



Lloyd's
Register

Type Approval Certificate Extension

This is to certify that Certificate No. 10/70021(E1) for the undernoted products is extended and renumbered as shown.

This certificate is issued to:

PRODUCER	Danfoss Power Electronics A/S	
PLACE OF PRODUCTION	Danfoss Power Electronics A/S Ulsnaes 1 DK-6300 Graasten Denmark	Danfoss LLC 4401 N Bell School Rd Loves Park, IL USA 61111
DESCRIPTION	Frequency converters for speed control of squirrel cage motors – 3-phase, 50/60 Hz - at line voltages 200V-690V - in power range of 0.25 kW-1.4MW with options for Low Harmonic Drives and extended options cabinet EOC.	
TYPE	FC-102: Adjustable Frequency Converter VLT® HVAC Drive FC-202: Adjustable Frequency Converter, VLT® AQUA Drive FC-302: Adjustable Frequency Converter, VLT® Automation Drive AAF006: Stand-alone Advanced Active Filter series 006	
APPLICATION	Marine, Offshore and Industrial applications in environmental categories ENV1, ENV2, defined in LR Test Specification No.1: 2002 where the Test Specification is applicable for the service.	
STANDARD	LR Rules and Regulations for the Classification of Ship: 2010, Part 6, Ch2 IEC60533 IEC60529	

Certificate No.	10/70010(E2)
Issue Date	23 July 2014
Expiry Date	22 July 2019
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*Lloyd's Register EMEA
Strandvejen 104A, DK-2900 - Hellerup*


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RATINGS

Power sizes 1.1kW – 1.4MW
 Volt 3-ph, 50-60Hz T2: 200-240V - T4: 380-480V - T5: 380-500V - T7: 525-690V
 Enclosure Types See **SPECIFICATION** – Specification key below
 Hardware, RFI Filter See **SPECIFICATION** – Specification key below

SPECIFICATION

Specification key for FC-102 Drives:
 FC - 1 0 2 -----
 1 4 7 11 13 16 24 39
 Specification Key for FC 202 Drives
 FC - 2 0 2 -----
 1 4 7 11 13 16 24 39
 Specification Key for FC 302 Drives:
 FC - 3 0 2 -----
 1 4 7 11 13 16 24 39
 Specification Key for AAF 006 Advanced Active Filter:
 AAF 0 0 6 -----
 1 4 7 11 13 16 24 39

Char no	Specification	Options
1-3	Frq Converter	FC-
4-6	Advanced Active Filter VLT series	AAF- 102 for VLT HVAC Drive Advanced version 202 for VLT AQUA Drive Advanced version 302 for VLT Automation Drive Advanced version
7	Advanced Active Filter VLT Versions	006 N, or P
8-10	Advanced Active Filter VLT Power Size	A 0.25 kW-1.4 MW
11-12	AAF Power Size VLT Voltage range	190, 250, 310, 400 (indicates the current) T2: 200-240 - T4: 380-480 - T5: 380-500 - T7: 525-690
13-15	Advanced Active Filter VLT enclosures	T4: 380-480V E00:IP00/Chassis E20: IP20/Chassis E2S:IP/Chassis /medium power D-Frame) E21: IP21/Type 1 E2D: IP21/Type 1 (medium power D-Frame) H21:IP21/Type 1 with heater E54: IP54/Type 12 H54/Type 12 with heater E5H: for Hybrid IP54 E2M: IP20/Type 1 with mains shield E5M:IP54/Type 12 with mains shield ESD: IP54/Type 12 (medium power D-Frame) E21: IP21/Type 1

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Char no	Specification	Options
13-15		E54: IP54
16-17	VLT RFI Filter	E5M: IP54 with mains shield H2/H4: 6-Pulse Drive RFI for Maritime comply with Test Spec No1:2002 except for rad. and conducted emission (see OTHER CONDITIONS) B2: 12-Pulse Drive w RFI for Maritime, comply with Test Spec No1:2002 except for rad. and conducted emission. (see OTHER CONDITIONS) L2: Low Harmonics Drive w/ RFI for Maritime complies with Test Spec No1:2002 except for rad. and conducted emission (see OTHER CONDITIONS) N2: Low Harmonics Drive w/ RFI for Maritime complies with Test Spec No1:2002 except for rad. and conducted emission. (see OTHER CONDITIONS) HX: Active filter comply LR TA Spec No.1 except for radiated and conducted emissions. (see OTHER CONDITIONS)
	Advanced Active Filter	HX: Active filter comply LR TA Spec No.1 except for radiated and conducted emissions. (see OTHER CONDITIONS)
18	VLT hardware	B: Brake chopper
	Advanced Active Filter	X (none)
19	VLT hardware	Display
	Advanced Active Filter	G: graphical display
20	VLT hardware	Coating: C: Coating; R: Ruggedized boards (required for D1h-D8h enclosures)
	Advanced Active Filter	C: Coated boards
21	VLT hardware	1: Mains disconnect -2: Mains contactor - 3: Mains disconnect+fuses-4: Mains contactor +fuse E: Mains disconnect, contactor and fuse J: Mains circuit breaker and fuse
	Advanced Active Filter	X: None - 3: Disconnectors + fuses - 7: Fuses
22	VLT hardware	Adaptation for power terminals
	RFI	Reserved
23	VLT hardware	Options for 24Vdc input for control voltage
24-28	Software Options	
29-30	VLT options	A: Options for field bus
31-32	VLT options	B: I-O options
33-37	VLT options	C: Motion control options
38-39	VLT options	D: External control power input
	Advanced Active Filter	DX: no D option - DO: 24V backup

For types FC-102 & FC-202 stated shaft power is defined @ 110% normal overload/variable torque.

For type FC-302 the stated shaft power is defined at 160% high overload/constant torque.

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At high overload 160% torque, de-rate output current with 1%/°C, at ambient temperatures 45-55°.

At normal overload 110% torque, de-rate output current by 1.5%/°C @ ambient temperature 45-55°.

Overview of possible combinations of converter type & rating/enclosure types/ please consult the Danfoss literature.

OTHER CONDITIONS

- Screened cables are to be applied between Motor and Converter.
- Test of software is limited to demonstration of correct function during Type Approval testing.
- Converters for installation in LR Classed vessels shall comply with the requirements of Part 6, Chapter 2, section 10 of the Ships Rules.
- Converters used for "essential services" on board LR Classed Ships and rated above 100kW shall be surveyed and tested at the manufacturers according to Ships Rules Part 6, Chapter 2, section 1.4.
- Converters which exceed the limits for radiated and conducted emission of IACS E10 can be installed in "special power distribution zone" according to IEC60533. For installations in "general power distribution zone" measures must be taken to attenuate the effects on the distribution system according to IEC 60533. Planned EMC measures shall be assessed prior to installation on board.

In LR classed vessels the harmonics content at AC switch boards and section boards shall be limited to values specified in Part 6, Chapter 2, section 1.8.3 of the Ships Rules.

"This Certificate is not valid for equipment, the design, ratings or operating parameters of which have been varied from the specimen tested. The manufacturer should notify Lloyd's Register EMEA of any modification or changes to the equipment in order to obtain a valid certificate."

The attached Design Appraisal Document No.TA10/70021(E2) and its supplementary Type Approval Terms and Conditions form part of this Certificate.

All other details remain as the previous Certificate No.10/70021(E1) to which this extension should be attached.

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