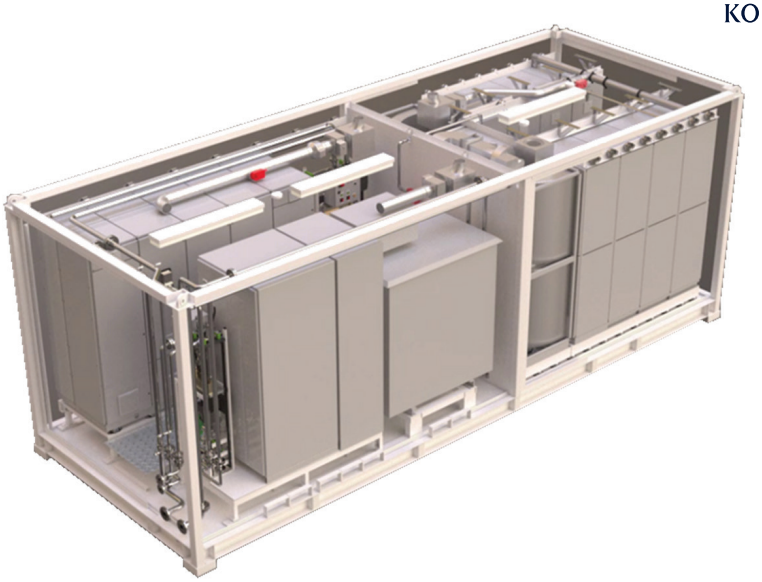
ENERGY STORAGE DECKHOUSE

KONGSBERG



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 system deckhouse from Kongsberg Maritime is specifically designed for demanding marine applications and optimised retrofitting existing vessels.

KONGSBERG ENERGY STORAGE SYSTEM

ESS Deckhouse

About

Kongsberg Maritime has several energy storage deckhouse solutions to meet the requirements our customers have towards charters and regulators for reduced emissions and safe operation. All solutions are prepared for shore connection according to the new IEC recommendations.

Design

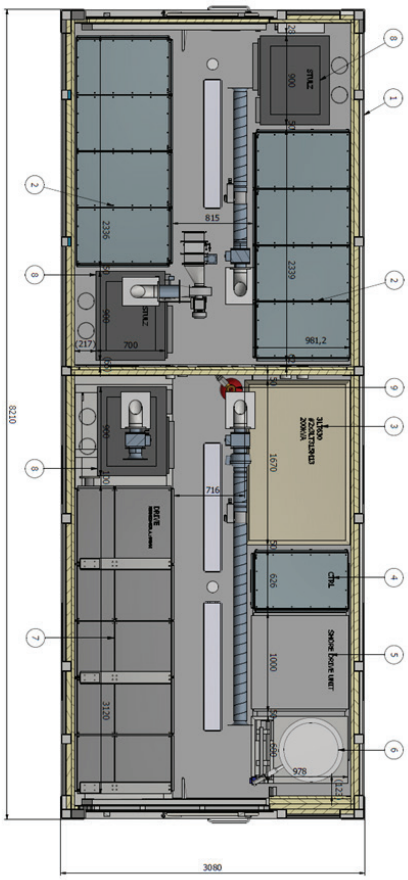
The ESS deckhouse is a compact solution that consists two individual rooms and is designed per class rules applicable for deckhouse. The structure protects against solid foreign objects and ingress of water

The energy storage room consists of batteries and axillary equipment needed to operate the equipment. The equipment inside the energy storage room is ex-rated to avoid a potential explosion from occurring

The other room is the power electronic section. This section normally consists of a converter, transformer and auxiliary equipment needed to operate the converter. The ESS deckhouse is pre-assembled for simple installation.

BENEFITS

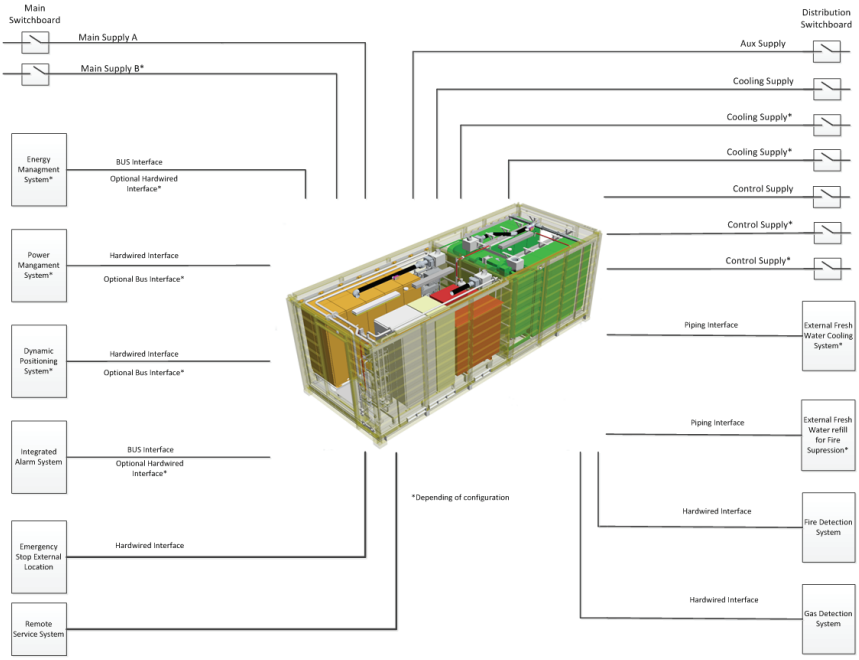
- Type Approved and pre certified by class authority
- Easy integration
- Designed with multiple safety barriers incase of thermal runaway
- Unique and patented solution enables use of one battery connected to several main bus segments both in open and closed bus operation
- Unique and patented
- energy control system for hybrid power systems utilising load predication from K-POS to extend battery life
- Can be interfaced to any power system



Dimensions: Up to 44ft
Energy: Up to 1,6MWh
Power: Up to 5 MW
Voltage: LV and HV

Product integration

The ESS deckhouse is developed to meet the highest requirements for maritime applications. The deckhouse must be placed and fixed in compliance with the relevant class society and flag-state requirements. Below is a generic interface presented for a typical integration



Safety

The ESS deckhouse contains the Kongsberg Maritime energy storage unit. The Integrated battery system 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. Toxic and flammable gasses are 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 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.

Internal equipment

Deckhouses contains the following internal equipment:

- ✓ Energy Storage Unit
- ✓ Energy Storage Converter
- ✓ AC-Units
- ✓ Fire Suppression
- ✓ Cooling Skid*
- ✓ Shore Drive Unit*
- ✓ Transformers*
- ✓ Fan coils*
- ✓ Propagation Control System/ Water-mist*
- ✓ Ventilation and gas extraction system
- ✓ Lights and emergency lighting
- ✓ Fire and Gas detectors
- ✓ Hand held fire suppression
- ✓ Drain system

** Depending on configuration*

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