operating diagram

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

• The Converty DC can operate in any position. However, the IP54 protection rating is only guaranteed if the unit is installed vertically, cables down.

• The installation site must be well ventilated. In case of installations in small, closed rooms, these must be equipped with a ventilation system. The minimum clearance around the battery charger must be at least 5 cm.

• To ensure good heat dissipation in an open environment, the best mounting position is vertical (cables down). A second choice is a good horizontal position with the heatsink facing up.

• It is recommended to place the Converty DC close to the battery with the lowest voltage rating. The battery with the lowest nominal voltage will be the one with the highest currents, bringing the Converty DC closer to this battery will reduce the cable cross-sections and the power losses in these cables. (see part Sizin section p. 14).

This recommendation is not necessary if the two batteries are of similar nominal voltage (for example two 12 V batteries).

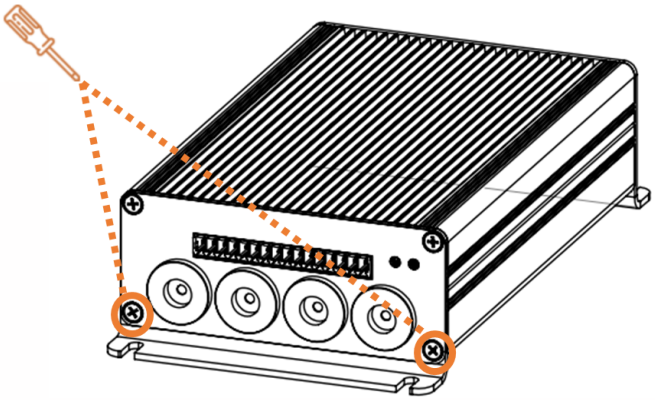
• The Converty DC should not be installed in environments containing flammable materials.

• The mounting surface must be flat and sufficiently stable.

• The Converty DC should not be near a heat source.

• The enclosure can reach temperatures above 60°C, so the location and signage should be chosen accordingly.

In order to proceed with the connection of the elements, it is necessary to open the Converty DC. Indeed, it is necessary to unscrew the 4 screws which are located next to the fixing lugs. (diagram opposite)



Please insert the counterpart for the I/O connector (male) into the 16-pin connector (female) on the DC Converty, this action will allow you to access all the features.

When connecting the battery, please note the following tips:

- Disconnect the poles of the input and output batteries before any connection to the Converty DC.
- Ensure that the battery poles are clean when connecting the terminals.
- Make sure the plug-in connector is securely attached.
- Select a sufficient cross-section for the connection cable (see table below).
- Lay the cables in accordance with the applicable standards.
- Connect the negative cable directly to the negative pole of the battery, not to the chassis of a vehicle or boat.
- Use the following cable colors:
  - Red: positive connection
  - Black: negative connection
- Install protective fuses on each battery (see operating diagram).

## Cable sizing:

The following tables give the recommended minimum cable cross-section (in $mm^2$) according to:

- The total length (round trip) of a connection between the battery (motor or auxiliary) and the DC converter.
- The maximum current (Ampere).

| With a voltage of 12V | | | | | | | |
|---|---|---|---|---|---|---|---|
| Max current | Fuse | 1 m | 3 m | 5 m | 10 m | 15 m | 20 m |
| 5 A | **7.5 A** | 0,75 | 0,75 | 1,50 | 2,50 | 4,00 | 6,00 |
| 10 A | **15 A** | 0,75 | 1,50 | 2,50 | 6,00 | 10,00 | 10,00 |
| 15 A | **20 A** | 0,75 | 2,50 | 4,00 | 10,00 | 10,00 | |
| 20 A | **25 A** | 1,00 | 4,00 | 6,00 | 10,00 | | |
| 25 A | **30 A** | 1,50 | 4,00 | 6,00 | | | |
| 30 A | **40 A** | 1,50 | 4,00 | 10,00 | | | |
| 35 A | **50 A** | 2,50 | 6,00 | 10,00 | | | |
| 40 A | **50 A** | 2,50 | 6,00 | 10,00 | | | |
| 45 A | **60 A** | 2,50 | 6,00 | 10,00 | | | |
| 50 A | **70 A** | 2,50 | 10,00 | | | | |

| With a voltage of 24V | | | | | | | |
|---|---|---|---|---|---|---|---|
| Max current | Fuse | 1 m | 3 m | 5 m | 10 m | 15 m | 20 m |
| 5 A | **7.5 A** | 0,75 | 0,75 | 0,75 | 1,50 | 2,50 | 2,50 |
| 10 A | **15 A** | 0,75 | 0,75 | 1,50 | 2,50 | 4,00 | 6,00 |
| 15 A | **20 A** | 0,75 | 1,00 | 2,50 | 4,00 | 6,00 | 10,00 |
| 20 A | **25 A** | 0,75 | 1,50 | 2,50 | 6,00 | 10,00 | 10,00 |
| 25 A | **30 A** | 0,75 | 2,50 | 4,00 | 6,00 | 10,00 | |
| 30 A | **40 A** | 0,75 | 2,50 | 4,00 | 10,00 | 10,00 | |
| 35 A | **50 A** | 1,00 | 2,50 | 4,00 | 10,00 | | |
| 40 A | **50 A** | 1,00 | 4,00 | 6,00 | 10,00 | | |

| With a voltage of 36V | | | | | | | |
|---|---|---|---|---|---|---|---|
| Max current | Fuse | 1 m | 3 m | 5 m | 10 m | 15 m | 20 m |
| 5 A | **7.5 A** | 0,75 | 0,75 | 0,75 | 0,75 | 1,50 | 1,50 |
| 10 A | **15 A** | 0,75 | 0,75 | 0,75 | 1,50 | 2,50 | 4,00 |
| 15 A | **20 A** | 0,75 | 0,75 | 1,50 | 2,50 | 4,00 | 6,00 |
| 20 A | **25 A** | 0,75 | 1,00 | 1,50 | 4,00 | 6,00 | 6,00 |
| 25 A | **30 A** | 0,75 | 1,50 | 2,50 | 4,00 | 6,00 | 10,00 |
| 30 A | **40 A** | 0,75 | 1,50 | 2,50 | 6,00 | 10,00 | 10,00 |
| 35 A | **50 A** | 0,75 | 1,50 | 2,50 | 6,00 | 10,00 | |

| With a voltage of 48V | | | | | | | |
|---|---|---|---|---|---|---|---|
| Max current | Fuse | 1 m | 3 m | 5 m | 10 m | 15 m | 20 m |
| 5 A | **7.5 A** | 0,75 | 0,75 | 0,75 | 0,75 | 1,00 | 1,50 |
| 10 A | **15 A** | 0,75 | 0,75 | 0,75 | 1,50 | 2,50 | 2,50 |
| 15 A | **20 A** | 0,75 | 0,75 | 1,00 | 2,50 | 2,50 | 4,00 |
| 20 A | **25 A** | 0,75 | 0,75 | 1,50 | 2,50 | 4,00 | 6,00 |

# 11 – Selfenergy Supervisor

The Selfenergy Supervisor software allows a fine control of the DC Converty through the CAN bus. It requires a PC with Windows and a PCAN-USB opto-decoupled interface.
(ref. IPEH-002022 : http://www.peak-system.com/PCAN-USB.199.0.html?&L=1 )

Selfenergy Supervisor combines the following functions:

- Real time visualization of the DC converter operation:
  - Operating status (load phases, ...)
  - Input and output voltages
  - Input and output currents
  - Input and output powers
  - Temperatures

- Visualization and modification of the parameters of the Converty DC:
  - Stand-alone or controlled mode
  - Load voltages in each phase
  - Load current in each phase
  - Voltage safety thresholds
  - Current safety thresholds
  - Power safety thresholds
  - Temperature safety thresholds

- Updating of the Converty DC firmware.

- Data logger: Recording of data (voltages, currents, temperatures, etc.) in real time in a .csv file (usable in any spreadsheet program such as MS Excel, OpenOffice, or others).

For more details, please consult the Selfenergy Supervisor user manual.

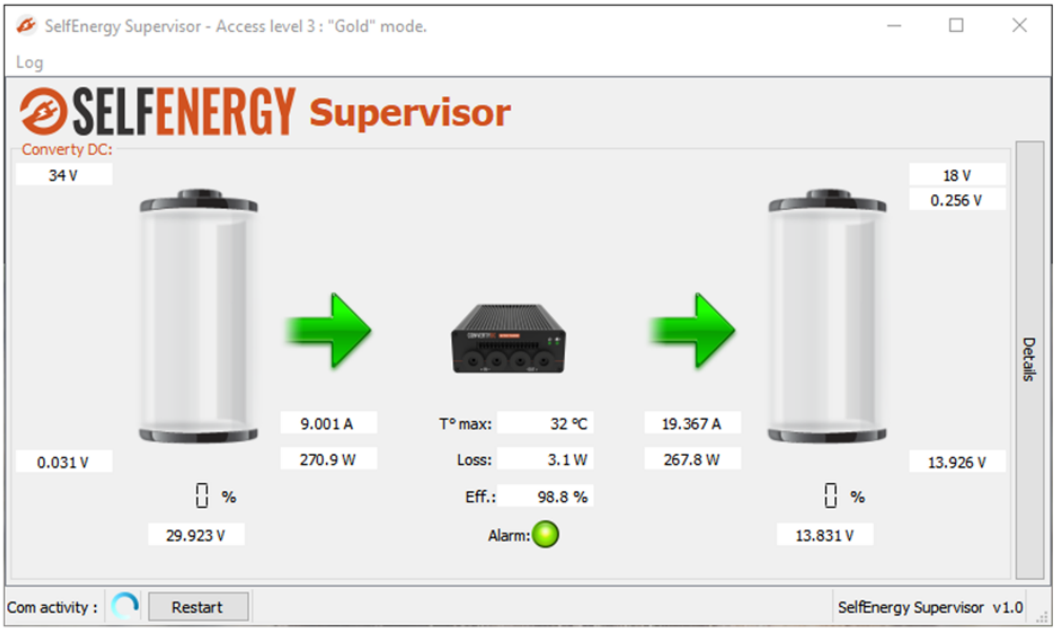



Figure 1 : Real-time data visualization*

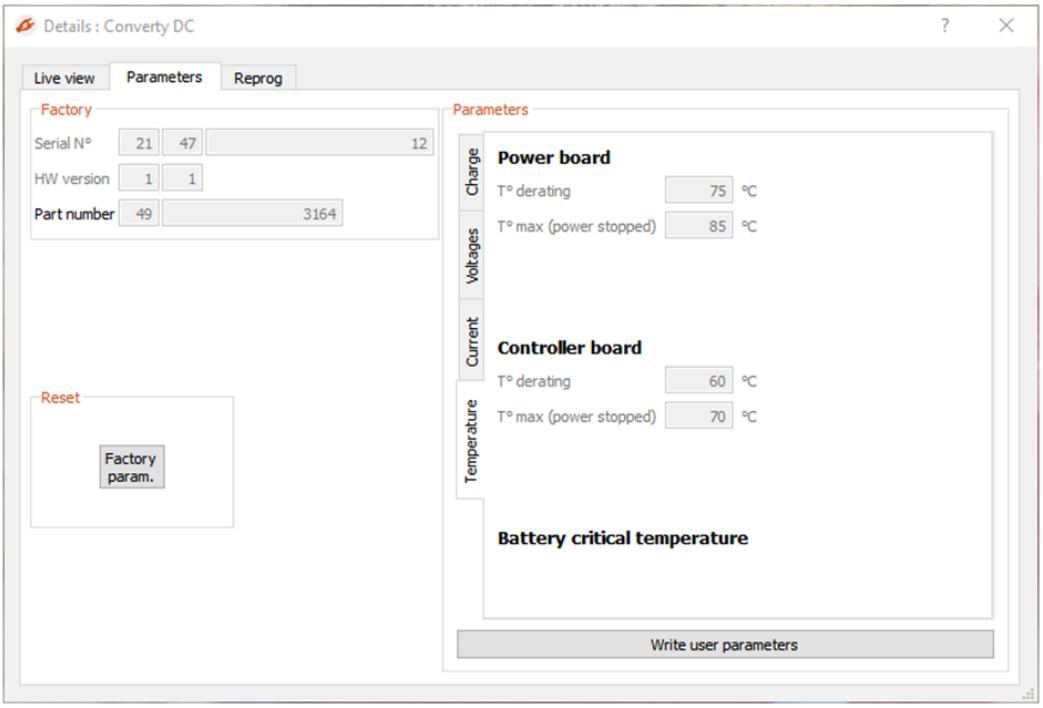



Figure 2 : Viewing and modifying parameters*

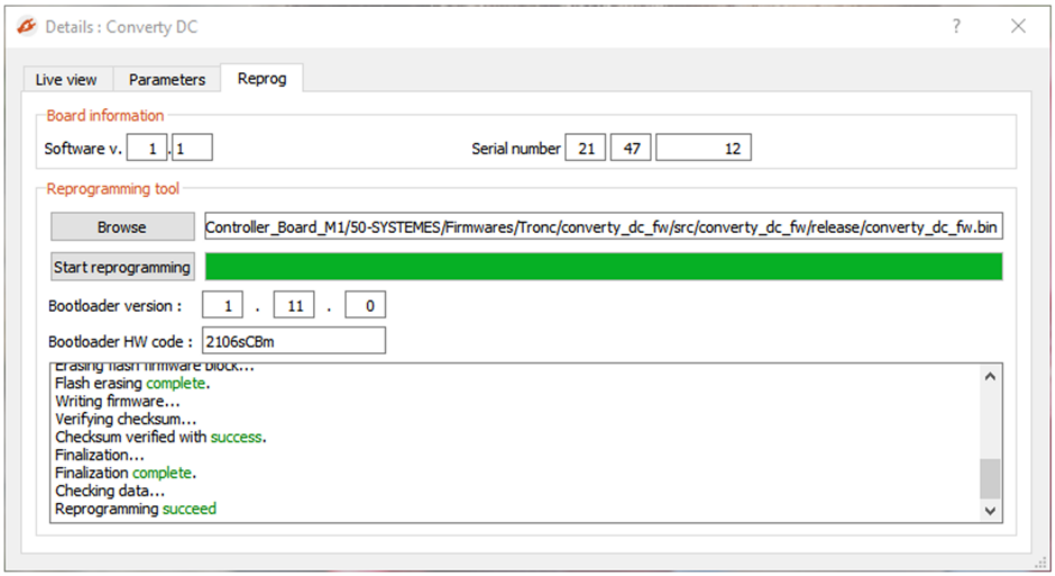
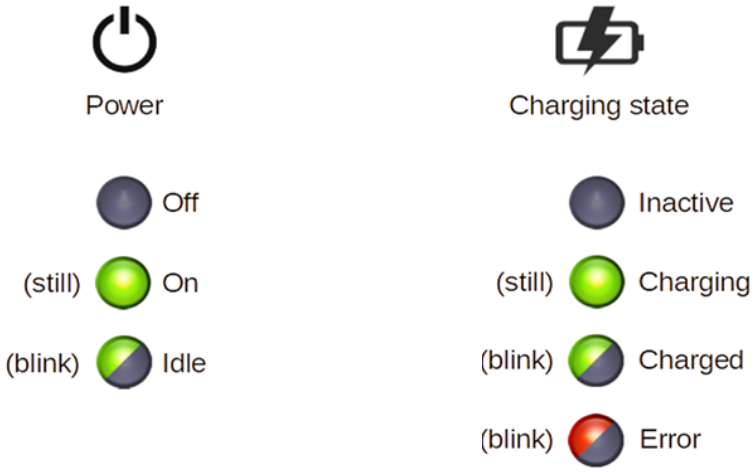



Figure 3 : Firmware update*

*Non-contractual pictures

# 12 – Troubleshooting guide



# 13 - Warranty

The "SELFENERGY" brand is a protected trademark of CLAIRITEC.

The warranty covers the repair of material malfunctions of the product occurring during a period of two years after the date of purchase, only if the product is used in accordance with its user manual. The request for warranty intervention is made to the distributor or the brand.
The purchaser of the product is responsible for the safety of his installations. This means in particular that the purchaser is required to comply with the safety standards applicable to the product.

SELFENERGY declines all responsibility if the user of the product does not respect the precautions described in this document and more generally the documents provided by SELFENERGY. Failure to comply with these rules may result in total or partial damage to the product as well as an electric shock that may cause personal injury to third parties. SELFENERGY cannot be held responsible for the potential consequences of this non-compliance.

If, during the warranty period, the product proves to be defective due to a material defect, SELFENERGY will repair it according to the terms below, without charging for additional labour and parts.
SELFENERGY reserves the right to repair the product or replace it with an identical or equivalent model.

The SELFENERGY warranty does not cover:

- Maintenance and necessary repairs, or replacement of parts, due to normal wear and tear;
- Malfunction due to the opening of the product by a person not expressly authorised by SELFENERGY;
- Malfunction in the event of modification of the product's firmware by a person not expressly authorised by SELFENERGY;
- Modifications intended to improve the product beyond its normal use as described in the user manual, without the prior written consent of SELFENERGY;
- Repair of a defective product following use that does not respect the precautions described in this document and more generally the documents provided by SELFENERGY;
- Non-compliance with the rules of assembly and disassembly of products supplied by SELFENERGY;
- The use of non-compliant electrical harnesses;
- Equipment in the model or prototype phase.

The Client alone is responsible for:

- Periodic maintenance and repairs or replacement of parts due to normal wear and tear;
- The safety of its premises and installations to meet the safety standards applicable to products supplied by SELFENERGY;

- Any damage resulting from modifications or adjustments that may be made to the product, without the prior written consent of SELFENERGY, in order to comply with the technical standards at the local or national level, in force in any country other than those for which the product was originally designed and/or manufactured;

- Any damage caused by misuse of the product or failure to comply with the instructions for proper use and maintenance of the product, and by installation or use of the product that does not comply with the safety standards in force in the country where it is used;

- Any damage caused by accident or shock, including but not limited to: lightning, water damage, fire, misuse or negligence in the use of the product;

- Deliberate deterioration and damage caused by water (notably oxidation);

- Any modification or deletion of the model number or serial number on the product;

- Any damage resulting from repairs or adjustments made by companies or persons not expressly authorised by SELFENERGY;

- Any defects in any system in which the product is incorporated or with which it is used;

- Any damage caused by improper transport or packaging when returning the product to the distributor or to SELFENERGY;

- The cost of travel for repair outside the premises of SELFENERGY;

- Transportation costs for repatriation and shipment of the products outside of the original delivery location of the product;

- Any aesthetic damage, including scratches and impact marks.

# 14 – Waste disposal

➤ Dispose of the packaging in the recycling containers provided for this purpose.

When you take your product out of service, ask your local recycling center or specialist dealer about the regulations for waste disposal.