

# DEPENDABLE HYBRID POWER

## THE VIRTUAL GENERATOR THE SOLUTION

### STORE AND RETRIEVE ENERGY TO IMPROVE EFFICIENCY AND COMFORT

#### IMPROVED GENERATOR EFFICIENCY AND EMISSIONS

Under loaded generators operating outside their efficiency zones often causes increased fuel consumption, leading to higher emissions and unexpected maintenance issues. The Magnus ES200 Energy Storage System can maintain the generator operation inside the efficiency regions saving time, money and the environment.

#### SEAMLESS STORAGE OF ENERGY

As the ships load fluctuates excess generator power can be stored by the energy storage system. Stored energy can then be used when power demand exceeds that of the generator(s). Using the energy storage system during peak periods prevents additional generators from starting. Operating the ship in this configuration offers significant fuel savings which would have otherwise been lost. Additionally maintaining the generator at its nominal load keeps generator run hours, maintenance and exhaust fumes to a minimum.

#### VIRTUAL GENERATOR MODE

The Virtual Generator operating mode is unique to the ES200 power electronic platform and mimics the behaviour of regular rotary generators. Interfacing the ships generator(s) with a balanced 3-phase voltage delivers a true dynamic system with bi-directional connectivity. The benefit of this is a natural connection between the generator(s) and the Energy Storage System.

In addition physical inertia is modelled by the system, providing a stable response to the grid frequency.

The ES200 Virtual Generator can control its own voltage and frequency, enabling it to create an island grid should a problem occur with the generators or shore supply. In such condition the ES200 will support the load without disturbance.

Changing modes between power flow and voltage & frequency control is possible without stopping the ES200 and is achieved with seamless transfer of power.

