TYPE APPROVAL CERTIFICATE

Certificate no.:
TAE00004S2
Revision No:
1

This is to certify:

that the Frequency Converter

with type designation(s)
iC7-60SL

issued to
Danfoss Drives Oy
VAASA, **Finland**

is found to comply with
DNV rules for classification – Ships, offshore units, and high speed and light craft

Application:

Products approved by this certificate are accepted for installation on all vessels classed by DNV.

Issued at **Høvik** on **2026-08-28**
This Certificate is valid until **2028-07-18**.
DNV local unit: **Finland CMC**

Approval Engineer: **Qiang William Guo**

for **DNV**

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This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to USD 300 000.

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 PCBA's. All electronics are inside IP55 enclosure. Terminals are exposed so the IP rating is IP00. Application software and options define 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, SISO filter, DC filter, pre-charging circuit and cooling modules (heat exchanger).

Code	Description
iC7-60	**Product group**
SL	**Product category** SL = System module, Liquid-cooled
IN	**Product type** 3A = 3-phase active front-end, AFE 3H = 3-phase low harmonic, AFE BR = Brake chopper, BCU DC = DC/DC converter, DC GC = Grid converter, GC IN = Inverter unit, INU
07	**Voltage rating** 07 = 525-690 VAC, 640-1100 VDC A7 = 525-690 VAC, 640-1200 VDC A5 = 380-500 VAC, 425-830 VDC B5 = 380-500 VAC, 425-830 VDC
-300A	**Current rating, $I_{L(1/5)}$** 170A, 206A, 208A, 236A, 245A, 261A, 271A, 300A, 302A, 317A, 325A, 334A, 360A, 365A, 380A, 385A, 400A, 416A, 420A, 425A, 460A, 465A, 475A, 480A, 510A, 520A, 525A, 530A, 570A, 580A, 590A, 595A, 650A, 658A, 670A, 720A, 730A, 760A, 816A, 820A, 840A, 850A, 880A, 945A, 960A, 970A, 1000, 1040, 1060, 1080, 1200, 1210, 1230, 1270, 1300, 1325, 1400, 1410, 1440, 1460, 1500, 1630, 1640, 1680, 1700, 1760, 1795, 1800, 1900, 1920, 1960, 2000, 2080, 2150, 2160, 2200, 2250, 2300, 2340, 2400, 2450, 2500, 2510, 2650, 2800, 2830, 2880, 2940, 3050, 3120, 3240, 3260, 3270, 3420, 3500, 3600, 3720, 3820, 3900, 4035, 4140, 4160, 4320, 4400, 4500, 4650, 4750, 4850, 4900, 5040, 5200, 5220, 5300, 5400, 5550, 5600, 5610, 5680, 5750, 5930, 6100, 6400, 6450, 6900, 7370
E00	**Protection rating** E00 = IP00 / Open type
F4	**EMC Level** F3 = Industry Environment F4 = System Component
+XXXX	**Options**

Application/Limitation

Input voltage:	3 x 380…500 VAC (-15…+10%), 400…830 VDC (-0…+0%) 3 x 525…690 VAC (–15…+10%), 640…1200 VDC (–0…+0%)
Input frequency:	45 -66 Hz
Output voltage:	0 – U_{in}, 3-phase
Output frequency:	0 – 599 Hz
Temperature range in operation:	0 – 60 °C
Temperature class:	B
Vibration class:	A
Humidity class:	B
EMC class:	DNV-CG-0339 / IEC 61800-3. To be used on EMC class A locations

iC7 system modules must be handled as a component. The actual installation shall be designed according to Danfoss Installation & Operating instructions and according to the applicable DNV Rules for the actual application.

Product certificate
Semi-conductor converters rated equal or larger than 100 kW serving essential or important functions as defined in DNV rules Pt.4 Ch.8 shall have a product certificate according to DNV Ships — DNV-RU-SHIP Pt.4 Ch.8. Sec.1 Edition July 2025, Table 8 for each delivery to DNV classed vessels.

For product certification, the following documents shall be submitted for approval:

- Reference to this Type Approval Certificate
- Functional description for the intended use, configuration and interface (e.g. alarms, monitoring and auxiliary power supplies)
- Test program for routine tests and functional tests
- Single line diagram (only applicable for multi drive configuration)
- If additional components apart from the type approved Semi-conductor converter are part of the delivery, documentation in accordance with DNV rules Pt.4 Ch.8 Sec.1 table 2 shall be delivered for the additional components

The Type Approval covers hardware and software for the basic controller.

Clause for software control:

All changes in software are to be recorded as long as the system is in use on board. The records of all changes are to be forwarded to DNV for evaluation and approval. Major changes in the software are to be approved before being installed in the converter.

Manufactured by:

Vacon Ltd
Runsorintie 7
FI-65380 VAASA Finland

Tests carried out

Type tests in accordance with IEC 62477-1 and IEC 61800-5-1.
Visual inspection, Performance, Power supply failure, Power supply variations, Voltage/frequency variation, Vibration, Dry heat, Damp heat, Insulation resistance, High voltage, EMC tests (immunity and emission), Temperature rise test, short circuit test according to IEC 62477-1.

Marking of product

Danfoss – Type designation – Option – Power – Voltage

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the Type approval are complied with and that no alterations are made to the product design or choice of materials.
The main elements of the assessment are:

- Inspection on factory samples, selected at random from the production line (where practicable)
- Results from Routine tests (RT) checked (if not available tests according to RT to be carried out)
- Review of type approval documentation
- Review of possible change in design, materials and performance
- Ensuring traceability between manufacturer's product type marking and Type Approval Certificate.

Assessment to be performed at 2 and 3.5 year and at renewal.

END OF CERTIFICATE