



Marine & Offshore

Certificate number: 75215/A0 BV

File number: MPA2301001

Product code: 2592I

This certificate is not valid when presented without the full attached schedule composed of 7 sections

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TYPE APPROVAL CERTIFICATE

This certificate is issued to

Danfoss Drives Oy

VAASA - FINLAND

for the type of product

FREQUENCY CONVERTERS (Power 50kW and over)

iC7-60 SL

Requirements:

Bureau Veritas Rules for the Classification of Steel Ships.

EC Code: 31

This certificate is issued to attest that Bureau Veritas Marine & Offshore did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.

This certificate will expire on: 13 Feb 2029

For Bureau Veritas Marine & Offshore,

At BV TURKU (ABO), on 13 Feb 2024,

Miika KOKKO

This certificate was created electronically and is valid without signature



This certificate remains valid until the date stated above, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with Bureau Veritas Marine & Offshore. Should the specified regulations or standards be amended during the validity of this certificate, the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply. This certificate is issued within the scope of the General Conditions of Bureau Veritas Marine & Offshore available on the internet site www.veristar.com. Any Person not a party to the contract pursuant to which this document is delivered may not assert a claim against Bureau Veritas Marine & Offshore for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

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BV Mod. Ad.E 530 June 2017

This certificate consists of 4 page(s)

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION :

Danfoss **iC7-60** system modules are used as building blocks for larger power systems. Modules consist of inverter units, front ends and other power handling building blocks.

System modules can be configured to different product functions like inverter units (INU), active front end units (AFE), brake chopper units (BCU), grid converter units (GC) and DC/DC converter units (DC). All products share the same system module building block with AC/DC terminals, IGBTs, DC-capacitors and PCBAs. All electronics are inside IP55 enclosure. Terminals are exposed so the IP rating is IP00. Application software and options defines the product function.

The product can be configured as basic system modules and loose filters or with integration units. Integration units improves serviceability and allows input and output filters to be integrated to the same mechanical construction.

IC7 system modules can be equipped for example with following options: L filter, LC filter, Sin filter, Du/dt filter, common mode filter, DC filter, pre-charging circuit and cooling modules (heat exchanger).

1.1 - Description of the model Code:

Code	Description
iC7-60	Product group
SL	Product category SL = system module, liquid-cooled
IN	Product type 3A = 3-phase active front end, AFE GC = grid converter module, GC IN = inverter module, INU DC = DC/DC Converter module, DC BR = Braker chopper module, BCU
07	Voltage rating 07 = 525–690 VAC (640–1100 VDC) A7 = 525–690 VAC(640-1250VDC) B5 = 380-500 VAC(465-800VDC)
-300A	Current rating (IL(1/5)) 170A, 206A, 208A, 236A, 245A, 261A, 300A, 302A, 325A, 334A, 360A, 365A, 380A, 385A, 416A, 420A, 425A, 465A, 475A, 480A, 510A, 525A, 530A, 570A, 590A, 595A, 650A, 670A, 720A, 730A, 760A, 820A, 840A, 850A, 945A, 960A, 1040, 1060, 1080, 1200, 1230, 1325, 1400, 1440, 1500, 1640, 1680, 1700, 1795, 1800, 1920, 2000, 2080, 2160, 2250, 2300, 2400, 2500, 2650, 2830, 2880, 2940, 3050, 3120, 3240, 3260, 3500, 3600, 3900, 4035, 4320, 4400, 4750, 4850, 5040, 5300, 5400, 5600, 5750, 6100, 6400
E00	Protection rating E00 = IP00/Open type
F4	EMC level F3 = C3 industry environment F4 = C4 system component
+XXXX	Options

The model code can have the format for example:

iC7-60SLIN07-300AE00F4+XXXX(+XXXX)

1.2 - Specifications:

Input voltage	3 x 380...500 VAC (-15...+10%), 400...800 VDC (-0...+0%) 3 x 525...690 VAC (-15...+10%), 640...1250 VDC (-0...+0%)
Input frequency	45-66 Hz for AFE/GC 25-70Hz for GC with derating
Output voltage	0 – U _{in} , 3-phase
Output frequency	0 – 599 Hz
Temperature range in operation	-15°C - +60°C (power units) -15°C - +55°C (control units)

2. DOCUMENTS AND DRAWINGS :

- iC7 Series Liquid-cooled System Modules Operating Guide, No. AQ303746230368en-000101, dated June 2021.
- Propulsion Application Software Guide for iC7-60 Series, No. AB284850130221en-000101/130R0888, dated Dec. 2020.
- Schemati multi-line AR10L - Standard level, No. TED14191 Rev.V003, dated 10-02-2021.
- Schemati multi-line AR12L - Standard level, No. TED14193 Rev.V003, dated 10-02-2021.
- Schemati multi-line IR10L - Standard level, No. TED16864 Rev.V003, dated 10-02-2021.
- Schemati multi-line IR12L - Standard level, No. TED16865 Rev.V003, dated 10-02-2021.
- Schemati multi-line DR10L - Standard level, Rev.V001, dated 10-02-2021.
- Schemati multi-line DR12L - Standard level, Rev.V001, dated 10-02-2021.

3. TEST REPORTS :**SGS:**

- Test Report IEC 61800-5-1, No. HELES2102000122-1, dated 23-06-2022.
- Test Report IEC 62477-1, No. HELES2102000122-2, dated 08-12-2021.
- Test Report IEC 61800-5-1, No. HELES22000152-1, dated 02-02-2023.
- EMC Test Report No. HELEM2204000174-1, dated 17-05-2022.
- EMC Test Report No. HELEM2204000174-2, dated 17-05-2022.
- EMC Test Report No. 299288-1, dated 06-05-2020.

Danfoss:

- iC7-60 LCD P4050 - IACS UR E10 Test Report No. 00775653

eurofins:

- Mechanical Tests iC7-60SL3A07-380AE00C_ No.EUFI29-19006315-T2, dated 10-03-2020.
- Mechanical Tests iC7-60SL3A08-750AE00C4 No.EUFI29-19004589-T4, dated 12-12-2019.
- Mechanical Tests iC7-60SL3A08-750AE00C4 No.EUFI29-19004589-T6, dated 12-12-2019.
- Mechanical Tests iC7-60SLIN08-820AE00C4 No.EUFI29-19004589-T2, dated 12-12-2019.
- Mechanical Tests LINPAK Module IM10L, INU416A No.EUFI29-21002279-T1, dated 10-06-2021.

4. APPLICATION / LIMITATION :



- 4.1 - BUREAU VERITAS Rules for the Classification of Steel Ships.
- 4.2 - Approval valid for ships intended to be granted with the following additional class notations: **AUT-UMS, AUT-CCS, AUT-PORT and AUT-IMS.**
- 4.3 - BUREAU VERITAS Environmental Category, EC Code: **31.**
- 4.4 - The equipment fulfils the EMC requirements for installation in Special Power Distribution Zones in accordance with IEC 60533.
- 4.5 - The actual installation shall be designed according to Danfoss Installation & Operating instructions and according to the applicable BV Rules for the actual application.
- 4.6 - Equipment covered by this Type Approval certificate has been tested according to requirements of IACS UR E10 rev 8.

5. PRODUCTION SURVEY REQUIREMENTS :

- 5.1 - The **iC7-60** are to be supplied by **Danfoss Drives Oy** in compliance with the type and the requirements described in this certificate.
- 5.2 - This type of product is within the category IBV of Bureau Veritas Rule Note NR320.
- 5.3 - BV product certificate is required.
- 5.4 - For information, **Danfoss Drives Oy** has declared to Bureau Veritas the following production site(s):

Danfoss Drives Oy
P.O. Box 25
Runsorintie 7
65381 VAASA
FINLAND

6. MARKING OF PRODUCT :

- Trade name.
- Date of manufacture and serial number.
- Equipment type or model identification under which it was type-tested
-  or  conformity marking, as relevant

7. OTHERS :

It is **Danfoss Drives Oy's** responsibility to inform shipbuilders or their sub-contractors of the proper methods of fitting, use and general maintenance of the approved equipment and the conditions of this approval.

***** END OF CERTIFICATE *****