



Certificate no.:
TAE00004VF

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Frequency Converter

with type designation(s)

LM60xx-WC, LM60xx-AC, LM40xx-AC

issued to

CSSC-Wuxi Silent Electric System (SES) Technology Co., Ltd.
Wuxi, China

is found to comply with

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

Application:

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Issued at **Høvik** on **2024-03-21**

This Certificate is valid until **2029-03-20**.

for **DNV**

DNV local unit: **Jiangyin NB & CMC**

Approval Engineer: **Andreas Andrecht**

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.



Form code: TA 251

Revision: 2023-09

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Product description

The power module is composed of fully controlled power device IGBT. The power module can work in rectifier mode, converting AC voltage to DC voltage, or in inverter mode, converting DC voltage to AC voltage, or in DC/DC mode, converting DC voltage from the energy storage element to a stable DC voltage.

LM60xx-WC Water cooled module general technical data:

	LM6081-WC	LM6068-WC	LM6042-WC
Rated AC voltage	690Vac	690Vac	690Vac
Rated AC current	800A	670A	410A
Rated DC voltage	1100Vdc	1100Vdc	1100Vdc
Rated power	810kW	680kW	420kW
Rated frequency	50Hz/60Hz	50Hz/60Hz	50Hz/60Hz
Power factor	-0.85~0.85	-0.85~0.85	-0.85~0.85
Overload current	880A(60 s)	737A(60 s)	451A(60 s)
Switching frequency	2500Hz	2500Hz	2500Hz
Cooling	Water cooled	Water cooled	Water cooled
Rated water flow	30L/min	24L/min	16L/min
Rated heating power	16kW	12kW	8kW
Water inlet temperature	≤ 50°C (over 50°C, reduce capacity)	≤ 50°C (over 50°C, reduce capacity)	≤ 50°C (over 50°C, reduce capacity)

LM60xx-AC Air cooled module general technical data:

	LM6040-AC
Rated AC voltage	690Vac
Rated AC current	400A
Rated DC voltage	1100Vdc
Rated power	400kW
Rated frequency	50Hz/60Hz
Power factor	-0.85~0.85
Overload current	440A(60s)
Switching frequency	2500Hz
Cooling	Forced Air cooling
Environment temperature	≤ 50°C (over 50°C, reduce capacity)

LM40xx-AC Air cooled module general technical data:

	LM4035-AC	LM4023-AC	LM4018-AC	LD4008-AC
Rated AC voltage	400Vac	400Vac	400Vac	400Vac
Rated AC current	600A	390A	310A	135A
Rated DC voltage	700Vdc	700Vdc	700Vdc	700Vdc
Rated power	350kW	230kW	180kW	80kW
Rated frequency	50Hz/60Hz	50Hz/60Hz	50Hz/60Hz	50Hz/60Hz
Power factor	-0.85~0.85	-0.85~0.85	-0.85~0.85	-0.85~0.85
Overload current	660A(60s)	430A(60s)	341A(60s)	149A(60s)
Switching frequency	2500Hz	2500Hz	2500Hz	2500Hz
Cooling	Forced Air cooling	Forced Air cooling	Forced Air cooling	Forced Air cooling
Environment temperature	≤ 50°C (over 50°C, reduce capacity)	≤ 50°C (over 50°C, reduce capacity)	≤ 50°C (over 50°C, reduce capacity)	≤ 50°C (over 50°C, reduce capacity)

Location Classes

Temperature Class	B
Humidity Class	B
Vibration Class	A
EMC Class	A
Enclosure Class	IP 00

Application/Limitation

When installed on a DNV classed ship or offshore unit each delivery of the application system is to be certified according to Part 4 Chapter 8 Section 7. The routine tests (RT) are to be performed at the manufacturer of the application system before the system is shipped to the yard. For non DNV classed installations the product certification will be not mandatory.

Type Approval documentation

Tests carried out

Type tests for the frequency converter according to applicable DNV rules and standards as listed below have been carried out. DNV-RU-SHIP Pt.4 Ch.8 Sec.7 (Edition 2022-07) and DNV-CG-0339 (Edition: 2019-12).

Marking of product

The products to be marked with:

- manufacturer name
- model name
- serial number
- power supply ratings

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