

Leclanché

Corporate Presentation



Leclanché Overview

Key Figures



1909
Founded



375+
Employees



170+
Customers



50+
Electrochemists
& Engineers

Key Markets Addressed

Advanced Li-ion batteries for heavy-duty commercial applications, and services

Marine



e-MARINE

Rail



e-RAIL

Road



e-TRUCK

Stationary



STATIONARY
SOLUTIONS

Production



Cells



Packs

Made in Germany



Modules



Racks

Made in Switzerland



Process & Quality Certifications



Sustainability

- 100% renewable electricity used for all production
- Unique water-based electrode manufacturing process (no solvents)
- 90% of our cell materials are recyclable and recoverable

Company Milestones

Acquisition of Bulith AG & opening of Willstätt Li-ion cell production facility



E-Ferry Ellen. First fully electric ferry in the world



Leclanché implements fully automated M3 Module line



G/NMC cell with non-flammable electrolyte : 80% less of risk of fire



Grimaldi Ro-Ro Vessels. 11 x 5.1 MWh supplied from 2018 to 2023



Development of PFAS-free and Niobium Oxide cells



1909

2006

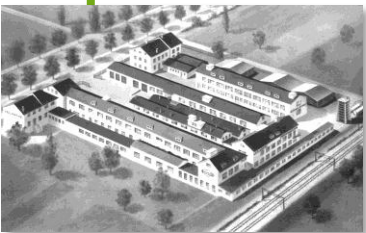
2019

2021

2022

2023

2025



Leclanché SA is founded in Yverdon-les-Bains, Switzerland



Selected as preferred global provider of battery systems to Bombardier



Canadian Pacific Selects Leclanché For zero emissions freight Locomotives



Leclanché moves to new headquarters in Yverdon-Les-Bains, Switzerland



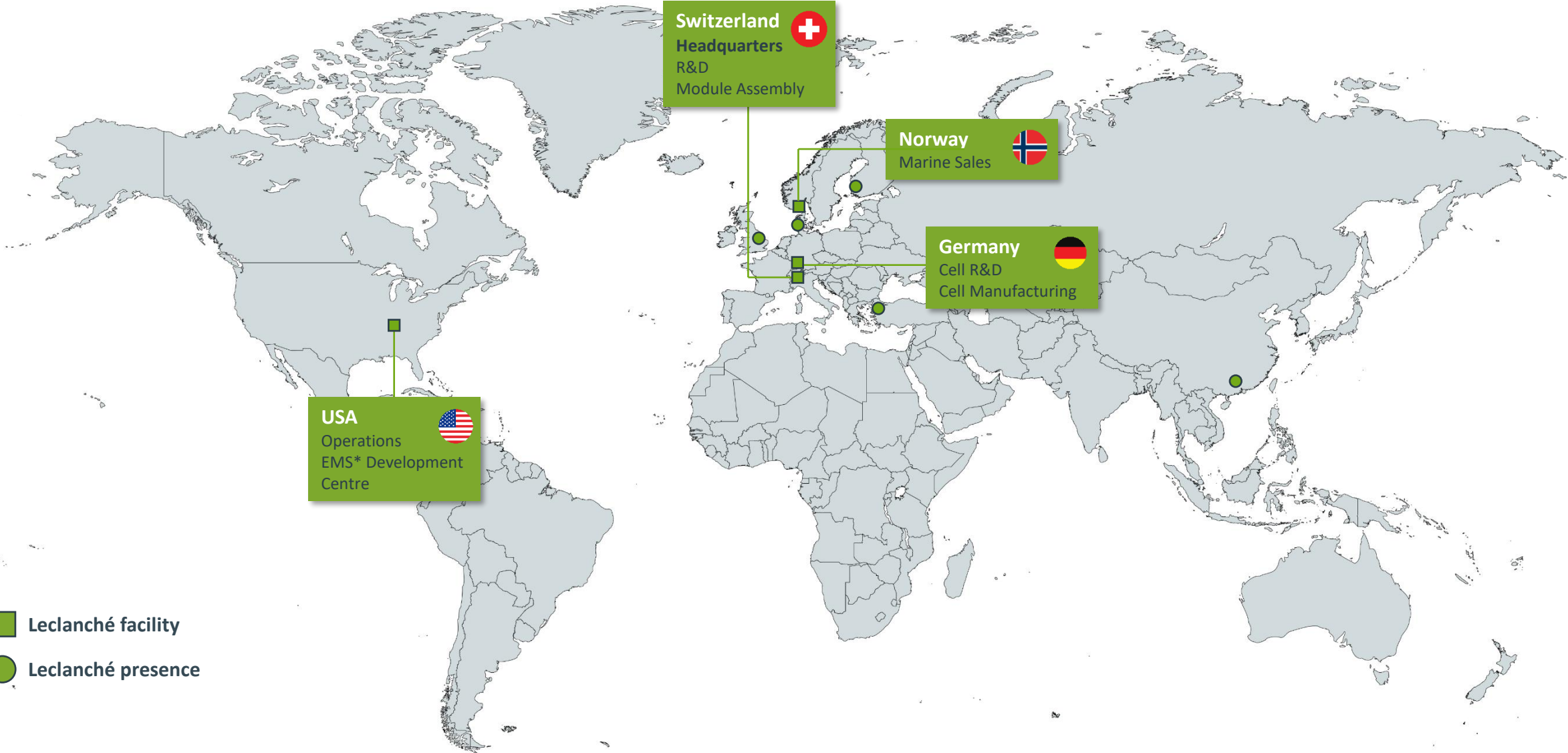
G/NMCA cells with less cobalt and 20% more energy density



Funded by the European Union Emissions Trading System Innovation Fund

Leclanché and CINEA* sign €74.2 million grant agreement to support sustainable battery production in Europe

Global Presence



*Energy Management Software

Senior Leadership Team and Board Members

Executive Officers



Phil Broad
CEO E-Mobility SA &
Group CCO



Pierre Blanc
Group CEO & CTIO



Jens Emrich
Group CFO

Board Members



Lex Bentner
Chairman



Christophe Manset



Marc Lepièce



Jean-Michel Pacaud



Raphaël Houillon

Leclanché Controls the Full Value Chain

We control the full value chain of our battery systems from powder to pack.



Product Lines & Services

- Catalogue and customer specific products engineered and certified to industry standards
- E-Mobility products are based on our in-house manufactured cells, modules and battery systems
- Dedicated Multi-String Managers designed to combine multiple battery systems
- Technical advisory services for Stationary Energy Storage systems

Marine



MRS-3™

Rail



Energy Series

Road



Fortius & Energy Series

Stationary



Technical Advisory Service



Ferries, Ro-Ro/Ro-Pax;
Offshore, Deep Sea, Cruise
Ships, Yachts



Trains
Locomotives
Maintenance Vehicles



Trucks
Agricultural Vehicles
Construction Vehicles



Utilities
Commercial & Industrial
Microgrid

Product Specifications

Advanced battery systems for rail applications featuring Leclanché European made G/NMC cells.

Rail

INT-53 Energy

- Leclanché high energy density G/NMC cells
- Class leading cycle life
- Functionally Safe BMS
- Liquid cooled
- Modular and scalable
- IEC 62928 certification



Technical Data	
Energy	52.6 kWh
Cycle life (60Ah cell, at 80% DoD) ¹	8,000 ¹
Weight	536 kg
Voltage (nominal)	876 V
Dimensions (L x W x H)	1631 x 612 x 409 mm

Rail

INT-105 Energy

- Example of a tailor-made battery system designed according to specific customer requirements
- Leclanché high energy density G/NMC cells
- Class leading cycle life
- Functionally Safe BMS
- Liquid cooled



Technical Data	
Energy	105.1 kWh
Cycle life (60 Ah cell at 80% DoD) ¹	8,000 ¹
Weight	1104 kg
Voltage (nominal)	876 V
Dimensions (L x W x H)	2646 x 620 x 792 mm

Product Specifications

Advanced generic battery systems for road applications featuring Leclanché European made G/NMC and G/NMCA cells.

Road

Fortius-145

- Leclanché high energy density G/NMCA cells
- Class leading cycle life
- Liquid cooled
- Modular and scalable
- IoT remote monitoring*
- Available from 2025



Technical Data	
Energy	147 kWh
Cycle life (80% DoD)	6,000
Weight	975 kg
Voltage (nominal)	670 V
Dimensions (L x W x H)	1,781 x 564 x 738 mm

Road

INT-39 Energy

- Leclanché high energy density G/NMC cells
- Class leading cycle life
- Liquid cooled
- Modular and scalable
- IoT remote monitoring*
- ECE R100.2 certification



Technical Data	
Energy	39.4 kWh
Cycle life (80% DoD)	8,000
Weight	372 kg
Voltage (nominal)	657 V
Dimensions (L x W x H)	1266 x 612 x 409 mm

Product Specifications

Design optimised product for Marine applications.

Marine

Navius MRS-3

- Leclanché high energy density G/NMC cells
- Class leading cycle life
- Functionally Safe BMS
- Liquid cooled
- Multiple configurations & 7 height options
- Superior safety with Battery Active Safety System
- Certified to DNV, LR & BV standards



Technical Data	
Energy	80 kWh to 50 MWh+
Cycle life (65 Ah cell at 80% DoD) ¹	7,000
Energy density (65 Ah cell)	98 Wh/kg / 108 Wh/litre
Voltage (maximum, DC)	1200 V
Dimensions (D x W x H)	700 x 435 x 926 to 2,431 mm



Product Specifications

Multi-String Manager (MSM) for road and rail battery systems where more than one battery pack/string is used in parallel.

Multi String Managers

MSM-M3-GRT

- Designed to interface seamlessly with existing Leclanché road and rail battery packs
- Reliable controller for the connection multiple packs or strings in parallel
- IoT edge device for remote monitoring*



Technical Data	
Application	Road (Packs with M3 Modules)
Quantity of packs	4
Weight	4.5 kg
Hardware	Bosch
Remote data-logging (option)	Wi-Fi / GSM
Dimensions (L x W x H) in mm	380 x 255 x 111

MSM-M3-RA

- Designed to interface seamlessly with existing Leclanché rail battery packs
- Certifications (controller): Rail
 - EN/IEC 61373, EN 50657, DIN EN 50125-1,
 - EN 50155 / IEC 60571



Technical Data	
Application	Rail (INT-53 Energy pack)
Quantity of packs	8
Weight	0.259 kg (controller only)
Hardware	Wago
Software	Leclanché SA
Dimensions (L x W x H) in mm	100 x 112 x 72 (controller only)

*Optional. The IoT edge device is integrated within the MSM enclosure.

Reference Customers

Commercial Vehicle & Rail



Alstom AGC
Train
INT-53 Energy



Canadian Pacific
Locomotive
INT-53 Energy



Končar
Train
INT-53 Energy



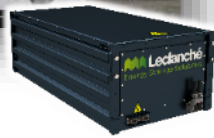
Socofer
Maintenance
INT-53 Energy



FCC
Refuse Truck
INT-39 Energy



Urovesa
Truck
INT-39 Energy



Major Truck OEM
Refuse Truck
Fortius-145



Uromac
Maintenance
INT-53 Energy



Reference Customers

Marine



Ellen e-Ferry
Ro-Pax vessel
System energy: 4.3 MWh



Wasaline
Ro-Pax
System energy: 2.4 MWh



Damen #1 (L. Ontario)
Ro-Pax vessel
System energy: 1.9 MWh



Damen #2 (L. Ontario)
Ro-Pax vessel
System energy: 4.6 MWh



Grimaldi Ro-Ro Series (11x)
Ro-Ro vessel
System energy: 5.0 MWh p.u.



Yara Birkeland
Autonomous Container Ship
System energy: 6.7 MWh



MS Jungfrau
Passenger Lake Vessel
System energy: 0.2 MWh



Siemens/Shiptec CGN*
Passenger Lake Vessel
System energy: 0.6 MWh p.u.

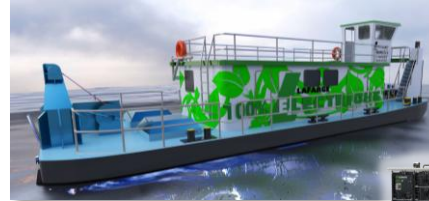


Reference Customers

Marine



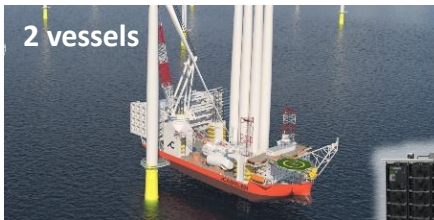
Ocean Cruise Operator
Hybrid Ocean Cruise
System energy: 4 MWh
Delivery: 2025



Lafarge Marsouin
Ro-Pax vessel
System energy: 0.8 MWh
Delivery: 2025



Geotechnical Service Company
Seismic exploration vessel
1.0 MWh
Delivery: 2025



Cadeler
Windfarm Vessel
2 x 5.2 MWh
Delivery: 2025/26



Confidential Yachts*
Super Yacht
2.4 MWh (total)
Delivery: 2025/6



Containerised Battery Project*
River Pusher Tug Container
1.6 MWh
Delivery: 2025



KONGSBERG



Reference Customers

Stationary



Enel Green Power
Cremzow, Germany
Frequency regulation
System energy: 34 MWh



S4 Energy
Noord Holland, Netherlands
Frequency regulation
System energy: 9 MWh



Romande Energie
Aigle, Switzerland
Frequency regulation & EV charging
System energy: 2.5 MWh



SGEM
Marengo, USA
Frequency regulation
System energy: 20 MWh



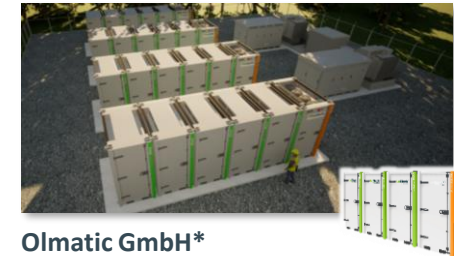
Veolia Gas Power Plant
Levice, Slovakia
Secondary Frequency Control
System energy: 5.2 MW / 2.9 MWh



Damen Shipyards*
Millhaven/Kingston, Canada
Load displacement & vessel charging
System energy: 6 + 10 MWh



Terna Energy
Crete, Greece
Solar + storage
System energy: 5 MWh



Olmatic GmbH*
Sembach, Germany
Frequency regulation
System energy: 12 MWh



*Project won, systems to be delivered

Cell Technology and Roadmap

Leclanché is continuously enhancing the energy output / capacity of its cells.

Cell energy is continually increasing while maintaining exceptional cycle life



Over 160 patents covering cell technology included in 10 patent families



Reduced cobalt in the cathode and higher energy materials to further reduce the costs per kWh



Continuous work on next generation cell technologies with partners from academia and industry



Materials with lower carbon footprint and energy-saving processing steps to make our batteries more sustainable



Control of the full value chain and supply of technologies designed for the specific application



Taking the Lead on Sustainable Batteries

Leclanché 12R Sustainability Strategy: Reducing the environmental impact of our batteries at every stage of the life cycle.

Supply Chain

- ESG compliance
- Responsible sourcing and materials

Recycling & Reuse

- Up to 95% recyclable
- Collaboration with leading recycling partners



Manufacturing


- 100% renewable electricity used at all production facilities
- Solvent free thanks to water-based cell production process

Consumption & Use


- Class leading cell cycle life to maximise battery service life
- Global after-sales services with IoT for maintenance optimisation

Sustainability and Environmental Impact

- The European Battery Regulation for circular economy was published in July 2023. Leclanché has started its implementation.
- Future restrictions of “forever chemicals” PFAS : an opportunity for Leclanché taking advantage of its unique water-based binder process (eliminating PFAS and NMP toxic solvents).
- Leclanché’s impact in 2024: an estimated reduction of **105,000 tonnes** of CO₂ eq. emissions, calculated over the lifetime of marine and rail projects equipped with our batteries.
- Leclanché is fully eligible for the ESG funds, article 9, according the Sustainable Finance Disclosure Regulation (SFDR).
- Leclanché developed a complete value chain sustainability Strategy (12R Strategy).



**PFAS-free ready
NMP free**






**105,000 t of
CO₂ avoided by
our customers**

Each of these scenarios is equivalent 105,000 tonnes of CO₂

	<p>14,100 Car trips around the world</p>		<p>10,500 People on average of 10 TCO₂ eq/year per EU Citizen</p>		<p>59,900 Plane round trips between Paris → New York</p>
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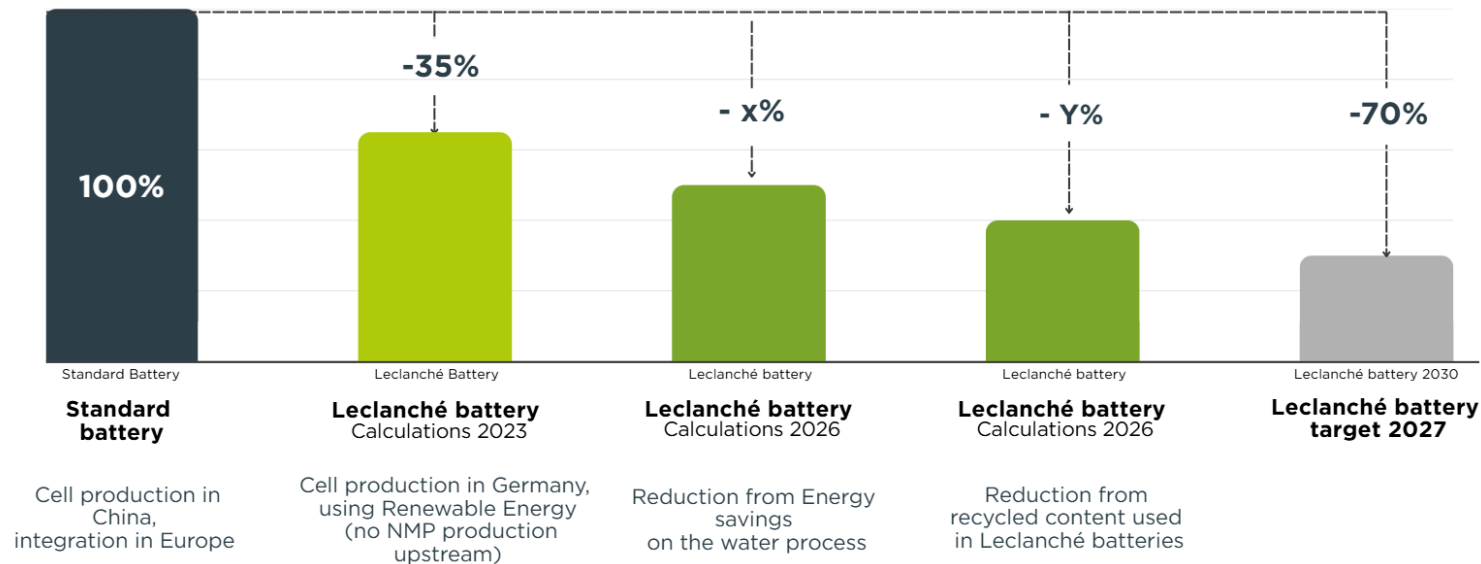
Yara Birkeland (fully electric vessel) Savings



	<p>1,000 t per year of CO₂</p>		<p>35,000 Truck journeys saved since 2022</p>
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Battery Carbon Footprint

- We are now updating the Life Cycle Assessment to include aspects of our current production that reduce our carbon footprint.
- This will provide a more accurate and complete picture of our battery's environmental impact and the advantages of our sustainable manufacturing approach.



Calculations for 2023

- Production running on 100 % renewable electricity
- No toxic solvents production upstream(NMP)

Calculations for 2026 (in progress)

- (x%) **Energy savings** from the water-based process with No toxic solvents
- (y%) **Recycled material** on our battery

For more information, [click here](#) to download our 2024 Sustainability Report

Production Technology

- Leclanché designs and manufactures cells and modules in-house
- Development of formulations, production processes and characteristics of the electrodes
- Manufacture of graphite anodes, NMC622 and NMCA cathodes

Cells

- High-energy density and high-power cells
- Class-leading cycle life
- New “Flame Retardant” (FR) cells
- Manufactured in a state-of-the-art automated production facility in Germany
- Electrodes made exclusively using a water-based binder (WBB)
- Experienced in production of LTO anodes



Technical Data	60 Ah FR	60 Ah	65 Ah	71 Ah
Cell chemistry	G/NMC	G/NMC	G/NMC	G/NMCA
Cell type	Pouch	Pouch	Pouch	Pouch
Cycle life (80% DoD) ¹	8,000	8,000	7,000	6,000

Modules

- Specifically designed for transport applications
- Available in 8 configurations
- Functionally Safe slave unit
- 400A (medium) or 800A (high) power variants
- Assembled on an automated production and testing facility, designed to automotive industry standards



Technical Data (with 65Ah cell)	20 cell	24 cell	32 cell	36 cell
Energy	4.8 kWh	5.8 kWh	7.7 kWh	8.7 kWh
Configurations	2	1	2	3
Weight	32 kg	38 kg	50 kg	55 kg

Production Facilities

Leclanché is one of the few battery system suppliers that manufactures cells in-house, in Europe.

Cell Production Line
Willstätt, Germany



- In-house cell production from raw materials
- Patented unique water-based manufacturing process for all electrodes, in production since 2012
- Producing pouch cells with G/NMC and G/NMCA chemistries

-  European cell and module production
-  Scalable production technology
-  Highly automated lines
-  Certifications that de-risk planned expansion
-  Production facilities with 100% renewable energy
-  Products designed by Leclanché engineers & electrochemists

Module Assembly Line
Yverdon, Switzerland



- State-of-the art automated production facility, designed with leading engineering company Comau (Stellantis Group)
- 400 MWh per year, and further expandable
- More than six times the production capacity of the previous module line

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