

Motive Power



**REVOLUTIONARY
INNOVATION
INSIDE**



High Safety
Standards



Availability
24/7



Maintenance
Free

 **SUNLIGHT**
Reliable Battery Solutions

As a member of a strong and developing business ecosystem, SUNLIGHT relies on its modern infrastructure, continuous innovation and its passion for excellence, to develop and supply reliable battery solutions.

Our manufacturing plant, located in Xanthi, Northern Greece, is a core element of our dynamic growth. We have systematically invested in the development of **one of the most modern industrial units**, in accordance with the strictest international standards. It covers **200.000m²**, with indoors areas of more than 60.000m².

The company has consistently invested in developing one of the **one of the most advanced industrial plants in the world**, running highly specialized production and assembly lines. The plant is fully compliant with the strictest international standards and is certified for Quality, Occupational Health & Safety and Environmental management systems.

The products are developed by SUNLIGHT R&D team which constantly designs and evaluates new innovative solutions to better meet market needs based on the latest technological trends, industry developments and market feedback. Advanced technology systems, comprising batteries such as Li-ion and Silver-Zinc with innovative electronics, have been developed and manufactured for over three decades to meet the highest of standards regarding safety and quality.

The increasing demands of Material Handling and Logistics Industry as well as the diversity of applications of modern forklifts/trucks require batteries capable to operate under extreme conditions and run longer.

SUNLIGHT Li.ON FORCE motive power range incorporates SUNLIGHT's vast know-how and long experience in the design & production of Lithium-Ion batteries for advanced applications into a robust product destined for a broad spectrum of industries, including Material Handling and Logistic.

The complete Motive Power portfolio consists of:

SUNLIGHT PzS, PzB Series

The proven vented solution with excellent reliability and long service life, utilizing premium quality materials

HydroSave Series

The low- maintenance solution with up to 13 weeks intervals between watering utilizing optimised alloys and increased head space

MotionGel Series

The maintenance free sealed-type battery with GEL electrolyte ensuring no acid leakage and minimum gas emissions

Xtreme Force Series

Based on CSM (Copper Stretch Metal) technology, is suitable for operation under extreme conditions while allowing fast and opportunity charging

Li.ON FORCE Batteries

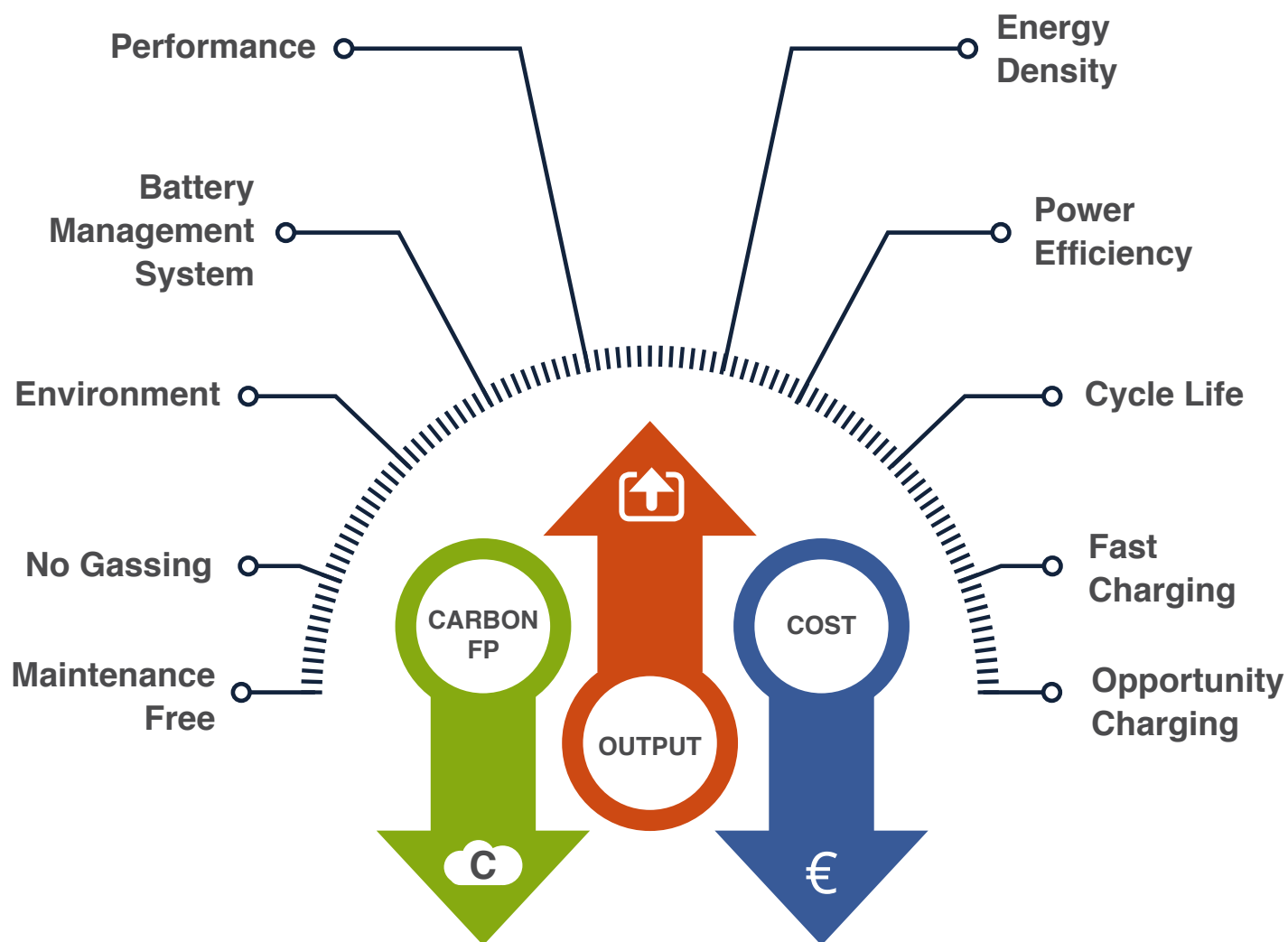
A complete range for motive applications of high safety standards. Designed with quality & reliability based on Innovation.

SUNLIGHT BCI Series

The BCI sized cells, combining compatibility with US battery dimensions with all the benefits of Tubular technology

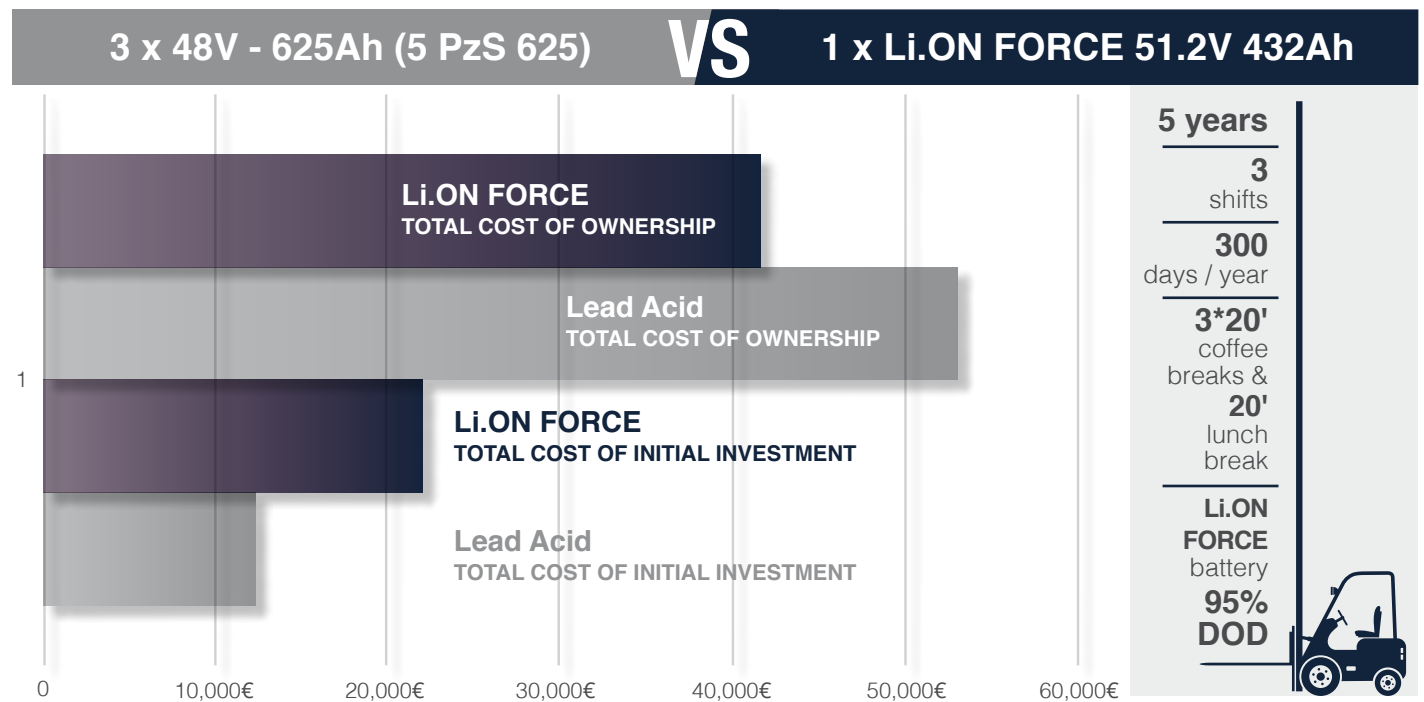
Full list of accessories

A full list of accessories ranging from small connectors up to large battery chargers and battery monitoring systems



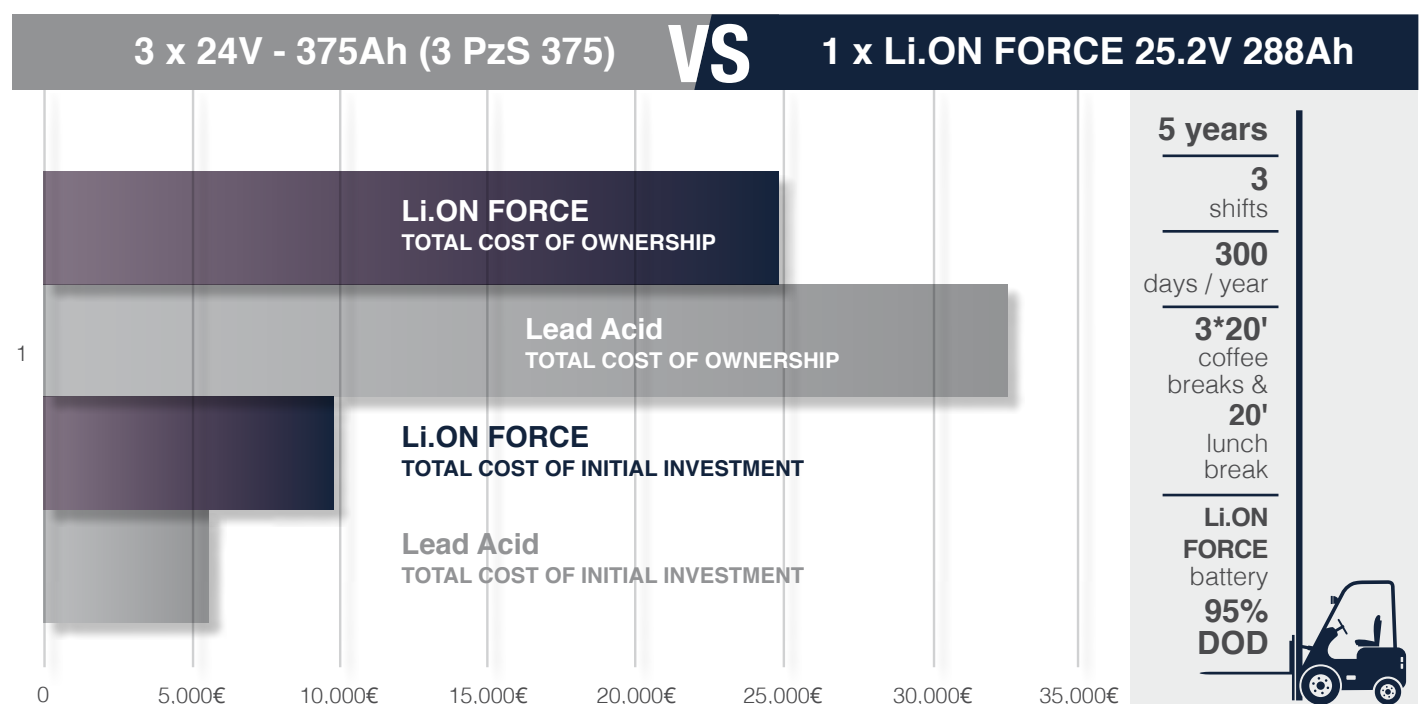
Characteristics	Lead Acid Batteries	Li.ON FORCE Batteries
Energy Density	~ 100 Wh/L	> 233 Wh/L
Charging Efficiency [%]	Up to 80%	Up to 95%
Emissions	Environmental unfriendly / Gassing and water loss when charging	Environmental friendly / Emission free
Maintenance	Required / water filling - check points	Not required
Charging Time (Full Charging)	8h	~ 1 - 1.5h
Opportunity Charging	Negative effect on service life	Yes, with NO negative effect on service life
Energy Efficiency	Up to 80%	95%
Operating Temperature	-20°C up to 55°C (-4°F up to 131°F)	-20°C up to 55°C (-4°F up to 131°F)
Temperature during Charge	-10°C up to 55°C (14°F up to 131°F)	0°C up to 45°C (32°F up to 113°F)

Li.ON FORCE Batteries provide lower Cost of Ownership & improved energy efficiency



↓ -35% Annual energy consumption for battery recharging

↓ -81% Annual operating expenses due to maintenance, battery handling / change



SUNLIGHT Li.ON FORCE offers the capability of fast and opportunity charging.

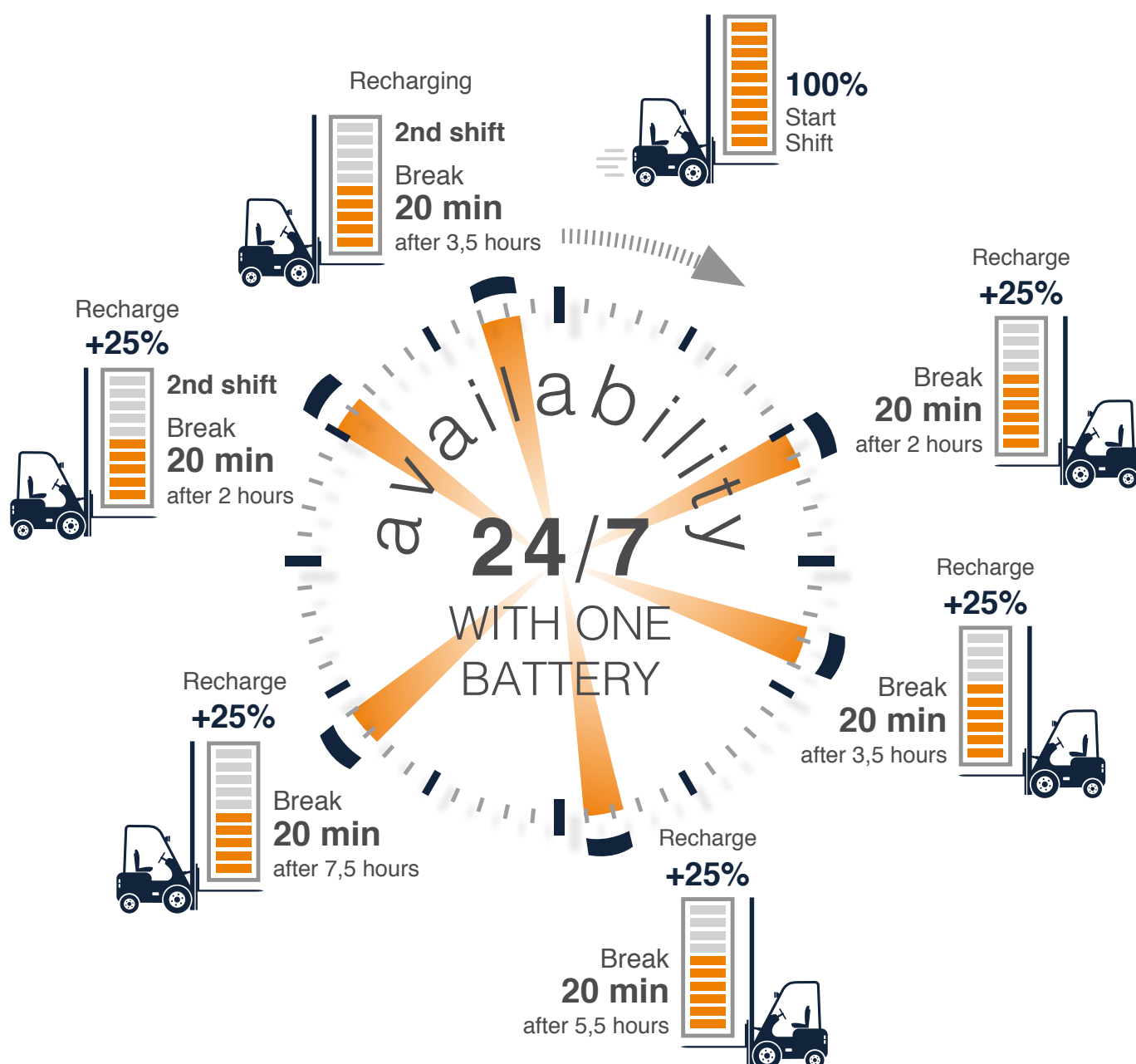


The battery can be fully recharged in 80 minutes per 8-hours shift in heavy duty use (for example, 4 opportunity charges of 20 minutes each, where it is also able to recover up to 25% of its discharged capacity)

The combination of fast and opportunity charging with the battery's outstanding efficiency and charge acceptance enables multi-shift operation.

In addition to this, SUNLIGHT Li.ON FORCE is able to support and utilize the regenerative braking in the most efficient way for its energy recovery.

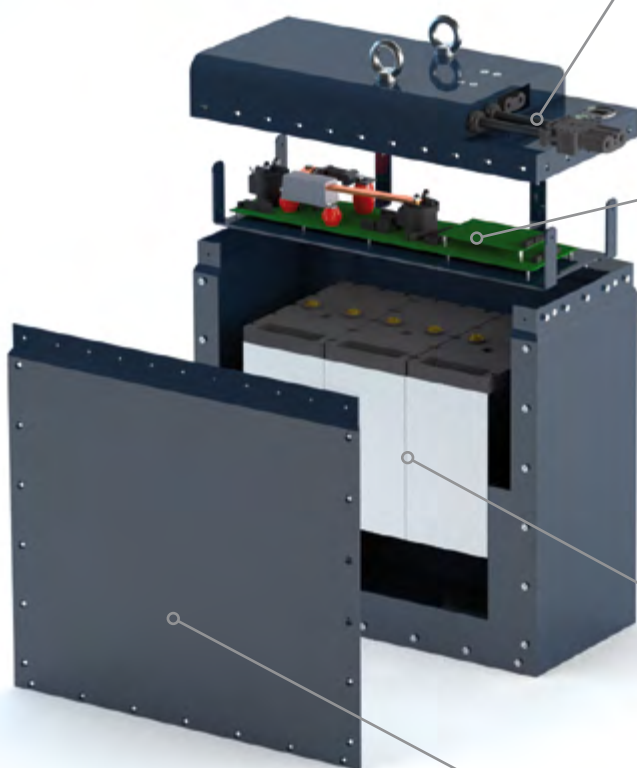
100%

Fully
recharged in
less than
1.5h





Quality & Reliability
based on Innovation



Battery Interface

SUNLIGHT innovation

- ⊕ **Charging selection button**
fast_standard_slow
- ⊕ On-board State of Charge display
- ⊕ Single power-ON mounted on the battery
- ⊕ Two integrated power plugs for easier recharging without removing the battery from the forklift

BMS & Power circuit

- ⊕ Continuous monitoring of crucial operating parameters (voltage, temperature and current)
- ⊕ Fully regulated charge / discharge procedure and integrated balancing function for maximum protection and enhanced battery cycle life.
- ⊕ Indication of the State of Charge (SoC)
- ⊕ Industrial design that optimizes cable management and allows easy access to all compartments of the battery.

Modular Design

- ⊕ Maximum safety
- ⊕ Full monitoring and balancing per cell
- ⊕ Robust construction
- ⊕ Serviceability

Battery Housing

- ⊕ Available in all sizes (standard DIN trays or customized upon request).
- ⊕ Retrofit in conventional trays of Lead-Acid powered forklifts
- ⊕ Additional compartment designed for counterweight to meet weight requirements
- ⊕ Durable housing allowing easy handling
- ⊕ Serviceability
- ⊕ Flexibility on special demand

Range: 25.6V / 38.4V / 51.2V / 83.2V

A large variety of batteries can be designed upon customer request fitting in a wide range of battery compartments and various types of electric forklifts.



Technology Advantages

LiFePO₄ one of the safest Lithium - technologies



Impressively stable performance under harsh operating conditions.



Optimal thermal stability leading to supreme cyclic performance and operation safety.



Low environmental impact as it contains non-toxic, non-contaminating, non-rare earth materials



Maintenance - free



Long cycle life up to 4.500 cycles



High energy density



Excellent voltage stability during discharge

Operational Advantages

High operational availability of the vehicle



No need for central charging station or special infrastructure for ventilation

No need for battery change between shifts



BMS Battery's DNA

Battery Management System Functions

SAFETY

- Overcharging
- Deep discharge
- Overcurrent
- Temperature
- Short circuit
- High current fuses (module and battery level)

DIAGNOSIS

- State of Charge SoC,
- State of Health (SoH) calculation
- Internal Resistance
- Errors/ warnings indication
- Event logging
- Data logger (optional)

FUNCTIONS

- Balancing function per single cell
- Sleep mode when the battery remains idle (minimization of self-consumption)

STANDARDS

BMS certified according to directives: **EMC, EMI, RED**
Designed according to **IEC 61508**

INTERFACE

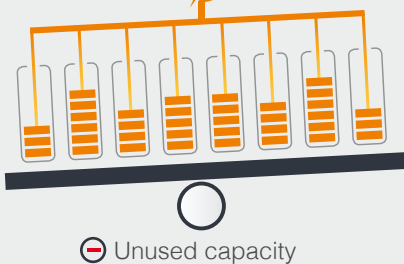
- State of Charge (SoC) & status indication
- External touch screen display (optional)
- Communication with charger

MONITORING

- Continuous monitoring of all crucial parameters (current, temperature, voltage etc.)

Passive Balancing Method

DISCHARGING ⚡ PROCESS



CHARGING ⚡ PROCESS



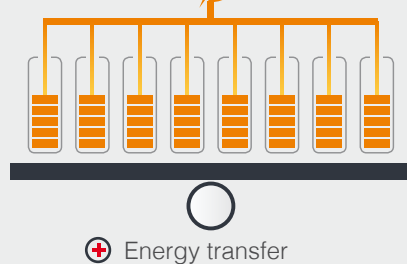
- ⊖ Energy loss
- ⊖ Battery temperature increasing
- ⊖ Cell cycle life is affected

Passive Balancing is performed during charging.

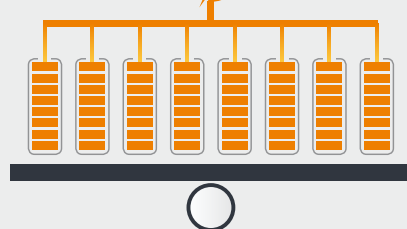
Battery's capacity is limited from the weakest cell during charge and discharge.

Active Balancing Method

DISCHARGING ⚡ PROCESS



CHARGING ⚡ PROCESS



- ⊕ Energy transfer
- ⊕ Each cell full capacity used

Active Cell Balancing is performed during charge and discharge cycle.

Active cell balancing increases:
- battery life cycle up to 30% - system run-time - charging efficiency



Bidirectional communication

24/7

BATTERY MONITORING

SAFETY

**MAINTENANCE
DIAGNOSIS**

**FIRST LEVEL
MAINTENANCE**

**E-MAIL WITH
WARNING
MESSAGES**

**IDENTIFICATION
OF WARNING
MESSAGES**

**CHANGE
CHARGING PROFILE**

**STATISTICAL ANALYSIS
PER BATTERY**

Connecting

INNOVATION

PERFORMANCE

EVOLUTION

QUALITY

**FUTURE
TECHNOLOGY**

RELIABILITY



**COMMUNICATION IN 3 ACCESS LEVELS
SUNLIGHT - SUPPLIER - WAREHOUSE**

Full Charge time	Standard 80min, Full charge at 1 hour possible
Standard Charge Current	0.5C
Maximum Charge Current	1C
Opportunity Charge Current	0.75C
Max. Continuous Discharge Current	1C
Temperature during charge	0°C up to 45°C (32°F up to 113°F)
Temperature during discharge	-20°C up to 55°C (-4°F up to 131°F)
Nominal battery voltage range	25.6V - 38.4V - 51.2V - 83.2V
Available Capacities	up to 864Ah
Tray Sizes (Dimensions, weights)	DIN, BS, Customized
State of Charge indicator	Integrated on the battery
Communication Protocol	CAN bus
Intercell connections	Copper Nickel-plated connectors
Electrical Power Connection	REMA, Anderson

Product Range



Fully certified Cells according to
**UL1642, IEC62660-3:2016,
IEC62619:2017, UN / DOT 38.3**

Fully certified Batteries according to
**UN / DOT 38.3, ISO 9001 ISO14001,
BS OHSAS 18001**

Design according to
UL 2580, IEC 62619, IEC 61508



SUNLIGHT Li.ON FORCE Charger series advantages:

- Innovative and worldwide unique multi-resonance converter technology
- High Energy Efficiency up to 97%
- IU charging characteristic
- Fast and opportunity charging modes
- Able to achieve full recharge of the battery within 1 hour
- IP21, higher protection categories up to IP54 upon request
- Fixed connections – ready to “plug & charge”
- Small footprint – decentralized charging point installed in the area where the vehicle operates
- Touch graphic display
- Integrated CAN interface with established data transfer and communication with **Li.ON FORCE** BMS offering fully-controlled, advanced charging procedure

FILON FUTURE High Frequency

Charging Voltage

24V, 36V, 48V, 72V, 80V

Charging current:

50A up to 400A

Mains voltage:

Single Phase: 230V, 50/60 Hz

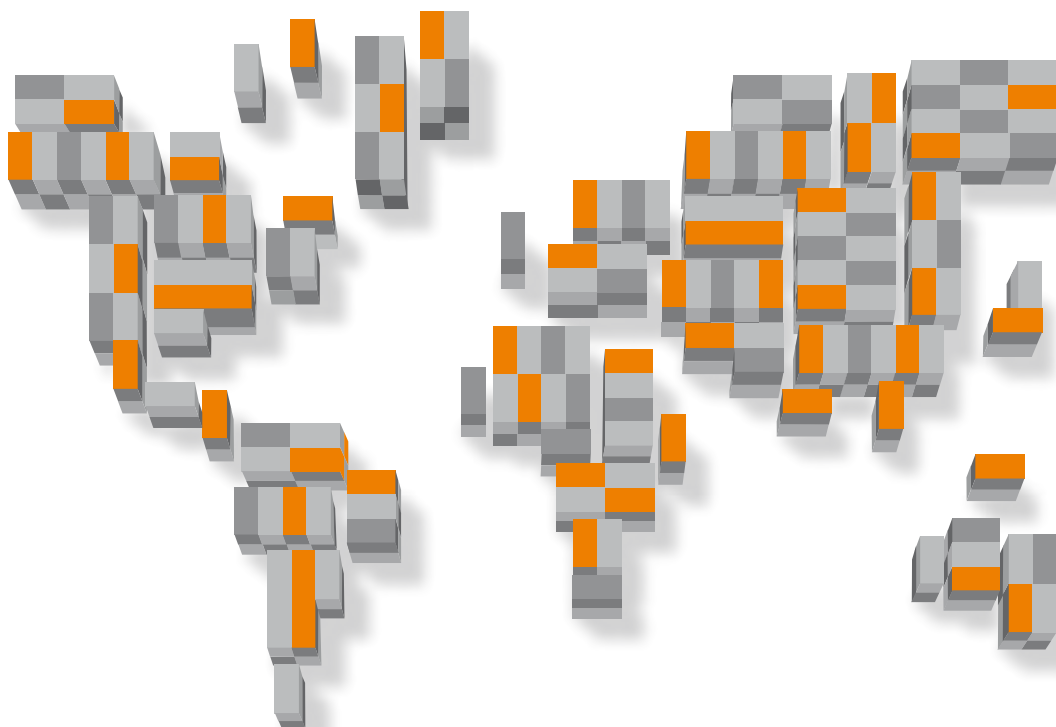
Three Phase: 400V, 50/60Hz

Also available for USA market with ETL certification

Mains voltage: Three phase 480V, 60Hz



Manufactured in Europe Delivered in more than **100** countries



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