

# Need **strong** and **secure** performance, with **flexible** integration?

## Highlights

- > Unrivalled power density
- > Robust in harsh environments
- > Modular, scalable and serviceable
- > Designed for easy integration
- > Superior control performance
- > Digital twin simulation models reduce risk and get you to market faster
- > Cybersecure by design



iC7-Marine liquid-cooled system modules enable you to build ultra-compact configurations performing with powerful robustness in marine and offshore environments.

Choose application software to suit your purpose:

- Propulsion & Machinery
- Active Front-end

Feature	Benefit
Secure-by-design	Reduce risk of downtime due to unauthorized access
High power density	Save space and reduce cooling costs
Native integration of filters below the power units	Save space and reduce installation costs
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
Expandable, encrypted microSD card-based memory	Securely record operational data for offline analysis
Integrated functional safety with STO and SS1-t SIL3, PLe as standard, or functional safety via fieldbus	Obtain certification more easily
Logic feature in MyDrive® Insight extends features and provides increased flexibility	Apply conditional controls, implement fault detection and diagnostics, create sequencing, modes, states, and interlocking logic

# iC7-Marine liquid-cooled system modules – the ultimate in power density

## iC7-Marine 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

## Type approvals

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



Illustrations not to scale

Voltage range	3 x 525-690 VAC 640-1100 VDC 3 x 380-500 VAC (B5) 465-800 VDC (B5)
Current range	Active front-end AFE 236-5750 A Inverter module 170-6400 A

## Key specifications <sup>1)</sup>

### Mains connection (AFE)

Mains voltage $U_{in}$	– Voltage class 07: 3 x 525-690 VAC (-15% – +10%); 640-1100 VDC (-0% – +0%) – Voltage class B5: 3 x 380-500 VAC (-15%...+10%); 465-800 VDC (-0%...+0%)
Mains frequency	– 45-66 Hz
Supply network	– TN-S, TN-C, IT and TT – Supply voltage limited to 500 VAC for corner grounded networks
Power factor	– $\cos\phi = 1$ (fundamental)
Short circuit current	– Maximum short circuit current must be < 100 kA
Total harmonics distortion THDi	– < 5%; < 3% with dedicated transformer
Overvoltage category	– Class III according to IEC/EN 61800-5-1
Imbalance	– Nominal performance with voltage imbalance $\leq 3\%$ . – Limited performance with >3% voltage imbalance
Connections to mains	– Once every 120 s

<sup>1)</sup> Values subject to validation

 For full specifications, ratings, and dimensions, refer to the iC7-Marine and iC7-Hybrid Selection Guide

**Motor connection inverter (IN)**

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 VAC) Default switching frequency 3 kHz
Motor 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 bus voltage	– Voltage class 07: 640-1100 VDC (-0%..+0%) – Voltage class B5: 465-800 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)

**Liquid cooling**

Temperature of cooling agent	– -10 to +45°C (IN)(nominal), up to 60 °C with derating – 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	– PD3
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
Compliance	– IEC-62477-1 – Cyber Security Product Certification IEC 62443-4-2 (UR26 and UR 27)



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

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.

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Some functionalities listed in this fact sheet are for future implementation

**Danfoss Drives A/S**  
Ulsnaes 1  
6300 Graasten  
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