Open up for flexible integration with extraordinary power density

Intelligence to empower your marine applications

iC7 series highlights

- Unrivaled power density
- Modular control architecture
- Integrated Industrial IoT security
- Streamlined system integration
- Efficient cooling management
- Integrated functional safety
- Precision motor control
- Ultra-low harmonic current distortion THDi
- Supported by DrivePro® services

Over 50 years in pioneering power electronics and 25 years in marine-optimized drives prepares us well to innovate for tomorrow

Contents

Specifications and dimensions

iC7-Marine

Need strong and secure maritime performance?

Embark on a new voyage of opportunity with the versatile and intelligent iC7-Marine, optimized for both ocean-going and inland waterway vessels. This drive features a new dimension of power density, motor control accuracy, and ultra-low THD. Navigate the most challenging of applications as diverse as propulsion, thrusters, winches, and more.

iC7-Marine gives you the edge on competitors with a whole new level of modular control, industry benchmark thermal management, and unparalleled ease of system integration.

This drive series supports your business with the highest quality and reliability standard available on the planet – thanks to a development approach based on unmatched expertise, the latest simulation techniques, and exhaustive testing.

Building on this foundation, iC7-Marine is equipped with a world-class Industrial IoT security approach that enables you to future-proof your system for the decades ahead.

Applications

Choose the optimal application for your process, to open a new dimension in system performance:

- Propulsion & Machinery, optimized for high-performance marine applications

Choose additional hardware functionalities to tailor the drive to your application needs:

- Active Front End (AFE)
- Inverter (INU)

At a glance

- Voltage rating:
  3 x 380-500 VAC -15%/+10%
  3 x 525-690 V AC -15%/+10%
- Output current: 170-6400 A
- Protection rating: IP00
  (IP55 electronics housing)

Fully compatible with:
iC7-Hybrid

iC7-Hybrid

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

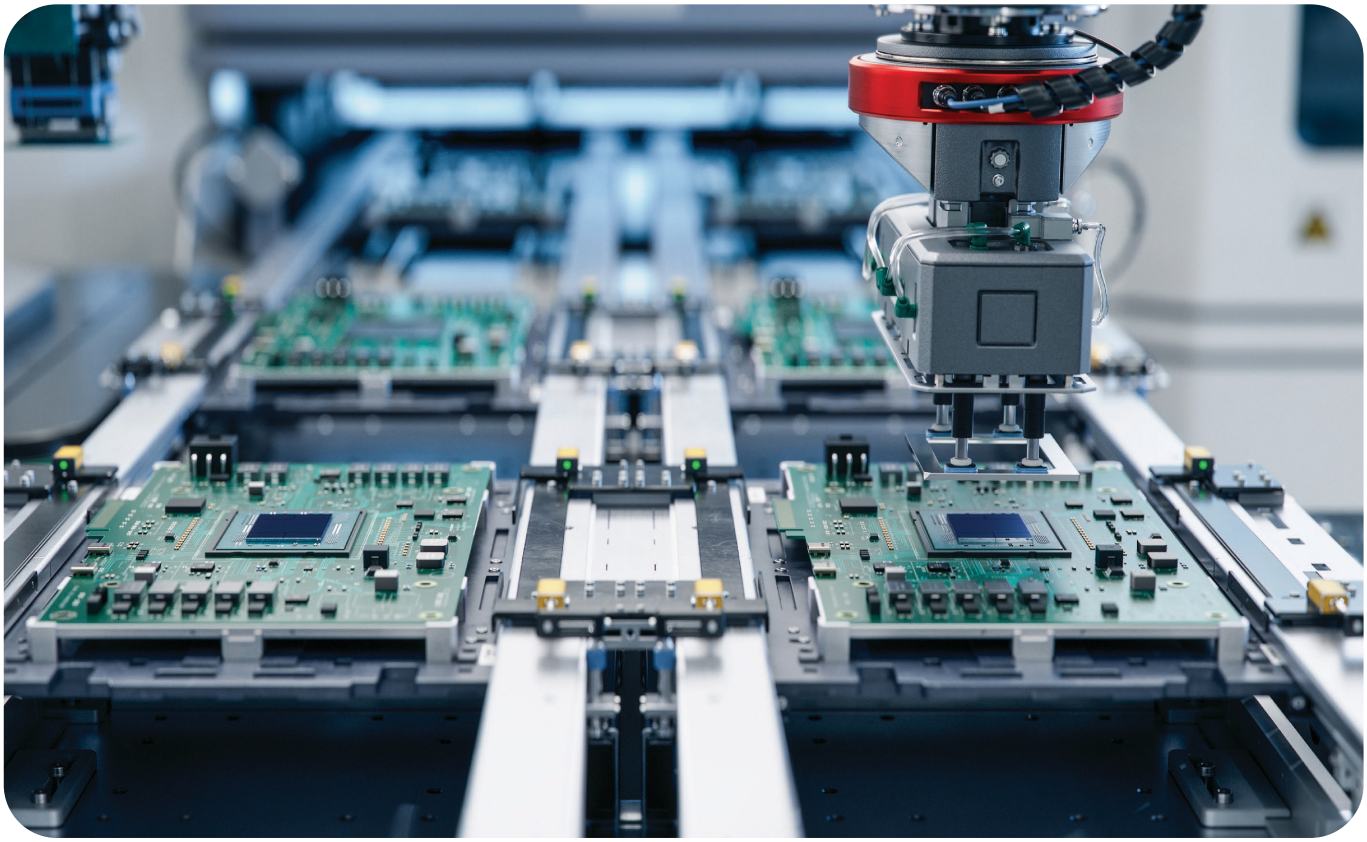
Choose the dedicated application software and hardware best suited to your electrification task:

- 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

Fully compatible with
iC7-Marine



iC7-Marine iC7-Hybrid

Features to enhance marine performance

Secure-by-design

Your drive is equipped with market-leading hardware-based protection against unauthorized access with a built-in crypto chip on the control unit.

Certified for marine cybersecurity according to IEC 62443-4-2.

Security

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.

Functional safety to match your needs

STO and SS1-t SIL3, Pl e as standard makes certification easier. A flexible offering allows the addition of functional safety via fieldbus.

Since functional safety is integrated, you can eliminate external safety contactors and extra wiring., to reduce total system cost.

Enclosed drives are equipped with emergency stop button on the door, to activate STO.

User interfaces

A new range of user interfaces integrate well-known features and functionality. Integration of features in MyDrive® tools is supported.

Adjust the user interface to your preferred language, including Chinese.

Halo indicator
Normal operation = white
Fault = red
Warning = orange

iC7-Marine iC7-Hybrid

More built-in sensors for enhanced control

The iC7 drive has an increased number of built-in sensors. This enables improved control performance, increased protection of application and drive, and capability to support Industrial IoT solutions.

Superior sensorless control

In open or closed loop, the iC7 drive delivers superior shaft performance even at low speed.
New motor? There's no need to change out the drive. Connect the motor and this drive will automatically self-tune and optimize: induction motor (IM), permanent magnet motor (PM) , or high-efficiency synchronous reluctance motor (SynRM).

Motor set-up and control is intuitive and easy.

Motor Control

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

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.

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.

fmi Functional Mock-Up Interface

MyDrive® Virtual
MyDrive®Drive Selectivity

iC7-Marine iC7-Hybrid

Scalable and flexible control

Enjoy a new level of performance thanks to the rapid-response control of iC7 drives.

The control capability is scalable and equipped with EtherNet-based fieldbus and functional safety inputs as standard. Add more I/Os as needed, to match your applications.

An optional basic I/O board offers typical I/O connectivity, and if more is needed, then you can add up to 10 options.

Configure multiple fieldbus protocols from the factory.

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 EtherCAT[1].

Switch fieldbus without changing boards

New fieldbus? No need for hardware. You can change the application or fieldbus on your drive without changing the hardware. This gives you the ultimate in drive flexibility.

For easy customization, just add the license token to the drive in the field.

Customizations available:
136S1002 PROFINET RT (OS7PR)
136S1004 Modbus/TCP (OS7MT)
136S1003 EtherNet/IP (OS7IP)

Connect to a computer via the extra Ethernet port, enabling you to use MyDrive® commissioning or service tools.

iC7-Marine iC7-Hybrid

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.

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® Energy
- 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 tailormade 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-Marine

Features and benefits

Feature	Benefit
High power density	Save space and reduce cooling costs
Native integration of filters below the power units	Save space and reduce installation costs
Secure-by-design	Reduce risk of downtime due to unauthorized access
Highly accurate motor control	Save costs and improve performance
Modular control architecture	Improve performance by adapting to your application's needs
Integrated Ethernet communication interfaces	Save costs and time in installation
Quick-connection of power unit cooling when using the integration units	Save costs and time in installation and servicing
High number of integrated sensors	Improve performance and control accuracy
Compact side-by-side mounting	Save space and reduce installation costs
Expandable, encrypted microSD card-based memory	Securely record operational data for offline analysis
STO and SS1-t SIL 3, Pl e as standard	Save costs and time in installation
Switch easily between fieldbus protocols using a license key	Extremely fast and secure communication with no need to exchange hardware

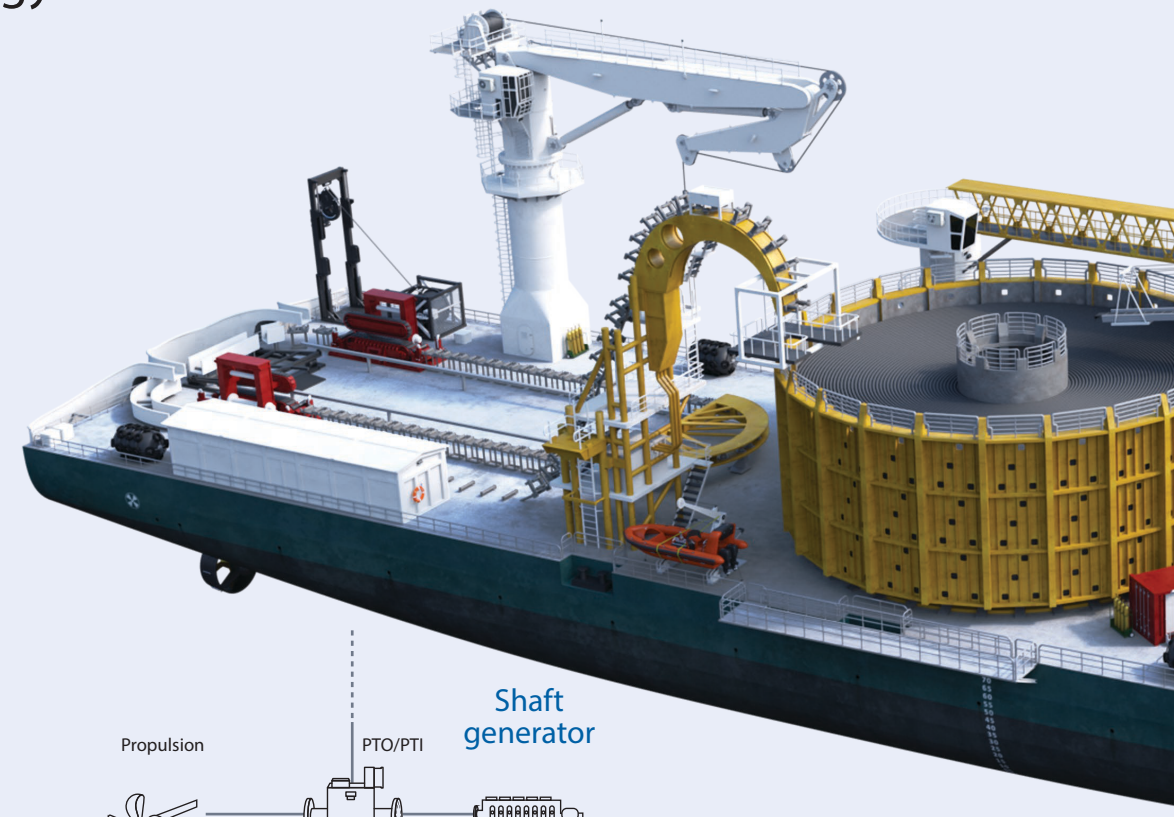
iC7-Hybrid

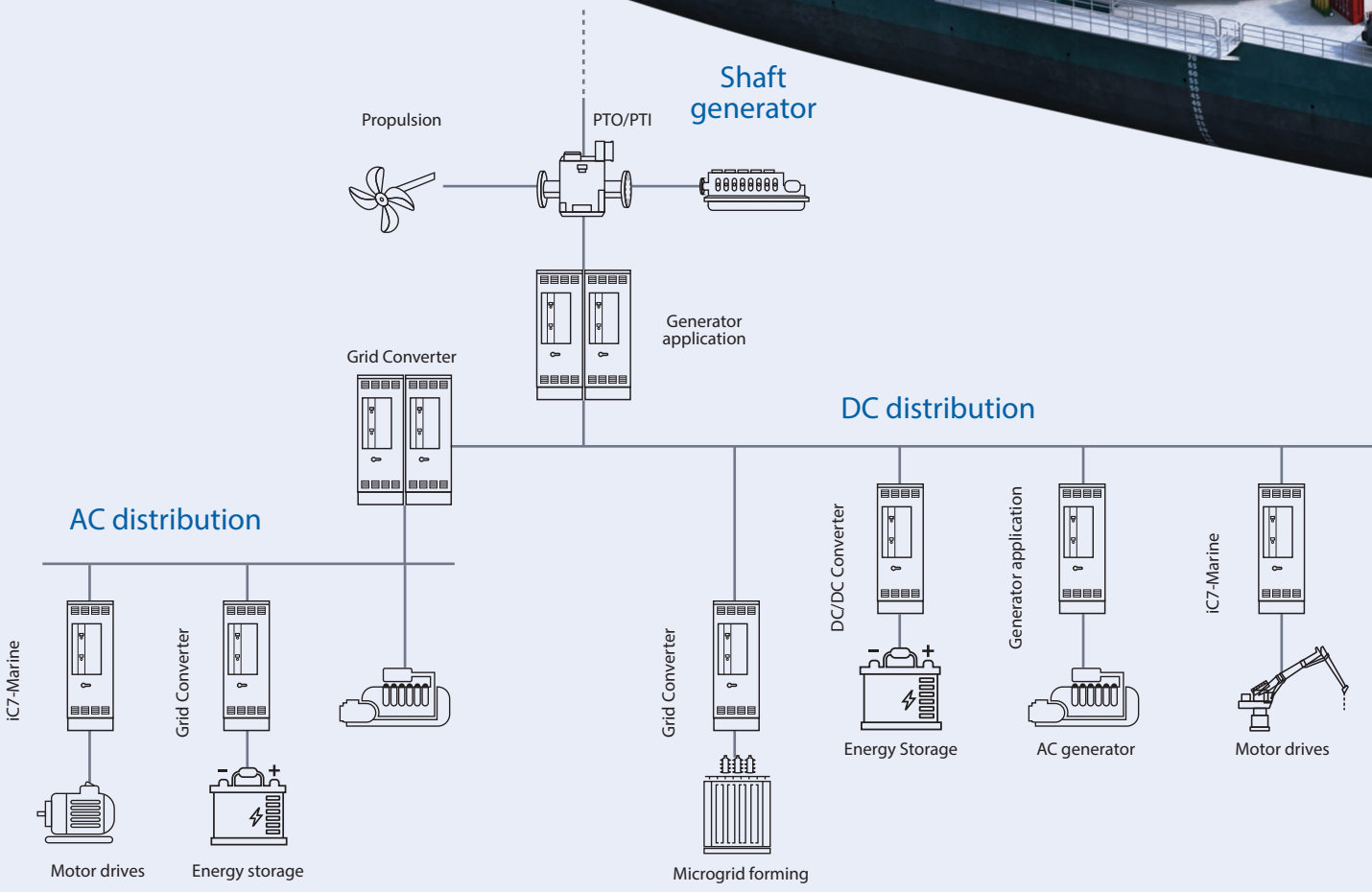
Features and benefits

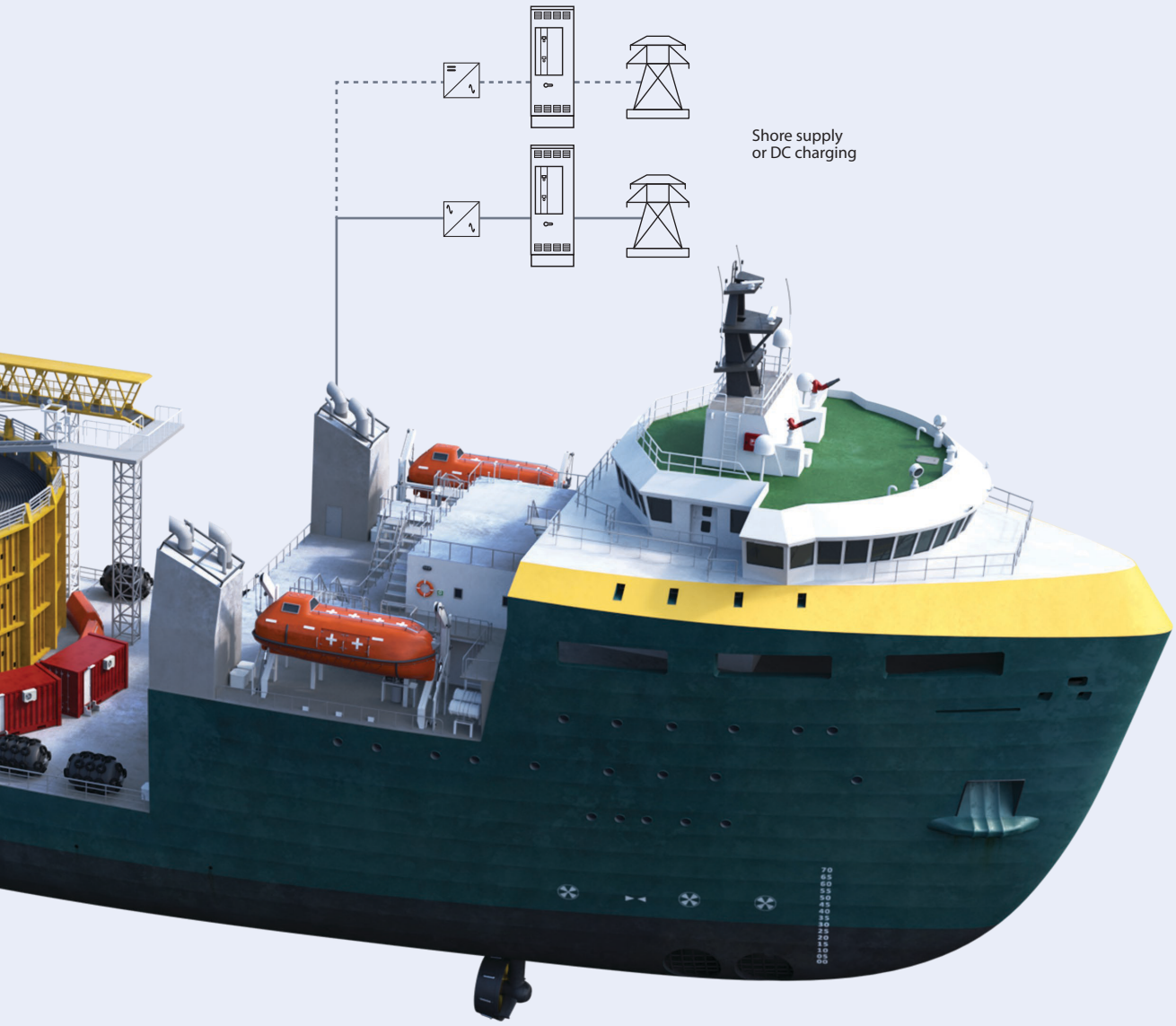
Feature	Benefit
Purpose-built product dedicated to power conversion	Fit-for-purpose in your industry increases competitiveness and reduces engineering effort
State-of-the-art power conversion control	Fast control loops meet the modern low-inertia network requirements Advanced control features unlock 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 motor drive applications	Shorter time to market. Lower lifecycle costs when both power converters and variable frequency drives (VFD) run in the same system

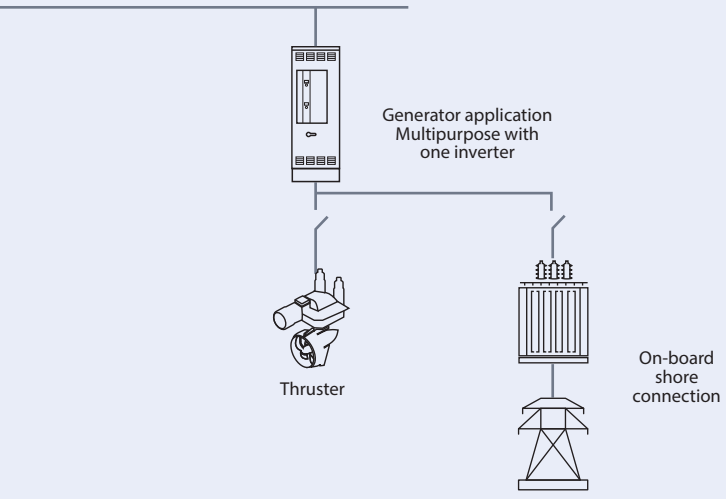
iC7-Marine iC7-Hybrid

iC7 series supports every element in the energy transition









Flexible and compact drives and 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.

iC7-Marine

Application software and hardware – for precise navigation of marine needs

Propulsion & Machinery

Propulsion & Machinery-dedicated software is optimized for essential high-end applications and gives you the power of focus on vessel-wide system requirements. It offers an open and flexible interface to the Power Management System, in a drive which self-adapts to any motor application. Typically employed in propulsion and thrusters, winches and cranes, pumps, fans and steering gears, the Propulsion & Machinery application software provides:

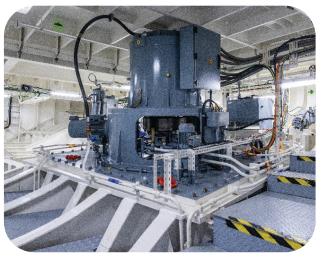
- Versatility for drive applications requiring a wide range of drive features for different motor types for either closed loop or open loop control methods
- Torque and power control/limit features: control the torque and power references, and limit using analog and digital signals or fieldbus
- Flexible control place options: control the drive from various control places and switch them smoothly and easily
- Flexible reference options: set up references and switch them smoothly and easily
- Basic PID-controller with flexible inputs/outputs: Utilize the integrated PID-controller to control any drive variable, by using any other drive variable
- DC-link handling: Enable, disable, set up, and adjust the over-voltage and under-voltage controllers
- Mechanical brake control: Connect a mechanical brake to the drive and operate it smoothly
- Motor breaker control: Monitor and control a motor breaker manually or by using the drive
- Fault simulation: Simulate any drive fault to accelerate your problem solving

iC7-Marine

Active Front-end application

Active Front-end dedicated hardware ensures a stable DC-bus for inverter modules, as well as effortless interaction with the grid, even in less-than-ideal grid conditions. It is designed for grid compliance and establishes grid-friendly harmonic content. It also safeguards energy recovery back to grid when excess energy from the process is available. It delivers robust control which is easy to customize and commission, with quick start-up and parametrization using wizards.

- Robust DC-link regulation
- Ultra-low harmonic current distortion THDi
- Unity power factor
- Support for grid voltage feedback option
- Power and current limitation
- Automatic AC-grid synchronization



iC7-Hybrid

Dedicated application software and hardware

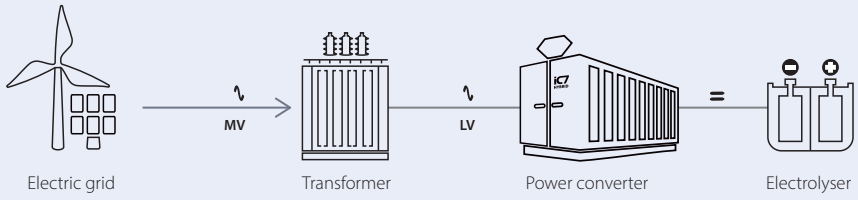
Grid Converter – for intelligent grid control

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

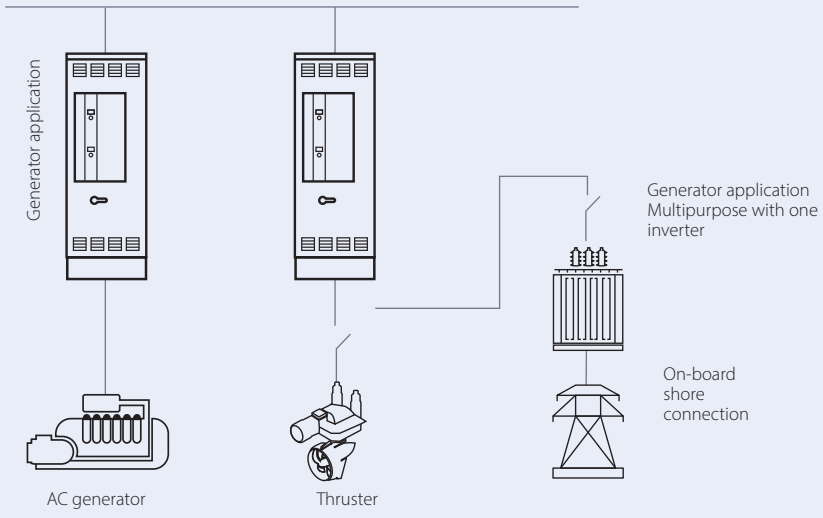


Generator application – for intelligent power generation

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



iC7-Hybrid

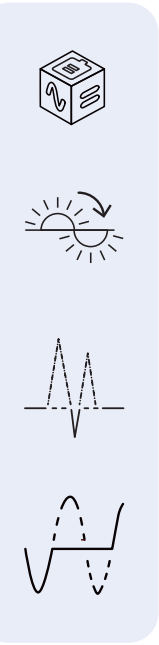
DC/DC Converter – for energy source and storage application software

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




POWERED BY
Danfoss

Specifications and dimensions

iC7-Marine and iC7-Hybrid are available in a liquid-cooled hardware variant with two separate mounting configurations:

- System modules: for versatile cabinet integration
- System modules with integration unit: integrated filters in a compact housing with quick-connections for cooling. Optimizing cabinet building and foot print.

For more details, read the chapter *Liquid-cooled system modules.*

Liquid-cooled system modules fact sheet

Type approvals

Based on decades of experience across a wide range of Marine and Offshore applications, these drives fulfill type approvals of major classification societies, such as ABS, BV, CCS, DNV, KR, LR, NK and RINA.

Illustrations not to scale

MyDrive® Suite – Digital tools empower you

Need help to design your application, or select, set up, and maintain your drive or power converter? Danfoss provides a pallette of digital tools to give you the information you need, at your fingertips. No matter which stage of the project you are at.

Select and dimension

- Select the right power converter or variable frequency drive (VFD), based on motor and load characteristics
- Find general product, industry, and application information

MyDrive® Select
Select and dimension your power converter or drive and motor, based on calculated motor load currents as well as current, temperature, and ambient limitations.

MyDrive® Portfolio
This smart device app gives you a full overview of all Danfoss Drives products and their documentation.

Set up and service

- Set up your drives and power converters to operate according to your requirements
- Monitor performance throughout the entire product lifecycle

MyDrive® Insight
Get easy access to parametrize your Danfoss drives or power converters, locally or remotely.
Use MyDrive® Insight for commissioning, monitoring, and troubleshooting.

The integrated Logic controller provides flexible logic blocks to support system integrators and OEMs in environment-based programming, which is flexible enough to replace a small PLC.

Validate performance

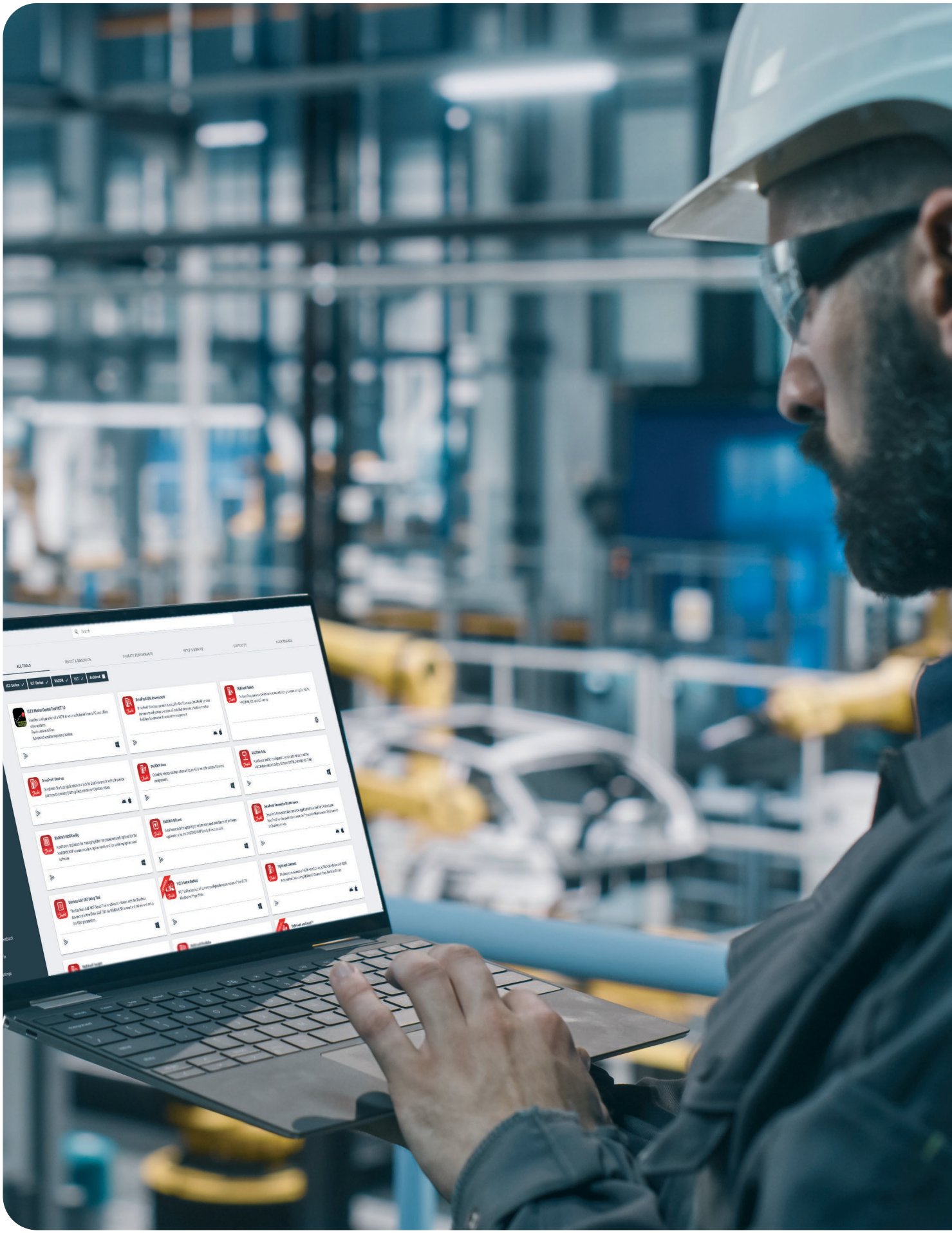
- Analyze the performance of your drives and power converters in relation to harmonics content
- Calculate the potential energy savings to be achieved
- Validate compliance to norms and standards

MyDrive® Harmonics
Estimate the benefits of adding harmonic mitigation solutions from the Danfoss product portfolio and calculate predicted system harmonic distortion.
This tool provides a quick indication of installation compliance with the most recognized harmonic norms, and mitigation recommendations.

MyDrive® Energy
Estimate the energy savings and CO_2 reduction achievable by installing Danfoss drives to perform variable speed control of electric motors. Calculate efficiency class and part load efficiency for drives from Danfoss. MyDrive® Energy supersedes the tools MyDrive® ecoSmart and VLT® EnergyBox.

MyDrive® Virtual
Simulate applications integrated in the physical product, such as Propulsion and Machinery or Grid Converter. The models support a wide range of use cases in speed, torque, an power control as well as power conversion applications.

MyDrive® Drive Selectivity
Use the Drive Selectivity toolbox to build system selectivity in the simulation environment, during design phase.
This toolbox includes a library of Danfoss drive and power converter components, ready for system engineers to design system and process with selectivity studies. It is ideal for ship electrical grid simulations.



DrivePro® Services

Delivering a customized service experience!

Every drive application is different. DrivePro® Services is a collection of **tailor-made products designed around your needs.**

From optimized spare part packages to condition-monitoring solutions, we deliver customized service offerings to **support your business through the different lifecycle stages of your drive.**

DrivePro® 360Live

Achieve excellence with precision of maintenance
An installed base management solution to register and effectively optimize drives maintenance.

DrivePro® Extended Warranty

Even the best performing drives need protection. DrivePro® Extended Warranty offers a wide range of warranty options and provides the longest coverage in the industry up to 72 months.

DrivePro® Site Assessment

Optimize your maintenance strategy with a complete onsite survey and risk analysis of all your drives collected in one detailed report. Together with a Danfoss expert, you can build a tailored plan for future maintenance, retrofits, and upgrades.

DrivePro® Start-up

DrivePro® Start-up includes a full range of operating health checks and parameters adjustments. Based on a manufacturer's commissioning checklist, our experts will inspect and test your drive and its motor performance to ensure the best configuration of your drives.

DrivePro® Spare Parts

Maximize uptime and maintain peak performance throughout the lifetime of your drives with DrivePro® Spare Parts by making sure you are equipped with the original spare parts from Danfoss Drives.

DrivePro® Exchange

Maintain uptime with a fast alternative to repair when there is a time critical situation. If a drive fails, the DrivePro® Exchange service can quickly exchange any drive to a new unit of the same type to ensure as little production delay as possible.*

** DrivePro® Exchange is available for iC7-Automation Frequency Converter only*

To learn which products are available in your region, please reach out to your local Danfoss Drives sales office or visit our website.

Read more about DrivePro®

Local contacts

Liquid-cooled system modules

Need flexible integration with extraordinary power density?

Optimize installation footprint, speed and reduce costs more than you dreamt possible, with the revolutionary iC7 series liquid-cooled system modules with integration unit.

High power density thanks to new filter technology means you achieve a smaller footprint and reduce space requirements in your electrical room. Filters integrate beneath the module, so you don't need extra cabinet space for them.

Enjoy optimal cabinet integration, with input and output filters contained within the pre-wired integration unit. Mechanical integration is fast with unified mechanical interfaces and modular design.

Meet weight restrictions more easily with iC7 liquid-cooled system modules, which are amazingly lightweight compared to standard solutions on the market.

Power density is optimized for a universal 600 mm depth cabinet. Install multiple units in parallel to achieve power range up to 6 MW, with no need for an output filter. Service is faster with lightweight power units; and with quick coolant connectors, there is no need to drain the cooling system.

Reduce your operating costs with industry-benchmark liquid cooling. These modules offer true liquid cooling technology with very low losses to air. There's no need to spend time on connections, since cooling distribution to filters and system modules is built-in.

Robust in harsh environments

The combined vibration, temperature, humidity, and moisture/dust resistance with IP55 electronics compartment, ensures more reliable operation than most alternative drives. Run at 60 °C with no derating.

Achieve flexibility with our highly expandable filter concept. Select your choice of input and output filter options in the integration unit located beneath the module. The same mechanical concept serves all module variants: INU, AFE, GC, and DC/DC.

HIGHLIGHTS

- Save space with world-class power density
- Ideal for lightweight installations due to market-leading low mass
- Reliable even in harsh conditions
- Fast mechanical integration
- Fast and easy service
- Close to silent operation
- World-first drive with cyber-secure design
- More uptime, longer service intervals and long storage life due to film capacitor technology
- Liquid cooling enables reuse of waste heat for energy efficiency

Features and benefits
– all liquid-cooled system modules

Feature	Benefit
Market-leading power density	Save space and weight in marine and urban installations
World's most reliable drive Robust thanks to high quality design: vibration- and shock-resistant aluminium frame with IP55 protected electronics compartment	High uptime Peace of mind even in unpredictable conditions
Output filters and fuses integrate neatly below the power module	Reduced footprint. Reduced cost of integration and service
Performs reliably at high ambient and coolant temperatures	High uptime in harsh environments
Quick connectors, no draining of liquid, quick cabling	Fast serviceability
Cloud connectivity is cybersecure	Reduced risk of unauthorized access or cybersecurity incident
Same mechanical integration for all applications (INU,AFE,GC,DC/DC) means fewer variants are required	Reduce storage required for spares and complexity in integration Simplify serviceability
Modular and scalable. Fewer variants. No need for output filters when installing modules in parallel.	Reduce cost of integration Go to market faster Simplify serviceability
Long design life and film capacitor technology	Reduced maintenance downtime
True liquid cooling ensures low losses to air and enables reuse of waste heat for energy efficiency	Highest possible system efficiency Reduced air conditioning need
ABS, BV, CCS, KR, LR,. NV and RINA certifications, including type approvals for the system module and filters in the integration unit	Accelerate certification time for marine systems

Liquid-cooled module types

Control unit and control options

Star coupler board

System modules AM/IM/DM10L modules

System modules AM/IM/DM12L modules

Inverter unit IR10L with or without filters

Inverter unit IR12L with or without filters

AFE & GC AR10L with LC-filter

AFE & GC AR12L with LC-filter

DC/DC Converter DR10L With DC/DC filter

DC/DC Converter DR12L With DC/DC filter

System module(s) for integration unit

+

Integration unit: contains options "+AE__" input or output filter

=

Example AFE module with LC-filter

→

Enclosure solution example

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

Illustrations not to scale

Modular architecture
Setting the standard for modular control

A flexible, modular, control architecture means you can tailor the control functionality exactly to your needs. You can purchase exactly the control options you need, or replace PLC components, I/O and external safety components.

This modularity gives you not only more flexibility, but more secure integration of drives and power converters in the control system and IT architecture. You achieve faster set-up, and smarter monitoring, data gathering and analytics thanks to support for multiple communication protocols.

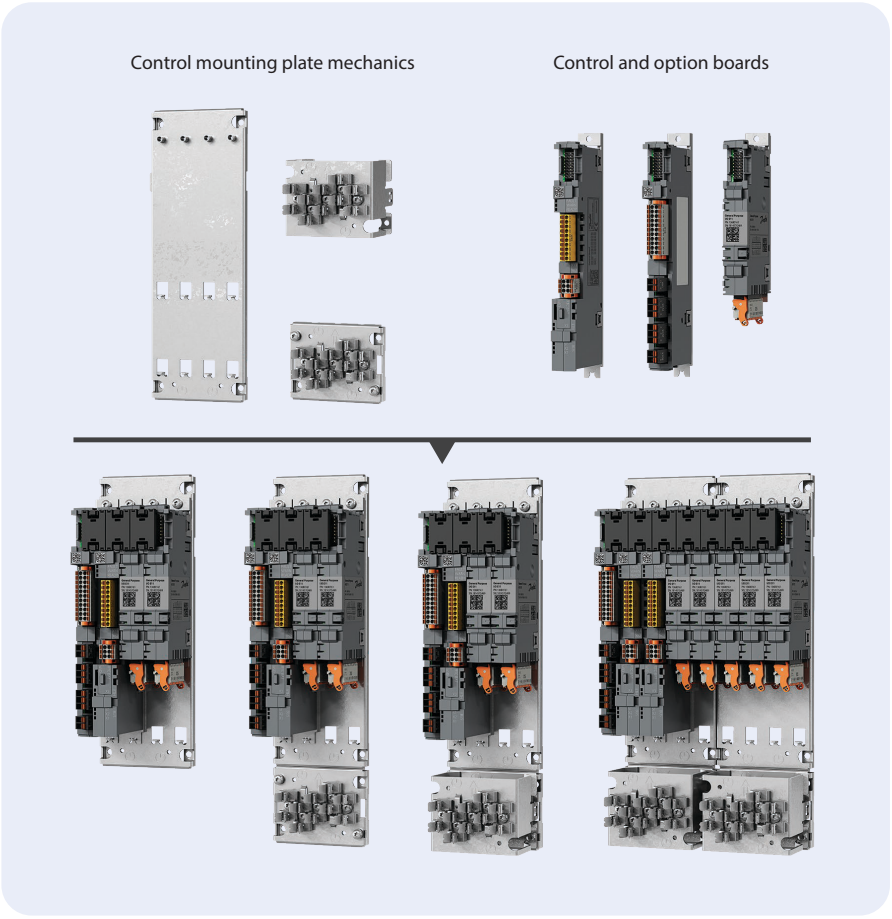
The purchase cost is lower since you only buy the necessary control options, saving excess unused functionality. The drive or power converter can reduce your costs further by substituting for a low-end PLC controller/system.

Program execution close to the process opens new possibilities in maritime control thanks to reduced delays. Built-in security protects your IPR and service business.

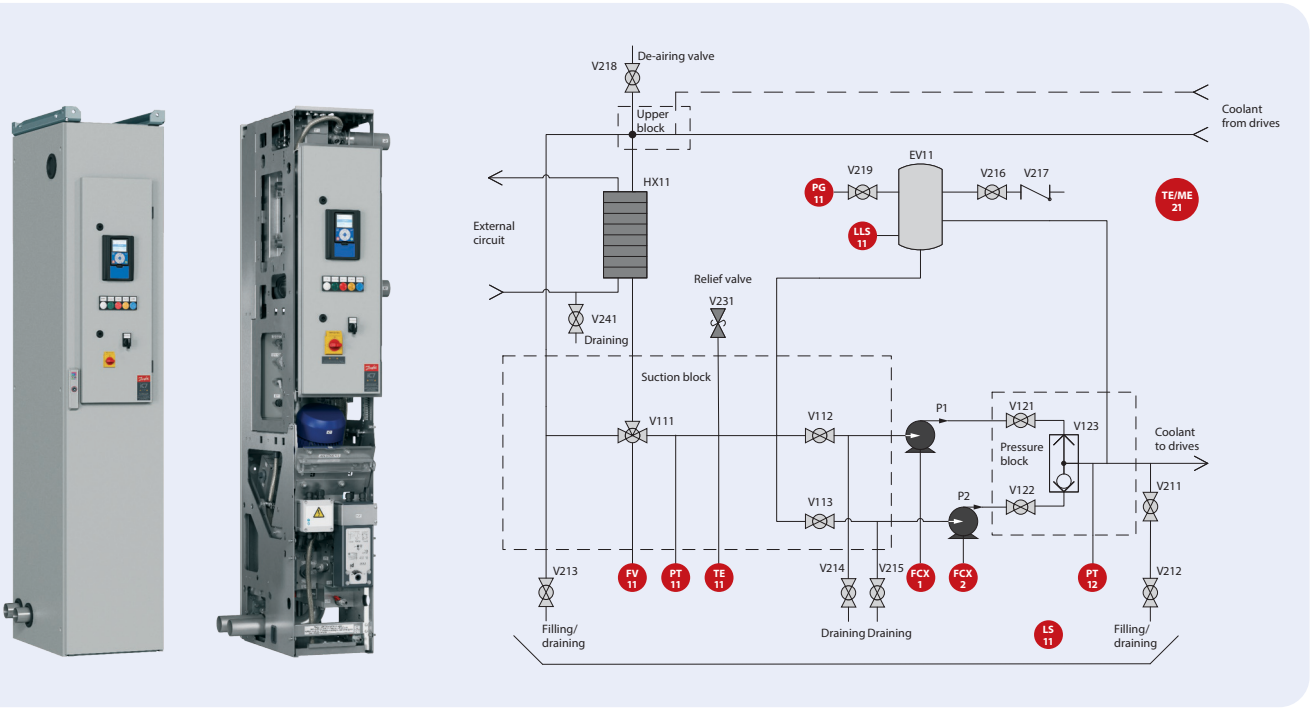
Technical information

- Integrated Ethernet port
- Dual-channel STO and SS1-t SIL3 integrated as standard
- Modbus TCP as standard and other fieldbus protocols optional
- Basic I/O: 6 x DI, 2 x DO, 2 x AI +/-10 V/0-20 mA, 1 x AO (0-10/4-20 mA), 2 x NO/NC RO, 1 x NO RO, 1 x Thermistor
- One optical fiber pair as communication link with power module or star coupler board
- For more options such as voltage measurement, temperature measurement, relay option, and encoder option, refer to the web page.

Functional extensions



Highly compact cooling unit



At the heart of iC7 liquid-cooled technology is the cooling unit. The cooling unit is service-friendly despite its extremely compact design, making it fast and easy to work with.
The cooling unit gives you especially easy access to the pump, as well as providing pump shut-off valves.

- Liquid cooling temperature control with integrated 3-way valve
- Extensive sensor package with humidity and ambient temperature measurement
- Cooling unit supply distance: 15-25 m, optionally up to 40 m
- Drive-side temperature control with 3-way valve and actuator

Key specifications: Cooling unit	
System pressure	Customer side: max 1000 kPa • Drive side working pressure: 50-350 kPA, maximum 600 kPa
Cooling	Ambient operating temperature: -15-55 °C • Coolant temperature: -15-38 °C (Ith) (nominal); 38-55 °C with limited performance
Sensor measurements on the drive side	Pressure • Flow (pressure sensor-based) • Temperature • Leakage detection • Condensation (humidity/ambient temperature sensor-based)
Compatibility	Compatible with diverse Ethernetbased fieldbuses
Type approvals	DNV
Optional extras	Protection rating IP23 (without enclosure) and IP54 with enclosure • Double/redundant pump • Coolant connectors positioned on left or right side of the cooling unit

Cooling unit

Model code	Cooling power [kW]	Coolant flow [l/min]	Pump quantity	Dimensions IP23 enclosures W x H x D [mm]	Dimensions IP54 enclosures W x H x D [mm]
iC7-60SLLQxx-0076…	76	190	1 and 2	300/500 x 1900 x 550	408/608 x 2060 x 608
iC7-60SLLQxx-0152…	152	360	1 and 2	300/500 x 1900 x 550	408/608 x 2060 x 608

Key specifications: Liquid-cooled system modules

Mains connection (AFE & GC)	
Mains voltage Uin	– Voltage class 07: 3 x 525-690 V AC (-15% – +10%); 640-1100 V DC (-0% – +0%) – Voltage class B5: 3 x 380-500 V AC (-15%…+10%); 465-830 V DC (-0%…+0%)
Mains frequency	– 45-66 Hz AFE, GC, 25-70 Hz for GC with derating
Supply network	– TN-S, TN-C, IT and TT – Supply voltage limited to 500 V AC for corner grounded networks
Power factor	– cosφ = 1: (fundamental) (AFE module) – cosφ = 1 leading to 1 lagging (fundamental) (GC module)
Short circuit current	– Maximum short circuit current must be < 100 kA
Total harmonics distortion THDi	– < 5%: (AFE and GC module), < 3% with dedicated transforme
Overvoltage category	– Class III according to IEC/EN 61800-5-1
Imbalance	– Nominal performance with voltage imbalance ≤ 3%. (AFE and GC module) – Limited performance with >3% voltage imbalance
Connections to mains	– Once every 120 s
Motor/generator connection (INU)	
Output voltage	– 0-Uin 3-phase
Output frequency	– 0-599 Hz (Limited performance with output filters above 70 Hz)
Switching frequency	– 1.5-10 kHz (525-690 V AC) Default switching frequency 3 kHz
Motor/generator control principles	– U/f control – Voltage Vector Control (VVC+) – Flux Vector Control (FVC+)
Motor and generator types supported	– Induction/asynchronous motor – Permanent magnet motor – Salient permanent magnet motor – Synchronous reluctance assisted permanent magnet motor
Cable length	– Up to 150 m [492 feet] with symmetrical 3-phase screened motor cable
DC connection (DC/DC converter)	
DC bus voltage	– Voltage class 07: 640-1100 V DC (-0%..+0%) – Voltage class B5: 465-830 V DC (-0%..+0%)
DC source voltage	– 3%-100% of DC bus voltage – 3%-97% of DC bus voltage with full control performance
Source current ripple with iC7 DC/DC Filters	– DR10L < 1% RMS (typical) – DR12L < 0.5% RMS (typical)
EMC (IEC61800-3)	
Immunity	– Fulfils IEC/EN61800-3 (2018), 2nd environment
Emissions	– IEC/EN61800-3 (2018), category C4, default for the IP00/UL Open Type drive – IEC/EN61800-3 (2018), category C3, if the drive is installed according to the instructions of the manufacturer (C3 not applicable for DC/DC Converter) – CISPR 11 (EN 55011) Class A (Grid Converter)

Key specifications: Liquid-cooled system modules (continued)

Liquid cooling	
Temperature of cooling agent	– -10…+45 °C (14...113 °F) at I_N (nominal) Except -10…+38 °C (14...100 °F) at I_N (nominal) for: l INU, voltage class 07 with +AES1/AEZ1, current ratings 730 A, 1400 A, 2080 A, and 2830–4400 A l AFE and GC, voltage class 07, current ratings 380 A, 760 A, 1500 A, 2250 A, 2940 A, 3600 A, 4320 A, 5040 A, 5750 A l DC/DC converter, voltage class 07, current ratings 1200 A, 2400 A, 3600 A 45 °C (113 °F) at I_L and overloadability, 38 °C (100 °F) at I_H and overloadability for the sine-wave filter +AES1 – Temperature rise during circulation max 10 °C – Glycol to be used in cooling agent below 0 °C and ice formation not permitted
System max. working pressure	– Operating pressure 100-150 kPa (recommended) – Maximum pressure 500 kPa
Pressure drop	– 50-120 kPa at rated volumetric flow.
Allowed cooling agents	– Demineralized water or good pure quality water according to cooling liquid quality specification with inhibitor and propylene or ethylene glycol
Corrosion inhibitor	– Corrosion inhibitor recommended, for long lifetime
Allowed materials in the cooling system	– Aluminum – Stainless steel AISI 304/316 – Plastic (PVC not allowed) – Elastomers (EPDM, NBR, FDM)
Environmental conditions	
Protection rating drive modules	– IP00/UL Open Type
Ambient operating temperature	– -15 °C (no frost) to +60 °C (at IN)
Storage/transportation temperature	– -40 °C to +70 °C; glycol to be used in liquid under 0°C and ice formation not permitted
Relative humidity	– 5 to 96% RH, no dripping water or condensation allowed
Pollution degree	– Power units: PD3 – Control units: PD2
Altitude	– 0-3000 m above sea level: voltage class 07 without AFE supply – 0-2000 m: voltage class 07 with AFE supply – Above 1,000 m derating of maximum ambient operating temperature by 0.5 °C per each 100 m is required
Vibration (IEC60068-2-6)	– Displacement amplitude 1 mm (peak) at 2-13.2 Hz – Maximum acceleration amplitude 0.7 G at 13.2-100 Hz with maximum amplification of 5
Shock (IEC60068-2-27)	– Max 15G, 11 ms (in package)
Environmental operating conditions (IEC 60721-3-3	– Climatic conditions: Class 3K22 – Chemically active substances: IEC 60721-3-3 Edition 3.0/ISO 3223 Second Edition, class C4 – Biological conditions: Class 3B1 – Mechanically active substances: Class 3S6 – Special climatic conditions (heat radiation): Class 3Z1

Run at

60°C

with no derating

Inverter modules (INU)

Inverter module (INU)

The inverter module is a bidirectional DC-fed power inverter for the supply and control of AC motors and generators.

The inverter (INU) module is intended for the regulation of motor speed in response to system feedback or to remote commands from external controllers. A drive system consists of the system modules, the motor, and equipment driven by the motor. The INU module is also intended for system and motor status surveillance.

Benefits of the Inverter module

- Designed for maximum machine performance and flexibility
- Versatility for drive applications requiring a wide range of drive features for different motor types for either closed loop or open loop control methods
- Optional system module with integration unit including high performance dU/dt filters and/or common-mode filters as well as sine wave filter for space saving

Ratings

- 170-6400 A IL, +10% overload 1 min/5 min
- 525-690 V AC / 640-1100 V DC (07)
- 380-500 V AC / 465-800 V DC (B5)
- Output frequency: 0-599 Hz
- dU/dt filter up to 250 Hz with derating
- Sine-wave filter up to 300 Hz with derating
- Switching frequency: 2-10 kHz. Nominal 3 kHz, Sine-wave filter 8 kHz
- Ambient temperature 60 °C at IN
- Coolant temperature 45 °C at IN with the exception of 38 °C at IN for 07 voltage class Sine-wave filter current ratings 730 A, 1400 A, 2080 A 2830 A, 3500 A and 4400 A

Highlights

- Most compact INU module on the market thanks to integration of filters
- Robust and reliable in varying ambient conditions
- Designed for enclosure integration and quick serviceability
- Multipurpose use cases for motor or generator control and shore connection (AFE) with Generator application software

Motor and generator control

- Highly dynamic performance: Highest possible machine accuracy due to superior shaft performance, also for sensorless operation
- Superior low-speed performance also in sensorless operation
- The motor always runs at maximum possible torque for the given current – ensuring highest possible motor efficiency: Maximum Torque Per Ampere (MTPA)
- Fast commissioning using Automatic Motor Adaption (AMA) at standstill maximizes energy efficiency with any motor
- More integrated sensors for better performance
- Flexible choice of control features optimized to your application, thanks to integrated application software
- Variable speed power generation with stable DC voltage reference even without filter
- Externally excited synchronous generator supported with Generator application and AFE control mode

Ratings: Inverter module (INU) at 690 V AC

iC7-60SLIN07, 525-690 V AC (640-1100 V DC), Type Open/IP00 inverter module

Model code	AC ratings [1]				Motor output power [2]		Frame	Frame with option +AE__	Filter options available [3]	
	3 x 525-690 V				690 V AC mains					
	I_N	I_L	I_H	I_{peak}	P_L	P_H			+AEU1 +AEU2 [4] +AE10	+AES1 +AEZ1 [5]
	[A]	[A]	[A]	[A]	[kW]	[kW]				
iC7-60SLIN07-170AE00F4	174	170	127	254	160	90	**IM10L**	**IR10L**	X	
iC7-60SLIN07-208AE00F4	213	208	156	312	200	132	**IM10L**	**IR10L**	X	
iC7-60SLIN07-261AE00F4	267	261	195	390	250	160	**IM10L**	**IR10L**	X	
iC7-60SLIN07-325AE00F4	332	325	243	486	315	200	**IM10L**	**IR10L**	X	
iC7-60SLIN07-365AE00F4	373	365	273	546	355	250	**IM10L**	**IR10L**	X	
iC7-60SLIN07-416AE00F4	425	416	312	624	400	250	**IM10L**	**IR10L**	X	
iC7-60SLIN07-465AE00F4	475	465	348	696	450	315	**IM12L**	**IR12L**	X	X
iC7-60SLIN07-525AE00F4	536	525	393	786	500	355	**IM12L**	**IR12L**	X	X
iC7-60SLIN07-590AE00F4	603	590	442	884	560	400	**IM12L**	**IR12L**	X	X
iC7-60SLIN07-650AE00F4	664	650	487	974	630	450	**IM12L**	**IR12L**	X	X
iC7-60SLIN07-730AE00F4	746	730	547	1094	710	500	**IM12L**	**IR12L**	X	X
iC7-60SLIN07-820AE00F4	838	820	615	1230	800	560	**IM12L**	**IR12L**	X	
iC7-60SLIN07-945AE00F4	965	945	708	1416	900	630	**2xIM12L**	**2xIR12L**	X	X
iC7-60SLIN07-1060E00F4	1083	1060	795	1590	1000	710	**2xIM12L**	**2xIR12L**	X	X
iC7-60SLIN07-1230E00F4	1256	1230	922	1844	1100	800	**2xIM12L**	**2xIR12L**	X	X
iC7-60SLIN07-1400E00F4	1430	1400	1050	2100	1300	900	**2xIM12L**	**2xIR12L**	X	X
iC7-60SLIN07-1500E00F4	1532	1500	1125	2250	1400	1000	**2xIM12L**	**2xIR12L**	X	
iC7-60SLIN07-1640E00F4	1675	1640	1230	2460	1500	1100	**2xIM12L**	**2xIR12L**	X	
iC7-60SLIN07-1795E00F4	1833	1795	1346	2692	1700	1250	**3xIM12L**	**3xIR12L**	X	X
iC7-60SLIN07-2080E00F4	2124	2080	1560	3120	1900	1400	**3xIM12L**	**3xIR12L**	X	X
iC7-60SLIN07-2300E00F4	2348	2300	1725	3450	2100	1600	**3xIM12L**	**3xIR12L**	X	
iC7-60SLIN07-2500E00F4	2552	2500	1875	3750	2300	1750	**3xIM12L**	**3xIR12L**	X	
iC7-60SLIN07-2830E00F4	2889	2830	2122	4244	2600	1950	**4xIM12L**	**4xIR12L**	X	X
iC7-60SLIN07-3050E00F4	3114	3050	2287	4574	2800	2000	**4xIM12L**	**4xIR12L**	X	
iC7-60SLIN07-3260E00F4	3328	3260	2445	4890	3000	2200	**4xIM12L**	**4xIR12L**	X	
iC7-60SLIN07-3500E00F4	3573	3500	2625	5250	3300	2400	**5xIM12L**	**5xIR12L**	X	X
iC7-60SLIN07-4035E00F4	4119	4035	3026	6052	3800	2800	**5xIM12L**	**5xIR12L**	X	
iC7-60SLIN07-4400E00F4	4492	4400	3300	6600	4100	3100	**6xIM12L**	**6xIR12L**	X	X
iC7-60SLIN07-4850E00F4	4951	4850	3637	7274	4500	3500	**6xIM12L**	**6xIR12L**	X	
iC7-60SLIN07-5300E00F4	5411	5300	3975	7950	5000	3700	**7xIM12L**	**7xIR12L**	X	
iC7-60SLIN07-5600E00F4	5717	5600	4200	8400	5300	4000	**7xIM12L**	**7xIR12L**	X	
iC7-60SLIN07-6100E00F4	6227	6100	4575	9150	5700	4300	**8xIM12L**	**8xIR12L**	X	
iC7-60SLIN07-6400E00F4	6534	6400	4800	9600	6000	4600	**8xIM12L**	**8xIR12L**	X	

[1] ***Ratings are valid at 1025 V nominal DC voltage***
I_N Nominal (thermal) continuous current. Dimensioning can be done according to this current if the process does not require any overloadability
or the process does not include any load variation or margin for overloadability
I_L Low overload – 110% overload – 1 min every 5 min
I_H High overload – 150% overload – 1 min every 5 min
I_{peak} Peak output current. Available for 3 seconds at start, then as long as allowed by system module temperature
[2] *All values with efficiency = 98.5%*
[3] *+AEU1 = dU/dt filter in Integration unit; +AEU2 = dU/dt + CM filter in Integration unit; +AE10 = Integration unit without filter;*
+AES1 = Sine-wave filter in Integration unit
[4] *+AEU2 only available for IM10L and IR10L*
[5] *+AEZ1 only available for iC7-Hybrid with Generator application*

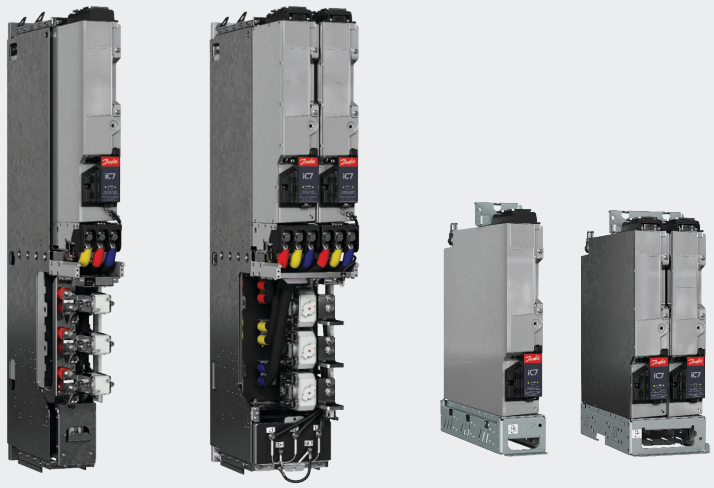
Ratings: Inverter module (INU) at 500 V AC

iC7-60SLINB5, 380-500 V AC (465-800 VDC), IP00 Liquid-Cooled inverter module

Model code	AC ratings [1]				Motor output power [2]		Frame	Frame with option +AE__	Filter options available [3]	
	3 x 380-500 V				500 V AC mains				+AEU1 +AEU2 [4] +AE10	+AES1 +AEZ1 [5]
	I_N	I_L	I_H	I_{peak}	P_L	P_H				
	[A]	[A]	[A]	[A]	[kW]	[kW]				
iC7-60SLINB5-206AE00F4	211	206	155	310	132	90	**IM10L**	**IR10L**	X	
iC7-60SLINB5-245AE00F4	251	245	184	368	160	110	**IM10L**	**IR10L**	X	
iC7-60SLINB5-302AE00F4	309	302	227	454	200	132	**IM10L**	**IR10L**	X	
iC7-60SLINB5-385AE00F4	394	385	289	578	250	160	**IM10L**	**IR10L**	X	
iC7-60SLINB5-416AE00F4	425	416	312	624	270	200	**IM10L**	**IR10L**	X	
iC7-60SLINB5-525AE00F4	536	525	393	786	355	250	**IM12L**	**IR12L**	X	X
iC7-60SLINB5-590AE00F4	603	590	442	884	400	250	**IM12L**	**IR12L**	X	X
iC7-60SLINB5-650AE00F4	672	658	487	974	400	315	**IM12L**	**IR12L**	X	X
iC7-60SLINB5-730AE00F4	746	730	547	1094	500	355	**IM12L**	**IR12L**	X	X
iC7-60SLINB5-820AE00F4	838	820	615	1230	560	400	**IM12L**	**IR12L**	X	
iC7-60SLINB5-1060AE00F4	1083	1060	795	1590	630	500	**2xIM12L**	**2xIR12L**	X	X
iC7-60SLINB5-1230AE00F4	1256	1230	922	1844	800	630	**2xIM12L**	**2xIR12L**	X	X
iC7-60SLINB5-1400AE00F4	1430	1400	1050	2100	900	710	**2xIM12L**	**2xIR12L**	X	X
iC7-60SLINB5-1500AE00F4	1532	1500	1125	2250	1000	710	**2xIM12L**	**2xIR12L**	X	
iC7-60SLINB5-1640AE00F4	1675	1640	1230	2460	1100	800	**2xIM12L**	**2xIR12L**	X	
iC7-60SLINB5-1795AE00F4	1833	1795	1346	2692	1200	900	**3xIM12L**	**3xIR12L**	X	X
iC7-60SLINB5-2080AE00F4	2124	2080	1560	3120	1400	1000	**3xIM12L**	**3xIR12L**	X	X
iC7-60SLINB5-2300AE00F4	2348	2300	1725	3450	1500	1100	**3xIM12L**	**3xIR12L**	X	
iC7-60SLINB5-2500AE00F4	2512	2460	1845	3690	1600	1200	**3xIM12L**	**3xIR12L**	X	
iC7-60SLINB5-2830AE00F4	2889	2830	2122	4244	1900	1400	**4xIM12L**	**4xIR12L**	X	X
iC7-60SLINB5-3050AE00F4	3114	3050	2287	4574	2000	1500	**4xIM12L**	**4xIR12L**	X	
iC7-60SLINB5-3260AE00F4	3328	3260	2445	4890	2200	1600	**4xIM12L**	**4xIR12L**	X	

[1] ***Ratings are valid at 800 V nominal DC voltage***
I_N Nominal (thermal) continuous current. Dimensioning can be done according to this current if the process does not require any overloadability
or the process does not include any load variation or margin for overloadability
I_L Low overload – 110% overload – 1 min every 5 min
I_H High overload – 150% overload – 1 min every 5 min
I_{peak} Peak output current. Available for 3 seconds at start, then as long as allowed by system module temperature
[2] *All values with efficiency = 98.5%*
[3] *+AEU1 = dU/dt filter in Integration unit; +AEU2 = dU/dt + CM filter in Integration unit; +AE10 = Integration unit without filter;*
+AES1 = Sine-wave filter in Integration unit
[4] *+AEU2 only available for IM10L and IR10L*
[5] *+AEZ1 only available for iC7-Hybrid with Generator application*

AFE modules



AFE module

The AFE unit is a bi-directional low harmonic supply unit for motor drive applications. Active front end is typically used as a supply to a common DC bus drive line-ups or single drives when low harmonics or regeneration of power back to the grid is needed/valued.

The main functionality of the AFE is to maintain stable DC-link voltage reference. The AFE transfers power between the grid and the DC bus both ways depending on the load of the DC bus.

Benefits of the AFE

- Regenerative energy is fed back to the grid, improving the payback time of the investment. Regeneration at full power is available at any time.
- The AFE can boost the DC-link voltage within the voltage window of the converter hardware. Its advantage is that the DC-voltage available for motor inverters is not limited even under non-ideal grid conditions.
- Power quality is excellent since the grid current is sinusoidal with very low harmonics (<5% THDi) and power factor is unity (cos φ = 1) This means that there is no need to oversize incoming supply transformers, as for traditional diode rectifiers, which reduces investment costs and space.

Ratings

- 236-5750 A I_L, +10% overload 1 min/5 min
- 525-690 V AC / 640-1100 V DC (07)
- 380-500 V AC / 465-830 V DC (B5)
- 45-66 Hz Grid frequency
- THDi <5%
- Fundamental power factor cos φ = 1, adjustable reactive current set point
- Ambient temperature 60 °C at I_N
- Coolant temperature 45 °C at I_N, with the exception of 38 °C at I_N for current ratings 380 A, 760 A, 1500 A, 2250 A, 2940 A, 3600 A, 4320 A, 5040 A, 5750 A.

Highlights

- Most compact AFE on the market thanks to integration of LC-filter and fuses
- Meets the most stringent harmonics requirements thanks to high DC and AC power quality
- Robust and reliable in varying ambient conditions
- Designed for enclosure integration and quick serviceability
- Lowest weight on the market thanks to new filter technology

DC-bus and grid control

- Fast primary control ensures stable DC voltage even under non-ideal grid conditions for accurate motor control.
- AFE is able to boost DC voltage to guarantee full motor voltage even when the supply voltage is below nominal.
- Low harmonic operation meets even the stringest power quality requirements for drive systems.
- Reactive reference can be used to compensate other low power factor equipment in the network.
- Unrivalled paralleling options with no need for drive-to-drive communication
- Power can be shared between parallel units automatically with DC-link voltage droop control.

Ratings: Active front-end (AFE) at 690 V AC

iC7-60SL3A07, 525-690 V AC (640-1100 V DC), Type Open / IP00 active front-end

Model code	AC current			DC power [2]		Frame size	Frame with option +AEZ1 or +AEZ3 [3]	L-filter size (part of LCL-filter +AEZ3 [3])
	Current ratings [1]			690 V AC mains				
	I_N	I_L	I_H	P_L	P_H			
	[A]	[A]	[A]	[kW]	[kW]			
iC7-60SL3A07-236AE00F4	241	236	177	277	208	AM10L	AR10L	OF7Z5-M-LC-07-400A-A1-E00-F4
iC7-60SL3A07-300AE00F4	307	300	225	352	264	AM10L	AR10L	OF7Z5-M-LC-07-400A-A1-E00-F4
iC7-60SL3A07-334AE00F4	341	334	250	392	293	AM10L	AR10L	OF7Z5-M-LC-07-400A-A1-E00-F4
iC7-60SL3A07-380AE00F4	388	380	285	446	334	AM10L	AR10L	OF7Z5-M-LC-07-400A-A1-E00-F4
iC7-60SL3A07-425AE00F4	434	425	318	498	373	AM12L	AR12L	OF7Z5-M-LC-07-1000-A1-E00-F4
iC7-60SL3A07-475AE00F4	485	475	356	557	417	AM12L	AR12L	OF7Z5-M-LC-07-1000-A1-E00-F4
iC7-60SL3A07-530AE00F4	542	530	397	621	465	AM12L	AR12L	OF7Z5-M-LC-07-1000-A1-E00-F4
iC7-60SL3A07-595AE00F4	608	595	446	697	523	AM12L	AR12L	OF7Z5-M-LC-07-1000-A1-E00-F4
iC7-60SL3A07-670AE00F4	684	670	502	785	588	AM12L	AR12L	OF7Z5-M-LC-07-1000-A1-E00-F4
iC7-60SL3A07-760AE00F4	776	760	570	891	668	AM12L	AR12L	OF7Z5-M-LC-07-1000-A1-E00-F4
iC7-60SL3A07-850AE00F4	868	850	637	996	747	2xAM12L	2xAR12L	OF7Z5-M-LC-07-1640-A1-E00-F4
iC7-60SL3A07-945AE00F4	965	945	708	1107	830	2xAM12L	2xAR12L	OF7Z5-M-LC-07-1640-A1-E00-F4
iC7-60SL3A07-1040E00F4	1062	1040	780	1219	914	2xAM12L	2xAR12L	OF7Z5-M-LC-07-1640-A1-E00-F4
iC7-60SL3A07-1230E00F4	1256	1230	922	1441	1080	2xAM12L	2xAR12L	OF7Z5-M-LC-07-1640-A1-E00-F4
iC7-60SL3A07-1325E00F4	1353	1325	993	1552	1164	2xAM12L	2xAR12L	OF7Z5-M-LC-07-1640-A1-E00-F4
iC7-60SL3A07-1500E00F4	1532	1500	1125	1757	1318	2xAM12L	2xAR12L	OF7Z5-M-LC-07-1640-A1-E00-F4
iC7-60SL3A07-1700E00F4	1736	1700	1275	1992	1494	3xAM12L	3xAR12L	OF7Z5-M-LC-07-2300-A1-E00-F4
iC7-60SL3A07-1800E00F4	1838	1800	1350	2109	1582	3xAM12L	3xAR12L	OF7Z5-M-LC-07-2300-A1-E00-F4
iC7-60SL3A07-2000E00F4	2042	2000	1500	2343	1757	3xAM12L	3xAR12L	OF7Z5-M-LC-07-2300-A1-E00-F4
iC7-60SL3A07-2250E00F4	2297	2250	1687	2636	1976	3xAM12L	3xAR12L	OF7Z5-M-LC-07-2300-A1-E00-F4
iC7-60SL3A07-2500E00F4	2552	2500	1875	2929	2197	4xAM12L	4xAR12L	2xOF7Z5-M-LC-07-1640-A1-E00-F4
iC7-60SL3A07-2650E00F4	2706	2650	1987	3104	2328	4xAM12L	4xAR12L	2xOF7Z5-M-LC-07-1640-A1-E00-F4
iC7-60SL3A07-2940E00F4	3002	2940	2205	3444	2583	4xAM12L	4xAR12L	2xOF7Z5-M-LC-07-1640-A1-E00-F4
iC7-60SL3A07-3120E00F4	3185	3120	2340	3655	2741	5xAM12L	5xAR12L	2xOF7Z5-M-LC-07-2300-A1-E00-F4
iC7-60SL3A07-3600E00F4	3675	3600	2700	4217	3163	5xAM12L	5xAR12L	2xOF7Z5-M-LC-07-2300-A1-E00-F4
iC7-60SL3A07-3900E00F4	3982	3900	2925	4568	3426	6xAM12L	6xAR12L	2xOF7Z5-M-LC-07-2300-A1-E00-F4
iC7-60SL3A07-4320E00F4	4410	4320	3240	5060	3795	6xAM12L	6xAR12L	2xOF7Z5-M-LC-07-2300-A1-E00-F4
iC7-60SL3A07-4750E00F4	4849	4750	3562	5564	4172	7xAM12L	7xAR12L	4xOF7Z5-M-LC-07-1640-A1-E00-F4
iC7-60SL3A07-5040E00F4	5145	5040	3780	5903	4428	7xAM12L	7xAR12L	4xOF7Z5-M-LC-07-1640-A1-E00-F4
iC7-60SL3A07-5400E00F4	5513	5400	4050	6325	4744	8xAM12L	8xAR12L	4xOF7Z5-M-LC-07-1640-A1-E00-F4
iC7-60SL3A07-5750E00F4	5870	5750	4312	6735	5051	8xAM12L	8xAR12L	4xOF7Z5-M-LC-07-1640-A1-E00-F4

[1] ***Ratings are valid at 1025V nominal DC voltage***
I_N Nominal (thermal) continuous current. Dimensioning can be done according to this current if the process does not require any overloadability
I_L Low overloadability current (1/5min) Allows +10% load variation for 1 minute every 5 minutes.
I_H High overloadability current (1/5min) Allows +50% load variation for 1 minute every 5 minutes.
[2] *All values with cosφ = 1.00, efficiency = 98.0% and rated voltage 1025 V DC*
[3] *Incudes LC-filter with the option +AEZ1 and LCL-filter with the option +AEZ3 net side L-filter separate module*

Ratings: Active front-end (AFE) at 500 V AC

iC7-60SL3AB5, 380-500 V AC (465-830 V DC), Type Open/IP00 active front end [1]

Model code	AC current			DC power [3]		Frame size	Frame with option +AEZ1 or +AEZ3 [4]	L-filter size (part of LCL-filter +AEZ3 [3,4])
	Current ratings [2]			500 V AC mains				
	I_N	I_L	I_H	P_L	P_H			
	[A]	[A]	[A]	[kW]	[kW]			
iC7-60SL3AB5-261AE00F4	267	261	196	222	167	**AM10L**	**AR10L**	**OF7Z5-M-LC-07-400A-A1-E00-F4**
iC7-60SL3AB5-325AE00F4	332	325	244	276	208	**AM10L**	**AR10L**	**OF7Z5-M-LC-07-400A-A1-E00-F4**
iC7-60SL3AB5-380AE00F4	388	380	285	323	242	**AM10L**	**AR10L**	**OF7Z5-M-LC-07-400A-A1-E00-F4**
iC7-60SL3AB5-425AE00F4	434	425	318	361	270	**AM12L**	**AR12L**	**OF7Z5-M-LC-07-1000-A1-E00-F4**
iC7-60SL3AB5-475AE00F4	485	475	356	404	303	**AM12L**	**AR12L**	**OF7Z5-M-LC-07-1000-A1-E00-F4**
iC7-60SL3AB5-530AE00F4	542	530	397	450	337	**AM12L**	**AR12L**	**OF7Z5-M-LC-07-1000-A1-E00-F4**
iC7-60SL3AB5-595AE00F4	608	595	446	505	379	**AM12L**	**AR12L**	**OF7Z5-M-LC-07-1000-A1-E00-F4**
iC7-60SL3AB5-670AE00F4	684	670	502	569	427	**AM12L**	**AR12L**	**OF7Z5-M-LC-07-1000-A1-E00-F4**
iC7-60SL3AB5-760AE00F4	776	760	570	646	484	**AM12L**	**AR12L**	**OF7Z5-M-LC-07-1000-A1-E00-F4**
iC7-60SL3AB5-850AE00F4	868	850	637	722	541	**2xAM12L**	**2xAR12L**	**OF7Z5-M-LC-07-1640-A1-E00-F4**
iC7-60SL3AB5-945AE00F4	965	945	708	803	601	**2xAM12L**	**2xAR12L**	**OF7Z5-M-LC-07-1640-A1-E00-F4**
iC7-60SL3AB5-1040E00F4	1062	1040	780	883	662	**2xAM12L**	**2xAR12L**	**OF7Z5-M-LC-07-1640-A1-E00-F4**
iC7-60SL3AB5-1230E00F4	1256	1230	922	1044	783	**2xAM12L**	**2xAR12L**	**OF7Z5-M-LC-07-1640-A1-E00-F4**
iC7-60SL3AB5-1325E00F4	1353	1325	993	1125	843	**2xAM12L**	**2xAR12L**	**OF7Z5-M-LC-07-1640-A1-E00-F4**
iC7-60SL3AB5-1500E00F4	1532	1500	1125	1274	955	**2xAM12L**	**2xAR12L**	**OF7Z5-M-LC-07-1640-A1-E00-F4**
iC7-60SL3AB5-1700E00F4	1736	1700	1275	1443	1083	**3xAM12L**	**3xAR12L**	**OF7Z5-M-LC-07-2300-A1-E00-F4**
iC7-60SL3AB5-1800E00F4	1838	1800	1350	1528	1146	**3xAM12L**	**3xAR12L**	**OF7Z5-M-LC-07-2300-A1-E00-F4**
iC7-60SL3AB5-2000E00F4	2042	2000	1500	1698	1274	**3xAM12L**	**3xAR12L**	**OF7Z5-M-LC-07-2300-A1-E00-F4**
iC7-60SL3AB5-2250E00F4	2297	2250	1687	1910	1432	**3xAM12L**	**3xAR12L**	**OF7Z5-M-LC-07-2300-A1-E00-F4**
iC7-60SL3AB5-2500E00F4	2552	2500	1875	2122	1592	**4xAM12L**	**4xAR12L**	**2xOF7Z5-M-LC-07-1640-A1-E00-F4**
iC7-60SL3AB5-2650E00F4	2706	2650	1987	2250	1687	**4xAM12L**	**4xAR12L**	**2xOF7Z5-M-LC-07-1640-A1-E00-F4**
iC7-60SL3AB5-2940E00F4	3002	2940	2205	2496	1872	**4xAM12L**	**4xAR12L**	**2xOF7Z5-M-LC-07-1640-A1-E00-F4**

[1] Main voltage 380-500 V AC (465-800 V DC) (Improved hardware transient withstand)

*[2] **Ratings are valid at 800V DC voltage***

I_N Nominal (thermal) continuous current. Dimensioning can be done according to this current if the process does not require any overloadability

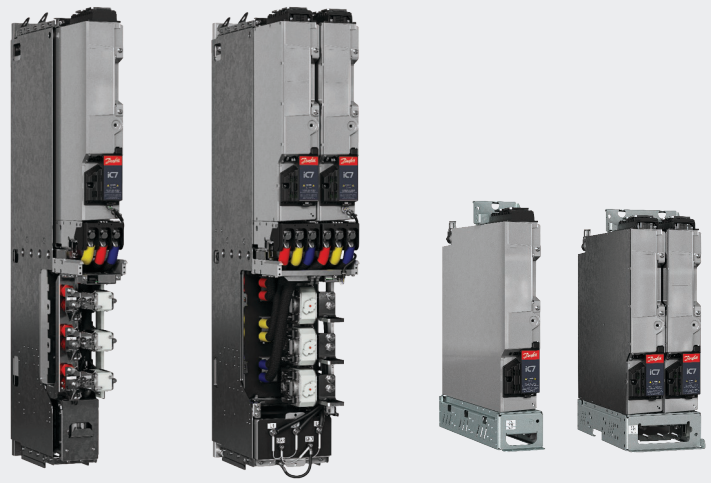
I_L Low overloadability current (1/5min) Allows +10% load variation for 1 minute every 5 minutes.

I_H High overloadability current (1/5min) Allows +50% load variation for 1 minute every 5 minutes.

[3] All values with cosφ = 1.00, efficiency = 98.0% and rated voltage 742 V DC

[4] Incudes LC-filter with the option +AEZ1 and LCL-filter with the option +AEZ3 net side L-filter separate module

Grid Converter module



Grid Converter for advanced AC/DC power conversion

- Grid converter is a bi-directional AC/DC power converter for grid forming, advanced grid control and DC power supply applications
- Ideal for smart grid applications such as energy storage and DC power supply for hydrogen electrolysis.
- Stand-out solution for marine & offshore energy management applications such as energy storage, micro grid forming, shaft generators and shore power.

Ratings

- 236-5750 A I_L, +10% overload 1 min/5 min
- 525-690 V AC / 640-1100 V DC (07)
- 380-500 V AC / 465-830 V DC (B5)
- 45-66 Hz Grid frequency (25-70 Hz with derating)
- THDi < 5% (< 3% with dedicated transformer)
- Adjustable power factor
- Ambient temperature 60 °C at I_N
- Coolant temperature 45 °C at I_N, with the exception of 38 °C at I_N for current ratings 380 A, 760 A, 1500 A, 2250 A, 2940 A, 3600 A, 4320 A, 5040 A, 5750 A.

Highlights

- Most compact AC/DC power conversion on the market thanks to integration of filters and fuses
- High short-circuit current injection capability reduces oversizing
- Meets the stringest harmonics requirements thanks to high DC and AC power quality
- Robust and reliable in varying ambient conditions
- Designed for fast enclosure integration and quick serviceability
- Lowest weight on the market thanks to new filter technology
- Same mechanical footprint and integration as INU, AFE and DC/DC modules

State-of-the-art grid control

- Fast primary control ensures power system stability and streamlined power management
- Synchronize to external grid and compensate voltage drop thanks to dual-channel voltage measurement option
- Blackout prevention and black start
- Unrivalled paralleling options for high-power installations
- Flexible grid forming and grid following control modes to optimize system-level cost
  - DC-bus voltage
  - DC current / power
  - Active and reactive power
  - AC voltage & frequency
  - Island (grid forming)
  - Droop control
  - Droop with base load
  - Limit controllers
  - Smooth transition between grid-following and grid-forming control modes

Ratings: Grid converter (GC) at 690 V AC

iC7-60SLGC07, 525-690 V AC (640-1100 V DC), IP00/UL Open Type Grid Converter module

Model code	Current ratings [1]					Power ratings [2]		Frame size	Frame with option +AE__
	3 x 525-690 V					690 V AC mains			
	I_N	I_L	I_H	I_S	I_{S2}	P_L	S_L		
	[A]	[A]	[A]	[A]	[A]	[kW]	[kVA]		
iC7-60SLGC07-236AE00F4	241	236	177	354	330	277	283	**AM10L**	**AR10L**
iC7-60SLGC07-300AE00F4	307	300	225	450	420	352	359	**AM10L**	**AR10L**
iC7-60SLGC07-334AE00F4	341	334	250	501	468	392	400	**AM10L**	**AR10L**
iC7-60SLGC07-380AE00F4	388	380	285	570	532	446	455	**AM10L**	**AR10L**
iC7-60SLGC07-425AE00F4	434	425	318	638	595	498	508	**AM12L**	**AR12L**
iC7-60SLGC07-475AE00F4	485	475	356	712,5	665	557	568	**AM12L**	**AR12L**
iC7-60SLGC07-530AE00F4	542	530	397	795	742	621	634	**AM12L**	**AR12L**
iC7-60SLGC07-595AE00F4	608	595	446	892,5	833	697	712	**AM12L**	**AR12L**
iC7-60SLGC07-670AE00F4	684	670	502	1005	938	785	801	**AM12L**	**AR12L**
iC7-60SLGC07-760AE00F4	776	760	570	1140	1064	891	909	**AM12L**	**AR12L**
iC7-60SLGC07-850AE00F4	868	850	637	1275	1190	996	1016	**2xAM12L**	**2xAR12L**
iC7-60SLGC07-945AE00F4	965	945	708	1417,5	1323	1107	1130	**2xAM12L**	**2xAR12L**
iC7-60SLGC07-1040E00F4	1062	1040	780	1560	1456	1219	1243	**2xAM12L**	**2xAR12L**
iC7-60SLGC07-1230E00F4	1256	1230	922	1845	1722	1441	1470	**2xAM12L**	**2xAR12L**
iC7-60SLGC07-1325E00F4	1353	1325	993	1988	1855	1552	1584	**2xAM12L**	**2xAR12L**
iC7-60SLGC07-1500E00F4	1532	1500	1125	2250	2100	1757	1793	**2xAM12L**	**2xAR12L**
iC7-60SLGC07-1700E00F4	1736	1700	1275	2550	2380	1992	2032	**3xAM12L**	**3xAR12L**
iC7-60SLGC07-1800E00F4	1838	1800	1350	2700	2520	2109	2152	**3xAM12L**	**3xAR12L**
iC7-60SLGC07-2000E00F4	2042	2000	1500	3000	2800	2343	2391	**3xAM12L**	**3xAR12L**
iC7-60SLGC07-2250E00F4	2297	2250	1687	3375	3150	2636	2690	**3xAM12L**	**3xAR12L**
iC7-60SLGC07-2500E00F4	2552	2500	1875	3750	3500	2929	2988	**4xAM12L**	**4xAR12L**
iC7-60SLGC07-2650E00F4	2706	2650	1987	3975	3710	3104	3168	**4xAM12L**	**4xAR12L**
iC7-60SLGC07-2940E00F4	3002	2940	2205	4410	4116	3444	3514	**4xAM12L**	**4xAR12L**
iC7-60SLGC07-3120E00F4	3185	3120	2340	4680	4368	3655	3729	**5xAM12L**	**5xAR12L**
iC7-60SLGC07-3600E00F4	3675	3600	2700	5400	5040	4217	4303	**5xAM12L**	**5xAR12L**
iC7-60SLGC07-3900E00F4	3982	3900	2925	5850	5460	4568	4661	**6xAM12L**	**6xAR12L**
iC7-60SLGC07-4320E00F4	4410	4320	3240	6480	6048	5060	5163	**6xAM12L**	**6xAR12L**
iC7-60SLGC07-4750E00F4	4849	4750	3562	7125	6650	5564	5677	**7xAM12L**	**7xAR12L**
iC7-60SLGC07-5040E00F4	5145	5040	3780	7560	7056	5903	6024	**7xAM12L**	**7xAR12L**
iC7-60SLGC07-5400E00F4	5513	5400	4050	8100	7560	6325	6454	**8xAM12L**	**8xAR12L**
iC7-60SLGC07-5750E00F4	5870	5750	4312	8625	8050	6735	6872	**8xAM12L**	**8xAR12L**

[1] ***Ratings are valid at 1025 V DC nominal voltage***
I_N Nominal (thermal) continuous current. Dimensioning can be done according to this current if the process does not require any overloadability
I_L Low overload – 110% overload – 1 min every 5 min.
I_H High overload – 150% overload – 1 min every 5 min.
I_S Short-term current injection available for 1s
I_{S2} Short-term current injection available for 3.0s
[2] *DC power is calculated with cosφ = 1, efficiency = 98% and at nominal 1025 V DC voltage*

Ratings: Grid converter (GC) at 500 V AC

iC7-60SLGCB5, 380-500 V AC (465-830 V DC), IP00/UL Open Type Grid converter unit [1]

Model code	Current ratings [2]					Power ratings [3]		Frame size	Frame with option +AE__ [4]
	3 x 380-500 V					500 V AC mains			
	I_N	I_L	I_H	I_S	I_{S2}	P_L	S_L		
	[A]	[A]	[A]	[A]	[A]	[kW]	[kVA]		
iC7-60SLGCB5-261AE00F4	267	261	196	392	365	222	227	**AM10L**	**AR10L**
iC7-60SLGCB5-325AE00F4	332	325	244	488	455	276	282	**AM10L**	**AR10L**
iC7-60SLGCB5-380AE00F4	388	380	285	570	532	323	330	**AM10L**	**AR10L**
iC7-60SLGCB5-425AE00F4	434	425	318	638	595	361	369	**AM12L**	**AR12L**
iC7-60SLGCB5-475AE00F4	485	475	356	713	665	404	412	**AM12L**	**AR12L**
iC7-60SLGCB5-530AE00F4	542	530	397	795	742	450	459	**AM12L**	**AR12L**
iC7-60SLGCB5-595AE00F4	608	595	446	893	833	505	516	**AM12L**	**AR12L**
iC7-60SLGCB5-670AE00F4	684	670	502	1005	938	569	581	**AM12L**	**AR12L**
iC7-60SLGCB5-760AE00F4	776	760	570	1140	1064	646	659	**AM12L**	**AR12L**
iC7-60SLGCB5-850AE00F4	868	850	637	1275	1190	722	737	**2xAM12L**	**2xAR12L**
iC7-60SLGCB5-945AE00F4	965	945	708	1418	1323	803	819	**2xAM12L**	**2xAR12L**
iC7-60SLGCB5-1040E00F4	1062	1040	780	1560	1456	883	901	**2xAM12L**	**2xAR12L**
iC7-60SLGCB5-1230E00F4	1256	1230	922	1845	1722	1044	1066	**2xAM12L**	**2xAR12L**
iC7-60SLGCB5-1325E00F4	1353	1325	993	1988	1855	1125	1148	**2xAM12L**	**2xAR12L**
iC7-60SLGCB5-1500E00F4	1532	1500	1125	2250	2100	1274	1300	**2xAM12L**	**2xAR12L**
iC7-60SLGCB5-1700E00F4	1736	1700	1275	2550	2380	1443	1473	**3xAM12L**	**3xAR12L**
iC7-60SLGCB5-1800E00F4	1838	1800	1350	2700	2520	1528	1559	**3xAM12L**	**3xAR12L**
iC7-60SLGCB5-2000E00F4	2042	2000	1500	3000	2800	1698	1733	**3xAM12L**	**3xAR12L**
iC7-60SLGCB5-2250E00F4	2297	2250	1687	3375	3150	1910	1949	**3xAM12L**	**3xAR12L**
iC7-60SLGCB5-2500E00F4	2552	2500	1875	3750	3500	2122	2166	**4xAM12L**	**4xAR12L**
iC7-60SLGCB5-2650E00F4	2706	2650	1987	3975	3710	2250	2295	**4xAM12L**	**4xAR12L**
iC7-60SLGCB5-2940E00F4	3002	2940	2205	4410	4116	2496	2547	**4xAM12L**	**4xAR12L**

[1] Main voltage 380…500 V AC (465…830 V DC) (Improved hardware transient withstand)

*[2] **Ratings are valid at 800 V DC voltage***

I_N Nominal (thermal) continuous current. Dimensioning can be done according to this current if the process does not require any overloadability

I_L Low overloadability current (1/5min) Allows +10% load variation for 1 minute every 5 minutes.

I_H High overloadability current (1/5min) Allows +50% load variation for 1 minute every 5 minutes.

[3] DC power is calculated with cos φ = 1, efficiency = 98% and 742 V DC voltage

[4] Incudes LC-filter with the option +AEZ1 and LCL-filter with the option +AEZ3 (net side L-filter separate module)

DC/DC Converter

Tap in to the benefits of electrification with the DC/DC Converter

- DC/DC Converter is a bi-directional power converter enabling interconnection of two (DC) systems having different voltage levels
- Energy storage with wide voltage range can be connected to a stable DC bus
- Ideal for high-power battery or fuel cell applications
- Enables peak shaving and zero emission operation while providing additional redundancy.

Ratings

- 300-3600 A I_L, +10% overload 1 min/5 min
- 640-1100 V DC bus (07)
- 465-830 V DC bus (B5)
- DC Source voltage range 3-100% of DC bus voltage. Full control performance 3-97% of DC bus voltage
- DC source current ripple (typical):
  – DR10L < 1% RMS (typical)
  – DR12L < 0.5% RMS (typical))
- Ambient temperature 60 °C at I_N
- Coolant temperature 45 °C at I_N, with the exception of 38 °C at I_N for current ratings 1200 A, 2400 A, 3600 A

Highlights

- Most compact DC/DC Converter on the market thanks to integration of filters and fuses
- Lowest weight on the market thanks to new filter technology
- Same mechanical footprint and integration as INU,AFE and GC.
- Meets strict DC power quality requirements
- Robust and reliable in varying ambient conditions
- Designed for enclosure integration and quick serviceability

DC/DC Converter control

- Fast primary control ensures power system stability and streamlined power management
- Flexible control modes to optimize system-level cost and time to market
  – DC-bus voltage reference
  – Source voltage reference
  – Source power and current references
  – Current and voltage limit controllers
  – Smooth transition between control modes during run state
- Able to maintain stable DC bus voltage even when other power generation goes offline – added redundancy on top of the benefits of hybridization and electrification
- Black start capability

Ratings: DC/DC Converter (DC) at 1025 V DC

iC7-60SLDC07, 640-1100 V DC bus, IP00/UL Open Type DC/DC Converter

Model code	DC current			DC power	Frame	Frame with option +AE__
				1000..250 $V_{DC\ source}$		
	I_N	I_L	I_H	$P_{L\text{-}typ}$		
	[A]	[A]	[A]	[kW]		
iC7-60SLDC07-300AE00F4	307	300	225	300..75	**DM10L**	**DR10L**
iC7-60SLDC07-360AE00F4	368	360	270	360..90	**DM10L**	**DR10L**
iC7-60SLDC07-420AE00F4	429	420	315	420..105	**DM10L**	**DR10L**
iC7-60SLDC07-480AE00F4	490	480	360	480..120	**DM10L**	**DR10L**
iC7-60SLDC07-570AE00F4	582	570	428	570..142	**DM10L**	**DR10L**
iC7-60SLDC07-720AE00F4	735	720	540	720..180	**DM12L**	**DR12L**
iC7-60SLDC07-840AE00F4	858	840	630	840..210	**DM12L**	**DR12L**
iC7-60SLDC07-960AE00F4	980	960	720	960..240	**DM12L**	**DR12L**
iC7-60SLDC07-1080E00F4	1103	1080	810	1080..270	**DM12L**	**DR12L**
iC7-60SLDC07-1200E00F4	1225	1200	900	1200..300	**DM12L**	**DR12L**
iC7-60SLDC07-1440E00F4	1470	1440	1080	1440..360	**2xDM12L**	**2xDR12L**
iC7-60SLDC07-1680E00F4	1715	1680	1260	1680..420	**2xDM12L**	**2xDR12L**
iC7-60SLDC07-1920E00F4	1960	1920	1440	1920..480	**2xDM12L**	**2xDR12L**
iC7-60SLDC07-2160E00F4	2205	2160	1620	2160..540	**2xDM12L**	**2xDR12L**
iC7-60SLDC07-2400E00F4	2450	2400	1800	2400..600	**2xDM12L**	**2xDR12L**
iC7-60SLDC07-2880E00F4	2940	2880	2160	2880..720	**3xDM12L**	**3xDR12L**
iC7-60SLDC07-3240E00F4	3308	3240	2430	3240..810	**3xDM12L**	**3xDR12L**
iC7-60SLDC07-3600E00F4	3675	3600	2700	3600..900	**3xDM12L**	**3xDR12L**

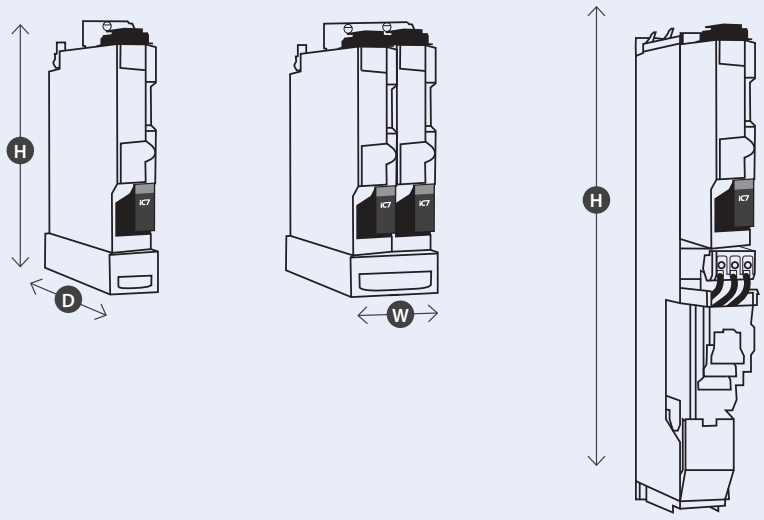
Ratings are valid at 1025 V nominal DC bus voltage
I_N Nominal (thermal) current. Dimensioning according I_N if the process does not require overloadability
I_L Low overload – 110% overload – 1 min every 5 min
I_H High overload – 150% overload for 1 min every 5 min
$P_{L\text{-}TYP}$ is the DC source power with the stated source voltage and I_L current
DC bus current rating is equal to DC source current ratings (DC current)
Source voltage range 3..100% of DC bus voltage. Full control performance 3..97% of DC bus voltage

Ratings: DC/DC Converter (DC) at 800 V DC

iC7-60SLDCB5, 465-830 V DC bus, IP00/UL Open Type DC/DC Converter

Model code	DC current			DC power	Frame	Frame with option +AE__
				700..250 $V_{DC\ source}$		
	I_N	I_L	I_H	$P_{L\text{-}typ}$		
	[A]	[A]	[A]	[kW]		
iC7-60SLDCB5-300AE00F4	307	300	225	210..75	**DM10L**	**DR10L**
iC7-60SLDCB5-360AE00F4	368	360	270	252..90	**DM10L**	**DR10L**
iC7-60SLDCB5-420AE00F4	429	420	315	294..105	**DM10L**	**DR10L**
iC7-60SLDCB5-480AE00F4	490	480	360	336..120	**DM10L**	**DR10L**
iC7-60SLDCB5-570AE00F4	582	570	428	399..143	**DM10L**	**DR10L**
iC7-60SLDCB5-720AE00F4	735	720	540	504..180	**DM12L**	**DR12L**
iC7-60SLDCB5-840AE00F4	858	840	630	588..210	**DM12L**	**DR12L**
iC7-60SLDCB5-960AE00F4	980	960	720	672..240	**DM12L**	**DR12L**
iC7-60SLDCB5-1080E00F4	1103	1080	810	756..270	**DM12L**	**DR12L**
iC7-60SLDCB5-1200E00F4	1225	1200	900	840..300	**DM12L**	**DR12L**
iC7-60SLDCB5-1440E00F4	1470	1440	1080	1008..360	**2xDM12L**	**2xDR12L**
iC7-60SLDCB5-1680E00F4	1715	1680	1260	1176..420	**2xDM12L**	**2xDR12L**
iC7-60SLDCB5-1920E00F4	1960	1920	1440	1344..480	**2xDM12L**	**2xDR12L**
iC7-60SLDCB5-2160E00F4	2205	2160	1620	1512..540	**2xDM12L**	**2xDR12L**
iC7-60SLDCB5-2400E00F4	2450	2400	1800	1680..600	**2xDM12L**	**2xDR12L**
iC7-60SLDCB5-2880E00F4	2940	2880	2160	2016..720	**3xDM12L**	**3xDR12L**
iC7-60SLDCB5-3240E00F4	3308	3240	2430	2268..810	**3xDM12L**	**3xDR12L**
iC7-60SLDCB5-3600E00F4	3675	3600	2700	2520..900	**3xDM12L**	**3xDR12L**

Ratings are valid at 800 V DC voltage
I_N Nominal (thermal) current. Dimensioning according I_N if the process does not require overloadability
I_L Low overload – 110% overload – 1 min every 5 min
I_H High overload – 150% overload for 1 min every 5 min
$P_{L\text{-}TYP}$ is the DC source power with the stated source voltage and I_L current
DC bus current rating is equal to DC source current ratings (DC current)
Source voltage range 3..100% of DC bus voltage. Full control performance 3..97% of DC bus voltage



Dimensions and weight: INU, AFE, GC and DC/DC modules

Module type		Inverter		AFE and Grid Converter		Inverter with integration unit		AFE/Grid Converter with integration unit		DC/DC Converter		DC/DC Converter with integration unit	
Frame		**IM10L**	**IM12L**	**AM10L**	**AM12L**	**IR10L**	**IR12L**	**AR10L**	**AR12L**	**DM10L**	**DM12L**	**DR10L**	**DR12L**
[mm]	Width	140	235	140	235	140	235	140	235	140	235	140	235
	Height	710	710	710	710	1295	1295	1295	1295	710	710	1295	1295
	Depth	558	558	558	558	566	566	566	566	558	558	566	566
[kg]	Weight [1]	41	80	41	80	106	178	138	230	41	80	130	230
[in]	Width	5.5	9.3	5.5	9.3	5.5	9.3	5.5	9.3	5.5	9.3	5.5	9.3
	Height	28	28	28	28	51	51	51	51	28	28	51	51
	Depth	22	22	22	22	22.3	22.3	22.3	22.3	22	22	22.3	22.3
[lb]	Weight [1]	90	176	90	176	234	392	304	507	90	176	287	507

[1] *Weight includes integration unit with these filters installed:*
IR10L, IR12L with dU/dt filter (+AEU1)
IR12L with sine-wave filter (+AES1): weight 222 kg
AR10L, AR12L with LC filter (+AEZ1)
DR10L, DR12L with DC/DC filter (+AED1)

Filters

Type	
Input filters	LC-filter and LCL-filter for Active front end and Grid converter modules
Output filters	dU/dt filter for inverter module (INU)
	Sine-wave filter for inverter module (INU)
	Common-mode filter for inverter module (INU), frame IR10L
DC/DC filter	DC/DC filter for DC/DC converter modules
Filter features	IP00 (IP55 excluding power terminals)
	Dedicated liquid cooled filters with up to 90% of heat losses to liquid Very low losses to air reduce air conditioning load
	Unsurpassed power density, ultra compact, super lightweight filter concept – unmatched anywhere in the market
	Supports vertical and horizontal mounting

Filters are available integrated in the integration unit and separately as loose options, which enables low-height installations

iC7-Marine iC7-Hybrid

Liquid-cooled Enclosed Drives

These drives meet the most demanding low-harmonic requirements for clean power and deliver other important benefits: regenerative braking, voltage boost for maximum output power, and more.

Ease of use

Packed full of features, these fully standardized, compact and robust drives with a full power range help maximize the utilization of space while minimizing overall costs.

Motor or generator control optimized for your application

Designed for maximum machine performance and flexibility.

- Versatility for drive applications requiring a wide range of drive features for different motor/ generator types, for either closed loop or open loop control methods
- Enjoy the highest possible machine accuracy due to superior shaft performance, even for sensorless operation
- The motor always runs at maximum possible torque for the given current, ensuring highest possible motor efficiency: Maximum Torque Per Ampere (MTPA)
- Fast commissioning using Automatic Motor Adaption (AMA) at standstill maximizes energy efficiency with any motor
- Flexible choice of control features optimized to your application, thanks to integrated application software.
- Variable speed power generation with stable DC voltage reference even without filter. Externally excited synchronous generator supported with Generator application and AFE control mode

HIGHLIGHTS

> Streamlined system integration
> Save space with world-class power density
> Fast and safe service access
> Modular control
> Reliable even in harsh conditions
> World-first drive with cyber-secure design
> More uptime, longer service intervals and long storage life due to film capacitor technology
> Small footprint thanks to cutting-edge heat management
> Liquid cooling enables reuse of waste heat for energy efficiency
> Wide range of cabinet options

Feature	Benefit
Market-leading power density	Save space and weight in marine and urban installations
World's most reliable drive	High uptime, a drive you can trust/built to last
Quick connectors, no draining of liquid, quick cabling	High uptime in harsh environments
Long design life and film capacitor technology	Reduced maintenance downtime
Robust by design, high uptime and quality	Peace of mind even in unpredictable conditions and heavy-duty service
Wide range of pre-designed options	Flexible to meet any application need
True liquid cooling ensures low losses to air and enables reuse of waste heat for energy efficiency	Highest possible system efficiency Reduced air conditioning need
Integrated options such as functional extensions, output filters, fuses and disconnects mean no extra external devices are required	Save cost and time in installation
Installer-friendly design includes pluggable control terminals, easy-access power terminals, and easily replaceable fans	Save cost and time in installation and service
Modular and scalable solutions for high powers Simplified spare unit handling	Fast integration and serviceability
Pull-out of power unit without removing motor or mains cables, included with integration unit	Fast and easy serviceability
Safe door-in-door access to the control compartment	Safe and fast serviceability

iC7-Marine iC7-Hybrid

Clean power saves money

The low-harmonic cabinet drive offers an excellent total solution to meet even the most demanding power quality requirements. The drive also complies with the IEEE-519, GS/4 harmonic standards.

The low THDi reduces supply currents and allows supply transformers, protection devices and power cables to be dimensioned according to the actual active power. It creates savings for both new and retrofit projects as there's no need to invest in expensive 12- or 18-pulse transformers.

Typical applications

- Pumps and fans
- Chillers
- Thrusters and main propulsion
- Shaft generators
- Energy storage

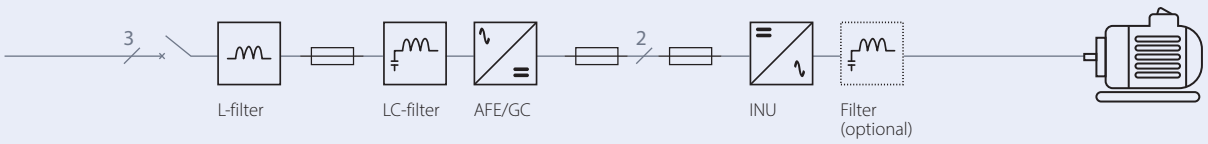
Reduce your operating costs with industry-benchmark liquid cooling. These modules offer true liquid cooling technology with very low losses to air.

Versatility to meet your needs

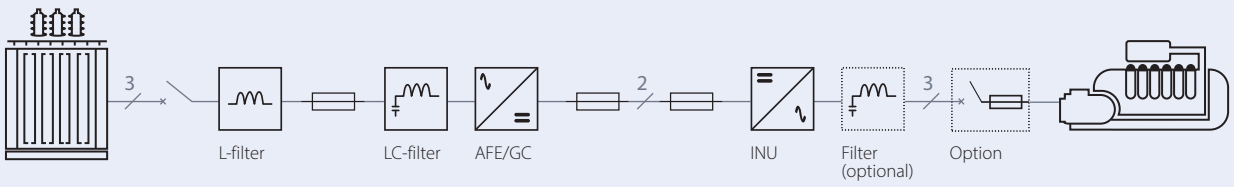
These Enclosed Drives are available in standard cabinet sizes, configured in the right variant to suit your application:

- Low-harmonic and regenerative variants
- Wide range of options

iC7-Marine Enclosed Drive topology



iC7-Hybrid Enclosed Drive topology



Key specifications: Enclosed drives

Input	
Voltage rating	3 x 525-690 V AC, -15%...+10%
Current range	590-4850 A
Overload capacity	110/150% for 1 minute every 5 minutes
Supply frequency	45-66 Hz for AFE/GC 25-70 Hz for GC frequency operation below 45 Hz with derating of 0.2% Hz
Switching on input	Once every 60 s for 5 minutes, then pause of 10 minutes
Grid type	TN, TN-T, IT and TT
Output	
Output frequency	0-599 Hz
Switching on output	Unlimited
Overload capacity	110% and 150%
Motor control principles	U/f control VVC+ (Vector Voltage Control) Flux Vector Control
Motor and generator types supported	– Induction/asynchronous motor – Non-salient permanent magnet motor – Salient permanent magnet motor – Synchronous reluctance assisted permanent magnet motor
Output filter	dU/dt and sine-filter available as option integrated into inverter unit enclosure section
EMC	
Immunity	– Fulfills IEC/EN 61800-3, 2nd environment – Fulfills IEC/EN 61000-6-2
Emissions	IEC/EN 61800-3, category C4
Environmental conditions	
Protection rating	IP54
Ambient temperature	-15 °C/5 °F (no frost) to +40 °C/104 °F (at IN))
Relative humidity	10 to 95% RH, no dripping water or condensation allowed
Pollution degree	PD3
Rated altitude	– 0-2000 m (0-6500 ft): Voltage class 07 with AFE supply – Above 1000 m (3280 ft): Derating of maximum surrounding operating temperature by 0.5 °C per each 100 m (0.9 °F per each 330 ft) is required
Vibration (IEC60068-2-6)	– Displacement amplitude 1 mm (0.04 in) (peak) at 2...13.3 Hz – Maximum acceleration amplitude 0.7 G at 13.2...100 Hz with maximum amplifcation of 5
Shock (IEC60068-2-27)	Max 15G, 11 ms (in package)

Key specifications: Enclosed drives (continued)

Enclosure	
Busbars material	Copper without surface treatment, full lenght PE-busbar
Degree of protection	IP54
Surface color	Standard 7035/7024 *(other colors upon on request project based)*
Short circuit current	Icw (1s): 45 kA, Ipk (peak): 94.5 kA
Cable entry	Bottom, standard EMC cable entry
Marine standard options	Handrails, door stoppers, halogen free wiring, metallic plinth and enclosure heaters
Auxiliary voltage supply	External 230 V supply for controls, cooling fans and cabinet heaters. Internal supply for 24 V DC. External 400-690 V AC for cooling module
Internal liquid cooling unit	
Temperature of coolant	-10...+45 °C (14...113 °F) at I_N (nominal) Except -10...+38 °C(14...100 °F) at I_N (nominal) for: – INU, voltage class 07 with +AES1/AEZ1, current ratings 730 A, 1400 A, 2080 A and 2830-4400 A – AFE and GC, voltage class 07, current ratings 380 A, 760 A, 1500 A, 2250 A, 2940 A, 3600 A, 4320 A, 5040 A and 5750 A – DC/DC converter, voltage class 07, current ratings 1200 A, 2400 A and 3600 A – 45 °C (113 °F) at I_L and overloadability. 38 °C (100 °F) at I_H and overloadability for the sine-wave filter +AES1
Pressure limits	– Recommended default pressure: 100-150 kPa (1) – Maximum operating pressure (= design pressure): 500 kPa – Maximum test pressure: 750 kPa
Allowed coolants	Demineralized water or pure Ethylene glycol – DOWCAL 100 – Clariant Antifrogen N Propylene glycol – DOWCAL 200 – Clariant Antifrogen L
Allowed materials	– Aluminium – Stainless steel AISI 304/316 – Plastic – Elastomers (EPDM, NBR, FDM) – Do not use PVC, copper, brass, steel or other materials not compatible with the heat sink material or coolant
External liquid cooling circuit	
Temperature of coolant Nominal (allowable)	– External circuit: < +38 °C (-30...+55 °C) < 100 °F (-22...+131 °F) – Glycol to be used in liquid under 0 °C (32 °F)
System maximum pressure	External circuit: 1000 kPa
External circuit pressure drop	– 76 kW cooling module: 20 kPa at 190 l/min – 152 kW cooling module: 25 kPa at 360 l/min
Water to water heat exchanger	Full stainless steel
Allowed coolant	Purified water or good quality pure water, with inhibitor and glycol
External circuit pipe connections	DN50 pipe with Axilock-S coupling included in delivery or DIN/ANSI flanges as option
Cooling module pump configuration	Single pump or redundant pump

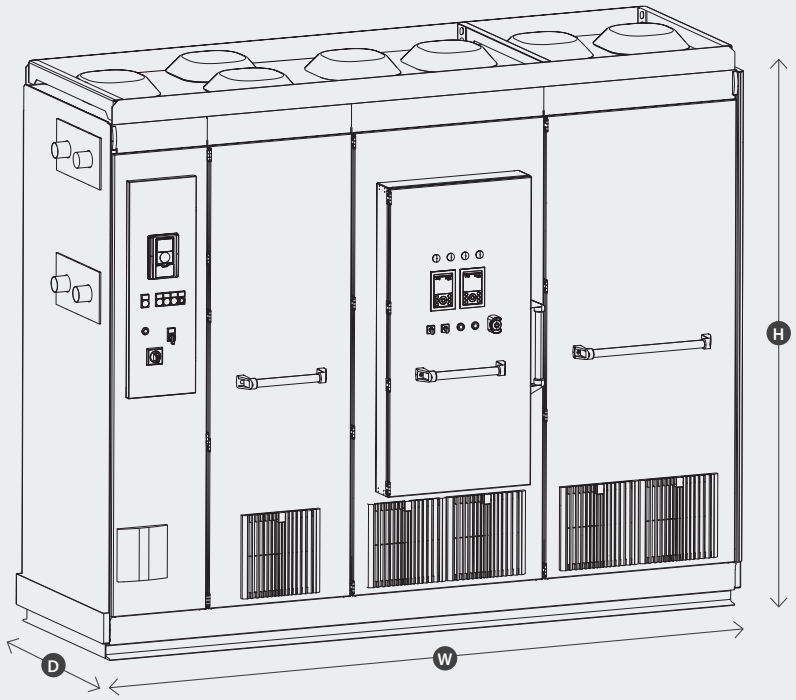
Ratings: Enclosed drives

iC7-Marine Enclosed Low-harmonic regenerative drive	Rated generator/motor current			Generator/motor power		Frame
	3 x 525-690 V			690 V AC mains		
	I_N	I_N	I_N	P_L	P_H	
	[A]	[A]	[kW]	[kW]	[kW]	
iC7-60EL3A07-650AE00	664	650	487	630	450	**AR12L+IR12L**
iC7-60EL3A07-730AE00	746	730	547	710	500	**AR12L+IR12L**
iC7-60EL3A07-820AE00	838	820	615	800	560	**AR12L+IR12L**
iC7-60EL3A07-1230E00	1256	1230	922	1100	800	**2xAR12L+2xIR12L**
iC7-60EL3A07-1400E00	1400	1400	1050	1300	900	**2xAR12L+2xIR12L**
iC7-60EL3A07-1500E00	1532	1500	1125	1400	1000	**2xAR12L+2xIR12L**
iC7-60EL3A07-1640E00	1675	1640	1230	1500	1100	**2xAR12L+2xIR12L**
iC7-60EL3A07-2080E00	2124	2080	1560	1900	1400	**3xAR12L+3xIR12L**
iC7-60EL3A07-2300E00	2348	2300	1725	2100	1600	**3xAR12L+3xIR12L**
iC7-60EL3A07-2500E00	2552	2500	1875	2300	1750	**3xAR12L+3xIR12L**
iC7-60EL3A07-2830E00	2889	2830	2122	2600	1950	**4xAR12L+4xIR12L**
iC7-60EL3A07-3050E00	3114	3050	2287	2800	2000	**4xAR12L+4xIR12L**
iC7-60EL3A07-3260E00	3328	3260	2445	3000	2200	**4xAR12L+4xIR12L**
iC7-60EL3A07-3500E00	3573	3500	2625	3300	2400	**5xAR12L+5xIR12L**
iC7-60EL3A07-4035E00	4119	4035	3026	3800	2800	**5xAR12L+5xIR12L**
iC7-60EL3A07-4400E00	4492	4400	3300	4100	3100	**6xAR12L+6xIR12L**
iC7-60EL3A07-4850E00	4951	4850	3637	4500	3500	**6xAR12L+6xIR12L**

I_N: Nominal (thermal) continuous current. Dimensioning can be done according to this current if the process does not require any overloadability or the process does not include any load variation or margin for overloadability
I_L: Low overload – 110% overload – 1 min every 5 min
I_H: High overload – 150% overload – 1 min every 5 min
I_{S1}: Short-term current injection available for 1 s. Applicable for the grid converter control mode in grid forming in the event of short-circuit current feed.
I_{S2}: Short-term current injection available for 3 s. Applicable for the grid converter in the grid forming control mode in the event of short-circuit current feed.

Cabinet options: Enclosed drives

Main circuit	+GACB	Air circuit breaker fixed, busbars 50kA Icw for 1s
	+GACC	Air circuit breaker fixed, busbars 65kA Icw for 1s
Busbars	+GIBX	Without Busbar plating
	+GIBB	With Busbar plating
Motor/Generator device	+GEXX	None
	+GECF	Air circuit breaker and fuse
Motor heater control	+IAXX	None
	+IAMH	Yes, 500W, 1 Ph, 230Vac
Cabinet heater	+IBXX	None
	+IBCH	Yes (Included as default)
Motor fan control	+ICXX	None
	+ICF1	Motor Fan Control / supply 2.5-4A, 3 Phase
	+ICF2	Motor Fan Control / supply 4-6.3A, 3 Phase
	+ICF3	Motor Fan Control / supply 6.3-10A, 3 Phase
	+ICF4	Motor Fan Control / supply 10-16A, 3 Phase
Control power supply	+IFXX	None
	+IFCS	Yes (Power supply 24 VDC, 5 A)
	+IFCR	Redundant 24 VDC, 5A Power Supply
Service Socket	+IGXX	None
	+IGS0	230 VAC socket CEE 7/3
Auxiliary voltage supply	+IHAS	AC supply terminals
	+IHAT	Aux. trafo 230 V secondary for internal circuits
Emergency stop	+ILXX	None
	+ILSS	STO/SS1 push button on door (future)
	+ILSD	Emergency disc. w Safety Relay (stop cat. 0)
	+ILSX	Emergency disc. w Safety Relay (stop cat. 1) with delay
Insulation monitoring	+IMXX	None
	+IMIF1	Yes (Insulation fault relay Bender ISO685-D)
	+IMIF2	Yes (Insulation fault relay Dold RN5897/010 IMD)
Output filter	+MAXX	None
	+MAU1	dU/dt Filter
	+MAS1	Sine Filter
Cooling module configuration	+SAP1	Cooling module Liquid-to-liquid single pump
	+SAP2	Cooling module Liquid-to-liquid redundant pump
Brake chopper	+GGXX	None
	+GGB1	Brake chopper option 1xBCU
	+GGB2	Brake chopper option 2xBCU
Additional cabinets	+NAXX	None
	+NAR4	Empty 400 cabinet, right
	+NAR6	Empty 600 cabinet, right
Product/project specific marine certification	+VBXX	No approval
	+VBAB	American Bureau of Shipping
	+VBBV	Bureau Veritas
	+VBDN	DNV
	+VBLR	Lloyd's Register
	+VBIN	Registro Italiano Navale
	+VBKR	Korean Register of Shipping
	+VBCN	China Classification Society
	+VBNP	Nippon Kaiji Kyokai



Dimensions: Enclosed drives

Frame		iC7-Marine Enclosed drives (liquid-cooled) [1]					
		IR12L + AR12L	2xIR12L + 2xAR12L	3xIR12L + 3xAR12L	4xIR12L + 4xAR12L	5xIR12L + 5xAR12L	6xIR12L + 6xAR12L
[mm]	Width	1630 [2]	2230 [2]	3130 [2]	3430 [2]	4900 [2]	5700 [2]
	Height	2172	2172	2172	2172	2172	2172
	Depth	840 [3]	840 [3]	840 [3]	840 [3]	840 [3]	840 [3]
	Weight [kg]	1600	2200	3100	3400	4900	5700
[in]	Width	64.2 [2]	87.8 [2]	123.2 [2]	135 [2]	192.9 [2]	224.4 [2]
	Height	85.5	85.5	85.5	85.5	85.5	85.5
	Depth	33.1 [3]	33.1 [3]	33.1 [3]	33.1 [3]	33.1 [3]	33.1 [3]
	Weight [lbs]	3527.4	4850.2	6834.3	7495.7	10802.7	12566.3

[1] Including Liquid to liquid cooling module with single pump
[2] Width does not include cooling pipes
[3] Depth does not include door mounted accessories

Dimensions: Cabinet options for enclosed drives

Options		+NAR400, empty 400 cabinet, right	+NAR600, empty 600 cabinet, right	+SAP2, cooling module liquid-to-liquid redundant pump	+GGB1, brake chopper option max. 1000 kW (0.5s/60s) @690 V AC	+GGB2, brake chopper option max. 2000 kW (0.5s/60s) @690 V AC
[mm]	Width	+400	+600	+200	+200	+200
	Height	2172	2172	2172	2172	2172
	Depth	840	840	840	840	840
	Weight [kg]	+90	+110	+110	+250	+330
[in]	Width	+15.7	+23.6	+7.9	+7.9	+7.9
	Height	85.5	85.5	85.5	85.5	85.5
	Depth	33.1	33.1	33.1	33.1	33.1
	Weight [lbs]	+198.4	+242.5	+242.5	+551.2	+727.5

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