BENOIT SYSTEMES

LITHIUM-ION BATTERIES

USER MANUAL

JUNE 2025

CE

CONTENTS

GENERAL INFORMATION ABOUT LITHIUM-ION BATTERIES

WHAT IS A LITHIUM-ION BATTERY?

The battery supplied with your power add-on consists of a set of rechargeable lithium-ion cells (Li-ion), controlled by an electronic protection and regulation system (BMS: battery management system).

The battery's functions, performance and safety limits are programmed in the BMS and were developed especially for our applications.

MAIN ADVANTAGES

LIGHTWEIGHT

The energy density of a lithium-ion battery is higher than a conventional battery (such as a lead-acid battery), making it more compact and lighter for the same capacity.

LONG LIFESPAN

Under ideal conditions, a lithium-ion battery can be used for several years and tolerates a great number of charge/discharge cycles while retaining its initial performance level..

LOW SELF-DISCHARGE

When the battery's BMS is on standby, there is practically no spontaneous discharge, allowing prolonged storage without a significant fall in charge level with no risk for its state of health (subject to following the storage recommendations)..

WHAT AFFECTS THE BATTERY LIFE?

This depends on two main factors: the battery capacity and the energy consumption of the wheelchair.

BATTERY CAPACITY

The available capacity reduces as the temperature falls, as the internal electrical resistance increases. As a result, in winter, the usual battery life is likely to be lower. In the medium term, the residual capacity depends directly on use and storage conditions (it decreases

unavoidably over time).
The number of cycles of a battery is generally determined by a measurement at 80% of its initial capacity.
Beyond that, the battery can still be used but the shorter range of the wheelchair is more noticeable.
Some factors make it possible to preserve this residual capacity for longer:

- Storage at a temperature around 15 °C.
- Storage with a charge level of approximatively 60-80%.
- Partial cycles from a charge level still above 30%.
- Put into standby between uses.
- Recharge after each use.

Conversely, other factors can harm its lifepan:

- Storage at an ambient temperature below 0 °C or above 20 °C.
- Prolonged storage at a charge level below 30%.
- Cycles with complete discharge.

WHEELCHAIR RANGE

The range of a power add-on is expressed in kilometers and measured using a standard method (ISO 7176-4), under ideal conditions: maximum user weight of 100 kg, flat rectangular test track, maximum continuous speed, and temperature around 20 °C.

Unfortunately, these ideal conditions rarely apply in everyday life, and many factors increase power consumption of the wheelchair and adversely affect the range:

Rolling resistance

Camber, wheelbase, diameter and material of the front wheels, front/rear load distribution, and tire pressure have a significant effect on the wheelchair's rolling resistance. Active wheelchairs generally provide better performance.

Weight

The range is influenced by the user's weight, added to that of the wheelchair and power add-on. The difference is relatively small on flat terrain but much more significant on uphill slopes, where the power required increases rapidly.

Slope

Power consumption increases exponentially with the steepness of the slope. The camber also has an influence as it requires compensation of the trajectory to maintain the desired direction.

Speed

Paradoxically, the total range falls when the power add-on is driven below its maximum speed, as the electrical efficiency of the motors reduces. A loss of approximately 15% is seen when speed is reduced by half.

Driving style

Frequent starts and stops, changes in direction, and sudden acceleration consume more power than gentle continuous driving at full speed.

TECHNICAL SPECIFICATIONS OF BATTERIES AND CHARGER

SPECIFICATIONS

Model		282 Wh Li-ion battery	484 Wh Li-ion battery
Technology		NMC	NMC
Rated voltage (V)		25,2	25,2
Capacity(Ah)		11,2	19,2
Power rating (Wh)		282	484
Max. current (A)		50	50
Weight (kg) Standard configuration		3,21	3,84
Max. range [2]		up to 12 km [1]	up to 20 km [1]
Charge indicator		Yes	Yes
On/Off push button		Yes	Yes
Suitable for air transport ✈		Yes	Yes [3]
Charging time (h)		4,5	7,7
Min. number of cycles		500	500
Max. charge voltage (V)		29,4	29,4
Low voltage cut-out (V)		18,9	18,9
Operating temperatures (°C)	Charge	2/60	2/50
	Discharge	-20/60	-20/60
	Storage and transport	0/20	0/20
Guarantee		24 months or 12 months (spare part)	24 months or 12 months (spare part)

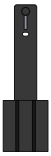
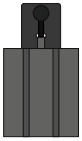
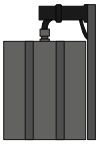
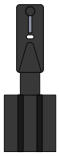
(1) Tests carried out as per standard ISO 7176-4 with a Light Drive 3.
(2) The battery's range varies with temperature, user weight, terrain type, wheelchair configuration, and operating conditions.
(3) In accordance with the IATA 2025 regulation, no watt-hour limit applies if the battery is securely attached to power add-on and transported as checked luggage. Please contact the airline to find out their requirements.

Charger	
Make	Mascot
Model	2440(P)
Input voltage (Vac)	100 - 240
Maximum power (W)	380
Charging current (A)	2.5
Power cable types	Type C (Euro) Type G (UK/EIRE) Type A (US/CAN/JPn) Type I (AUS)
Option	12 V car charger
Guarantee	24 months or 12 months (spare parts)

CONFIGURATIONS

The batteries can be fitted in various ways depending on the configuration of the wheelchair and dimensions of the space provided.

There are 4 main configurations : standard folding frame, horizontal rigid frame, vertical rigid frame, offset.

Configuration	Standard Folding Frame	Horizontal Rigid Frame	Vertical Rigid Frame	Offset
				
Dimensions (mm) (HxLxP)	550 x 177 x 99	297 x 177 x 99	273 x 207 x 95	495 x 177 x 147
Li-ion battery 282 Wh Weight (kg)	3,2	3,0	3,2	3,2
Li-ion battery 484 Wh Weight(kg)	3,8	3,6	3,8	3,8
Fitting	From the rear of the wheelchair	From the front of the wheelchair and from the rear of the tilt-in-space wheelchair with Light Assist	From the front of the wheelchair	From the rear of the wheelchair

USER MANUAL

LABELS ON THE BATTERY

Legend	
	Read the manual carefully before use
CE	CE marking in accordance with Annex V of European Regulation 2017/745/CEE
	Recyclable packaging
	Compliant with international air transport regulations
	The battery must not be disposed of in regular household waste
	The QR code links to the serial number printed below, in the format 2246B13120240001: • 2246B1: Battery variant • 312024: Week and year of manufacture • 0001: Serial number

Identification labels

Warning label

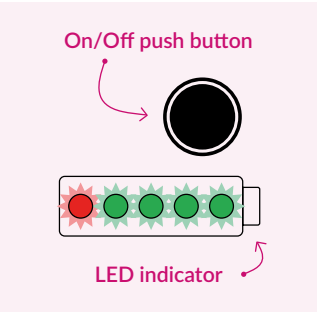
LABEL ON THE CHARGER

Legend	
CE	CE marking in accordance with Annex V of European Regulation 2017/745/CEE
	Read the manual carefully before first use
	The charger must not be disposed of in regular household waste
	Classe II double insulation
	Indoor use only

LED INDICATOR

The battery is fitted with a LED indicator and a push button. Pressing it quickly displays the charge level on 5 LEDs, each representing 20% of the total capacity. When the capacity falls below 10%, the last red LED flashes.

A long press (> 2 secondes) puts the battery into standby or switches it on (On/Off).



The battery can also go into standby automatically in the following situations:

- Complete inactivity for more than 10 days.
- Complete discharge.
- Temporary fault.

USE

The battery is delivered in standby mode to optimise its lifepan and to prevent it self-discharging too quickly. Before first use or after more than 10 days' inactivity, the battery should be reactivated by a long press (> 2 seconds) on the push button.

Check that the battery is sufficiently charged.
Check that the battery is switched on and then connect it to the power add-on.

During use, the indicator lights are lit and display the approximate charge level. This can fluctuate depending on the terrain, as the battery voltage falls in proportion to the power consumed. On a steep slope, the dynamically displayed level may therefore be lowered than the actual level. The value stabilises after around 30 seconds.

LOW CHARGE LEVEL

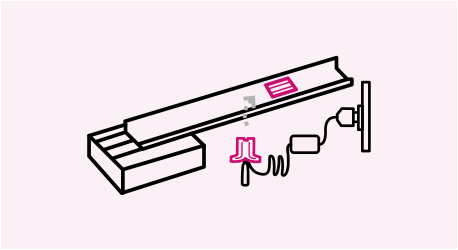
The control unit of Light Drive indicates that charge level is too low when the last LED (on the joystick) is flashing. Then, it's no longer possible to move forward normally without the system putting itself into safe mode. Light Assist behaves similarly but with no visual indication. This safety feature is normally triggered before the battery is completely discharged to manage safe shutdown conditions.

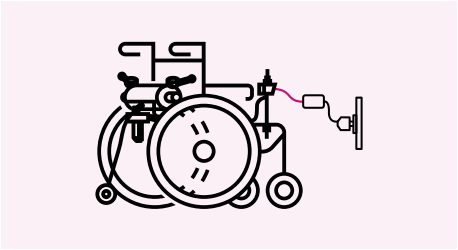
However, if a lot of power is drawn from the battery when its level is already low or it is not recharged rapidly before its next use, it reaches a first protection threshold. Several LEDs of the indicator flash to indicate that the battery should be recharged immediately (see *Troubleshooting and fault codes*).
After a few days' warning, a new threshold is passed and the battery is switched off to preserve the little remaining internal capacity.
It is again time to recharge it, after switching it back on by holding down the push button.

CHARGING

Use only the charger supplied by BENOIT SYSTEMES. It is designed to manage the end of charging and the BMS settings have been specifically optimised for this model. Otherwise, there is a risk of over-voltage or damage to the charging circuit or cells.
Lead battery chargers are not compatible.

Ensure the battery is switched on before recharging.
First connect the battery to the charger, either directly using the red connector if battery has been removed from power add-on, or through the XLR connector located under the control unit.
Then connect the charger to the power source (mains socket or cigarette lighter socket).

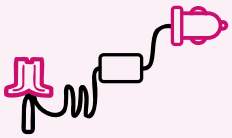




The charger's LED is orange/red when charging is in progress, and turns green once charging is complete. If the LED remains green when a battery is connected, there are three possible explanations:

- The battery is sufficiently charged and has not reached the recharging limit yet (generally between 95% and 100%).
- The battery is too discharged and is switched off as a protective measure. It must be switched back on by a long press (>2 seconds) on the push button.
- The battery is profoundly discharged and should be scrapped as described in section *Waste Management*.

The battery's LED indicator shows progress throughout charging (LEDs steady on for the level reached and one flashing for the current level). It goes out when charging is complete.



Option

Car charger for Lithium-ion batteries
(with cigarette lighter socket)

TROUBLESHOOTING AND FAULT CODES

The battery unit is sealed and requires no maintenance. Under no circumstances should it be dismantled. The guarranty is void if the screws to open the upper or lower cover plates are tampered with, or if the regulatory labels have been deliberately damaged.

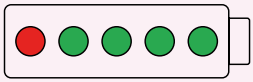
The battery's LED indicator is programmed to show not only the charge level but also certain temporary or permanent faults.

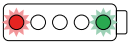
These may be indicated:

- Continuously, when the battery is active, telling that action is required to clear the error.
- Temporarily, when the battery is in standby. Pressing the push button briefly first indicates the charge level and then the most critical fault code if several have accumulated.

TO DIAGNOSE THE FAULT, CHECK LED INDICATOR

Flashing Steady



	LED indicator	Fault description	Solutions
Temporary faults		Over-voltage	Discharge the battery by use
		Under-voltage	Recharge the battery
		Surge current or short-circuit	Switch the battery back on using the push button
		Over-temperature	Allow the battery to cool
		Under-temperature	Place the battery in a temperate environment
Permanent faults		Cells overheating	Contact your dealer
		Over-voltage	
		Defective BMS	
		BMS overheating	
		Profound discharge	
		Charging circuit imbalance	

Temporary errors disappear as soon as the internal or external initiating conditions are rectified, except surge currents and short circuits, which require a long press on the push button. This fault generally indicates an electrical problem on the power add-on that must be addressed.
Too high or too low a temperature does not necessarily prevent use of the battery. The first threshold reached only prevents recharging, the temperatures for which are strictly controlled on all Li-ion technology batteries.

The power add-on, when used to go downhill quickly or when braking hard, behaves like a dynamo and transiently recharges the battery.
These conditions can cause power cuts if the internal temperature of the battery is too low or too high (see *Specifications* table). If necessary, the wheelchair can be driven more slowly to reduce its inertia when going downhill or braking.
It is also preferable to store the battery in a temperate environment between uses.

TRANSPORT, STORAGE AND WASTE MANAGEMENT

TRANSPORT

GENERAL REMARKS

Lithium-ion batteries are classified as hazardous goods and are subject to the ADR, RID, IMDG, and IATA regulations. They are classified as UN 3480 or UN 3481, and they must be transported in line with the requirements imposed by these regulations.

TRANSPORT BY THE USER

By air

The IATA 2025 regulation still imposes a limit of 300 Wh for batteries if they are transported in the cabin, separately from the mobility aid.
However, when the Li-ion battery remains installed on the device and is put in the hold, there is no Wh limit, as long as the battery and power add-on are firmly secured to the wheelchair. Remember to label the power add-on and battery so that they are not mislaid during loading and unloading of the aircraft.

If you have to travel by air, contact the airline to seek its approval and take the necessary measures.

The battery certificate is available on our website on the « Documentation » page.

Recharging batteries in foreign countries:
Ensure you have an adaptor to fit between the wall socket and the plug on your charger. Find out about the type you require. The supported voltage range is specified on the charger.

By car

For safety reasons, remove the battery from the power add-on and put it in the boot of the car. BENOIT SYSTEMES supplies a car charger as an option.

> ⚠ **CAUTION**
>
> BENOIT SYSTEMES and its representatives decline all liability for accidents and/or damages on the motorised wheelchair arising from inappropriate use, failure to follow these instructions, and/or non-compliance with applicable national regulations in the country of use.

STORAGE

If the battery is not used for more than 10 days, you should prepare it for storage in order to extend its lifespan.
Follow these instructions:

- Store the battery at a temperature close to 15 °C and avoid extreme temperatures (recommended temperature range is between 0 ° and 20 °C).
- Store the battery in a dry, well-ventilated environment protected from outside influences.
- Store the battery with a charge level above 60%.
- During prolonged storage, check and top up the charge level every 3 months.
- The Li-ion battery requires no maintenance.

WASTE MANAGEMENT

Scrapping or recycling must meet current local and national legal requirements.

Preserve the environment by recycling this product in the appropriate industrial sectors:

- Battery: to be taken to a shop or a Household Waste Recycling Centre.
- Charger (Waste Electrical and Electronic Equipment): to be taken to a shop or a Household Waste Recycling Centre.
- Packaging materials and void-fill items: to be taken to a Household Waste Recycling Centre or put in a selective recycling bin.

BENOIT SYSTEMES is listed in the French national SYDEREP register for the following EPR industrial sectors (Extended Producer Responsability):

- Portable cells and batteries: unique ID FR345369_06AKFJ
- Electrical and electronic equipment: unique ID FR345369_05TDAF
- Household packaging materials: unique ID FR345369_01JHJQ

SAFETY INFORMATION

Only use original batteries.
We decline all liability for damage caused by using a battery or charger other than those supplied by BENOIT SYSTEMES.
We decline all liability for damage caused by the use of BENOIT SYSTEMES battery on any device other than that for which it is intended.

WARNING

Risk of injury by explosion or destruction of battery if the charger is used improperly:

- Use only the charger supplied by BENOIT SYSTEMES.
- Unplug the charger once the battery is fully recharged.
- Never charge the battery at temperatures below 0°C or above 50°C.
- Never charge the battery near flammable liquids or gases.

WARNING

Risk of injury by electrocution and/or destruction of the charger if exposed to moisture:

- Protect the charger from moisture. It is designed for interior use only.
- Always charge in a dry environment.
- Do not expose the charger and its battery to moisture (water, rain, snow) during charging.
- Never charge the battery in rooms exposed to moisture.
- If condensation occurs, wait for it to evaporate completely before using the charger.
- Do not use the charger plug and/or mains plug if they are wet or dirty. Clean the plugs with a dry cloth before plugging them in.

WARNING

Risk of damage to the charger:

- Never carry the charger by its mains cable or its charging cable.
- Never pull on the mains cable to unplug the charger.
- At the end of charging, first remove the charger's plug from the mains socket, then remove the connector from the battery.
- Only use an electrical extension lead if it is absolutely essential. If one is used, first ensure it is undamaged.
- Place the charger safely in a stable position on a flat surface.

- Place the charger in a well-ventilated area where air can circulate.
- Do not cover the charger.
- Protect the mains cable and charging cable from being stepped on or tripped over.

WARNING

Risk of injury by electrocution:

- Do not use the charger if it has suffered an impact or if damaged. Contact your BENOIT SYSTEM approved dealer.
- Do not dismantle nor modify the charger.
- Keep the charger out of reach of children.

WARNING

Risk of fire and injury by electrocution if used improperly:

- Do not immerse the battery in water.
- Do not expose the battery to extreme temperatures.
- Never crush the battery case or covers.

WARNING

Risk of damage to the battery:

- Do not use the battery when the outside temperature is below -20°C or above 50°C.
- Store the battery in a dry temperate place, away from moisture and dust.
- Never store your battery near a source of heat or direct light.
- Never use the battery to power another device.

WARNING

Risk of injury by explosion if batteries handled improperly:

- Do not puncture or drill into the battery.
- Do not touch or replace the case screws.
- Do not dismantle the main connector.
- Do not lift the battery by the power cord.
- Do not short-circuit the connector.

WARNING

Risk of injury if the wheelchair is used during charging:

- Do not use the wheelchair while charging the battery.
- Do not remain seated in the wheelchair while charging the battery.

CE MARKING

This medical device is a regulated health product and bears the CE marking.

As manufacturer, BENOIT SYSTEMES declares that this products is Class I medical devices and complies with EU Regulation 2017/745/CEE on medical devices.

GUARANTEE

The guarantee period for the battery is twenty-four (24) months from the invoice date, if purchased with a power add-on. To initiate a guarantee claim, please provide the serial number located as described in the *Battery Labels* section, and contact an authorised dealer or BENOIT SYSTEMES.

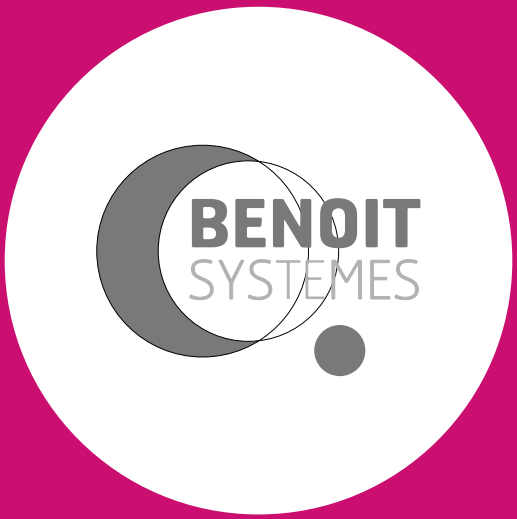
All batteries purchased separately are covered by a twelve (12) months guarantee.

Guarantee exclusion

The guarantee is valid only if the product is used under the specified conditions and for the use for which it is designed. There are several specific cases excluded from the guarantee, particularly:

- The battery is stored for an extended period with low charge level.
- The battery is damaged following unauthorised modification or reprogramming of the power add-on.
- The battery is damaged as a result of negligence, accident, or inappropriate use.
- The battery is damaged following the use of an unauthorised charger.
- The screws to open the lower or upper cover plates have been tampered with, or the regulatory labels have been deliberately damaged.
- The battery is used to power a device other than that for which it is intended.

NOTES



CE

This medical device is a regulated health product and bears the CE marking. As manufacturer, BENOIT SYSTEMES declares that this products is Class I medical devices and complies with EU Regulation 2017/745/CEE on medical devices.

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