



## Confirmation of Product Type Approval

**Company Name:** DANFOSS POWER ELECTRONICS A/S

**Address:** ULSNAES 1 DK-6300 GRAASTEN Denmark

**Product:** Frequency Converter

**Model(s):** Series FC-102, FC-202, FC-301, FC-302

**Endorsements:**

Certificate Type	Certificate Number	Issue Date	Expiry Date
Product Design Assessment (PDA)	23-2443672-PDA	15-DEC-2023	14-DEC-2028
Manufacturing Assessment (MA)	21-4961693	29-SEP-2021	05-OCT-2026
Product Quality Assurance (PQA)	NA	NA	NA

### Tier

5 - Unit Certification Required

### Intended Service

Marine and Offshore Installations - Air-cooled adjustable frequency converters for variable speed control of AC motors

### Description

Frequency Converters with Frame sizes A, B, C, D, E and F Frame (Enclosure Type) used to control motor drives having rated power 0.25KW to 1400KW, including Series FC-102, FC-202, FC-301 & FC-302 with Radio Frequency Interference (RFI) filter.

FC-102: VLT HVAC Drive - Advanced version

FC-202: VLT AQUA Drive - Advanced version

FC-301: VLT Automation Drive - Standard version

FC-302: VLT Automation Drive - Advanced version

\* Refer to "Products List" attached for details of configurations of each series.

### Ratings

Rated power: 0.25-1400 KW

Input voltage: 200-240 VAC (A, B & C Frame)

380-480 VAC, 380-500 VAC, 525-690 VAC (A, B, C, D, E and F Frame)

Input frequency: 50/60 Hz

Output voltage: 0-100% of input voltage

Output frequency: 0-590 Hz

Input/Output Phase: 3

Degree of ingress protection (enclosure): IP20, IP21, IP55, IP66 (A, B and C Frame)

IP00, IP20, IP21, IP54 (D, E and F Frame)

Design Ambient Temperature: 0°C-45°C; Maximum 55°C (with current derating)

Relative humidity: 5-95% (non-condensing)

\* Refer to "Products List" attached for details of design ratings based on Type Codes.

### Service Restrictions

- 1) Unit Certification is required for the frequency converters used to control motor drives having a rated power of 100 kW and over intended for essential services defined in Marine Vessel Rules 4-8-1/7.3.3 and Mobile Offshore Units Rules 4-1-1/3.5 or for services indicated in Marine Vessel Rules 4-8-3/TABLE 7 or related to additional optional notations requested for the ship and offshore unit.
- 2) If the manufacturer or purchaser request an ABS Certificate for compliance with a specification or standard, the specification or standard, including inspection standards and tolerances, must be clearly defined.
- 3) The products are not to be installed in the bridge and deck zone.
- 4) The converters are not intended for the service in hazardous areas.

### Comments

- 1) The Manufacturer has provided a declaration about the control of, or the lack of Asbestos in this product.
- 2) Where the converters with (RFI) filter, which exceeds the limits for radiated and conducted emissions required by Marine Vessel Rules 4-9-9/Table 1, are to be installed in the general power distribution zone, measures shall be taken per Danfoss Operating Guides / Instructions for the relevant Series for EMC-compliant installation to attenuate the emission effects on the distribution system. Planned EMC measures shall be assessed and communicated with the user in accordance with Marine Vessel Rules 4-8-3/8.5.14.
- 3) The converters are to be selected to have a degree of ingress protection suitable for intended installation locations in accordance with Marine Vessel Rules 4-8-3/Table 2 and Mobile Offshore Units Rules 4-3-3/Table 1, or to be installed in an enclosure with an IP degree complying with the Rules aforementioned.
- 4) The current derating of the converters under ambient temperature 46°C-55°C is according to relevant Danfoss Design Guide for the associated series.
- 5) The alarm functions of converters, as a minimum, as specified per Marine Vessel Rules 4-8-3/8.5.12 are to be tested, as applicable at the plant of the manufacturer.
- 6) Assessment is for hardware only.
- 7) External cables of the subject converters are not covered by this PDA certificate.

### Notes, Drawings and Documentation

00714813, Product overview complete Marine approval Note, Revision: A,33

Drawing No. 177R0433, Block Diagram D-frame, Revision: 006

Drawing No. 177R0659, Block Diagram E-frame, P4001, Revision: 004

Drawing No. 177R0704, Installation drawing, E1h, IP21/54, Revision: 001

Drawing No. 177R0705, Installation drawing, E2h, IP21/54, Revision: 001

Drawing No. 177R0706, Installation drawing, E3h, IP00/20, Revision: 001

Drawing No. 177R0707, Installation drawing, E4h, IP00/20, Revision: 001

OJ L 96, 29.3.2014 (p. 79-106), Summary of references of harmonised standards published in the Official Journal – Directive 2014/30/EU, Date: 19.9.2022.

UL Bulletin, UL 61800-5-1 Effective Date Reminder and Update on Implementation, Date: April 23, 2018

00730213, FC-102 EU Declaration of Conformity, Revision: A,7

00730215, FC-202 EU Declaration of Conformity, Revision: A,7

00730216, FC-301 EU Declaration of Conformity, Revision: A,7

00730217, FC-302 EU Declaration of Conformity, Revision: A,7

UL File E70524, Vol. 2, Index, Issued: 2006-01-11, Revised: 2023-02-28

Drawing No. 134H1451, D1h Bill of Materials, Date: 2023.10.31

Drawing No. 177R0374, INSTALLATION DRAWING, D1H, IP21/54, Revision: 005

Drawing No. 134H3073, D2h Bill of Materials, Date: 2023.10.31

Drawing No. 177R0375, INSTALLATION DRAWING, D2H, IP21/54, Revision: 004

Drawing No. 136L9248, D3 Bill of Materials, Date: 2023.10.31

Drawing No. 177R0339, INSTALLATION DRAWING, D3H, IP20/CHASSIS, Revision: 004

Drawing No. 136N3304, D4h Bill of Materials, Date: 2023.10.31

Drawing No. 177R0340, INSTALLATION DRAWING, D4H, IP20/CHASSIS, Revision: 003

Drawing No. 137G5387, D5h Bill of Materials, Date: 2023.10.31

Drawing No. 177R0490, INSTALLATION DRAWING, D5H, IP21/54, Revision: 006

Drawing No. 136I8761, D6h Bill of Materials, Date: 2023.10.31

Drawing No. 177R0491, INSTALLATION DRAWING, D6H, IP21/54, Revision: 002

Drawing No. 134X5648, D7h Bill of Materials, Date: 2023.10.31

Drawing No. 177R0492, INSTALLATION DRAWING, D7H, IP21/54, Revision: 006

Drawing No. 136n0748, D8h Bill of Materials, Date: 2023.10.31

Drawing No. 177R0493, INSTALLATION DRAWING, D8H, IP21/54, Revision: 002

UL-US-L70524-1212-20202102-7, UL CERTIFICATE OF COMPLIANCE, NMMS - Power Conversion Equipment, Date: 3-Mar-2023

Drawing No. 132N0351, E1h Bill of Materials, Date: 2023.10.31

Drawing No. 136U9981, E2h Bill of Materials, Date: 2023.10.31

Drawing No. 132N3420, E3h Bill of Materials, Date: 2023.10.31

Drawing No. 137H6958, E4h Bill of Materials, Date: 2023.10.31

Compare Submittal drawings, E-Frame drives

UL-US-L70524-1215-13107102-4, UL CERTIFICATE OF COMPLIANCE, NMMS - Power Conversion Equipment, Date: 31-May-2022

FM5F9078a, 2MBI800XNE120-50 Fuji IGBT Modules Datasheet, Date: 2018/09

UL File E134261, Vol. 1, Index, Issued: 2006-01-27, Revised: 2021-03-05

MG21A502, Operating Guide, VLT AQUA Drive FC 202, 110–400 kW, Enclosure Sizes D1h–D8h, Date: 09/2018

MG34U502, Operating Guide, VLT Automation Drive FC 302, 90–315 kW, Enclosure Size D1h–D8h, Date: 09/2018

MG33AT22, Operating Guide, VLT Automation Drive FC 301/302, 0.25–75 kW, Date: 05/2018

MG16D502, Operating Guide, VLT HVAC Drive FC 102, 110–400 kW, Enclosure Sizes D1h–D8h, Date: 09/2018

MG38A202, Operating Guide, VLT Automation Drive FC 302, 315–710 kW, Enclosure Sizes E1h–E4h, Date: 04/2018

MG33U402, Operating Instructions, VLT Automation Drive FC 302, 90–1200 kW, Date: 2013-12-16

MG22A202, Operating Guide, VLT AQUA Drive FC 202, 355–800 kW, Enclosure Sizes E1h–E4h, Date: 04/2018

MG20P402, Operating Instructions, VLT AQUA Drive FC 202, 110–1400 kW, Date: 2013-12-16

MG16O202, Operating Guide, VLT HVAC Drive FC 102, 355–800 kW, Enclosure Sizes E1h–E4h, Date: 04/2018

MG11F502, Operating Instructions, VLT HVAC Drive FC 102, 315-1400 kW, Date: 08/2014

E70524, UL Product IQ, NMMS.E70524 - Power Conversion Equipment, Last Updated on 2023-09-20

UL File E70524, Project no. 4791065942, LABORATORY DATA PACKAGE, Fuji IGBT test report, Date: 11-02-2023

UL File E134261 Vol.1 Sec. 13, Project 03NK27228 USL, CNL AC motor controllers, Issued: 2004-01-08, Revised: 2023-01-13

00720010, EMC measures in IT-Grid on ships GUIDELINE, Rev. A,8

NMMS.E1324261 Power Conversion Equipment, Last Updated: 2023-11-23

\* Refer to Documentation List attached for the drawings/documents included in the previous approvals.

### **Term of Validity**

This Product Design Assessment (PDA) Certificate remains valid until 14/Dec/2028 or until the Rules and/or Standards used in the assessment are revised or until there is a design modification warranting design reassessment (whichever occurs first).

Acceptance of product is limited to the "Intended Service" details prescribed in the certificate and as per applicable Rules and Standards.

This Certificate is valid for installation of the listed product on ABS units which exist or are under contract for construction on or previous to the effective date of the ABS Rules and standards applied at the time of PDA issuance. Use of the Product for non-ABS units is subject to agreement between the manufacturer and intended client.

**ABS Rules**

2023 Rules for Conditions of Classification, Part 1, 1-1-4/7.7, 1-1-A3, 1-1-A4, which covers the following:

2023 Marine Vessel Rules 4-1-1/7.11, 4-8-1/7.3.3, 4-8-3/1.11, 4-8-3/1.17, 4-8-3/8, 4-8-3/Table 2, 4-8-3/Table 7, 4-8-4/1.3, 4-9-9/Table 1 & Table 2

2023 Rules for Conditions of Classification, Part 1, Offshore Units and Structures 1-1-4/9.7, 1-1-A2, 1-1-A3, which covers the following:

2023 Mobile Offshore Units Rules 4-1-1/3.5, 4-1-1/7.7, 4-3-3/3.1, 4-3-3/Table 1, 6-1-7/12, 6-1-7/13.5, 6-1-7/19.1

**International Standards**

EN61800-5-1:2007+A1:2017+A11:2021 Adjustable speed electrical power drive systems – Part 5-1: Safety requirements – Electrical, thermal and energy

EN61800-3:2004 + A1:2012 Adjustable speed electrical power drive systems – Part 3: EMC requirements and specific test methods

**EU-MED Standards**

NA

**National Standards**

UL 61800-5-1 Edition 1, Adjustable Speed Electrical Power Drive Systems - Part 5-1: Safety Requirements - Electrical, Thermal and Energy

UL 508C Edition 4, Power Conversion Equipment

**Government Standards**

NA

**Other Standards**

None



Corporate ABS Programs  
American Bureau of Shipping  
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ABS has used due diligence in the preparation of this certificate, and it represents the information on the product in the ABS Records as of the date and time the certificate is printed.

If the Rules and/or standards used in the PDA evaluation are revised or if there is a design modification (whichever occurs first), a PDA revalidation may be necessary.

The continued validity of the MA is dependent on completion of satisfactory audits as required by the ABS Rules. The validity of both PDA and MA entitles the product to receive a **Confirmation of Product Type Approval**.

Acceptance of product is limited to the "Intended Service" details prescribed in the certificate and as per applicable Rules and

Standards.

This Certificate is valid for installation of the listed product on ABS units which exist or are under contract for construction on or prior to the effective date of the ABS Rules and standards applied at the time of PDA issuance. ABS makes no representations regarding Type Approval of the Product for use on vessels, MODUs or facilities built after the date of the ABS Rules used for this evaluation.

Type Approval requires Drawing Assessment, Prototype Testing and assessment of the manufacturer's quality assurance and quality control arrangements. The manufacturer is responsible to maintain compliance with all specifications applicable to the product design assessment. Unless specifically indicated in the description of the product, certification under type approval does not waive requirements for witnessed inspection or additional survey for product use on a vessel, MODU or facility intended to be ABS classed or that is presently in class with ABS.

Due to wide variety of specifications used in the products ABS has evaluated for Type Approval, it is part of our contract that; whether the standard is an ABS Rule or a non-ABS Rule, the Client has full responsibility for continued compliance with the standard.

Questions regarding the validity of ABS Rules or the need for supplemental testing or inspection of such products should, in all cases, be addressed to ABS.