



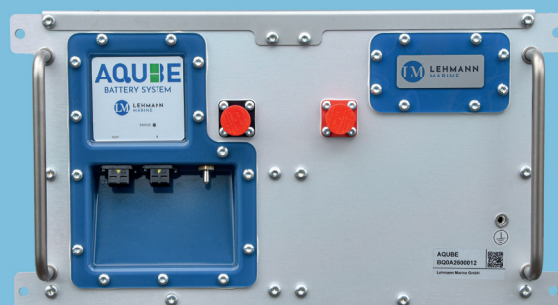
LEHMANN
MARINE

AQUBE
BATTERY SYSTEM



AQUBE FEATURES

- DNV & ESTRIN compliant
- Up to 2C charge/discharge
- Water-cooled
- Integrated BMS & pre-charge
- Compact & lightweight
- Scalable & modular design
- Flexible & easy installation
- Inherently safe LFP cells
- Zero Cobalt & Nickel



WATER-COOLED 2C LFP BATTERY SYSTEM

AQUBE features the compact and flexible design of our proven CUBE Battery System and the sophisticated water cooling technology based on our established COBRA Battery System. This combination results in the high-power energy storage solution AQUBE that incorporates safe lithium iron phosphate (LFP) cell chemistry with a charge/discharge rate up to 2C.

Enhanced safety is a considerable advantage of LFP cells. Compared to traditional nickel-manganese-cobalt (NMC) batteries, LFP batteries are much safer. Even in extreme situations where thermal runaway could occur, LFP batteries are not prone to fires. In a thermal runaway, only gas is released and vented outside. LFP batteries are environmentally friendly and safe for the maritime industry.

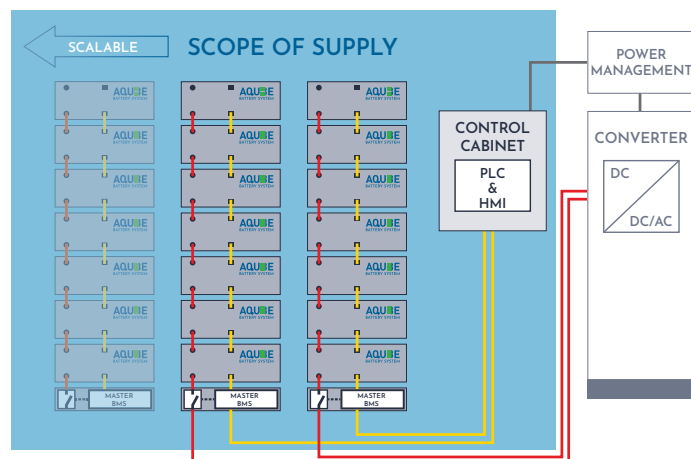
AQUBE is suited for a wide range of applications and various vessel types. High-power propulsion systems of larger vessels such as ferries, container feeders or OSVs can now utilise our safe and compact LFP battery technology. Short turnaround cycles of vessels will no longer be an obstacle when considering fully electric or electric hybrid propulsion.

Any scale of energy storage is available by freely configuring modular units in strings of up to 1,000 VDC. The battery system includes an integrated battery management system (BMS), a customised racking and a newly developed switch unit. AQUBE is ready for easy connection to the vessel's water cooling system for safe and reliable operation.

AQUBE FEATURES

- Flexible stacking to maximise battery room use
- Up to 11 AQUBE modules per battery string
- Up to 137.5 kWh and 1,000 VDC per battery string
- Cluster with up to 16 battery strings and 2.2 MWh
- Water-cooling technology ensures consistent temperature control across all cells, maximising cycle life
- Eco-friendly LFP battery without cobalt and nickel
- No propagation in case of thermal runaway on cell level, while fulfilling of highest safety requirements
- Flexible interface to battery management system (CanBus, ModBus or others)
- Includes multiple safety features
- Includes pre-charge functionality

AQUBE is a modular battery system with superior energy density. A cluster with up to 16 battery strings and one control cabinet provides a capacity of 2.2 MWh. AQUBE is scalable from a few kWh to several MWh.



The system allows for optimal use of the battery room space. LFP battery cells and permanent monitoring by the battery management system on cell, module and string levels guarantee the highest safety standards.

LFP chemistry does not catch fire during thermal runaway, short-circuit or mechanical damage, which makes AQUBE a safe energy storage solution for the shipping industry.



Picture © Diverse Marine

APPLICATION

- Electric drives
- Hybrid drives
- Peak shaving
- Hotel load
- Load levelling
- Energy storage

TECHNICAL DATA



MODULE

Chemistry:	LFP
Capacity:	12.5 kWh
Voltage:	87/77/60 VDC
(Max./Nom./Min.)	
C-Rate cont.*:	1.5 C
Energy density:	127 Wh/kg & 219 Wh/l
Size:	400/250/572 mm
(Width/height/depth)	
Weight:	99 kg
Cooling liquid:	Water-glycol
Cooling inlet temp:	15-25°C**

STRING

Modules max.:	11
Capacity max.:	137.5 kWh
Voltage max.:	1,000 VDC

CLUSTER

Strings max.:	16
Capacity max.:	2.2 MWh
Clusters max.:	unlimited

* Cont.: continuous charge and discharge cycles
** Depending on C-Rate