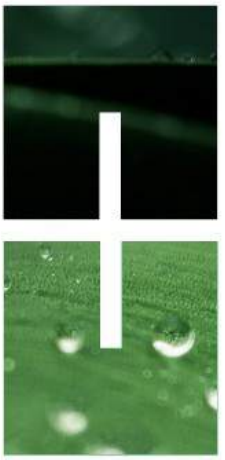
TAB
Li-Ion batteries

TAB LI-ION TRACTION BATTERIES



TAB TRACTION LI-ION BATTERIES

TAB Traction Li-Ion batteries are designed to deliver longer cycle life, reduction of the total ownership costs, higher productivity and faster charging and are completely maintenance free. TAB BMS (Battery Management System) allows you to monitor the status and health of the battery at any time.

ECOLOGY & PLANET

- TAB Lithium-Ion batteries are designed for a sustainable future of our planet
- No liquid acids in case of accidents
- Smaller CO2 footprint
- Better energy efficiency due to lower charging losses

ADVANTAGES

No need for central charging station

More flexibility to decentralized charging stations (in case with onboard charger)

No explosion hazard and no odours due to gassing

Longer operating terms and higher productivity due to fast and opportunity charging

The TAB Li-Ion battery system is absolutely maintenance free

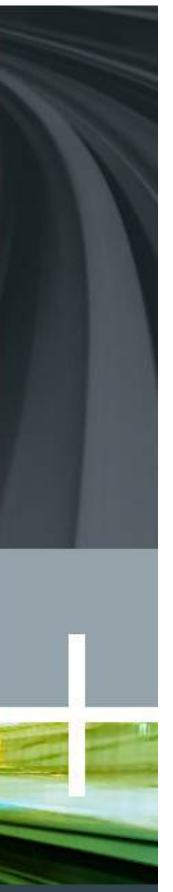
No need for security distance to charging facilities - opens new possibilities when planning site layout

ADVANTAGES OF LITHIUM-ION VS. LEAD-ACID BATTERIES

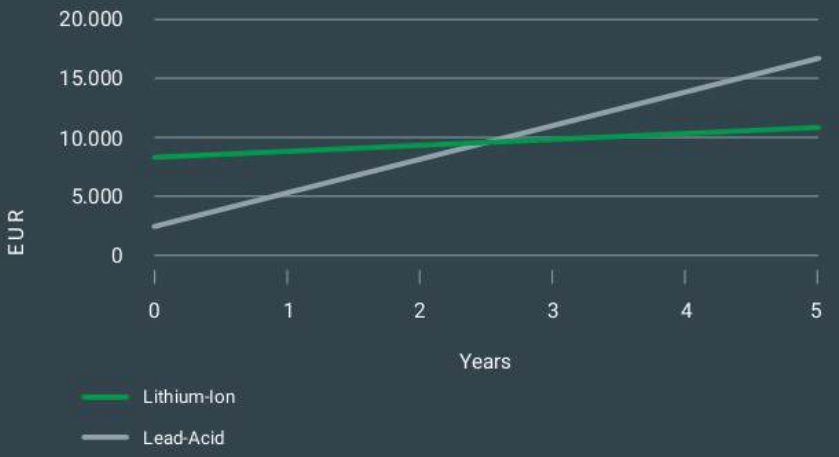
Compared with lead-acid, a lithium-ion battery does not require any maintenance and produces no toxic emissions.

Fast (<2 hours) and flexible charging, opportunity charging and two-times longer battery life than lead-acid batteries will increase productivity of your equipment and will take your business to the next level of efficiency.

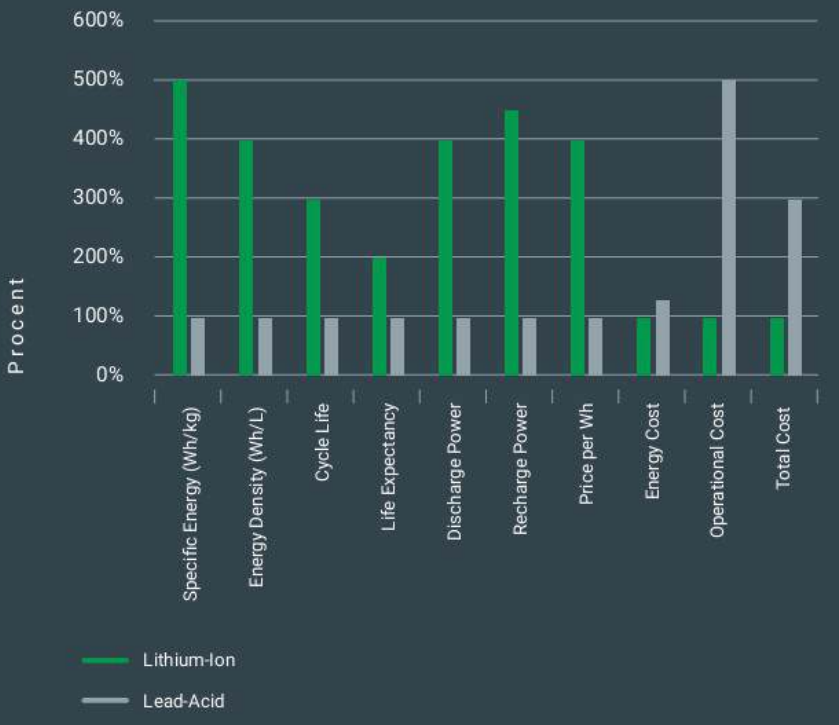
CHARACTERISTICS	Lead-Acid Batteries	TAB Lithium-Ion batteries
MAINTENANCE	Maintenance required Extra cost	No maintenance No extra cost
CHARGING TIME	8-10 hours 2 or more batteries per truck required for continuous operation	Less than 2 hours 1 battery per truck is enough for continuous operation
OPPORTUNITY CHARGING	No Lower fleet availability due to charging breaks	Yes 100% fleet availability
BATTERY LIFE	1500 charge/discharge cycles Periodic battery replacement	2000 charge/discharge cycles No need to replace batteries
DANGEROUS SUBSTANCES	Yes Battery room is required	No, environmentally friendly Safe and clean technology Battery room is not required
ELECTRICITY CONSUMPTION	Consumes 35% more energy Higher electricity costs	Consumes 35% less energy Lower electricity costs



LITHIUM-ION VS. LEAD-ACID BATTERY TOTAL COST



LITHIUM-ION VS. LEAD-ACID BATTERY TECHNOLOGY

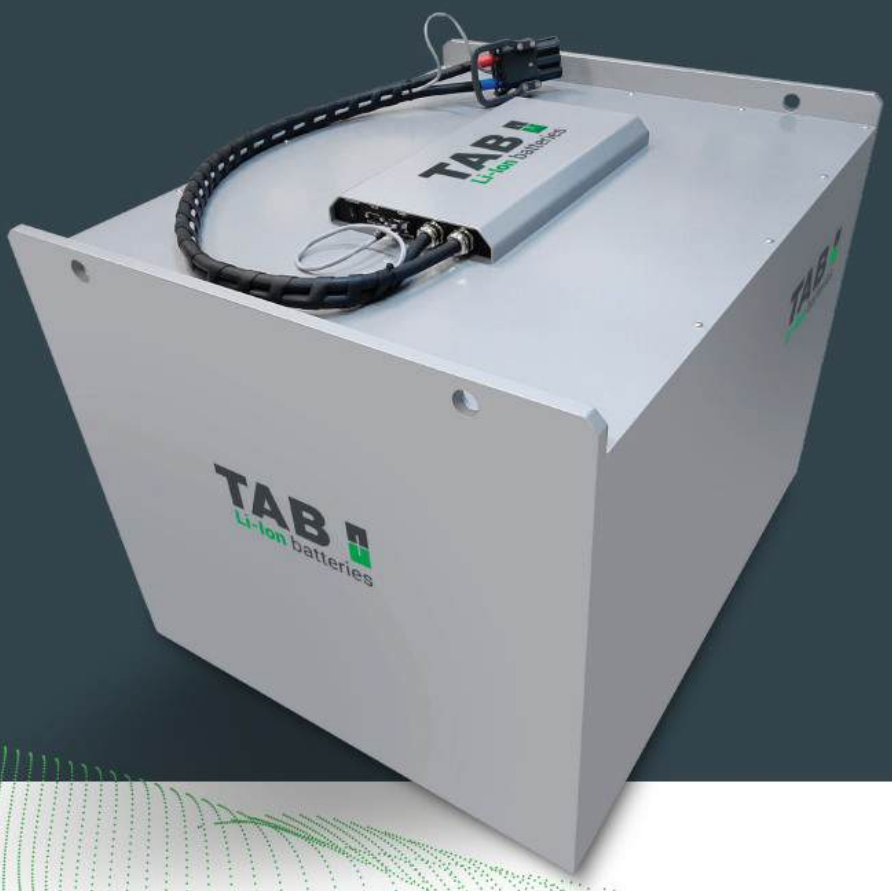


LITHIUM-ION BATTERY

- Operating time approx. 21-22 h
- Fast/Opportunity charging time approx. 2-3 h

LEAD-ACID BATTERY

- Operating time approx. 8 h
- Charging time/rest periods approx. 8 h



TAB SERVICE SOFTWARE

- Real time data logging
- Battery parameter configuration
- Battery monitoring
- Real time diagnostics
- Firmware updating
- Ensuring operational safety

TAB BATTERY SERVICE APP

Battery management service application for performance improvement and longer service life for industrial traction battery

ADVANTAGES FOR USERS

- **MONITORING AND DIAGNOSTICS:** Real-time overview of the battery condition via Bluetooth Application for Android and IOS
- **PROGNOSTICS:** Predictive diagnostics early detection of error and failures
- **FAULT DETECTION AND PREDICTION:** Higher vehicle availability due to fewer unplanned breakdowns
- **EVALUATION AND OPTIMIZATION:** Higher vehicle availability due to optimized charging times

TAB BMS
(BATTERY MANAGEMENT SYSTEM)

MAIN FUNCTIONS
- 12V, 24V and 48V Single unit system
- Master-Slave configuration for High voltage batteries
- LCD Touch screen information display
- Battery monitoring and protection
- Safety improvement

MONITORING
- Cell voltage
- Cell temperature
- Cell resistance
- Battery current
- BMS temperature
- SOC (State of Charge) calculation
- High resolution current measurement

CONTROL
- Safety devices
- Pre-charge circuit
- Standby mode
- Sleeping mode

BALANCING
- 1.3A passive balancing per cell
- 100% cell availability

PROGNOSTIC
- SOH (State of Health) calculation
- Remaining energy/capacity
- Time until Full / Time until Empty

PROTECTION
- Over-voltage
- Under-voltage
- Over temperature
- Over current
- Under temperature charge protection

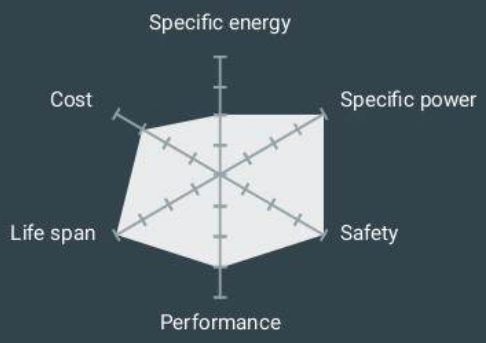
COMMUNICATION
- Galvanically isolated user defined multi-purpose digital input/output
- Additional user defined relays and digital inputs/outputs on master-slave configurations
- Galvanically isolated RS-485 communication
- Galvanically isolated CAN with 100, 125, 250, 500, 1 MHz bit-rate selection
- CAN to Charger communication

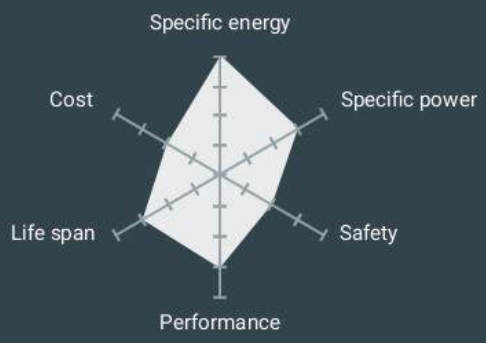
BATTERY SYSTEM SPECIFICATION

PRODUCT SOLUTION	Li-Ion
TEHNOLOGY	LiFePO4
VOLTAGE RANGE	12V-80V
CAPACITY RANGE	100Ah to 1000Ah
DESIGN LIFE (Cycle DOD 80%)	2000+
OPERATION TEMPERATURE	-10/+55 °C
CHARGING TEMPERATURE	0/+40 °C
CHARGING TIME	2h-Fast Charging , 4h-Normal Charging
PROTECTION INDEX	IP54 (IP67 optional)
BATTERY DIMENSION	DIN, BS, Additional Weighted, Customized
BATTERY CHARGER	TAB Li-Ion Charger
BATTERY MANAGEMENT SYSTEM	Integrated TAB BMS, (Data Logger Optional)
COMMUNICATION	CAN, RS485, Customized
STANDARDS/CERTIFICATES	IEC 62133-2, IEC 62619, ISO 12405-2, ISO 9001

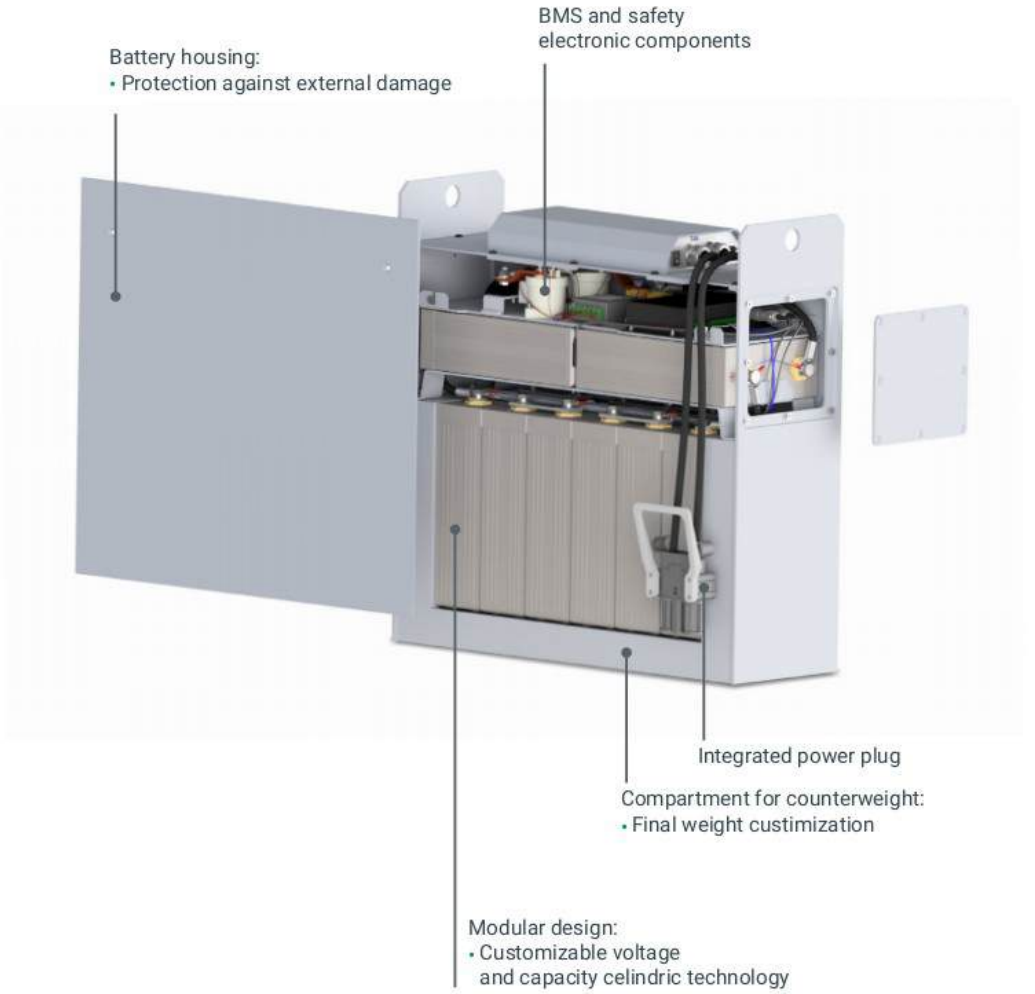
TECHNOLOGY

LFP – LITHIUM IRON PHOSPHATE (LIFEPO4)	NMC-LITHIUM NICKEL MANGANESE COBALT
Good thermal stability	High energy density
Long cycle life	Low cost
High power rating	Low internal resistance
Safe	Higher operating voltage





BATTERY COMPONENTS



PRODUCT RANGE

BASIC MODELS

Battery model*	LB24200/1	LB24300/1	LB24400/1	LB24450/1	LB48300/1	LB48400/1	LB48600/1	LB80600/1
Voltage [U]	25,6	25,6	25,6	25,6	51,2	51,2	51,2	80
Capacity [Ah]	200	300	400	450	300	400	600	600
Energy [kWh]	5,12	7,68	10,24	11,52	15,36	20,48	30,72	48
Cycle life DOD 80%	2000							
Dimensions [mm]	623x210x625	623x283x625	623x283x625	825x432x625	1210x345x784	825x630x630	825x630x630	1025x855x784
Battery socket [A]	DIN 160	DIN 160	DIN 160/320	DIN 160/320	DIN 160/320	DIN 160/320	DIN 320	DIN 320
Protection class	IP54							
Weight [kg] ± 5%	212	288	288	570	760	856	856	1860
Operating temp. [°C]	-20°C to +55°C (discharge) / 0°C to +50°C (charge)							
Storage temp. [°C]	-20°C to +60°C							

With its "PLUG AND PLAY" support, straight-forward replacement for most lead-acid batteries is possible. Normally, no modifications to forklift are needed.

*TAB Li-Ion batteries are available in all sizes (standard DIN trays or customized upon request).

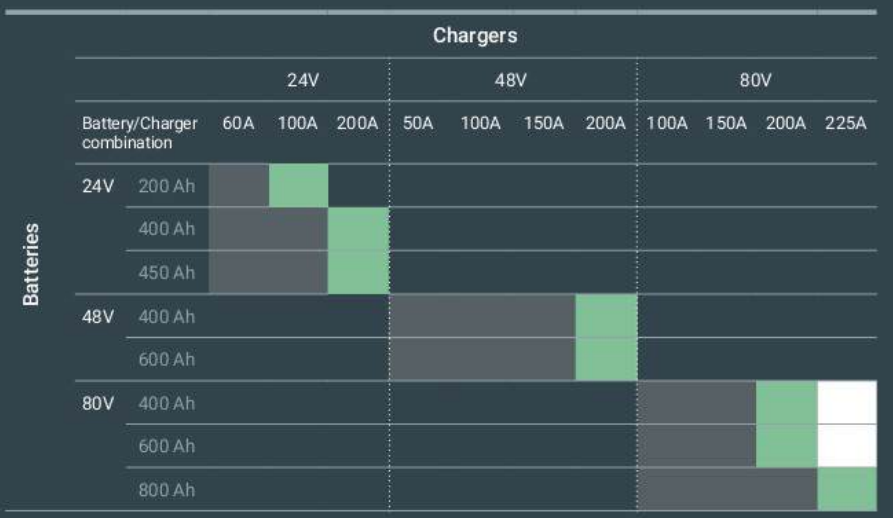
CUSTOM BATTERIES FOR VARIOUS APPLICATIONS

- Light EV
- Cleaning machines
- Cranes and lifts
- Robots
- Industrial drones
- Trains
- Utility vehicle
- UAV
- Boats
- Mining equipment
- Agriculture

OPPORTUNITY CHARGING

TAB Battery Chargers offer the advantage of fast and opportunity charging. Combination of fast and opportunity charging enables multi-shift operation.

STATE OF CHARGE

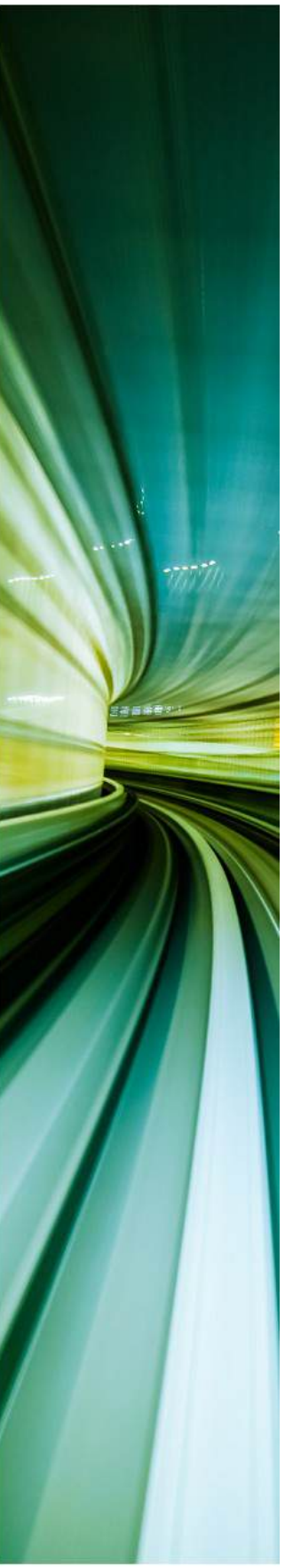


Optimally configured

Possible, but with longer charging time

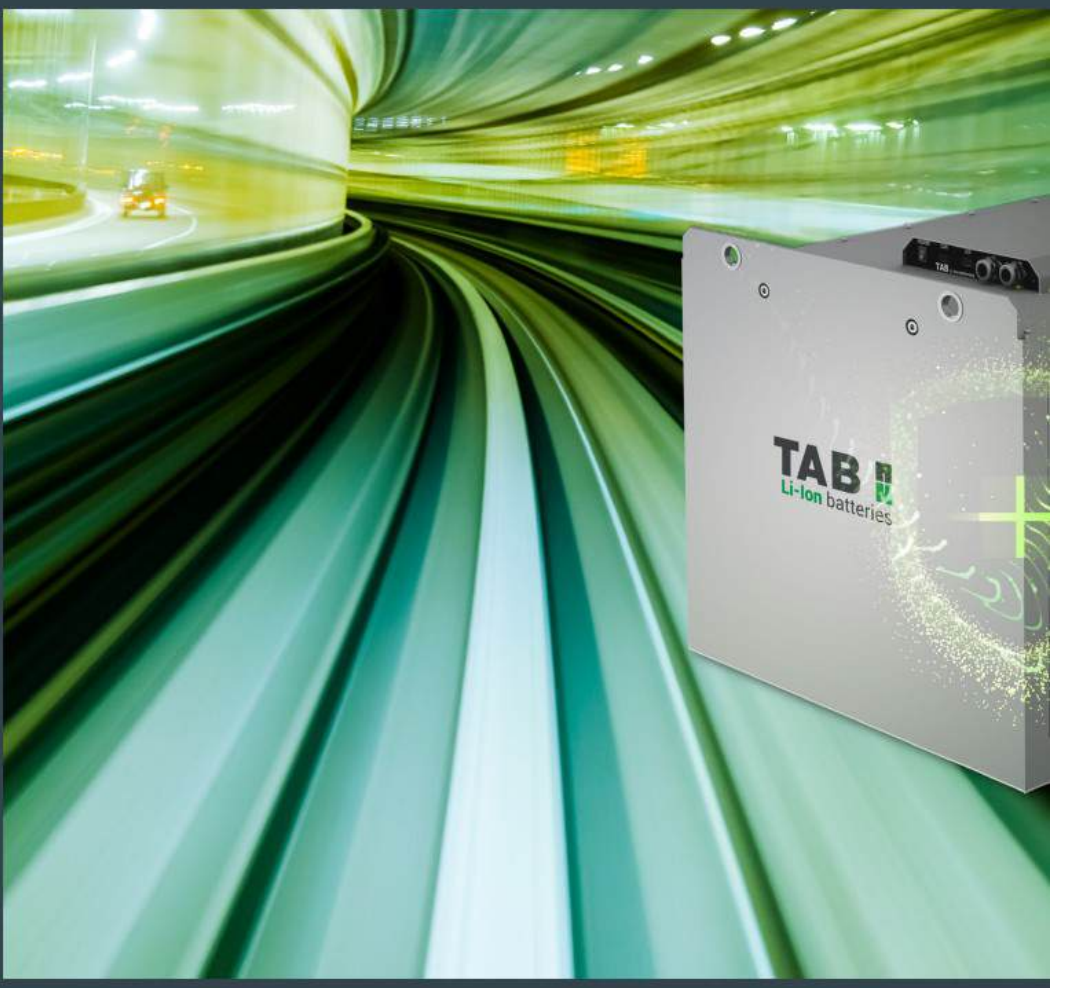
Possible, but more powerful than necessary

EFFICIENCY	Up to 94%
OUTPUT VOLTAGE STABILITY	± 1%
COOLING	Forced ventilation
DEGREE OF PROTECTION	IP 20
OPERATING CONDITIONS	From -10 °C up to 40 °C
PROTECTION CLASS	I
STANDARDS/CERTIFICATES	EN 61000-6-2, EN 61000-6-4, EN60950-1



SAFETY FEATURES

Modules and cells that are used in our batteries are designed in accordance with IEC 62133-2:2017. Modules and cells are certified according to UN38.3.

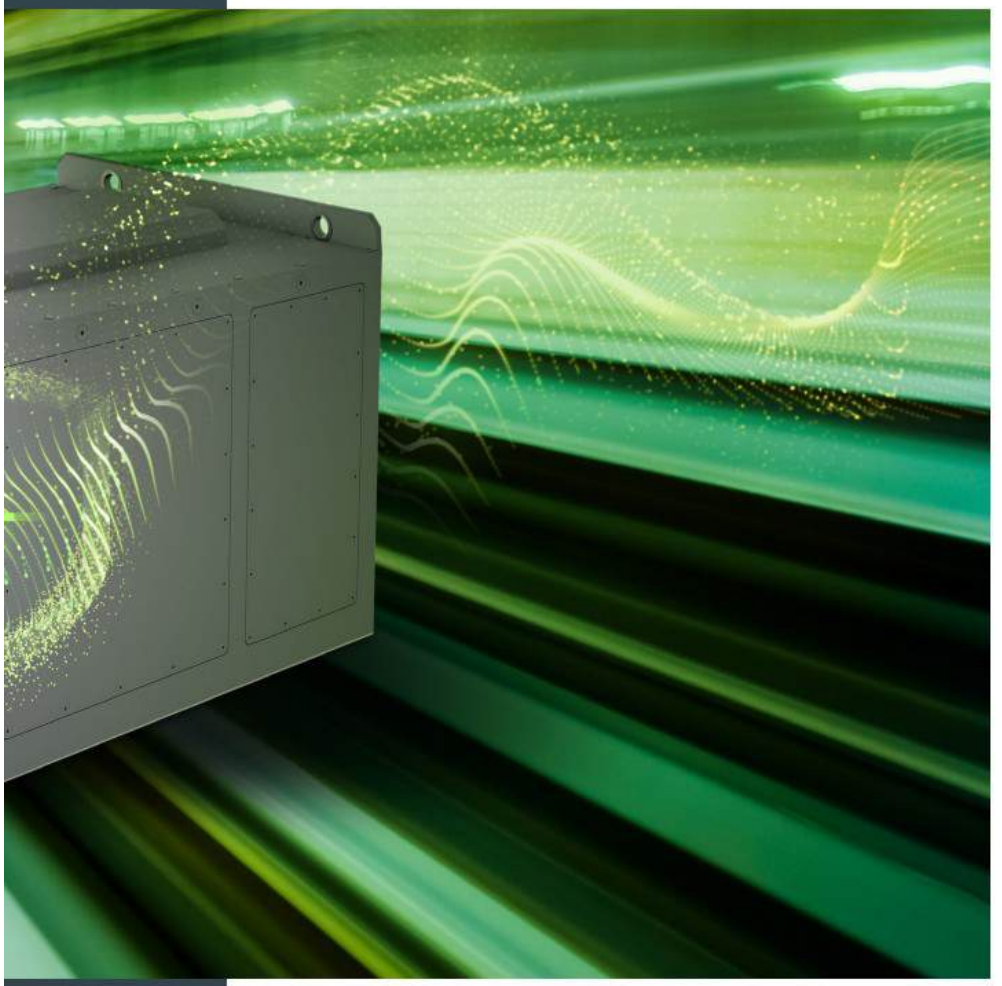


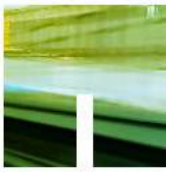
PASSIVE SAFETY

- Thick battery box walls
- IP54 or IP65 protection
- Fuses on main powertrain
- Short circuit protection
- Overcurrent protection

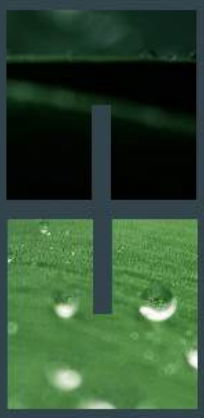
ACTIVE SAFETY

- Undervoltage and overvoltage protection
- Battery protected with high power contactors
- CAN controlled charging process
- Pilot contacts for anti-sparking





PURE ENERGY, MAXIMUM POWER



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