DNV·GL

Certificate No:
TAA000029V

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Monitoring System

with type designation(s)
T-Sense torque measuring system,
Control box 0399-0403, Rotor 100 mm to 1000 mm

Issued to
VAF Instruments B.V.
Dordrecht, Zuid-Holland, Netherlands

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:

Type	Temperature	Humidity	Vibration	EMC	Enclosure
Control box 0399-0403	C	B	A	A	B
Rotor 100 mm to 1000 mm	C	B	B	A	B

Issued at **Høvik** on **2019-04-24**
This Certificate is valid until **2023-12-31**.
DNV GL local station: **Rotterdam**

Approval Engineer: **Ståle Sneen**

for **DNV GL**

Trond Sjåvåg
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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Job Id: **262.1-015915-2**
Certificate No: **TAA000029V**

Product description

T-Sense torque measuring system comprising a control box (stator) and rotor equipment as follows:

Control box 0399-0403 at stator part

Power supply:	115 or 230 VAC, 50 or 60 Hz +/- 10%
Power consumption:	40 VA maximum
Input:	2.4 GHz fully protected encrypted signal
Outputs:	RS 485 for MODBUS protocol, Optional 4-20 mA isolated current output, Optional Ethernet port for service purposes only.
Dimensions:	408 x 360 x 111 mm

Rotor equipment

Material of mounting rings:	carbon steel
Material outside cover:	polyurea coated high density foam
Material compensator arms:	carbon steel
Shaft speed detection:	accelerometer signal
Output:	2.4 GHz fully protected encrypted signal
Dimensions:	100 mm to 1000 mm, depending on shaft diameter
Operating temperature:	-10°C to 60°C
Measuring tolerance:	< 0.5% FS

The T-Sense measuring system can be mounted on propeller or drive shafts. When a shaft is subject to torque this will result in a small strain at the shaft surface. A LED and an extremely accurate optical cell can detect these small movements of the surface. The measured values are transferred continuously from the rotating shaft to the stator part through a 2.4 GHz wireless data connection. Power transmission from the stator to the rotating shaft is performed by means of induction.

The stator part consists of a bracket, a power transmission coil, a data signal receiver and a control box equipped with digital and analogue output connections. These outputs can be linked directly to the vessels data network, monitoring or control system.

Radio specification

Bluetooth Adaptive Frequency Hopping between 79 channels in the 2.4 GHz ISM-band (2402 MHz - 2480 MHz). Typical radio transmitting power is 4 dBm / 2.5 mW from a directional antenna.

Approval conditions

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.

Application/Limitation

Installation of T-Sense is to be performed as described in the Technical Manual 661, which includes installation of ferrite core on antenna cable close to the control box.

Type Approval documentation

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Tests carried out

Applicable tests according to class guideline DNVGL-CG-0339, November 2016.
EMC radiated electromagnetic field immunity test at extended to 3 GHz at 10V/m to cover the wireless working frequency.
EMC radiated emission test from 2 GHz to 6 GHz according to CISPR22 for Class A IT-equipment.

Marking of product

Manufacturer: VAF Instruments BV
Type No.: T-Sense
Serial No.: Unique. The approval covers serial numbers 13.1204 and higher.
Supply: 115/230 VAC, 50/60 Hz

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