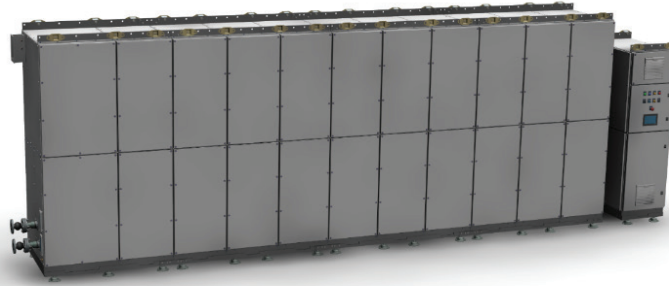




KONGSBERG

# ENERGY STORAGE



The demand for green solutions in the maritime industry is driving an increased use of clean electrical power systems that utilise energy storage. The energy storage unit from Kongsberg Maritime is specifically designed for demanding marine applications and optimised for both hybrid and pure electric vessels.

## KONGSBERG ENERGY STORAGE SYSTEM

### Energy storage unit

#### About

Energy storage unit has a modular design to enable highly cost efficient, standardised and scalable solutions. The sealed cabinet has a liquid thermal management system which ensures that the battery cells is safely and efficiently cooled to deliver the calculated life-time of the application.

#### Easy Installation

The energy storage unit is pre-assembled and transported in sections for simple installation. Modules within the energy storage unit can easily be mounted after the cabinet structure is in place to avoid heavy lifting of the sections, and also to avoid damage during a ship's construction period. The cabinet structure protects against solid foreign objects and ingress of water.

#### BMS and active balancing

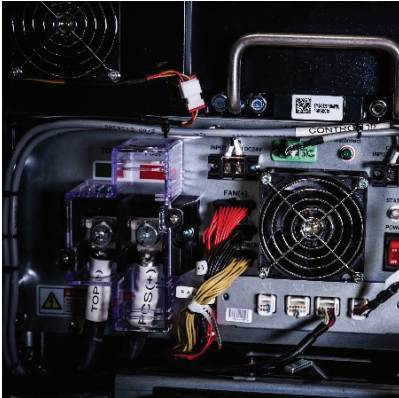
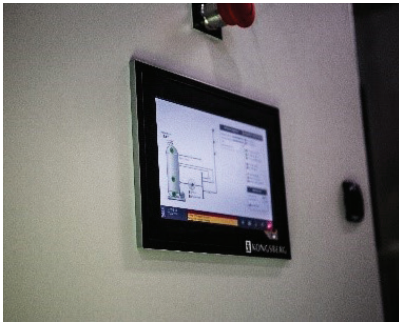
The Battery Management System (BMS) is developed to meet the highest requirements for maritime applications. The cells are monitored and logged for voltage, temperature and current. The redundant safety controller developed by Kongsberg Maritime constantly monitors the temperature, and has an independent safety shutdown. In addition, the BMS features active balancing during cycling, for optimal energy storage and battery life.

#### Safety

Energy Storage Unit embraces the Kongsberg Maritime multiple safety barrier principle. In case of thermal runaway in a cell or multiple cells, the safety systems prevents propagation. The propagation is limited and controlled by use of passive heat isolation, active air and liquid cooling. No flammable or toxic gasses are vented into the ambient space, but lead to open air or to a safe location with an independent ducting system. The first safety barrier is a passive heat insulation between cells to avoid thermal runaway propagation inside a battery module. The second barrier is automatic air cooling system that further enhances heat insulation between cells, preventing cell-to-cell propagation. The third barrier is a water cooled

#### BENEFITS

- Water cooling - Ensures accurate, efficient and safe cooling of the energy storage unit
- Isolated internal environment - Ambient environment is isolated from the internal environment, simplifies integration
- Safety - A Multi-barrier safety approach to ensure that the system can safely be installed in maritime applications
- Life cycle cost - Designed for demanding maritime applications that are primarily energy capacity driven, at an optimal life-cycle cost

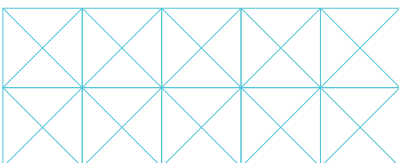


system which prevents module-to-module propagation if a malfunction in the other safety barriers occur. This multi-barrier safety approach ensures that the Kongsberg Maritime energy storage system can safely be installed in maritime applications.



## TECHNICAL DATA

String data	SAVe Energy	SAVe Power	SAVe Energy +
Chemistry	NMC	NMC	NMC
Energy capacity	92,3-112 kWh	100-150 kWh	150-203 kWh
Cell energy capacity	64Ah	78Ah	100Ah
Maximum CP-rate	2	3	1
Maximum current	314 A	560 A	280 A
DC-main supply	588-1000VDC	545-1082VDC	614-1145VDC
Cabinet IP rating	IP 54	IP 54	IP 54
Weight	~1130 kg	~1620 kg	~1510 kg
Dimensions	H: 2380mm	H: 2380mm	
Custom dimensions available on request	W: 635mm	W: 950mm	
	D: 1000mm	D: 1000mm	
Certification	Class and Flag-state		



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