MetaPower® Torque and Power Monitoring System for rotating shafts

Description
MetaPower® is a digital measuring system for detection of shaft torque, shaft RPM and consequently the transferred power of the propeller shaft. The system offers high accuracy and good long term stability. By transmitting measured data via satellite from ship to shore, the shipping company’s operation management is able to decide the most economical operating modes for the ship’s engine and propulsion system.

The MetaPower® system allows the ship’s management to maintain or increase the speed while saving significant amounts of fuel, reducing CO₂ and NOₓ output levels. It measures torque and power transferred from the main engines to the propellers. Comparison between power output and fuel consumption gives valuable information necessary to avoid over-stressing the engine.

Features
- System accuracy 0.5%
- Service free operations
- Ranging 0 RPM -> 10 000 RPM (depending on shaft diameter)
- Shaft diameters from 200 mm -> 1 000 mm
- Environmental operating temperature range from -15°C to +70°C.
- Two CAN bus outputs
- Serial output RS-422/485
- Four analogue 4 - 20 mA outputs
- Four analogue +/- 10 V outputs
- Basis for fuel performance monitoring
- Lens cleaning alarm
- Online calibration available

Design parameters
- Shaft maximum RPM
- Shaft outer diameter
- Shaft inner diameter
- Maximum power output
- Shaft steel properties

Output parameters
- Shaft RPM
- Shaft Power in kW
- Shaft Torque in kNm

Display options
Based on the system configuration there are two different display options.

Standalone or remote display (LOS 8”):

Integrated K-Chief/AC C20:
Functional Description

The MetaPower® Torque Measurement System measures the twist of a rotating shaft. Two LED forks, mounted on a solid framework, sends light through two slotted code wheels mounted on the shaft. Each fork then sends the modulated digital signal to the distributed processing unit (RTixe). The RTixe receives the digital signal from both forks and calculates the corresponding torque value.

Light fork

The LED fork photonic switch is used to create a fully digital signal for detection of the relative position of the code wheels.
- Non-contact interface to shaft
- 24 V power supply
- RS-422/485 sensor signal output
- Lens Cleaning Alarm
- Rugged construction
- Simple installation
- No configuration

Code wheels

Two stainless steel code wheels are mounted on the shaft. These wheels are manufactured to the individual shafts specification. The distance between the code wheels are defined by the outer and inner diameter of the shaft, Shaft maximum RPM, maximum power and the steel properties of the shaft.

Mechanical components

Frame work

To be able to do an accurate calculation, the LED fork need a solid framework. The customer is responsible for building such a framework. KM has a standard suggestion for framework construction.

NOTE: Some installations require different constructions. Please contact the KM project department for verification.

Signal cables and connection box.

KM will supply pre-connected signal cables from the LED fork to a KM supply connection box (UG-920). The connection box should be mounted close to the shaft, and maximum 10m from the LED forks.

Distributed Processing Unit (RTixe)

The system uses reliable, ruggedized single board Distributed Processing Units. The DPU should be installed close to the engine, into an appropriate cabinet.

For technical specification please see the datasheet 350628 for the RTixe.