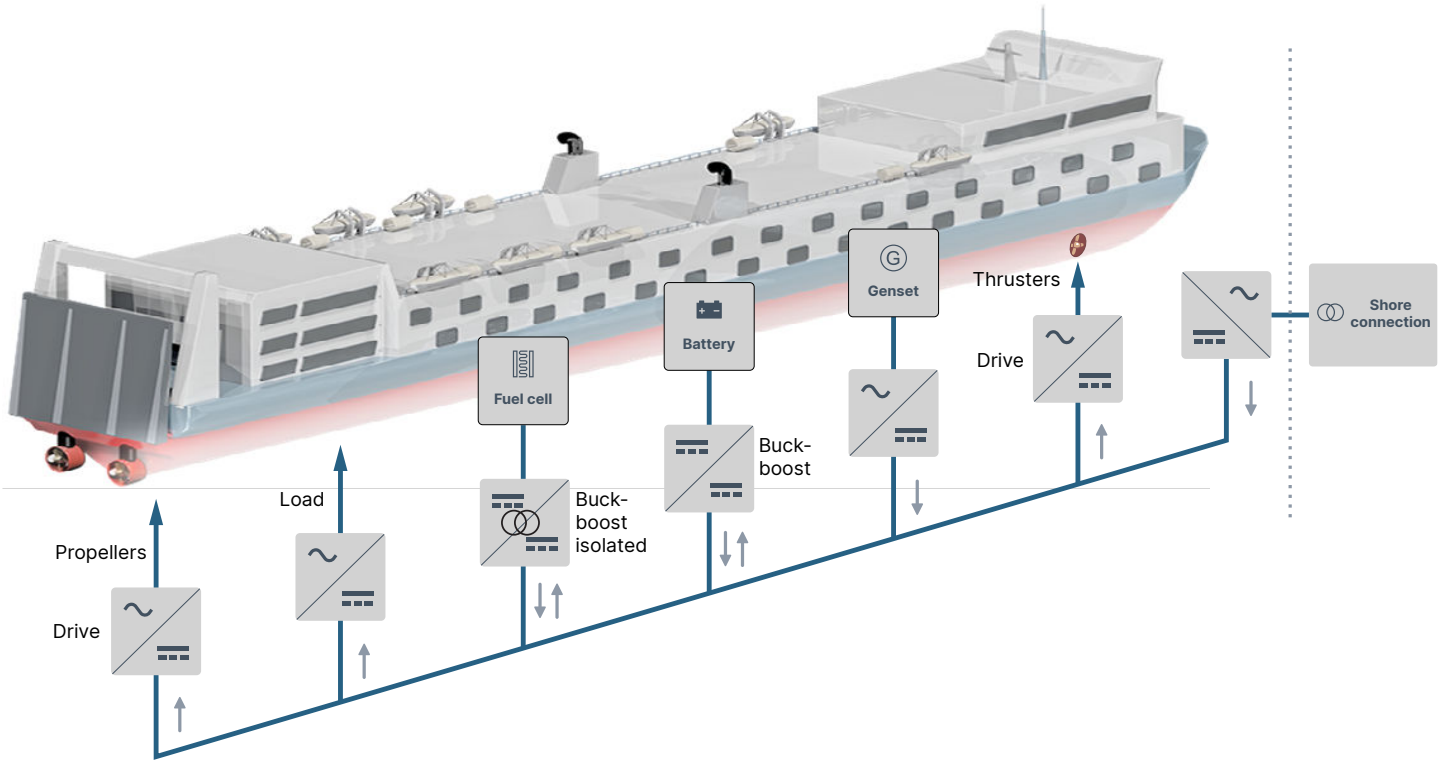
Introducing the iE Convert



For almost 100 years, DEIF has provided reliable products to the marine industry. This includes bridge instrumentation and advanced controllers. DEIF provides customer support with a global presence.

We have partnered with AVL and Wolfspeed to create marine power converters based on the latest silicon carbide technology. Power converters engineered by AVL have been used in demanding applications for years. Our collaboration with Wolfspeed ensures a steady supply of reliable silicon carbide MOSFETs.

Why silicon carbide?

Silicon carbide (SiC) operates at very high switching frequency. The high switching frequency leads to smaller filters, and there is low energy loss across a wide load range. Thanks to the smaller filters, SiC power converters are smaller and lighter than similar products based on IGBTs.

Compared to IGBTs, the power converters require 60 % of the volume. This saves valuable engine room space. The power converter weight is also 30 to 40 %. The lower weight means lower energy consumption over the life of the vessel.

99%

Lower energy losses mean a higher efficiency, which adds even more to the fuel savings. Lower losses also means less cooling demand. In addition, SiC technology has an almost flat efficiency curve. This means energy savings at all load factors (rather than at one sweet spot).

Faster switching means more accurate energy transformation. Our converters deliver higher quality power with minimal harmonic distortion.

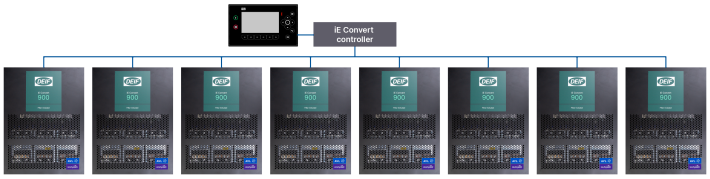
SiC MOSFETs can withstand a junction temperature up to 175 °C, which is much higher than IGBTs. This thermal performance enables operation at sustained higher loads and flexibility in handling peak loads.

On hybrid vessels with multiple energy sources, such as fuel cells, it is essential to prevent stray currents. Our technology provides isolation through soft-switching CLLC topology and a switching frequency up to 75 kHz.

How it works

iE Convert is easy to install and simple to use. The platform uses modular design, with three form factors. As a result, the iE Convert offers a wide range of power conversion capacity, from 125 kVA to 6 MVA.

You can connect the iE Convert controller to a DEIF iE controller. Up to eight power blocks can run in parallel and synchronise, with less than 5 % capacity derating.



For seamless power/energy management or PLC integration, you can use the CODESYS platform from DEIF. Use the MATLAB platform for simulation and verification.

Power block	Power	AC current
iE Convert 900	900 kVA	1100 A
iE Convert 500	500 kVA	640 A
iE Convert 125	125 kVA	175 A

Applications

DC-DC
A buck-boost DC-DC converter.

Example: Battery with a DC source. Step-down for charging. When discharging, step-up to the grid voltage.

Galvanic DC-DC
A buck-boost DC-DC converter with galvanic isolation. You can use it to isolate multiple power sources. Each connection requires two power blocks.

Example: Fuel cells.

DC-AC Drive
A DC-AC converter, used as a drive.

Example: Propulsion.

AC-DC Grid
An AC-DC converter, to connect an AC power source to a DC grid.

Example: Diesel generator, shore connection, connecting a hotel load to a DC grid.

Specifications

Power losses: 1 to 3 %
Switching speed: 24 to 75 kHz
AC nominal voltage: Up to 690 V AC, at 50 or 60 Hz, and up to 400 Hz for special cases
DC nominal voltage: 750, 1100, or 1500 V DC
Power/energy source: DC, 3-phase AC
Protections: Voltage, current, and fault monitoring
Supply: 24 V DC, 5 A

Housing: IP22, or none (IP00)
Ambient temperature: -20 to 60 °C
Coolant temperature: 20 to 40 °C
Humidity: 95 % RH, non-condensing
Altitude: Up to 2000 m

Communication: Modbus interface, EtherCAT, and/or PMS/EMS and Codesys

Standards and approvals: DNV-GL (Marine), UL, Cybersecurity, CE, RoHS

iE Convert power blocks

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