DNV·GL

Certificate No:
TAA0000187

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Monitoring System

with type designation(s)
TSX5 Shaft Power Meter

Issued to
Trelleborg Marine Systems UK Ltd
Deeside, Clwyd, United Kingdom

is found to comply with
DNV GL 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 GL.

Location classes:

Temperature	**C**
Humidity	**B**
Vibration	**Stator: Class A,** **Rotor: Class B**
EMC	**B**
Enclosure	**B / IP55**

Issued at **Høvik** on **2018-11-23**
This Certificate is valid until **2023-11-22**.
DNV GL local station: **Newcastle-upon-Tyne**

Approval Engineer: **Ståle Sneen**

for **DNV GL**

Jan Tore Grimsrud
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.

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Product description

TSX5 Shaft Power Meter for measurement of shaft torque, speed, power and optionally thrust in marine propeller shafts. The system consists of two main elements – the rotor and the stator.

The rotor comprises a set of split half rings secured to the shaft. This acts as a support for the rotor PCB and rotary transformer secondary and forms a protective cover for the strain gauge(s), which are mounted directly onto the shaft. The rotor electronics are powered by the rotary transformer. Power transfer does not require any rotation of the shaft.

The stator comprises a stand and an IP55 sealed enclosure, which contains the power supply, isolation and main I/O board. Mounted on the stand is the power head (the primary of the rotary transformer) used to power the rotor components. There are also two display variants, a LOCAL IP55 display (standard), which can be mounted local to the stator enclosure or a remote panel, or a REMOTE console mounted IP44 display (optional).

TSX5 is approved for power supply 110~240 VAC 50/60 Hz.

Measurement data from the rotor electronics are transferred wirelessly from the rotor to the stator using a 2.4GHz ZigBee transceiver. The measurement data is intended for statistical and monitoring purposes.

Radio specification:

- ZigBee communication protocol
- 2.4 GHz ISM band
- 16 channels (IEEE 802.15.4 channel 11 to 26).
  I.e. Channel center frequencies from 2405 MHz to 2480 MHz with 5 MHz separation
- 2 MHz channel bandwith
- 250 kbit/s over the air data rate
- +3 dBm output power (stator)
- -20 dBm output power (rotor)
- -100 dBm receiver sensitivity, typically @1% PER
- The system automatically selects a fixed communication channel at start-up
- Declared conformity with EN300 328 V2.1.1, EN301 489-1 V2.1.1 and EN301-489-17 V3.1.1

Application/Limitation

The Type Approval covers hardware listed under Product description. When the hardware is used in applications to be classed by DNV GL, 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 GL rules for classification of ships Pt.4 Ch.9 Control and monitoring systems.

Equipment to be installed according to instructions given in the Installation & Service Manual.

Type Approval documentation

Tests carried out

Applicable tests according to class guideline DNVGL-CG-0339, November 2016.

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 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