



Marine & Offshore

Certificate number: 52988/B0 BV

File number: ACE2/173/1

Product code: 2633H

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

CIRCUIT BREAKERS (LOW VOLTAGE)

VACON® DCGuard

Requirements:

Bureau Veritas Rules for the Classification of Steel Ships, Offshore Units, Naval Ships and Yachts.

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: 12 Aug 2029

For Bureau Veritas Marine & Offshore,

At BV TURKU (ABO), on 12 Aug 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 :

VACON® DCGuard is a fast-current cutter/DC-Bus Tie Device and consists of following:

- VACON® NXP inverter and application software ADFIF102.
- aR supply fuses in each DC supply line, according to NXP inverter manual.
- Vacon NXP inverter. (This item is covered under BV Valid type approved Certificate No: 14584).
- di/dt filter with $\approx 2\%$ inductance.

Technical Data:

Input voltage U _{IN} :	Voltage class 5: 380-500V ($\pm 10\%$) / DC Link voltage = 465 – 800VDC ($\pm 0\%$) Voltage class 6: 525-690V ($\pm 10\%$) / DC Link voltage = 640 – 1100VDC ($\pm 0\%$)
Rated current:	Rated AC current = Rated DC current. Example: Rating for NXP 1500 690V used as motor drive: 1500A, 0-320Hz. Rating for NXP 1500 690V used as VACON® DCGuard: 1500ADC
Networks	IT Grid, with appropriate insulation monitoring to PE.
Output voltage	Normal operation: U _{IN} \approx U _{OUT} Charging: 0 \approx U _{IN}
Output frequency	Normal operation: DC voltage (directly connected to DC terminals). Charging: DC voltage (Pulse Width Modulation)
Output filter	dI/dt filter, recommended 2% inductance.
Switching frequency:	Normal operation: No switching / 0kHz Charging: 1...10kHz; Factory default 5kHz.
Control method	Individual IGBT control
DC Short circuit current	Limited by the aR fuses in each DC supply line. aR fuses shall be used according to NXP inverter user manual.
Over voltage protection	500V / Voltage class5: 911VDC 690V / Voltage class 6: 1258VDC
IGBT hardware over current protection current.	$\leq I_H * 3...5$ Unit dependent.
IGBT hardware over current protection delay.	Hardware circuit, instant without time delay.

IP Rating for Air cooled type: IP 00, IP 21, IP 23 or IP 54.

IP Rating for Liquid cooled type : IP 00.

1.1 Air-Cooled 500V Units:

Air Cooled NX5 465-800VDC Type Code	Unit Type	Frame	DCGuard Current I ₂ (A)	DC Power @800V PDC (kW)	Over Current & Short Circuit Protection Instant trip # (A)
NXP00035A2T0SSS	NXP0003	FR4	3	2	10
NXP00045A2T0SSS	NXP0004	FR4	4	3	15
NXP00055A2T0SSS	NXP0005	FR4	5	6	19
NXP00075A2T0SSS	NXP0007	FR4	7	6	25
TO					
NXI01685A0T0ISF	NXP0168	FI9	168	134	616
NXI02055A0T0ISF	NXP0205	FI9	205	164	748
NXI02615A0T0ISF	NXP0261	FI9	261	209	902
TO					
NXI17705A0T0ISF	NXP1770	FI14	1770	1416	7040
NXI21505A0T0ISF	NXP2150	FI14	2150	1720	8536
NXI27005A0T0ISF	NXP2700	FI14	2700	2160	10120

1.2 Air-Cooled 690V Units:

Air Cooled NX6 640-1100VDC			DCGuard Current	DC Power @1100V	Over Current & Short Circuit Protection
Type Code	Unit Type	Frame	I2 (A)	PDC (kW)	Instant trip # (A)
NXP00046A2T0SSS	NXP0004	FR6	4.5	4	14
NXP00056A2T0SSS	NXP0005	FR6	5.5	4	20
NXP00076A2T0SSS	NXP0007	FR6	8	6	24
TO					
NXP01256A2T0ISF	NXP0125	FI9	125	100	440
NXP01446A2T0ISF	NXP0144	FI9	144	100	550
NXP01706A2T0ISF	NXP0170	FI9	170	136	634
TO					
NXP15006A2T0ISF	NXP1500	FI14(2xFI13)	1500	1200	5720
NXP19006A2T0ISF	NXP1900	FI14(2xFI13)	1900	1520	6600
NXP22506A2T0ISF	NXP2250	FI14(2xFI13)	2250	1800	8360

1.3 Liquid-Cooled 500V Units:

Liquid Cooled NX5 465-800VDC			DCGuard Current	DC Power @800V	Over Current & Short Circuit Protection
Type Code	Unit Type	Frame	I2 (A)	PDC (kW)	Instant trip # (A)
NXP00165A0T0IWF	NXP0016	CH3	16	13	61
NXP00225A0T0IWF	NXP0022	CH3	22	18	83
NXP00315A0T0IWF	NXP0031	CH3	31	25	116
NXP00385A0T0IWF	NXP0038	CH3	38	30	138
TO					
NXP03005A0T0IWF	NXP0300	CH61	300	240	616
NXP03855A0T0IWF	NXP0385	CH61	385	308	792
NXP04605A0T0IWF	NXP0460	CH62	460	368	946
TO					
NXP29505A0T0IWF	NXP2950	2xCH64	2950	2360	6058
NXP37105A0T0IWF	NXP3710	2xCH64	3710	2968	7617
NXP41405A0T0IWF	NXP4140	2xCH64	4140	3312	8501

1.4 Liquid-Cooled 690V Units:

Liquid Cooled NX6 640-1100VDC			DCGuard Current	DC Power @1100V	Over Current & Short Circuit Protection
Type Code	Unit Type	Frame	I2 (A)	PDC (kW)	Instant trip # (A)
NXP01706A0T0IWF	NXP0170	CH61	170	187	524
NXP02086A0T0IWF	NXP0208	CH61	208	229	641
NXP02616A0T0IWF	NXP0261	CH61	261	287	804
NXP03256A0T0IWF	NXP0325	CH62	325	358	1001
TO					
NXP08206A0T0IWF	NXP0820	CH64	820	902	2526
NXP09206A0T0IWF	NXP0920	CH64	920	1012	2834
NXP10306A0T0IWF	NXP1030	CH64	1030	1133	3172
TO					
NXP234006A0T0IWF	NXP2340	2xCH64	2340	2574	7207
NXP27006A0T0IWF	NXP2700	2xCH64	2700	2970	8316
NXP31006A0T0IWF	NXP3100	2xCH64	3100	3410	9548

2. DOCUMENTS AND DRAWINGS :

- VACON® DCGuard Function Description N° 00738711, rev.B.2
- VACON® DCGuard Technical Data N° 00738653, rev.C.2
- Software process and quality plan N° 00779678, rev.G, dated 11 Sep 2023.
- Functional description N° 00738711, rev.B.2, dated 27 Nov 2017.
- FMEA dated 05 Jul 2018.
- Software registry version V053, dated 16 Jun 2023.

3. TEST REPORTS :

- VACON® DCGuard BV Type Approval Test Report Technical Data N° 00742300 Rev.A.1 dated 08-11-2018

4. APPLICATION / LIMITATION :

- 4.1 - Bureau Veritas Rules for the Classification of Steel Ships and Offshore Units.
- 4.2 - Approval valid for ships intended to be granted with the following additional class notations: **AUT-UMS, AUT-CCS, AUT-PORT, AUT-IMS and AUTO.**
- 4.3 - Only Hardware and Firmware / Software successfully tested together in compliance with the regulations as referred to in page one, according to the declaration of the manufacturer are covered by this certificate.
- 4.4 - Each application and configuration is to be submitted to the Society's examination prior to fitting on board.
- 4.5 - The fuses as mentioned in the product description shall be type approved.
- 4.6 - The equipment, once installed on board ship, is to be tested in accordance with the above referred Regulations under the supervision of a Society's Surveyor.
- 4.7 - Factory Acceptance and On-board Tests are to be performed in accordance with requirements for Category III Equipment.
- 4.8 - Equipment covered by this Type Approval certificate has been tested according to requirements of IACS UR E10 rev 9.
- 4.9 - In accordance with IACS UR E22 and as applicable to programmable devices for computer based systems of Category II or III, for each ship application:
- Ship specific documentation is to be submitted including software documentation and categorization of the computer based system.
 - Inspection and testing before installation onboard is to be performed under the surveillance of the Society.

5. PRODUCTION SURVEY REQUIREMENTS :

- 5.1 - The above products are to be supplied by **Danfoss Drives Oy** in compliance with the type described in this certificate.
- 5.2 - This type of product is within the category HBV of Bureau Veritas Rule Note NR320 and as such does not require a BV product certificate.
- 5.3 - **Danfoss Drives Oy** has to make the necessary arrangements to have its works recognised by Bureau Veritas in compliance with the requirements of NR320 for HBV products.
- 5.4 - For information, **Danfoss Drives Oy** has declared to Bureau Veritas the following production sites:

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

Vacon China Drives Co., Ltd. Haiyan Branch
Block 6-7, No.339 North Xinqiao Rd.,
Wuyuan St., Haiyan County,
Jiaxing P.R.China
Jiaxing
CHINA

6. MARKING OF PRODUCT :

- Trade name.
- Date of manufacture and serial number.
- Equipment type or model identification under which it was type-tested Maker's name or trademark.

7. OTHERS :

- 7.1 - 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.
- 7.2 - This certificate supersedes the Type Approval Certificate N° 52988/A0 BV issued on 01 Feb 2019 by the Society.

*** END OF CERTIFICATE ***