

Danfoss

ENGINEERING
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iC7-Hybrid | Brochure

Need **intelligent power conversion** to drive the **energy transition?**



Competitive
clean energy enabler

iC7-Hybrid highlights

- Optimized for all power conversion applications
- Unrivalled power density
- Robust performance in harsh environments
- Advanced grid control features with ultra-fast response
- State of the art paralleling features extend power range significantly
- Built-in cybersecurity for Industrial IoT
- Model-based design enables accurate simulation models
- Freely customize your interface and functionality
- Reduced OPEX with energy savings

[🔗 Explore the specifications](#)

Contents

- 🔗 Features
- 🔗 Application software and hardware
 - Grid Converter
 - Generator application
 - DC/DC Converter



Need **intelligent power conversion** to drive the **energy transition**?

The future is electric, and the iC7-Hybrid is your ticket to join the energy transition. This intelligent converter is the most competitive choice for system integrators and OEMs to build clean energy systems. Tap into energy savings with hybrid and pure electric solutions in marine power conversion. Or decarbonize in onshore smart grid applications such as energy storage, shore supply, fast charging, and hydrogen electrolysis (P2X).

Using iC7-Hybrid, you can reduce emissions to meet carbon goals profitably.

The iC7 series covers all the building blocks for power conversion with scalable control and software platform. State-of-the-art power control and

application features enable easy power system design for both new and existing systems. iC7 series offers an ever-expanding power range and frequent new features.

Pack in more power, with ultra-compact hardware featuring unique integration of filters below power units.

Reduce time to market and de-risk your project using iC7 simulation models and MyDrive® digital tools to perfectly optimize your systems. Overcome application challenges before they arise in practice.

iC7-Hybrid power converters deliver the highest level of quality and reliability thanks to unmatched expertise, latest simulation techniques and exhaustive testing.

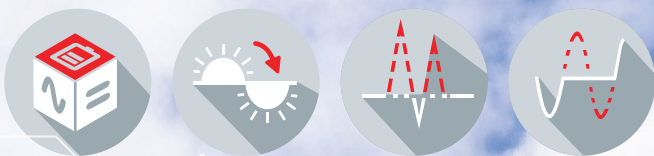
Applications

Choose the dedicated application software and hardware best suited to your electrification task:

- **Grid Converter**, for smart grid applications such as grid forming, hydrogen electrolysis, and flexible AC/DC power conversion
- **Generator**, Ideal for variable speed power generation such as shaft generators. Enables multipurpose use cases such as motor/generator control and shore connection with one physical hardware
- **DC/DC Converter**, optimized for connecting an energy source to a DC-bus

At a glance

- Voltage rating:
 - 3 x 380-500 VAC, 460-800 VDC
 - 3 x 525-690 VAC, 640-1100 VDC
- Current rating: 170-6400 A
- Power range: 0.25-6.8 MVA and beyond



Features to **enhance competitiveness**

Ultra-fast power conversion control

Fast control loops can handle rapid power system dynamics and enable you to use new control schemes. The iC7-Hybrid converter transitions smoothly between multiple control modes during operation, enabling easy power management. Ideal for all power control objectives: AC/AC, AC/DC, or DC/DC, iC7-Hybrid puts the agility of exceptional power conversion in your hands.

Secure-by-design

Your converter is equipped with market-leading hardware-based protection against unauthorized access with a built-in crypto chip on the control unit. Access and transfer data securely via cloud. Tamper-proof hardware protects your intellectual property for customized software. Encrypted connectivity means you can connect with confidence to your PC tools.

Use a microSD card to copy settings, log data, download software and activate additional features – all protected by the crypto chip ensuring end-to-end encrypted data transfer.

-  **Security**
-  **Security video**

Simulation reduces time to market

Remove the constraints of the physical environment and open up new opportunities using iC7 simulation models which perfectly mirror the converter or drive.

You can predict performance, test scenarios, streamline commissioning, and collaborate across teams and locations in an open environment.

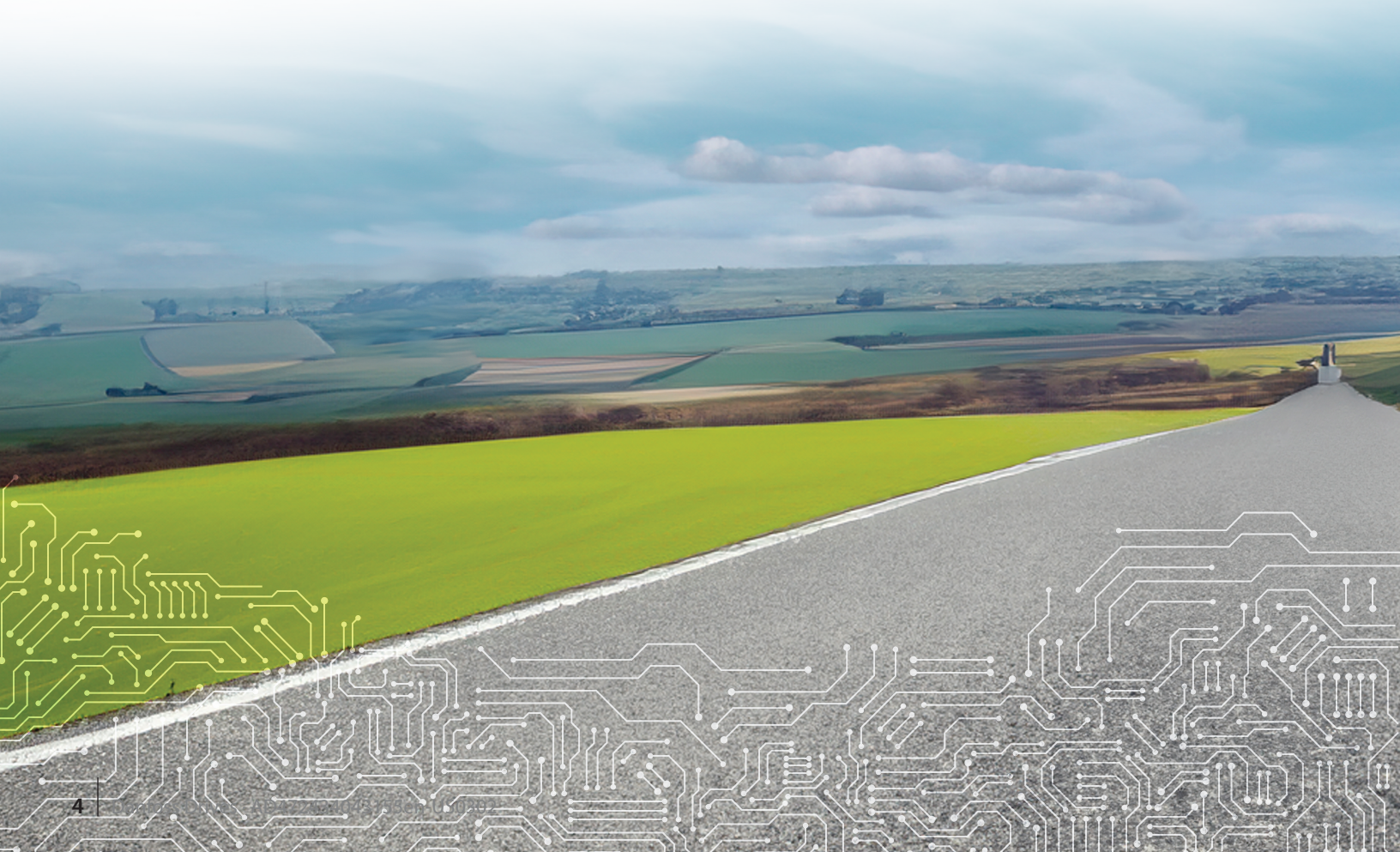
Reliably validate interoperability of systems, using high-fidelity hardware-in-the-loop (HIL) simulation support from Danfoss.

The iC7 platform is founded on model-based design, which ensures the simulation models are always valid: up to date and accurate.

These models comply with the FMI standard and are easy to integrate in your simulation platform.

 **MyDrive® Virtual**

 **fmi** Functional Mock-Up Interface



Quality in focus

Reliable and predictable operation has been a key driver. With an ISO 9001-certified and IATF 16949-compliant quality system combined with use of 6-Sigma principles, quality and reliability are at absolute market-leading standards.

Reliability is assured by design based on application load profiles and data collected from intensive simulations and feedback from exhaustive testing.

The finished products are 100% full load tested ensuring reliability before leaving the factory.

Quality video

Supported by MyDrive® tools

You can use MyDrive® tools on the device of your choice, supporting the entire lifecycle of the iC7 drive; from selection and dimensioning, through programming and commissioning, to maintenance and support during operation.

MyDrive® Insight

Engineering support

Danfoss provides an extensive selection of support material and tools to help in engineering, such as:

- Dimensioning tools, such as MyDrive® Select, MyDrive® Harmonics and MyDrive® ecoSmart™
- EPLAN P8 macros
- Dimensional and electrical drawings
- Local expert support
- Engineered-to-order enclosure solutions

Application Development Centers

DrivePro® Lifecycle Services

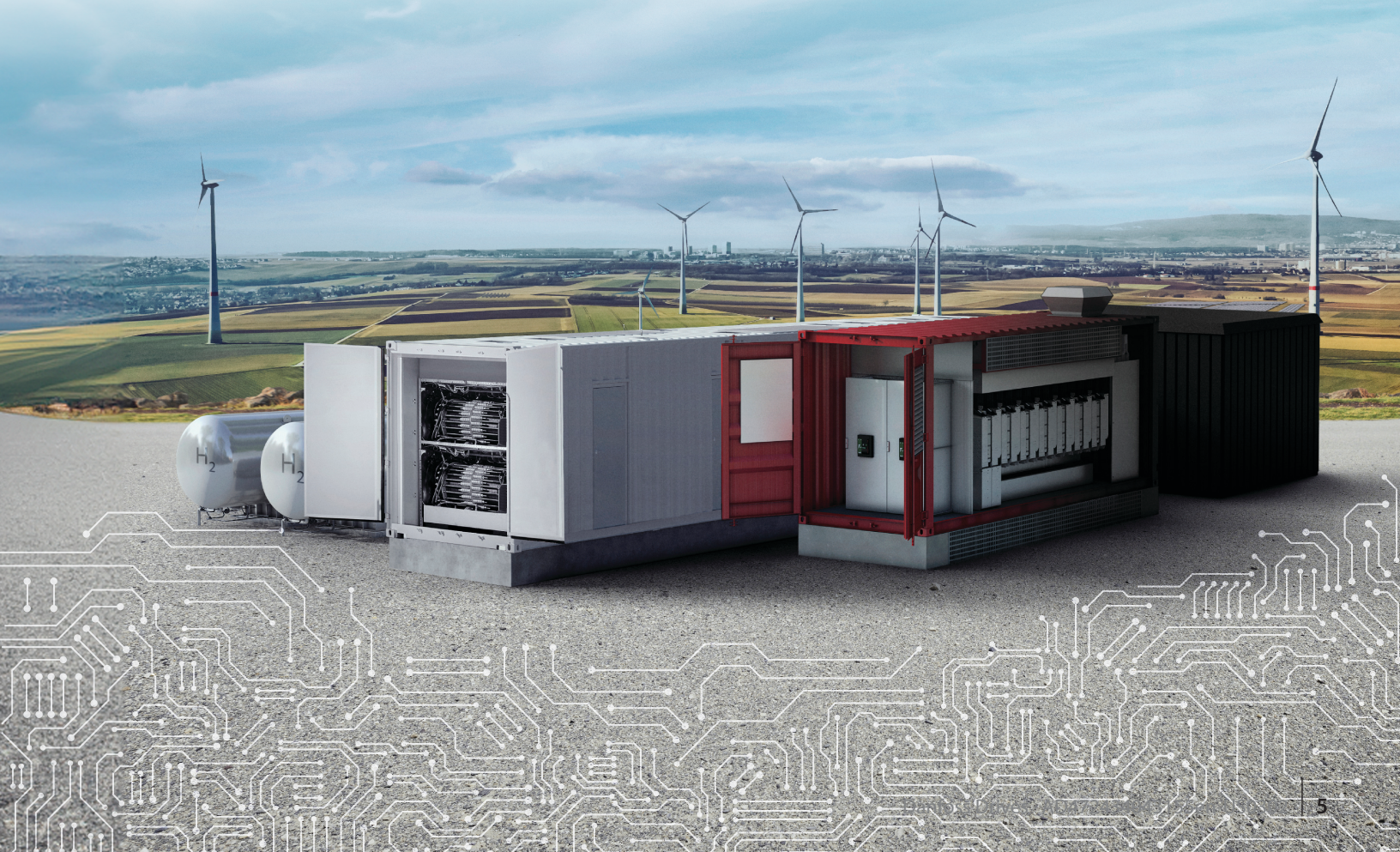
We understand that every application is different. Having the ability to build a customized service package to suit your specific needs is essential.

DrivePro® Lifecycle Services is a collection of tailor-made products designed around you. Each one engineered to support your business through the different stages of your product life cycle.

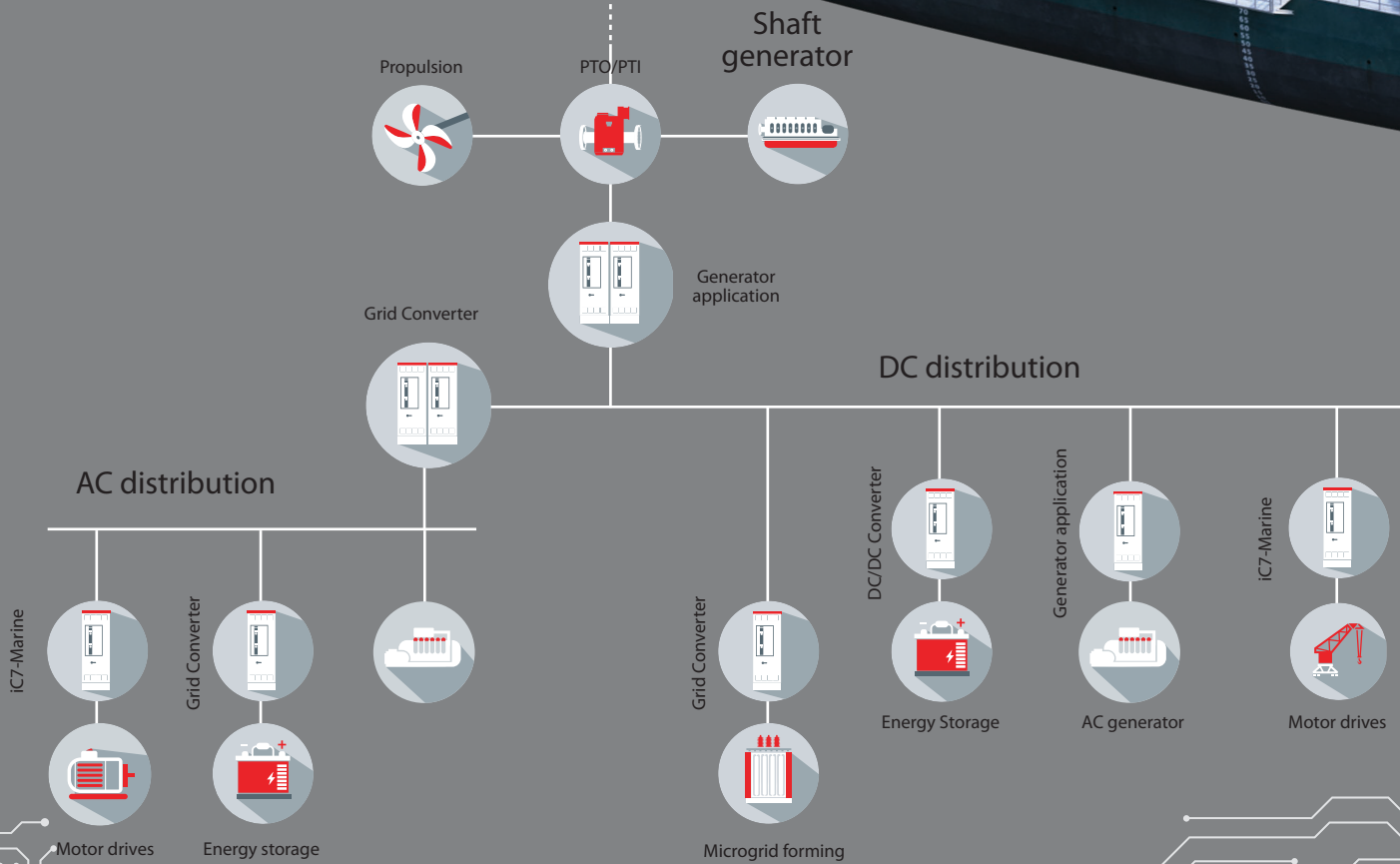
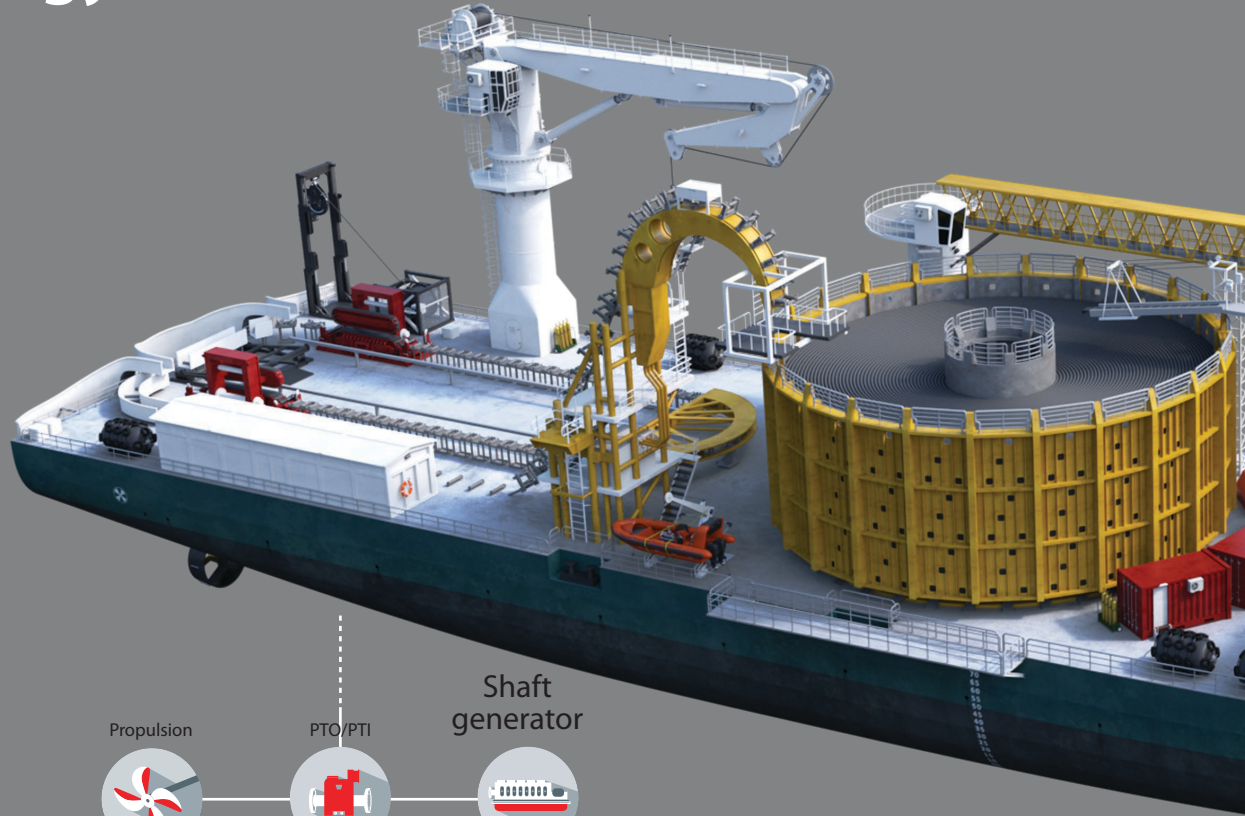
From optimized spare-part packages to condition-monitoring solutions, our products can be customized to help you achieve your business goals.

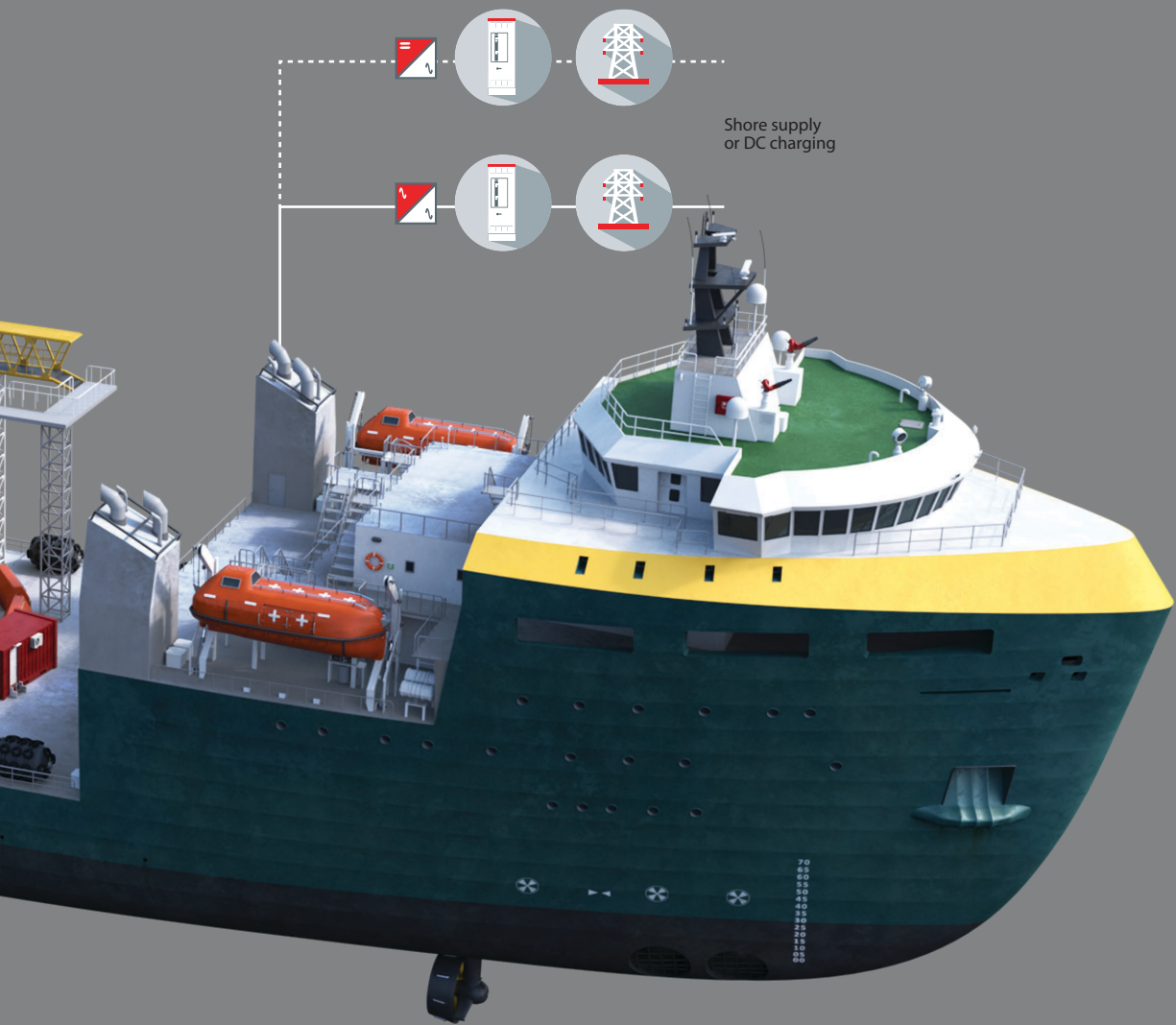
With the help of these products, we add value to your application by ensuring you get the most out of your power converter.

DrivePro® Lifecycle Services

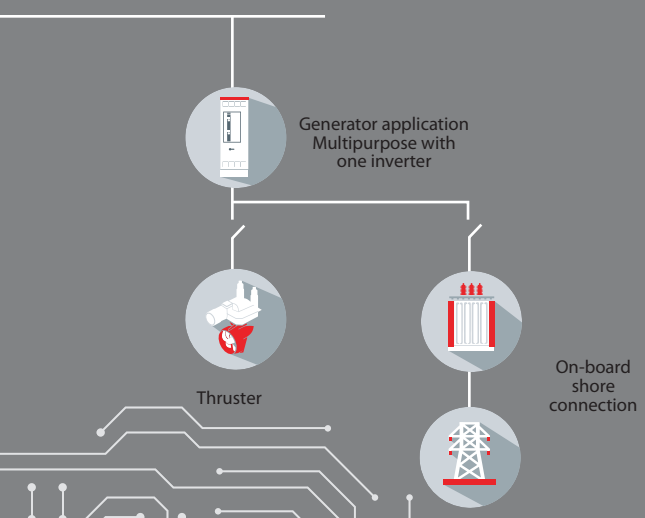


iC7 series supports every element in the energy transition





Shore supply
or DC charging



Generator application
Multipurpose with
one inverter

Thruster

On-board
shore
connection

Flexible and compact iC7-Hybrid power converters are ideal for a wide range of hybrid and electric applications. They enable you to design the best system possible with low complexity. Tailor the solution to your specific needs, so you get a plug-and-play system with maximum performance and reliability.

Dedicated application software and hardware – for **intelligent grid control**

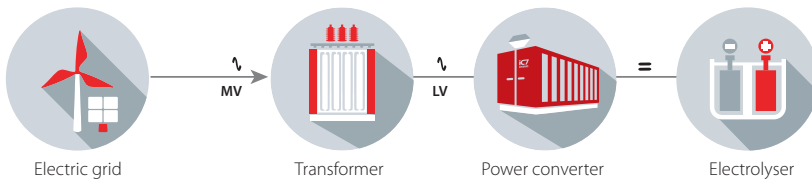
Grid Converter application software is dedicated to grid forming, advanced grid control and bi-directional AC/DC power conversion. Grid Converter is an ideal solution for smart grid applications such as

- micro grid forming
- AC-coupled energy storage
- shaft generator
- DC power supply for hydrogen electrolysis
- and other flexible AC/DC power conversion applications.

Grid Converter provides the flexibility to choose the control objective from DC-voltage control, grid AC-voltage and frequency control as well as direct active and reactive power control. The Grid Converter application software gives you:

- Flexible operating modes and reference handling for streamlined power management
- Seamless online transitioning between grid-following and grid-forming control unlocks new system design possibilities

- Fast control loops meet the modern low-inertia network requirements
- High short circuit current injection capability reduces oversizing which leads to space and cost savings
- Unrivaled paralleling solutions for high power installations
- Provides resilience with blackout prevention and black-start capability



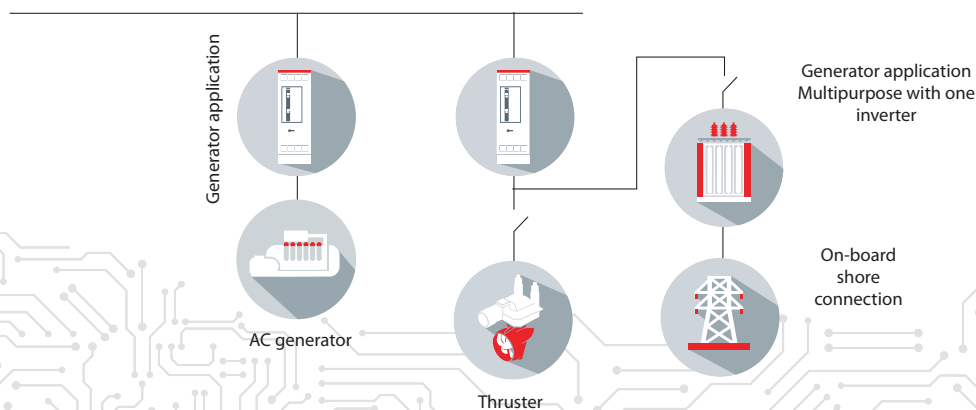
– for **intelligent power generation**

Generator application software enables the flexibility of a stable DC-voltage reference for variable speed power generation. It is compatible with all modern highly efficient induction, permanent magnet and synchronous generator types from any supplier. Excellent motor or generator control performance is achieved in speed, torque, power and DC-voltage control even without an encoder.

It efficiently handles the shaft generator control with predefined PTI/PTO operation modes. The software ensures reliable and uninterrupted power generation with advanced motor stall and generator overload protection. Its multipurpose functionality supports cost-saving by using the same hardware for shore connection (AFE) and motor or generator control.

Generator application use cases:

- Shaft generators
- Auxiliary generators
- Motor or generator control and on-board shore connection multipurpose use cases



– for **energy source** and **storage applications**

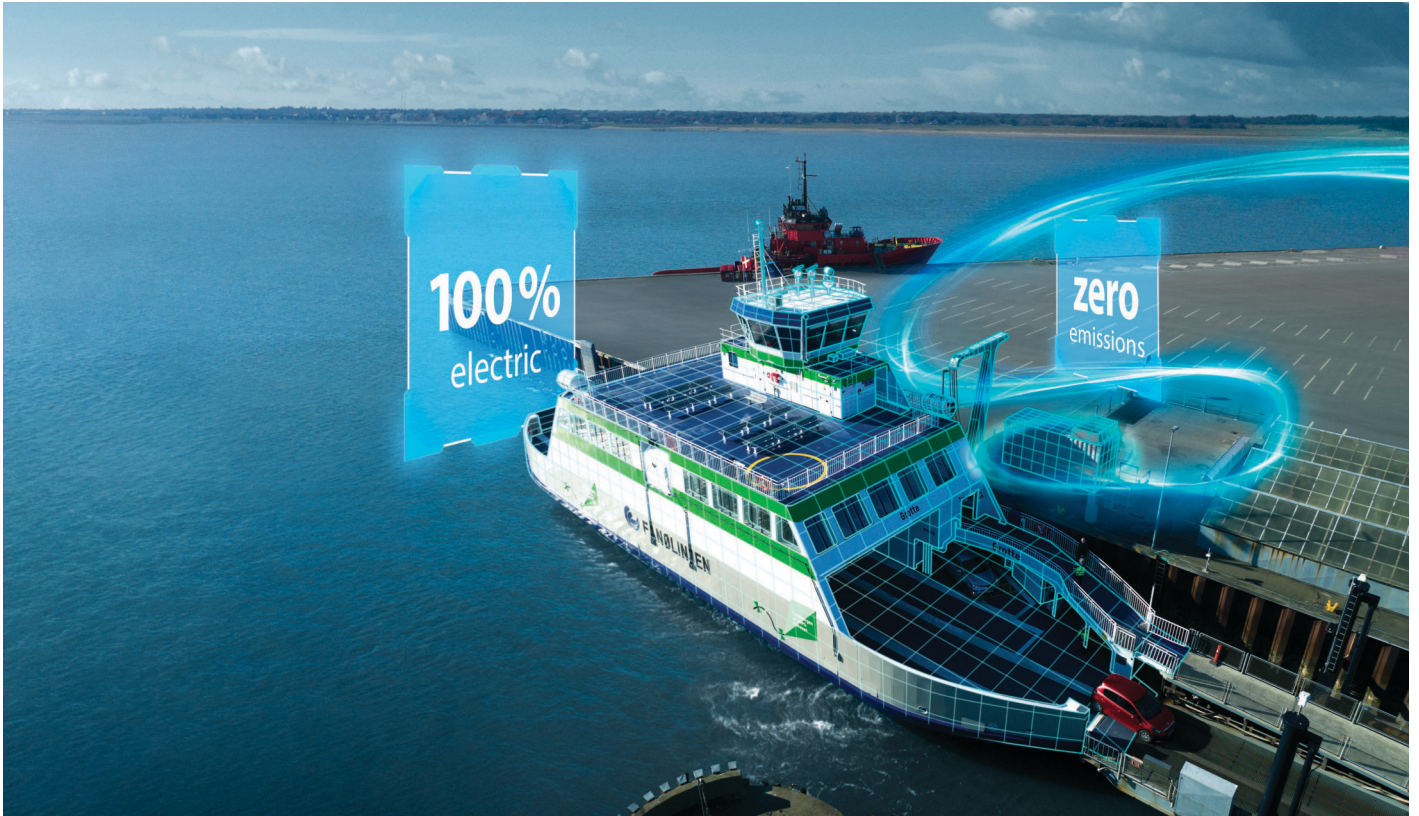
DC/DC Converter converts direct current (DC) from one voltage level to another, to overcome any voltage mismatch between energy source and the system DC-voltage.

Tap into the energy saving opportunities of peak shaving and time shifting. Do this by connecting batteries and fuel cells to a DC distribution grid or the DC-bus of a drive system. Increase the redundancy and availability of the system by utilizing the energy source as back-up power supply.

iC7-Hybrid with DC/DC Converter application is the ideal solution for high efficiency bi-directional DC to DC power conversion and gives you:

- Flexible voltage, current and power control references for accurate DC-bus and DC-source control.
- Ultra-fast control response, to handle the system dynamics
- Ability to Transition seamlessly between control modes and control places while running
- Limit controllers to improve system stability & resilience
- Fit for purpose features for energy source applications
- Dedicated fieldbus status and control words as well as fieldbus customizer
- Fault simulation to accelerate system development & commissioning





Scalable and modular control

Enjoy a new level of performance thanks to the modular control architecture of iC7-Hybrid.

Dual port Ethernet-based fieldbus connectivity is supplied as standard. Connectivity can be expanded with more I/Os, other fieldbus protocols and sensors to match the system needs.

Extend functionality with options such as the Voltage Measurement option which offers dual-channel 3-phase AC- or DC-voltage measurement.

Functional Extensions

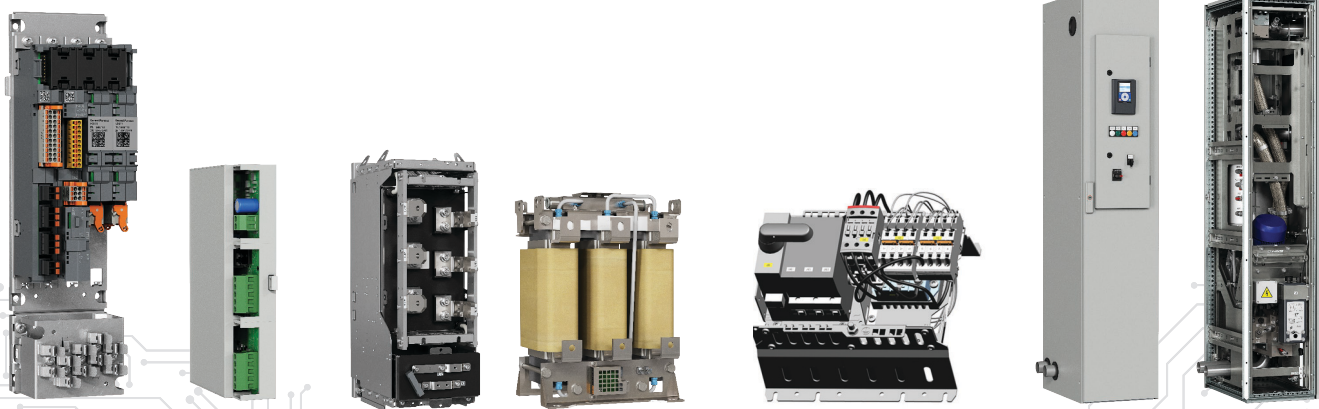
Configure fieldbus protocol from the factory: Modbus TCP, PROFINET, Ethernet/IP or EtherCAT¹⁾.

Filters and accessories

For a complete installation, a range of integrated and separate filters and accessories are available, as well as

- DC-bus pre-charge kits
- An extremely compact cooling unit for use with liquid-cooled system modules

iC7 Filters




¹⁾ Ethernet/IP and EtherCAT will be available soon.

iC7-Hybrid Liquid-cooled System Modules – the **ultimate** in **power density**

iC7-Hybrid is available in 2 variants

- System modules: Ideal for installations with low height clearance
- System modules with integration unit: integrated filters in a compact housing. Optimized power density for easy cabinet installation and serviceability

For specifications and dimensions, refer to the Selection Guide:

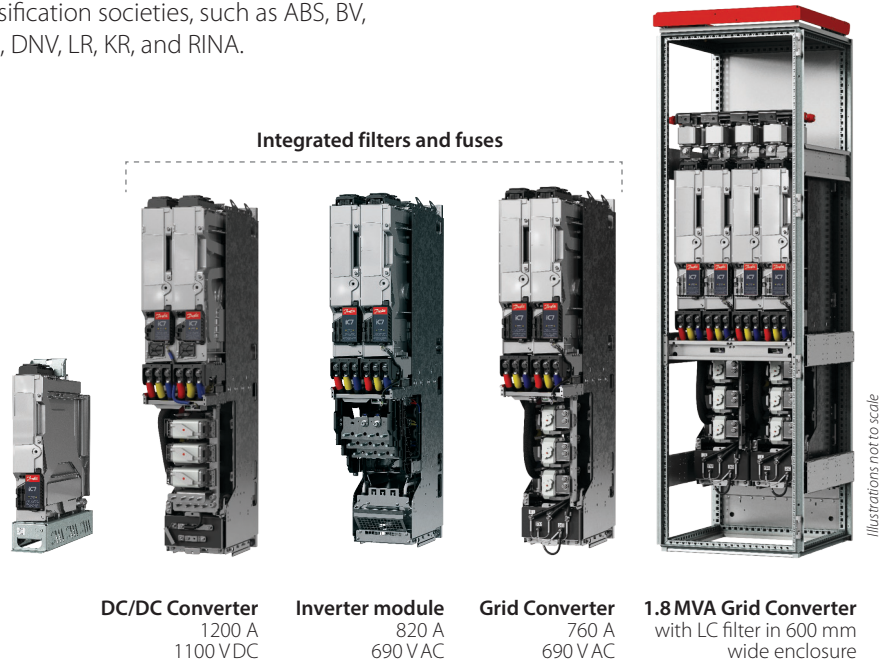
 **iC7-Marine and iC7-Hybrid Selection Guide**

 **Intelligent power conversion**

Voltage range	3 x 525-690 VAC 640-1100 VDC 3 x 380-500 VAC (B5) 465-800 VDC (B5)
Current range	Grid Converter 236-5750 A DC/DC converter 300-3600 A Inverter module for Generator application 170-6400 A

Type approvals

Based on decades of experience across a wide range of Marine and Offshore applications, iC7-Hybrid power converters fulfill type approvals of major classification societies, such as ABS, BV, CCS, DNV, LR, KR, and RINA.



DC/DC Converter
1200 A
1100 VDC


Inverter module
820 A
690 VAC

Grid Converter
760 A
690 VAC

1.8 MVA Grid Converter
with LC filter in 600 mm wide enclosure

Features and benefits

Feature	Benefit
Purpose-built product dedicated to power conversion	Fit-for-purpose in your industry increases competitiveness and reduces engineering effort
State-of-the-art power conversion control	Fast control loops meet the modern low-inertia network requirements Advanced control features unlock new system design possibilities Superior generator control performance even without encoder
Market-leading power density	Save space and weight in marine and urban installations
Innovative integration unit concept with integrated filters	Save space, reduce installation cost, reduce service cost, and improve uptime
Designed for harsh environment	Reliable in difficult installation and operating conditions. One design serves a wide range of installation locations
Model-based design simulation environment	Always up to date and accurate true digital twin simulation models for your system simulation
Secure-by-design	Access and transfer data securely. Tamper-proof hardware. Improved protection of your intellectual property
Optimized for enclosure integration and serviceability	Reduced investment and operating cost
Scalable, flexible, modular	Scales to any application over wide power range up to 6.8 MVA and beyond
iC7 platform covers power conversion and AC drives applications	Shorter time to market. Lower lifecycle costs when both power converters and AC drives run in the same system

Ensuring you shine in the marketplace is our goal. Learn how Danfoss supports your success [here](#) 

The Danfoss logo is written in a white, cursive script font on a red rectangular background.

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Imagine versatile and highly secure power conversion and motor control. Intensely powerful and compact converters and drives built to optimize a vast range of systems while giving you the flexibility to distribute intelligence the way you want. Paving the way for a new dimension, where open, connected and intelligent systems are the new reality.



 **Open up a new dimension with iC7 series**
iC7-Automation | iC7-Marine | iC7-Hybrid

Contact us 

Some functionalities listed in this fact sheet are for future implementation

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