

K-POWER



KONGSBERG

K-Power Dynamic Hybrid Control

Turn-key refit battery hybrid solution for OSV

Kongsberg Maritime together with strategic partners now offers a turn-key solution that includes a complete energy storage and energy control system. Our unique and patented energy control system for hybrid power systems extracts from and shares information between all components in the digital power layer. Tight synchronized integration delivers unique features at the cutting edge of DP technology.

Core components of the novel Dynamic Hybrid Control system includes Dynamic Load Prediction and Dynamic Inertia Control combined with an automatic start/stop strategy. Predictions of future thruster demand controls the energy production for generators and battery charge / discharge. Load dynamics shared between the batteries and generators ensures optimization for both generator limitations and battery lifetime.

Increased redundancy, performance and responsiveness, efficient operations and reduced maintenance are some of the other benefits.

Our mission is to help our customers lower the lifetime cost and maximising their investment in hybrid power. Dynamic Hybrid Control offers significant fuel efficiency gains, reduced emissions and an economically beneficial step towards a greener and cleaner environment.

BENEFITS

Reduce cost and emissions as well as improve competitiveness of your vessel with KM refit battery hybrid solution.

Operational profile analysis services

To ensure an optimal solution for your vessels, KM will perform an Operational Profile Analysis that includes:

- Selecting optimal type of battery
- Calculating needed battery capacity
- May support to calculating potential fuel savings
- Simulation of vessel behavior in DP operation

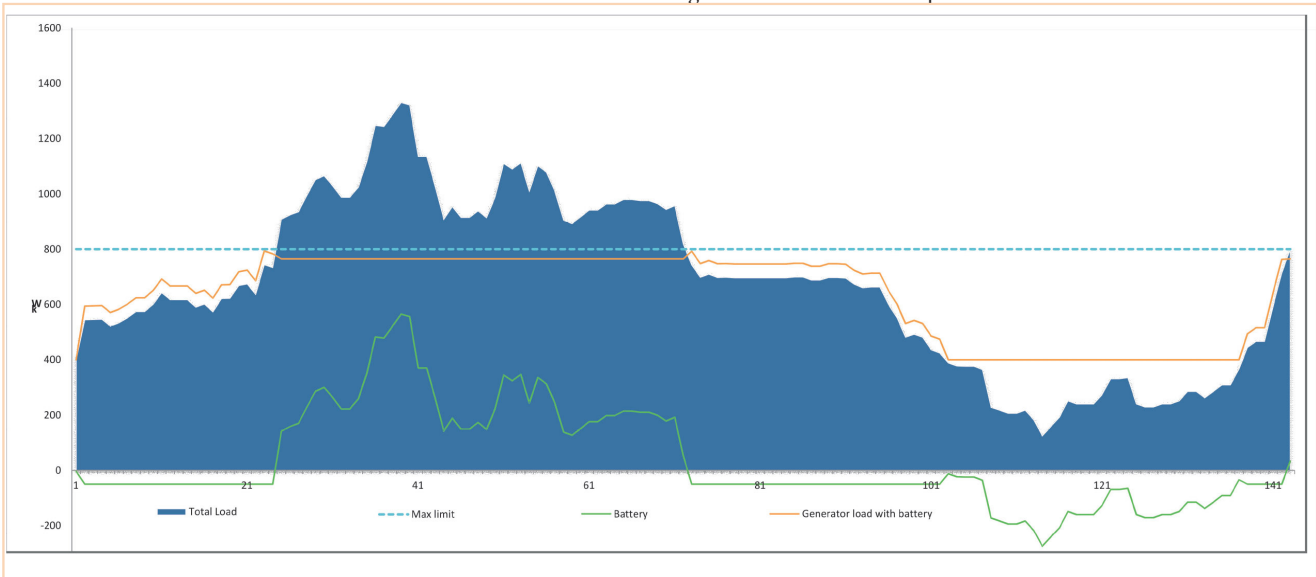
Modular design and benefits through integration

Dynamic Hybrid Control is designed with flexibility in mind and we offer optimized solutions for different vessel configurations:

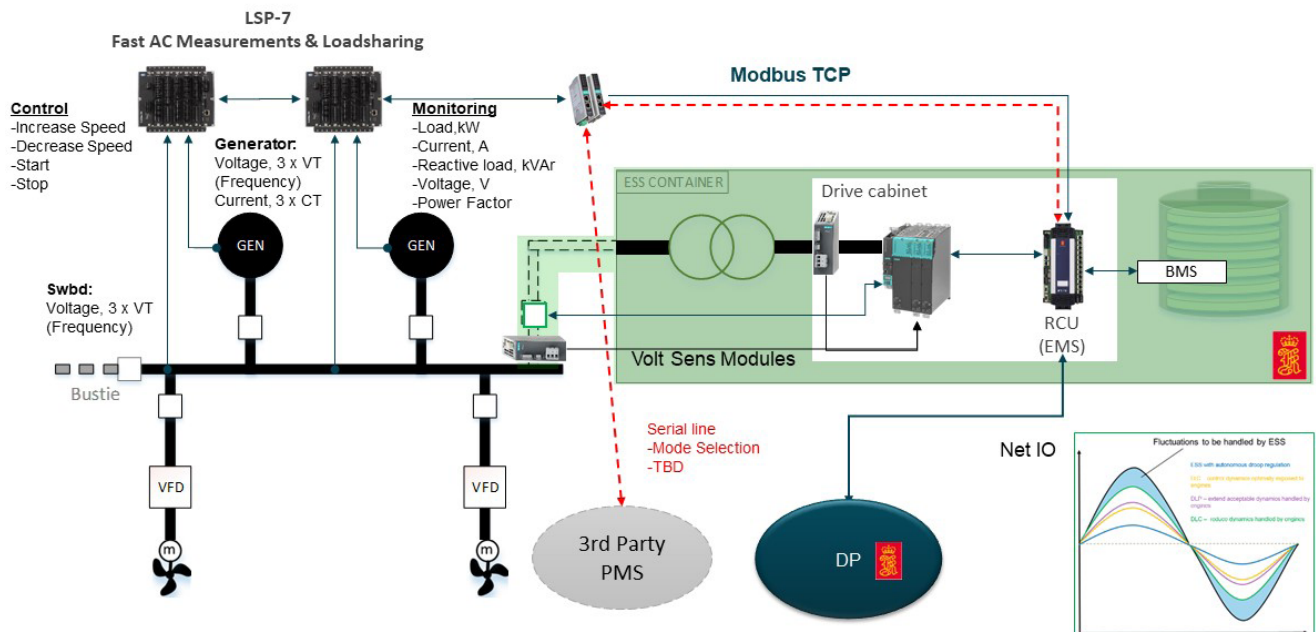
- K-Pos and KM Energy Storage System (3rd party Power Management System)
- K-Pos, KM Energy Storage System, and KM PMS

The technological edge of the K-Power Dynamic Hybrid Control solution lies within the integration between the DP control system, power management system, and the energy storage system.

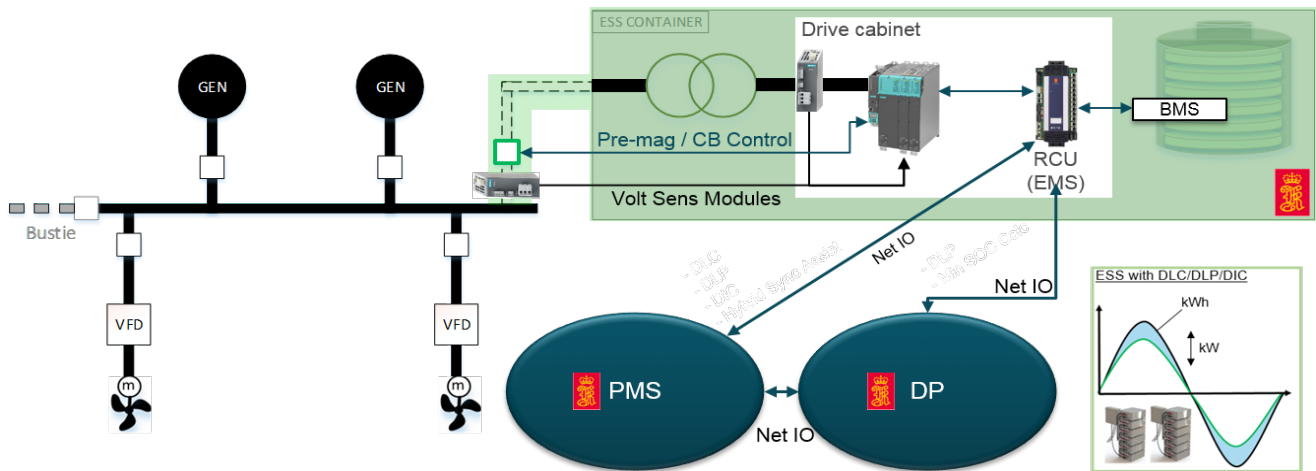
Additional benefits and functionality are unlocked as the integration between the KM products increases.



Solution topology - K-Pos and KM ESS



Solution topology K-Pos, KM ESS and KM PMS



Benefits

Standard hardware solutions:

- Proprietary interface between ESS and DP demanding less commissioning time and improved performance

Energy Control functions:

- ESS as redundant power supply (spinning reserve) compliant with battery power notation
- Limits load fluctuations which stabilizes the load of the main engines (increases available power for propulsion and other processes)
- DLP (ESS) Load predictions forwarded to EMS/ESS for improved handling of the load dynamics

- Minimum SOC is set based on the calculated remaining life time for batteries in case of worst single failure
- DIC (Lite/Static ramp) is looking at the total available inertia on the power plant in all different modes of operation and coordinates this with DP. The DP will distribute the available inertia to all thrusters, matching the load ramps with the engine performance
- Hybrid sync assist, reduces bustle sync time
- Island Mode allows power plant to run solely on battery

Functionality overview

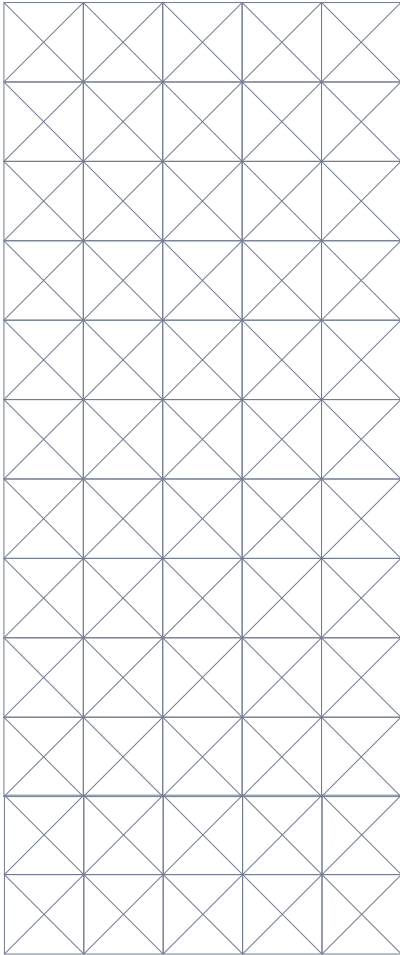
EMS Functions	K-Pos Stand-alone	K-Pos and KM PMS
Battery Notation	✓	✓
Island Mode	✓ ²	✓ ²
ESS Droop (Peak shaving)	✓	✓
Droop/Power Combi mode	✓ ¹	✓
DLP (ESS)	✓	✓
DLP (Gen)	✓ ⁴	✓
DIC	✓ ³	✓
Hybrid Sync Assist	✓ ¹	✓
DG Start/Stop	✓ ¹	✓

1) Depends on info from 3rd part PMS

2) Requires class related updates of the PMS and power plant HW

3) Foreseen additional fast AC measurement modules from all producers

4) Foreseen an additional RCU controller per MSWB and 3rd party PMS ready for load sharing by Energy Management System (EMS)



Reference

Type	Project name	Owner	Yard	Class
PSV	Viking Energy	Eidesvik	Kleven + Westcon	DnV AUTR Battery Power
Bulk Carrier	Star Laguna	Grieg Star	Hyundai Mipo + offshore retrofit	DnV AUTR Battery Safety
Offshore Supply Vessel	Seacor Maya	MEXMAR/Seacor Marine	Bollinger Morgan City	ABS DPS-2 Battery-Li
Offshore Supply Vessel	Seacor Warrior	MEXMAR/Seacor Marine	Tbd	ABS DPS-2 Battery-Li
Offshore Supply Vessel	Seacor Viking	MEXMAR/Seacor Marine	Tbd	ABS DPS-2 Battery-Li
Offshore Supply Vessel	Seacor Azteca	MEXMAR/Seacor Marine	Tbd	ABS DPS-2 Battery-Li

