



P R O D U C T B U L L E T I N 660

Optical Torque Measuring Systems

Introduction

The use of a T-Sense torque measuring system means efficiency improvement, overload protection and prevention of breakdown costs. For example in the shipping industry its application has led to savings up to 5% on fuel costs. The system is based on extremely accurate optical sensor technology and can be mounted around shafts in power transmission systems.

Why a torque measuring system?

A torque meter provides you with precise information on engine performance related to consumed energy. By giving instantaneous readout of torque, speed and power, the effects of operational changes are monitored. Because these effects are measured, you can use your engine-driven installation in its most efficient way. This will considerably reduce your fuel costs, one of the primary cost drivers.

Where is the T-Sense torque measuring system used?

T-Sense torque measuring systems are used for engine-driven installations in all kinds of power and propulsion plants. For example continuous power output measurement of ships propulsion; continuous power consumption measurement; continuous level check for torque, speed and power levels and direct visual control of changes in engine settings, trim and draught.

Possible system extensions

A full range of T-Sense torque measuring systems is available. The standard output of the torque measuring system consists of a torque, shaft speed and power signal. The system can be extended with energy consumption and propeller shaft vibration analysis, or can be combined with fuel consumption measurement.

Your advantage

Designed for durability and accuracy

The systems have a robust design. They are built to withstand the typical harsh environmental conditions in ships, engine rooms, dredgers, steelworks and heavy industries. Innovative optical sensor technology guarantees high accuracy with an overall error of less than 0.5% F.S.D.

No maintenance required

T-Sense torque measuring systems are maintenance-free as a result of non-contact power and signal transmission. They are designed to work continuously. No recalibration is needed, because signals are stable during its lifetime.

Easy installation and commissioning

The intelligent design enables installation by customers staff.

for latest information
visit
www.vaf.nl
on products, sales and service points

VAF VAF INSTRUMENTS
for quality and innovation

TO BE REALLY SURE

Typical system arrangement

Scope of supply is customized

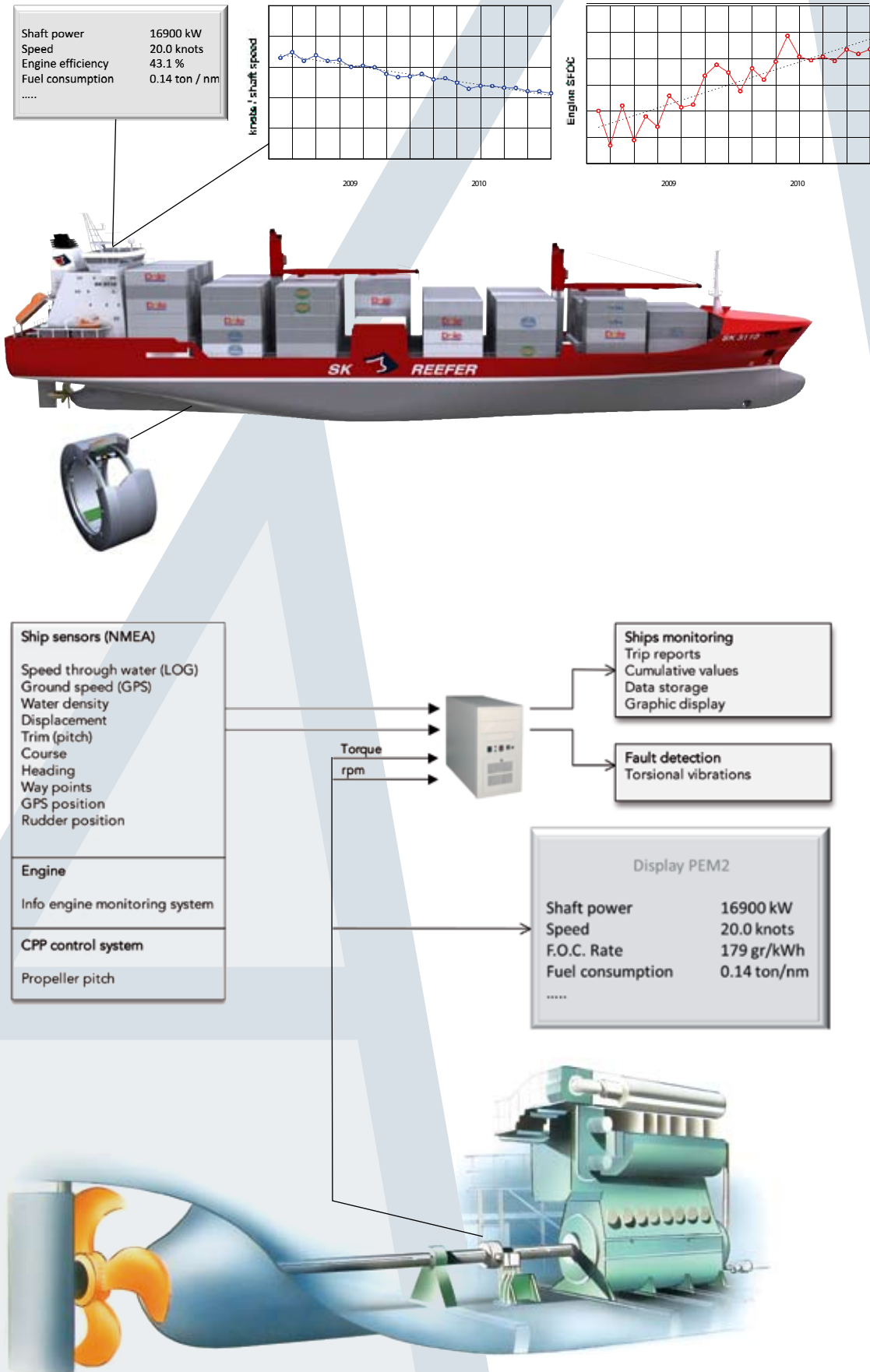
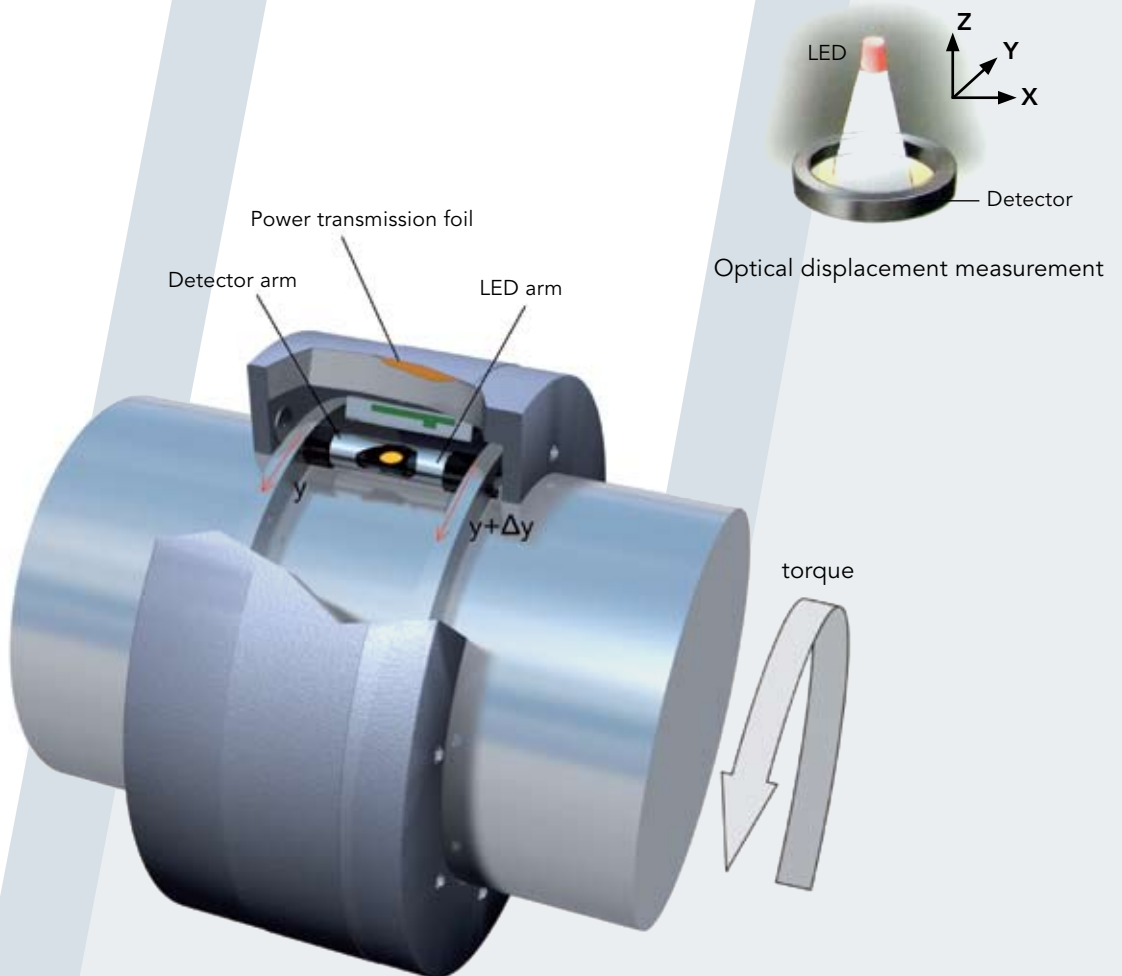


Figure 1: Typical T-Sense torque measuring system with optional energy consumption and outputs

Principle of operation

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. The stator part can optionally be connected to a Propulsion Efficiency Monitor (PEM2), which displays shaft power, torque and speed.



Δy is a small movement of the propeller shaft surface due to strain

Figure 2: Measuring principle

Features and benefits

VAF Instruments has developed the new T-Sense torque measuring system with modern and user-friendly electronics, based on proven very accurate optical sensor technology. The standard T-Sense torque measuring system will be delivered with an interface box for easy connection to the ships data network, monitoring or control system. The PEM2 with a touch screen display, can be supplied as a monitoring system.

Features	User benefits
Optical measuring principle	<ul style="list-style-type: none">• No time consuming mounting of strain gauges• High accuracy and repeatability• Detection of torsional vibrations
Extreme accuracy of optical sensor (within nanometer range)	<ul style="list-style-type: none">• Very accurate output signals resulting in high measuring accuracy and repeatability• Torsional vibration analysis is possible during long interval period
Wireless transmission of data and power	<ul style="list-style-type: none">• No maintenance• No wear
Digital output signal available	<ul style="list-style-type: none">• Easy and accurate digital data transfer to the vessels network, monitoring or control system• Only 1 communication cable to the bridge• User friendly installation
Easy installation and commissioning without assistance	<ul style="list-style-type: none">• Low overall installation costs• No engineering or commissioning assistance needed
Calibrated for life	<ul style="list-style-type: none">• No need for recalibration• No servicing costs• Low costs of ownership
A genuine VAF Instruments product	<ul style="list-style-type: none">• Over 70 years of experience in sensor technology for maritime applications
Manufactured by a NEN-EN-ISO 9001 certified organization	<ul style="list-style-type: none">• Assured constant product quality guaranteed
Touch screen display	<ul style="list-style-type: none">• No operator training required• User friendly human interface

Technical specification

T-Sense torque measuring system

Control box at stator part

Power supply	: 115 or 230 VAC, 50 or 60 Hz +/- 20%
Power consumption	: 40 VA maximum
Input	: 2.4 GHz fully protected encrypted signal
Output	: RS 485 for MODBUS protocol or 4-20 mA current output
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	: depending on shaft diameter
Operating temperature	: -10°C to 60°C
Measuring tolerance	: <0.5% F.S.D.

Optional

Propulsion Efficiency Monitor (PEM2)

Supply	: 24 VDC
Display	: touch screen, 320 x 240 pixels
Operating temperature	: 0°C to 55°C
Dimensions	: 186 x 145 x 45 mm
Front panel protection	: IP65/NEMA4
Input	: MODBUS for torque, speed and power
Optional input	: pulses from flow meter (2x) temperature sensor PT-100 (2x) speed log as pulse input or GPS (NMEA) signal 4-20 mA current input for generator power serial input for additional data
Output	: isolated 4-20 mA current output for torque, speed and power
Optional output	: relays for alarms, high/low torque levels

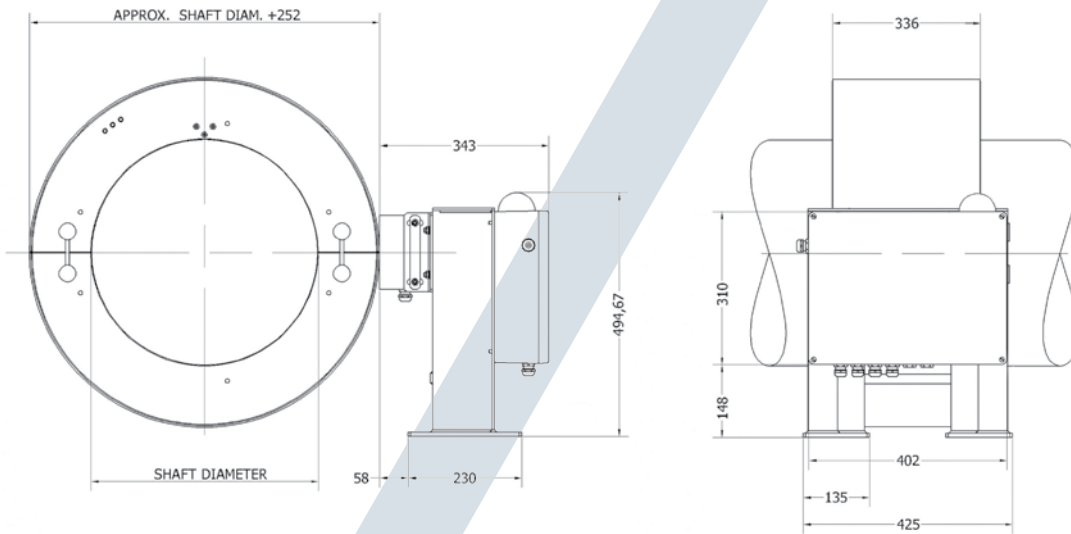


Figure 3: Rotor and stator

Applications

In combination with a PEM2 or with the vessels monitoring system, the T-Sense measuring system can be used in a variety of applications such as:

- Continuous power output measurements for ship propulsion
- Continuous power and consumption management including specific fuel oil consumption
- Direct visual control of changes in engine setting, trim and draught
- Continuous and long term monitoring of torque, speed and power
- Torsional vibration analysis for frequencies up to 50 Hz.

Besides these standard applications VAF Instruments also manufactures special designs:

- Test bed shafts
- Tailor-made software

Torsional vibration analysis

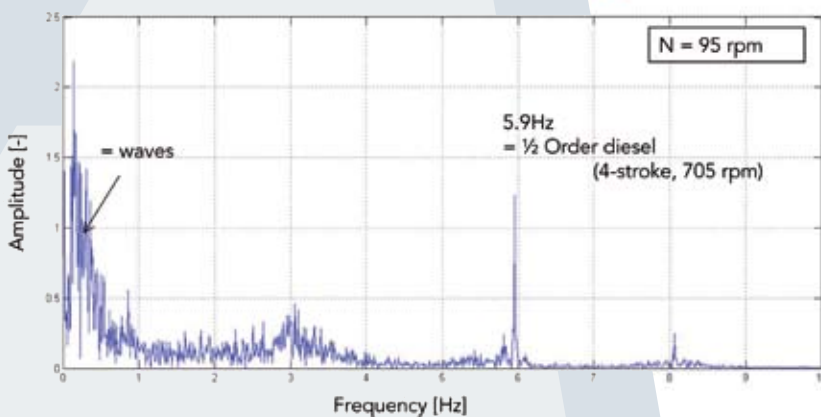


Figure 4: Monitoring torsional vibrations

Tailor-made solutions can be designed to suit your individual application. Please contact VAF Instruments for more information and possibilities.

Optional Propulsion Efficiency Monitor (PEM2)

The PEM2 instantly displays torque, speed, shaft power and other selected measuring data. Additional flow meter signals and temperature sensor (PT-100) signals enable calculation of the engines fuel consumption with optional temperature compensation. In combination with input signals from speedlog or GPS, the PEM2 will calculate the temperature corrected fuel consumption per kW or per nautical mile.

Features:

- Touch screen display
- Easy menu structure
- Display of figures and bar graphs
- User friendly, log functions for alarms and instant detection of missing signals

Optional:

- Display of fuel consumption per kW
- Display of fuel consumption per nautical mile

The PEM2 helps the ships crew and the owner to find the best settings for engine, trim and propeller pitch, as the effect of the changes will be instantly displayed.

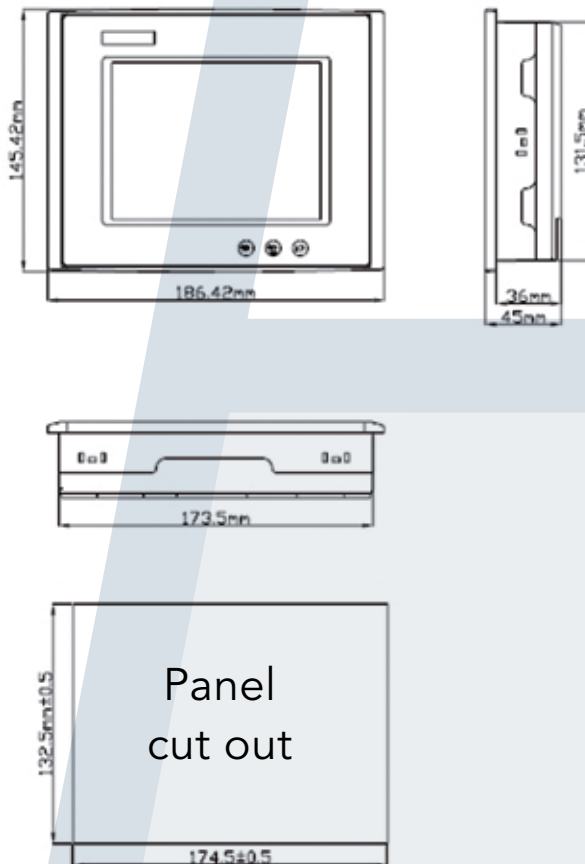


Figure 5: Dimensions PEM2 touch screen

Quotation and ordering information

Number of units per ship : _____

Ships name / hull : _____

Available shaft length : _____ mm

Please provide shaft line drawing for installation.

New building

Retrofitting

Design conditions

Power : _____ kW

Speed : _____ rpm

Shaft material : _____ or shear modulus G: _____ N/mm²

Shaft diameter : _____ mm (+tolerance)

Inside (bore) diameter : _____ mm

Duty : propeller shaft dredge pump

jet pump other _____

System

Required output : range 4 - 20 mA = _____ - _____ kNm

RS 485 / MODBUS

range 4 - 20 mA = _____ - _____ rpm

RS 485 / MODBUS

range 4 - 20 mA = _____ - _____ kW

RS 485 / MODBUS

Other: _____

Options : Touch screen display for torque, shaft speed and power read out

Trip levels on torque

Energy consumption

Total power calculation for twin screw vessels

Torsional vibration analysis



VAF Instruments B.V.

Amstelwijckweg 21, 3316 BB Dordrecht (Sales/Office)

Pieter Zeemanweg 131, 3316 GZ Dordrecht (Warehouse/Factory)

P.O.Box 40, NL-3300 AA Dordrecht

The Netherlands

Telephone: +31 78 618 3100

Fax: +31 78 617 7068

Internet: www.vaf.nl or www.vaf.eu

E-mail: sales@vaf.nl



Specifications subject to change without notice.
Agents and distributors in more than 50 countries

Represented by: