Certificate No:
TAA00003A0

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Electrical Control System

with type designation(s)
Digital voltage regulator E-Vo

Issued to
Marelli Motori S.r.l.
Arzignano VI, VI, Italy

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.

Location classes:

Temperature	**D**
Humidity	**B**
Vibration	**B**
EMC	**A**
Enclosure	**Required protection according to relevant rules shall be provided upon**

Issued at **Hamburg** on **2023-05-22**
This Certificate is valid until **2028-05-21**.
DNV local unit: **Italy/Malta CMC**

Approval Engineer: **Holger Jansen**

for **DNV**

Joannis Papanuskas
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

Voltage regulator for synchronous generators

E-Vo (10015286), E-Vo Light (10015267)

Both models are based on the same hardware, same firmware and software releases, only differ for the UL certification (E-Vo (10015286) is UL marked, E-Vo Light (10015287) is not)

Power supply: Up to 277Vac (max. 300Vac), 50 ~ 400Hz, (Source main terminal, aux. winding, PMG)

Excitation field data: Field voltage: up to 200Vdc;
Continuous field current up to 7Adc (@70°C)
10-seconds field forcing current: up to 15Adc (@70°C)

Generator voltage sensing: 1-ph or 3-ph, 200 ~ 480Vac (max. 600Vac), 50/60Hz

Generator current sensing: 1 channel (up to 1Aac, max. 5Aac, 50/60Hz)

Approval conditions

The Type Approval covers hardware listed under Product description. When the hardware is used in applications to be classed by DNV, documentation for the actual application is to be submitted for approval by the manufacturer of the application system in each case. Reference is made to DNV Rules for Ships Pt.4 Ch.9 Control and Monitoring Systems.

Application software control
All changes in software are to be recorded as long as the system is in use on board. The records of all changes are to be forwarded to DNV GL for evaluation and approval.
Major changes in the software are to be approved before being installed in the computer.
A Certification of Application Functions may be required for the particular vessel.

Application/Limitation

Compliance with the requirements for generator voltage regulation and generator short circuit capabilities given in Pt.4 Ch.8 Sec.5 is to be ensured. It must be possible to verify that compliance by review of power system documentation. Testing onboard should be limited to confirming compliance already verified by design review.

Type Approval documentation

Tests carried out

Applicable tests according to DNV Class Guideline CG0339, August 2021.

Marking of product

The products to be marked with:

- Model name
- Manufacturer name
- Serial number

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the 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