

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Frequency Converter

with type designation(s)
Emotron DCU

Issued to

CG Drives & Automation Sweden AB
Helsingborg, Sweden

is found to comply with

DNV rules for classification – Ships, offshore units, and high speed and light craft

Application :

DC to DC conversion different voltage DC bus systems with bidirectional power transfer.

Range: 164 ADC to 2190 ADC (480V series) and 164 ADC to 1500 ADC (690V series)

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

Issued at **Høvik** on **2023-03-21**

This Certificate is valid until **2028-03-20**.

DNV local station: **Sweden CMC**

Approval Engineer: **Nicolay Horn**

for **DNV**

Frederik Tore Elter
Head of Section

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 300,000 USD.



Product description

DCU: DC bus coupler for power transfer between two DC buses with different DC voltages. Liquid cooled.

DCU48 Series:

Model	Normal duty (120%, 1 min. every 10 min)		
	Rated current Idc @ LV side [A]	Rated Power Pdc @ LV side U _{dc(LV)} = 500 VDC [kW]	Current Idc @ HV side U _{dc(HV)} = 600 VDC [A]
DCU48-109-LC-xx	164	82	137
DCU48-175-LC-xx	263	131	219
DCU48-250-LC-xx	375	187	312
DCU48-365-LC-xx	548	274	456
DCU48-500-LC-xx	750	375	625
DCU48-730-LC-xx	1095	548	912
DCU48-1095-LC-xx	1642	821	1368
DCU48-1460-LC-xx	2190	1095	1824

DCU69 Series:

Model	Normal duty (120%, 1 min. every 10 min)		
	Rated current Idc @ LV side [A]	Rated Power Pdc @ LV side U _{dc(LV)} = 500 VDC [kW]	Current Idc @ HV side U _{dc(HV)} = 600 VDC [A]
DCU69-109-LC-xx	164	143	137
DCU69-250-LC-xx	375	328	312
DCU69-400-LC-xx	600	525	500
DCU69-500-LC-xx	750	656	625
DCU69-750-LC-xx	1125	984	937
DCU69-1000-LC-xx	1500	1312	1250

xx: 20 (IP20 modules) or 54 (IP54 cabinet)

** Values applicable for 40 °C, to be modified for ships application at 45 °C. See under "Application / limitation".

Application/Limitation

Supply voltage range HV side:	U _{dc(HV)} 450 VDC to 760 VDC (DCU48 series) or 550 - 1120 VDC (DCU69 series)
Supply voltage range LV side:	15 % to 85 % of U _{dc(HV)}
Temperature range in operation:	0 - 40 °C (40 - 45 °C when derated 1 %/°C)
Temperature class:	A
Vibration class:	A
Humidity class:	A
EMC class:	IEC 61800-3 To be used on EMC class A locations

The DCU must be regarded as a component. The actual installation shall be designed according to CG Drives & Automation Sweden AB Users Manual and according to the applicable DNV Rules for the actual application.

Product certificate:

Frequency converters rated equal or larger than 100kW serving essential or important functions as defined in DNV rules Pt.4 Ch.8 shall have a product certificate according to DNV Pt.4 Ch.8 Sec.1 Table 3 for each delivery to DNV classed vessels.

For product certification, the following documents should be submitted for approval, Ref. to DNV Pt.4 Ch.8 Sec.1 Table 2:

- Reference to this Type Approval Certificate
- (E180) A drawing showing external location of instruments and devices for operation (panel layout)
- (E240) Functional description for the intended use, configuration and interface (e.g. alarms, monitoring and auxiliary power supplies)
- (Z252) Test program at manufacturer for routine tests and functional tests as per DNV Pt.4 Ch.8 Sec.7, 2.1.1
- Single line diagram (only applicable for multi drive configuration)
- If additional components to the type approved frequency converter are delivered, documentation according to DNV rules Pt.4 Ch.8 Sec.1 table 2 shall be submitted for review.

All drives are to be installed in an enclosure with an IP degree in accordance with DNV Rules w.r.t. location.

*Converters with conducted and radiated emission above the DNV-GL required limits can be installed in "special distribution zone" and "general power distribution zone", in accordance with IEC 60533 provided measures are taken to attenuate these effects on the distribution system, so the safe operation is assured. Planned EMC measures shall be submitted for approval prior to installation onboard. The EMC measures should be derived from an EMC analysis and plan in accordance with IEC 60533 Annex B and /or IEC 61800-3 Annex E.

Type Approval documentation

Tests carried out

Visual inspection, Performance/heat run, Power supply failure, Power supply variations, Voltage/frequency variation, Vibration, Dry heat, Damp heat, Insulation resistance, High voltage.

EMC: The following tests are in accordance with the DNV-CG-0339 / IEC 61800-3: Electrical fast transient (Burst), electrical slow transient (Surge), RF-common mode Voltage, radiated RF-electromagnetic fields, electric discharge (ESD), radiated and conducted emission. (See under application limitation).

Marking of product

Type designation – Voltage – Current

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.

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE