



CERTIFICATE NUMBER  
18-HS1758227-PDA-DUP

DATE  
26 Nov 2018

ABS TECHNICAL OFFICE  
Houston ESD - Electrical

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## CERTIFICATE OF Design Assessment

This is to certify that a representative of this Bureau did, at the request of

### **DANFOSS LLC**

assess design plans and data for the below listed product. This assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. This assessment does not waive unit certification or classification procedures required by ABS Rules for products to be installed in ABS classed vessels or facilities. This certificate, by itself, does not reflect that the product is Type Approved. The scope and limitations of this assessment are detailed on the pages attached to this certificate.

Product: **Frequency Converter**

Model: **FC-102, FC-202, FC-30x Series Drives**

**FC-102/202/302 LHD with RFI N2, N4 and AAF Series 006**

This Product Design Assessment (PDA) Certificate 18-HS1758227-PDA-DUP, dated 26/Nov/2018 remains valid until 25/Nov/2023 or until the Rules or specifications used in the assessment are revised (whichever occurs first).

This PDA is intended for a product to be installed on an ABS classed vessel, MODU or facility which is in existence or under contract for construction on the date of the ABS Rules or specifications used to evaluate the Product.

Use of the Product on an ABS classed vessel, MODU or facility which is contracted after the validity date of the ABS Rules and specifications used to evaluate the Product, will require re-evaluation of the PDA.

Use of the Product for non ABS classed vessels, MODUs or facilities is to be to an agreement between the manufacturer and intended client.

AMERICAN BUREAU OF SHIPPING

*Dustin De Los Santos*

Dustin De Los Santos  
Engineer/Consultant

NOTE: This certificate evidences compliance with one or more of the Rules, Guides, standards or other criteria of ABS or a statutory, industrial or manufacturer's standards. It is issued solely for the use of ABS, its committees, its clients or other authorized entities. Any significant changes to the aforementioned product without approval from ABS will result in this certificate becoming null and void. This certificate is governed by the terms and conditions as contained in ABS Rules 1-1-A3/5.9 Terms and Conditions of the Request for Product Type Approval and Agreement (2010).

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**Tier: 4 - Enrolled in PQA Program**

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**Product:** Frequency Converter

**Model:** FC-102, FC-202, FC-30x Series Drives

FC-102/202/302 LHD with RFI N2, N4 and AAF Series 006

**Intended Service:**

Marine and Offshore Installations.

**Description:**

Low Power Drives: VLT® Automation Drive FC300 series type FC301/302 and FC-302 Series, VLT® AQUA Drive series FC202 and VLT® HVAC Drive series FC102.

High Power Drives: VLT® HVAC Drive Series FC-102, VLT® AQUA Drive Series FC-202 and VLT® Automation Drive FC-302 Series.

These are Motor Controllers that convert AC Mains Input into variable AC Waveform Output. The Output Frequency & Voltage are regulated to control the Motor Speed or Torque.

FC-102/202/302 LHD (low harmonic) with RFI (radio frequency interference) N2 and N4 & AAF (Advanced Active Filter) Series 006

**Rating:**

Range of ratings is per the configurations in attached product description sheet.

**Operating Temperature:**

FC-102: 0°C-45°C (0°C-40°C for >100kW)

FC-202: 0°C-45°C

FC-302: 0°C-45°C

AAF: 0°C-40°C

All drives have operating temperatures between 0°C and 55°C (with derating)

**Service Restriction:**

- Unit Certification is required for semiconductor converters used to control motor drives having a rated power of 100 kW (135 hp) and over intended for essential services as per 4-8-3/5.11, 4-8-3/8 and for propulsion applications as per 4-8-5/5.17.8 of the 2018 ABS Steel Vessels Rules.

- Unit certification is also required for Drives intended for Essential Services as per 4-1-1/3.5 of the 2018 ABS Mobile Offshore Drilling Unit Rules.

- Assessment is for Hardware only.

**Comments:**

1. The Manufacturer has provided a declaration about the control of, or the lack of Asbestos in this product.

2. The units are to have the appropriate enclosure IP rating as per 4-8-3/Table 2 of the ABS Steel Vessels Rules, based on their installed location.

3. Drives are not intended for installation in hazardous areas.

4. Where used in machinery space (i.e. engine room, boiler room) the units are to have an ambient rating of 45°C

**Notes/Drawing/Documentation:**

Dwg. 00714813, Product overview complete Marine approval 00714813, rev. A.31, last modified 2018-09-05, Pages:17;

Doc Id 00730213, EU Declaration of Conformity for FC-102 series, rev. A4, last modified 2018-10-11, Pages:3;

Doc Id 00730215, EU Declaration of Conformity for FC-202 series, rev. A4, last modified 2018-10-11, Pages:3;

Doc Id 00730216, EU Declaration of Conformity for FC-301 series, rev. A4, last modified 2018-04-06, Pages:2;

Doc Id 00730217, EU Declaration of Conformity for FC-302 series, rev. A4, last modified 2018-10-11, Pages:3;

Doc Id 00730296, EU Declaration of Conformity for AAF006 series, rev. A2, last modified 2016-12-23, Pages:1;

UL Cert no. 20180319-E134261, Certificate of Compliance Power Conversion Equipment Issued on 19 March 2018;

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UL Cert no. 20180319-E70524, Certificate of Compliance Power Conversion Equipment Issued on 19 March 2018;  
UL Cert no.20180418-E70524, Certificate of Compliance Power Conversion Equipment issued 18 April 2018,

Pages:2;

LVD Doc FC301 302 IP 55,LVD documentation according to IEC 61800-5-1 dated 06/03/2007, version 1, Pages:14;

LVD Doc FC301 IP 20, LVD documentation according to IEC 61800-5-1 dated 06/03/2007, version 1.1, Pages:17;

LVD Doc FC302 4kW, LVD documentation according to IEC 61800-5-1 dated 14/04/2005, version 1, Pages:14;

LVD Doc FC302 7.5kW, LVD documentation according to IEC 61800-5-1 dated 14/04/2005, version 1, Pages:14;

LVD Doc P404 C1 C2, LVD documentation according to IEC 61800-5-1 dated 21/02/2008, version 1.3, Pages:14;

LVD Doc P404 B1 B2 , LVD documentation according to IEC 61800-5-1 dated 21/02/2008, version 1.3, Pages:15;

LVD Doc P404 P430 B1 B2, LVD documentation according to IEC 61800-5-1 dated 30/08/2011, version 1.3,

Pages:21;

LVD Doc P404 P430 C1 C2,LVD documentation according to IEC 61800-5-1 dated 30/08/2011, version 1.3,

Pages:22;

LVD Doc B3 B4 P420, LVD documentation according to IEC 61800-5-1 dated 15/01/2010, version 1.3, Pages:18;

LVD Doc C3 C4 420,LVD documentation according to IEC 61800-5-1 dated 15/01/2010, version 1.3, Pages:18;

LVD Doc P429 B2, LVD documentation according to IEC 61800-5-1 dated 15/01/2010, version 1.3, Pages:12;

LVD Doc P429 C2, LVD documentation according to IEC 61800-5-1 dated 15/01/2010, version 1.3, Pages:13;

See the attached drawing list for additional list of documents previously submitted to ABS.

**Terms of Validity:**

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**STANDARDS**

**ABS Rules:**

Rules for Condition of Classification, Part 1- Steel Vessel Rules (2018): 1-1-4/7.7, 1-1-A3 & A4, which covers the following:

2018 Steel Vessel Rules: 4-8-3/1.7, 4-8-3/1.9, 4-8-3/1.11, 4-8-3/1.17, 4-8-3/8, 4-9-8 Table 1 and Table 2

Rules for Conditions of Classification, Part 1- 2018 Offshore Units and Structures 1-1-4/9.7, 1-1-A2 & A3, which covers the following:

2018 Mobile Offshore Drilling Units Rules: 4-3-1/11, 4-3-1/15, 4-3-1/17 and 6-1-7/12

**National:**

UL 508C: Edition 4 and UL61800-5-1:Edition 1 (UL file numbers: E70524 and E134261)

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**International:**

Low Voltage Directive 2014/35/EU : EN61800-5-1:2007 (VLT HVAC drive series, Type codes: FC-102x; VLT Aqua Drive series, Type codes FC-202x; VLT AutomationDrive series FC-301x, 302x; VLT Advances Active Filter series Type codes AAF006Ax)

EMC Directive 2014/30/EU: EN 61800-3:2004+A1:2012 (VLT HVAC drive series, Type codes: FC-102x; VLT Aqua Drive series, Type codes FC-202x; VLT AutomationDrive series FC-301x, 302x;)

EMC Directive 2014/30/EU: EN 61000-6-4:2011 and EN 61000-6-2:2005 (VLT Advances Active Filter series, Type codes AAF006Ax)

**Government:**

NA

**EUMED:**

NA

**OTHERS:**

None