

ADDVOLT



User Manual



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1 Introduction

The AddVolt systems were developed for the transportation market, avoiding the fuel usage and reducing noise and CO₂ emissions of refrigeration units during goods transportation. This non-invasive technology has high and positive impacts on the driver's quality of life due to its silent and emission-free operation. AddVolt enables the reduction of transportation costs while it contributes to having eco-friendly vehicles on the road.

ADDM/L systems target the Medium-Range vehicles equipped with reefer units with electrical-standby motor.

During the operation, the AddVolt systems generates a 3-phase / 50Hz grid on-board of the vehicle, making possible supply the electrical-standby motor, anytime.

Main benefits of the AddVolt systems:

- Enables day and night access to city centers;
- Compatible with all vehicles with refrigeration unit, even as retrofit;
- Perfect match with hybrid, LNG and all-electric trucks;
- Ready for vehicles with start-stop system activated.

This manual was designed for the users of AddVolt units.

It contains all the procedures of the AddVolt units' daily operation, namely:

- Safety information;
- The different modes of operation;
- Troubleshooting.

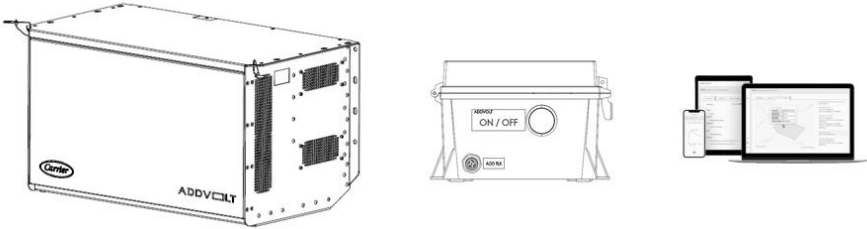
AddVolt also shared a preventive maintenance program that must be followed in order to guarantee the maximum reliability of the unit during its lifetime.

It is highly recommended to use original AddVolt spare parts ensuring the manufacturer's quality and reliability standards.

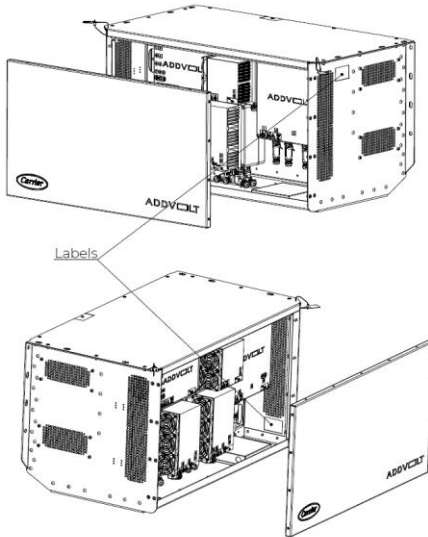
2 Product description

AddVolt systems are composed of three essential components when installed in drawbars or trailers:

1. AddVolt Plug-in Electric system attached to the vehicle;
2. Display;
3. My AddVolt digital platform for monitoring by the fleet manager.



Every product is accompanied by an identification label containing, among others, the respective Model, Serial Number and Rating Values.



ADDVOLT



Brand: AddVolt

Type: ADDM3817R

Serial No: 2010CTEADDM3817R-YYMMVVV

Rated Values:

P: 20 kVA P_{max}: 19 kW

Um: 400 VACrms fn: 50 Hz

LV Power Supply: 12/24 VDC



108-05-4874

addvolt.com | Made in Portugal

**WARNING!**

The removal of the label will result in warranty void of the product.

TABLE 1 – ADDITIONAL SYSTEM SPECIFICATIONS

Operating Ambient Temperature	-20°C to 40°C
Compliance and Safety	CE and ECE R10
Battery Technology	Lithium Ion
Battery Lifetime	4000 cycles (80% DOD to 80% of rated capacity)
Charging	On-board charger, 400V AC 50Hz
AC Installation Requirements	3x400V AC 50Hz, standard 5 pole 16/32A CEE socket
Frame and Enclosure	Stainless Steel

Systems: ADDM1507(R); ADDM1510(R); ADDM2014(R); ADDM2310(R); ADDM2517(R); ADDM3014(R); ADDM3817(R); ADDL3021(R) may be used in load constantly at temperatures below zero to avoid the battery internal temperature to drop below 0°C for Charging and -11°C for discharging. These battery packs are only allowed to operate within these limits for its internal temperature. It is of extreme importance to charge the system to 100% if the system is not going to be operated for more than 60h.


For low ambient temperature performance, please cover the Battery side air inlets with the special covers provided.


If, during operation, a problem occurs with the unit, before contacting the AddVolt customer support, please have the following unit data available:









- Serial number;
- AddVolt unit model.

3 Safety Information

To ensure a safe and a proper unit operation the following instructions must be accomplished.

 WARNING!
<p>In case of malfunction suspicion, contact AddVolt customer support or any approved service centre. Do not attempt to repair the unit. Incorrect unit handling may lead to malfunction and/or safety hazard. This unit operates with high voltage levels.</p>

 WARNING!
<p>Magnetic and electromagnetic fields generated near current-carrying conductors in electric devices represent a health danger to people with heart pacemakers, metal implants and hearing aids. People with a heart pacemaker, metal implants or hearing aids must consult a doctor before they enter areas nearby the AddVolt systems.</p>

 CAUTION!			
<table border="1"><tr><td> CAUTION! High Voltage</td><td> Disconnect power before servicing. Service by trained personnel only.</td></tr></table>	 CAUTION! High Voltage	 Disconnect power before servicing. Service by trained personnel only.	<p>High voltage can cause serious or fatal injuries. Disconnect power before servicing. Only qualified personnel are allowed to open the modules identified with this label. It must not be used by any other person on account of the high risk of injury.</p>
 CAUTION! High Voltage	 Disconnect power before servicing. Service by trained personnel only.		
	<p>If the vehicle is connected to the power grid with the Refrigeration unit operating:</p> <ol style="list-style-type: none">1. Turn OFF the refrigeration unit;2. Turn OFF the AddVolt unit by pressing the green button on the telematics unit;3. Unplug the cable from the three-phase outlet.		

3.1 Basic safety rules for the correct handling of the AddVolt system

Before connecting the cables to the power grid, check the cable and the socket for any damage.

Never pull the cables out of the outlets directly by the cables. Always pull by the connectors.

Before removing the vehicle from the dock, disconnect vehicle from the power grid.

Cables that are damaged may cause:

- Electrocutations;
- Short circuits;
- Fires.

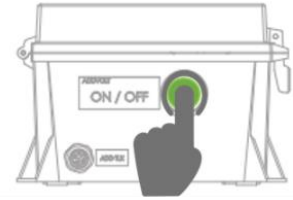
Connecting the power grid cable to the AddVolt system while the ON light in the display is lit may cause:

- Sparks to form;
- Electric arc;
- AddVolt system and Refrigeration unit damage

4 Operation

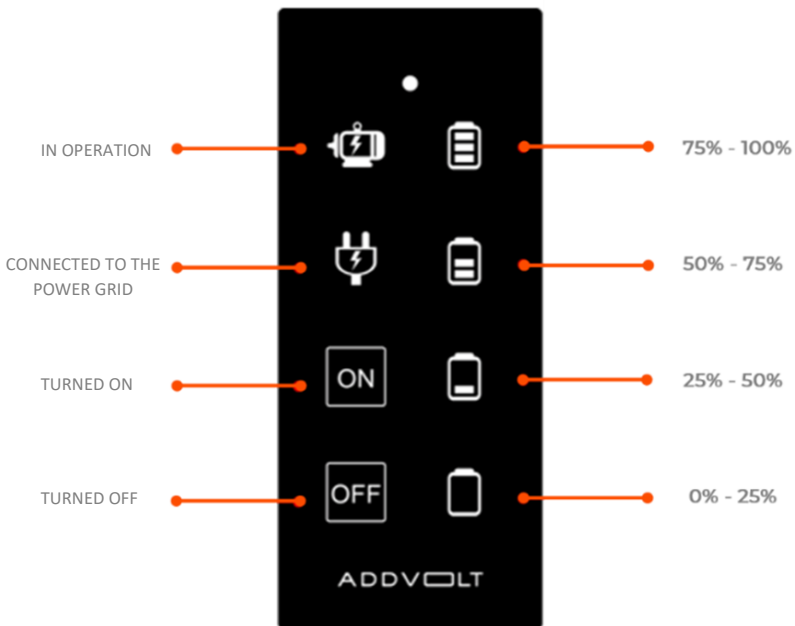
4.1 To turn ON / turn OFF the Refrigeration unit in electric mode

To turn ON and turn OFF the Refrigeration unit in electric mode, make sure that the green button of the AddVolt system is pressed as shown in the image.



In this case, the only button that must be actuated is the green button.

The display shown below is used only for visual monitoring.



4.2 AddVolt System OFF

In park situations, if there is no socket available to charge the system and the Refrigeration unit is not necessary, press the green button to turn OFF the AddVolt system and thus save energy.

The OFF light of the display will appear in white.



4.3 Supply Refrigeration unit using AddVolt system

Whenever the user needs to operate the Refrigeration unit in electric mode and the AddVolt system is OFF, proceed as follows:

1. Press the green button (ON light in white);
2. The Refrigeration unit will start in electric mode.


Note:

(1) In case it is not already done, set the Refrigeration unit to start in electric mode.



4.4 Charging the AddVolt system connected to the power grid

During daily operation, whenever the user has the opportunity to charge the system from the power grid, please proceed as described below:

1. Press the green button (OFF light in white);
2. Connect the vehicle to the power grid;
3. Check that  is lit in white;
4. Wait 30 seconds, the system will start charging automatically and the ON light will be either blinking or lit in white;
5. The autonomy indicators will blink during charge representing the battery level.

Notes:

(1) When the vehicle is parked

It is not necessary to disconnect the power grid cable whenever the charge is complete. It is advised to leave at least 2-4 times a month the system connected to the power grid for more than 5 hours.


(2) Before disconnecting the power grid cable, do the following:

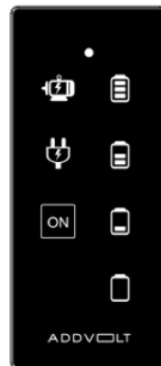
1. Stop the Refrigeration unit;
2. Press the green button until OFF is lit;
3. Disconnect the power grid cable.



4.5 Charging and supplying the Refrigeration unit

During daily operation, whenever the user has the opportunity to charge the system and supply the Refrigeration unit from the power grid simultaneously, please proceed as described below:

1. Press the green button (OFF light in white);
2. Connect the vehicle to the power grid;
3. Check that  is lit in white;
4. Turn ON the Refrigeration unit;
5. The Refrigeration unit will start automatically;
6. The display will activate the electric motor indicator, meaning that the Refrigeration unit is operating in electric mode;
7. Wait 30 seconds, the system will start charging automatically and the ON light will be either blinking or lit in white;
8. The autonomy indicators will blink during charge representing the battery level.



Keeping the system ON, it will automatically manage the power.

Notes:

(1) Before disconnecting the power grid cable, do the following:

1. Stop the Refrigeration unit;
2. Press the green button until OFF is lit;
3. Disconnect the power grid cable.

4.6 Charging the AddVolt unit through the generator

Whenever the generator is producing energy:

1. The system will start charging automatically and the ON light will be either blinking or lit in white;
2. The autonomy indicators will blink during charge representing the battery level.



4.7 Charging and supplying the Refrigeration unit through the generator

Whenever the generator is producing energy while the refrigeration unit is operating at the same time:

1. The system will start charging automatically and the ON light will be either blinking or lit in white;
2. The autonomy indicators will blink during charge representing the battery level.
3. In the display will activate the electric motor indicator, meaning that the Refrigeration unit is operating in electric mode;



5 Driver Troubleshooting

AddVolt produces its entire product range within the highest level of quality and reliability. However, if the unit isn't handled correctly, it shows certain alerts to guide the user to restore its normal operation.

Symptom	Possible Causes	Possible Solutions
Refrigeration unit detects "NO POWER"	Refrigeration unit tried to start before the AddVolt system is ready.	Shutdown Refrigeration unit and start AddVolt system before the refrigeration unit.
	AddVolt system is in sleep mode / critically discharged.	Connect to the power grid, turn service disconnect OFF and ON. Follow instructions in Alarm Signal section.
	Fuse in FUBO (Fuse Box) broken.	Press the service disconnect and disconnect from power grid. Measure continuity of all fuses in FUBO. Replace all broken fuses.
	Defect on cabling / connectors.	Open Motor and Grid/Gen power cables connectors on AddVolt system back and visually inspect for defects.
Refrigeration unit in electric stops before reaching setpoint	AddVolt unit is completely discharged.	Charge AddVolt system before trying again.
	Device failed.	Check if "fail" is active on display. Follow instructions in Alarm Signal section.
Refrigeration unit does not start from AddVolt system nor power grid	Fuse in FUBO (Fuse Box) broken.	Press service disconnect and disconnect from grid. Measure continuity of all fuses in FUBO. Replace all broken fuses.
	Issue on refrigeration unit	Check Service Manual of refrigeration unit.

If the problem you are experiencing with the unit is not listed in this section, please contact your AddVolt service partner.

5.1 Alarm signals - Supply Refrigeration unit using AddVolt system

If ON is yellow and AddVolt system is not starting:

1. Press and rotate the Service Disconnect;
2. Press the green button until ON is white, restarting AddVolt system.
3. If the alarm persists please contact your AddVolt service partner



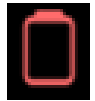
If the ON and OFF buttons are grey:

1. Press and rotate the Service Disconnect;
2. Press the green button until ON is white, restarting AddVolt system.



5.2 Alarm signals – SOC too low


The autonomy of the AddVolt system is too low, below 25%.
Please charge the AddVolt un it connecting it to the power grid.



5.3 Alarm signals - System blackout

When the system is critically discharged, it shuts down for safety and all the lights are off.

To initiate safe charging, the user must proceed as follows:

1. Connect the vehicle to the power grid;
2. Press the green button until the  is lit in white and AddVolt system starts charging.

5.4 Alarm signals - Charging and supplying the Refrigeration unit

When the motor indicator is red, please proceed as described below.

If the vehicle is connected to the power grid with the Refrigeration unit already in operation:

1. Turn OFF the Refrigeration unit, keeping the power grid cable connected;
2. Turn ON the Refrigeration unit again.



6 Maintenance and Service

Choosing to maintain the unit in a preventive way is one of AddVolt and its certified service partners recommendations, giving the unit greater longevity in its maximum performance.

Choosing this type of unit continuous monitoring will also confer greater control over the operational costs of the equipment.

The safety and comfort of our customers are one of AddVolt main priorities on a daily basis. For this reason, a maintenance program has been developed and presented below.



WARNING!

Device maintenance must be performed only by trained and approved personnel by AddVolt.

This unit operates with high voltage levels. Use insulated tools whenever necessary.

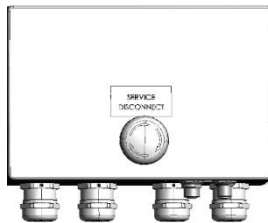
Make sure the device is shutdown 15 minutes before any intervention, to allow for all residual voltages to be internally discharged to a safe level. Make sure no terminal has voltage before any intervention.

Depending on configuration, the unit may start automatically on power-up.



DANGER!

Before performing any service in any AddVolt unit press the service disconnect (red button on fuse box near battery system).



To restart the system after the service intervention:

1. Rotate the Service Disconnect button;
2. Press the green button and both the system and the display will start.

6.1 Regular Maintenance Schedule

The items from Functional area require a frequent analysis by the driver.

In terms of Telematics, the fleet manager should inspect the data collection on a daily basis with her/his My AddVolt access.

Area	Symptom / Item	Periodicity
Functional	Check for fails / system shutdowns during operation.	Daily
	Check for noise.	Monthly
Telematics	Data is shown on platform (good internet connection).	Daily
Electrical Coupling	Damage in the power or signal cables.	Monthly
	Check electrical connections inside the fuse box	Every 6 month
Mechanical coupling	Check if device's screws to chassis have moved.	At each vehicle overhaul. (minimum every 6 month)
	Check the gearbox visual on every oil leakage. Contact your Service Centre if any.	Everyday
	Gearbox service to be performed by Carrier Service Centre.	Yearly or every 40 000kms whichever comes first
Inspection and cleaning system	Mud / dirt inside of the system	At each vehicle overhaul. (minimum every 6 month)
Extreme conditions	Install the winter covers in countries where the batteries could reach temperatures below zero degrees.	Before winter season

7 24/7 Assistance

At Carrier Transicold we're working hard to give you complete service when and where you need it. That implies a worldwide network of dealers and available an emergency service. These service centres are manned by factory-trained service personnel and backed by extensive parts inventories that will assure you of prompt repair.

Should you encounter a unit problem with your AddVolt unit during transit, follow your company's emergency procedure or contact the nearest Carrier Transicold service centre. Consult the directory to locate the service centre nearest you. This directory may be obtained from your Carrier Transicold dealer.

If you are unable to reach a service centre, call Carrier Transicold's 24Hour Assistance: ONE CALL.

In Europe, please use the following free phone numbers from:

AT	AUSTRIA	0800 291039
BE	BELGIUM	0800 99310
CH	SWITZERLAND	0800 838839
DE	GERMANY	0800 1808180
DK	DENMARK	808 81832
ES	SPAIN	900 993213
FR	FRANCE	0800 913148
FI	FINLAND	0800113221
GB	GREAT BRITAIN	0800 9179067
GR	GREECE	00800 3222523
HU	HUNGARY	06800 13526
IT	ITALY	800 791033
IE	IRELAND	1800 553286
LU	LUXEMBURG	800 23581
RU	RUSSIA	810 800 200 31032
NO	NORWAY	800 11435

NL	THE NETHERLANDS	0800 0224894
PT	PORTUGAL	8008 32283
PL	POLAND	00800 3211238
SE	SWEDEN	020 790470

From other countries / Direct: +32 11 8791 00

In Canada or United States, call: 1 – 800 – 448 1661

When calling, please have the following information ready for fastest service:

- Your name, the name of your company, and your location;
- A telephone number where you can be called back;
- Refrigeration unit model and serial number;
- Box temperature, Set-point and product;
- Brief description for the problem you are having and what you have already done to correct the problem.

We will do everything we can to get your problem taken care of and get you back on the road.



Addvolt's team is always looking for a way to contribute for a greener future. Talk to us!