Shaft Power Meter

DESCRIPTION
Datum Electronics Series 420 Shaft Power Meter provides an accurate tool to assess and monitor propeller shafts on ships by measuring shaft speed, torque and power. This Power Meter System can be installed on a ships propeller shaft or shafts and uses strain gauge technology providing a highly accurate non-contact method of measuring shaft torque.

The aim of this system is to offer the basic tools required to provide the means to operate a ship at its maximum efficiency level. To achieve this accurate shaft speed, power output and torque information on a ships propeller shaft is fundamental to provide a perfect balance and greater fuel economy.

SYSTEM OUTLINE
The Datum Electronics Series 420 Marine Shaft Power Meter accurately measures the on-shaft torque (kNm), speed of the shaft rotation (rpm) and the power (kW) that is going through the shaft. The data is transmitted from the shaft in a digital format that can be processed and scaled off-shaft. The data transmitted contains the torque level, the shaft speed and diagnostics data such as the on shaft voltage and power.

The System provides actual data on the power delivered that can be compared with the expected design performance, together with ongoing data, that will indicate any changes to this expected performance level.

Condition monitoring of a system of this type is important to any modern day vessel. Being able to accurately measure and record the ships power and speed data can help towards determining equipment condition and efficiency. It’s a pro-active measure with the specific purpose of improving performance and efficiency through a ship transmission system.

SINGLE OR DUAL SHAFT MEASUREMENT
The Datum Electronics Series 420 Shaft Power Meter System can either be a dual or a single shaft system to provide highly accurate non-contact torque measurement of shaft torque, speed and power.

If you are looking at ship efficiency systems and analysis tools to determine power efficiency then the Datum Series 420 Marine Torsionmeter is a valuable tool.

420 SHAFT POWER METER

SINGLE OR DUAL SHAFT SYSTEM

SHAFT SIZES RANGE FROM 160MM — 1100mm DIAMETER

STRONG ROBUST DESIGN
TESTED TO DEFSTAN 59-41, 61-5, 08-123 (INES 1004)

SHIPS DATA INFORMATION RELAYED TO PC
• RUNNING HOURS
• ACCUMULATED POWER
• POWER LOG
• TORQUELOG

FLEXIBLE SYSTEM FOR SEA TRIALS OR PERMANENT INSTALLATIONS
DISPLAY(S) FOR REMOTE MONITORING OF TORQUE, SPEED AND POWER

The Datum Electronics Series 420 Shaft Power Meter System has been developed to accurately access and monitor the performance and efficiency of the ships transmission system.
PRODUCT DEFINITION

The Datum Electronics Series 420 Shaft Power Meter System can either be a dual or a single shaft system to provide highly accurate non-contact torque measurement of shaft torque, speed and power.

The system comprises:-

A shaft Unit which is fitted to each propeller shaft to measure torsional strain and rotational speed.

A Control Unit to provide power to, and take data from, the shaft units, to calculate calibrated torque and shaft power (as a function of measured torque & speed). The Control Unit also records & displays accumulated running hours for each shaft.

An optional Display Unit that displays, Torque, Rotational Speed (and direction ‘AHEAD’ or ‘ASTERN’) and Calculated Power from the shafts. This feature is an additional extra as and where required.

SYSTEM DATA

A Series 420 Marine Shaft Power Meter System effectively allows you to monitor the ships propeller shaft in terms of its efficiency and performance levels, which can lead to reduced fuel costs and improved performance.

- Reduce fuel costs
- Optimisation of fuel and cylinder oil consumption
- Protection against engine overload
- Increase profitability
- Analysis of increased power compensation caused by natural growth on ships hull.
- Allow for better planning and scheduling of maintenance works
- Increasing a ships speed performance whilst reducing fuel consumption.
- Synchronise load distribution on two-shaft ships
- Verification of engine efficiencies as specified by engine suppliers
- Quick analysis of failures or inefficient drive systems
- Condition based monitoring of a ships transmission system during operation
- Continuous power monitoring

EQUIPMENT SPECIFICATION

The Series 420 Shaft Power Meter System provides a display of the shaft torque, rotary speed and power. The torque signal is derived from strain gauges installed on to the shafts. The shaft speed signal is derived from an on-shaft speed pick off within the stator unit. These signals are transmitted from the shaft rotor to the shaft stator unit. These signals are then transmitted to the Control Unit and calibrated to provide a display of torque, speed and power for either a single or dual shaft.

DESIGNED TO FIT SHAFT DIAMETER 160MM - 1100MM

The control unit is the main hub of the system and applies preset calibration values to the data received from the shafts and displays torque in kNm. It also calculates power from torque & speed data and uses the presence of speed signal to accumulate ‘shaft running hours’ for each shaft and this is displayed on the control unit. Once all the information has been processed the unit transmits Torque, Speed and Power data via RS485 to the remote display(s).

DIMENSIONS: L: 240MM  W: 304MM  D: 40MM

The remote display(s) receive RS485 Data and display Torque, Speed and Power. Each remote display(s) shows Torque, Speed and Power and as required. The display(s) also show direction of shaft rotation which is annotated by an illuminated legend, showing ‘AHEAD’ or ‘ASTERN’.

DIMENSIONS: L: 200MM  W: 210MM  D: 40MM
One of the advantages of this type of system is how easy the installation process is made. The shaft system is easy two install around the shaft and the control unit and display unit have been designed for easy installation within a marine environment.

The Torsionmeter System has a shaft installation supplied as a rotor sub-assembly and a stator sub-assembly.

The installation on to each shaft comprises a dual bridge strain gauge installation. The installation of the rotor is followed by the installation of the stator. The rotor sub assembly is split into two halves and bolted over the strain gauge installation. The rotor houses the rotor electronics module, acts as a carrier for the rotor coil and physical protection for the strain gauges. To maximise the vibration tolerance between the shaft and the stator the stator should be centred about the shaft to a tolerance of +/-1mm, this will allow an additional vibration tolerance of +/-6mm. On larger shafts this vibration tolerance is between +/- 2.5 to 3.5 shaft diameter.

The Control Unit is supplied as a complete assembly; it requires four physical mounting points for easy installation and 9 off connection points. The optional Remote Display Units are supplied as a complete assembly, with four physical mounting points and 2 off connection points.

Contact Datum Electronics Ltd for full details of the Series 420 Shaft Power Meter. The system is flexible to your requirements and environment, so if you require single or dual shaft installation on shaft diameters between 100mm - 650mm, one, two or three remote display units, the Series 420 Shaft Power Meter System can meet your requirements.

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Series 420 Universal Marine Torsionmeter System

DESCRIPTION

The Series DMTM-SS Single Shaft Marine Torsionmeter System Kit provides a permanent, robust, simple to install and accurate tool to access and monitor the performance and efficiency of the ship's transmission system(s).

It will accurately measure the on-shaft torque, the speed of the shaft(s) rotation and the power that is going through the shaft(s).

This product is supported by a growing Network of Worldwide authorised distributors and installers, visit our website for full details.

Simple to install by one of our trained representatives Worldwide
The shaft assembly comprises:
- Strain gauge installation
- Signal transmitter
- Signal condition unit
- Power Coil

SPECIFICATION

Utilising the vessel's existing shaft(s) this becomes the basis for the marine torsionmeter. This limits the impact on the existing drivetrain, and there is no requirement for special couplings or spacers.

The first basic element of the system requires a shaft(s) between 200mm - 900mm in diameter which is accessible. This will cover most Marine Shafts and is also suitable for non-marine applications.

The maximum Torque and Power rating is scaleable and dependant on ship's system. The maximum shaft speed is 1500rpm.

This product is suitable for Commercial shipping and Industrial applications.

All popular control outputs are available with this system including:
- RS485 to a ship PC or a bridge indicator.
- Analogue Output for 4-20mA, 0-10VDC.
- Digital Output via RS232 and USB (local logging).

Available for purchase from the UK, or from our reseller's world-wide, with short lead times, in some cases this can be available off the shelf.

The Universal Marine Torsionmeter System is has a high grade specification with a permanently installed analysis system. Flexible to each requirement with adaptable settings including input to Ship Management System, this is a truly robust solution for measuring torque on a large industrial/ship shaft.

Shaft Power Measurement
Ship Efficiency (Programmes)
Equipment Protection

"FLEXIBLE KIT FORMAT for all shafts between 200-900mm diameter"

Non-size dependant, no unwanted bits and lower cost as there is no excess premium for large shafts.

The outputted data signals can be transmitted to:

Local Display Control Unit to provide a local display of torque, speed and power for the shaft(s) along with other tools such as recording and transmission of Shaft Running Hours and diagnostics, and then onwards to our optional remote display(s).

Torque Log software Marine upgrade version for simple PC platforms, providing data on Torque, Speed and Power, with various diagnostics and analysis tools. (Standard supplied option)

Various Data outputs available into ships control system(s) including, RS485 to a ship PC or a bridge indicator. The system also has output options for 4-20mA, 0-10Vdc, RS232 and USB (local logging).

The System provides data on the actual power delivered that can be compared with the expected design performance together with ongoing data that will indicate any changes to this expected performance level.
**SYSTEM OUTLINE**

**SHAFT ASSEMBLY (INCLUDING 1 OFF ROTOR AND 1 OFF STATOR)**
Stator electronics module providing all outputs (RS485 to a ship PC or a bridge indicator. 4-20mA, 0-10Vdc, RS232 and USB (local logging). Bracket mountings for mounting stator assembly.

**CONTROL DISPLAY UNIT**
1 off Control Display Unit with Local indication of Torque and shaft power (as a function of measured torque & speed). This information is displayed on the integral Control Unit main display. The Control Unit also records & displays accumulated running hours for the shaft(s) so that the in-service life of propulsion equipment may be easily monitored. Once all the information has been processed the unit transmits Torque, Speed and Power data via RS485 to the optional remote display(s).

**ADDITIONAL REMOTE INDICATORS**
Indicators with visual display of data (repeat of control display). These require a minimum of 1 off Control Display Unit to “drive” the remote displays. Can be Panel mounted if required, the remote display(s) receive RS485 Data from the Local Display control unit and display Torque, Speed and Power. The display(s) also show direction of shaft rotation which is annotated by an illuminated legend, showing ‘AHEAD’ or ‘ASTERN’. The Local Display control unit displays torque in kNm. It also calculates power from torque & speed data and uses the presence of speed signal to accumulate ‘shaft running hours’ for each shaft and this is displayed on the control unit.

**TORQUE LOG MARINE**
Will provide a cost effective means of displaying all of the above information on a simple PC based platform. This comprehensive software package which will run on a PC platform giving detailed information about the system and complete with logging facility.

Compatible with Windows 2000 and XP, TorqueLog software provides a direct readout of Torque, Speed and Power on a Laptop or PC with additional facilities to read peak torque, log data to Excel and provide data for other applications.

The enhanced features of this software include:
- Calibrated Display of Torque in Nm or lbft
- Display of Speed in RPM
- Display of Power in kW or HP
- Peak Torque, Speed and Power Capture Facility
- Data logging of Torque (or Torque Speed and Power)

**STRAIN GAUGE KIT**
Strain gauge kit for installation of system, including bonding and cleaning equipment

Strain Gauge Assembly toolkit option extra. Includes the following items to enable a complete on site installation to be carried out without worrying if you have all the specialist equipment and tools required for successful strain gauge installation.
- Specialist Tools,
- Special Heating equipment,
- Clamps,
- Gauge meter
  “Dummy” transducer for diagnostics
  Marking kit for accurate placement of gauges
Series 430 Torque Trials Kit

DESCRIPTION
The Datum Electronics Marine Trials Kit will supply all equipment necessary for assembly of a shaft torque (power) trials kit which can be utilised for industrial and marine ship shafts between 150mm - 1100mm as standard. An additional adaptor is also available for smaller shafts starting from 30mm in diameter.

ACCURATE POWER & TORQUE MEASUREMENT
Datum Electronics Series 420 Marine Torque Trials Kit has been designed to measure the torque, power and speed of shaft(s). For example, the Trials Kit can provide an accurate tool to assess and monitor propeller shafts by using strain gauge technology to provide a highly accurate non-contact method of measuring shaft torque, power and speed.

STANDARD BATTERY
The standard built-in battery can last between 20-24 hours. The batteries are charged in-situ, by plugging in the inclusive charger (it is necessary to stop the shaft rotating to achieve this whilst the battery charges).

UP TO 50 HOURS CONTINUOUS USE – Long Lasting Battery
Another feature available is to purchase the optional off shaft battery holder and charger unit. This enables batteries to either be replaced or re-charged as and when necessary. Additional batteries are also available.

This reduces the time the shaft is stopped so the battery can be swapped quickly.

An additional optional feature may be purchased to extend the operational time to approx. 50 hours continuous use with a separate charger and an additional On-shaft battery unit and two spare batteries.

THE SYSTEM
The Datum Electronics Torque Trails Kit is simple and easy to install. The System provides a display of the torque on the shaft. The torque signal is derived from strain gauges installed on to the shafts. The signals are transmitted from the shaft rotor to the shaft stator unit providing a display of torque.

Measuring Torque on a shaft can provide an array statistical data providing useful information on shaft performance. The Datum Electronics Torque Trails Kit does more than just measure Torque; it can also be used to verify power outputs from engines and motors. The following data can also be measured and analysed:

- POWER TRANSMISSION
- TORQUE TRIALS
- TORSIONAL ACCELERATION
- POWER TRANSIENTS
- PEAK TORQUE LEVELS
- POWER DELIVERY
- SHAFT VIBRATION
The Datum Electronics Torque Trials Kit accurately measures the on-shaft torque (kNm). The data is transmitted from the shaft in a digital format that can be processed via the output options available.

The Trials Kit, transmits digital data (RS232) which can be easily monitored, analysed and recorded. Because the data is digital, it is noise immune and easy to process with a USB or serial interface or if required anaogue outputs are also available. This provides a clear clean signal of Torque with a system reliability of 0.1%

DATA ANALYSIS

DATA ACQUISITION SOFTWARE

TORQUE LOG DATA ACQUISITION SOFTWARE
Datum Electronics TorqueLog software is an easy and convenient way of collecting data. Compatible with Windows 2000 and XP, TorqueLog software provides a direct readout of Torque as standard and can be re-configured for other data signals as required with additional facilities to read peak torque, log data to Excel and provide data for other applications.

The enhanced features of this software include:

- Calibrated Display of Torque in Nm or lbft
- Display of Speed in RPM (optional)
- Display of Power in kW or HP (optional)
- Peak Torque, (Speed and Power optional) Capture Facility
- Data logging of Torque (or Torque Speed and Power — optional)

The TorqueLog software is easy to use and easy to install, and provides the user with data access at the touch of a button.

INSTALLATION OF TRIALS KIT

One of the advantages is how easy the instrumentation is to install, set up, test and operate. The trials kit consists of three main component elements making this trials application system as easy and simple and possible.

THE SHAFT
The first basic element of the system requires a shaft between 150 - 1100mm (minimum of 30mm with adaptor) in diameter which is accessible. The trials application uses strain gauges bonded to the shaft. One of the first and most important aspects in the installation of the Series 420 Trials Kit is the on shaft application of the strain gauges. Instructions are provided in the manual supplied.

ON-SHAFT ELECTRONICS TRANSMITTER
The On-shaft electronics consist of a transmitter module and battery supply. Both modules are held to the shaft with a supplied strapping kit. The data signal is transmitted off shaft to Receiver Module.

RECEIVER UNIT
The Receiver Unit receives the data transmitted from the on-shaft transmitter module. The data is then converted and sent to a PC or laptop which will display and record the on-shaft data which will contain the torque data from the shaft and the speed data from the mounted speed sensor.

SERIES 430 TRIALS KIT

TRANSMITTER
Battery powered with L-ion type batteries and a completely self-contained shaft unit that uses digital short-range telemetry technology to transmit data to a receiver.

RECEIVER
Outputs Digital Data (RS232) via USB connection for logging to a laptop, notepad or PC. The receiver is supplied with a mains power adaptor. The receiver has a transmission range of up to 30 metres and can sample raw data at up to 100 samples per second.

BATTERY UNIT
Standard battery lasts between 20 - 24 hours, with additional facility for up to 50 hours battery life if required.

TORQUELOG
Data acquisition software for PC/laptop for reading and logging torque, power and speed data from the shaft(s).

STRAIN GAUGE INSTALLATION KIT
See below for full details, the kit includes all equipment necessary for shaft installation direct to the shaft.
STRAIN GAUGE INSTALLATION KIT

Full bridge strain gauge for the on-shaft installation. All gauges are full bridge gauges and they will be pre-wired for easy installation.

All bonding adhesives and cleaning materials required for treatment of the shaft before applying gauges including cleaning compound.

Strain Gauge Installation Manual, which will provide a step-by-step guide on full installation of the Kit.

Environmental covering material for the gauged area.

Banding Kit, for On-Shaft Electronics Module. We will also supply “banding kit”, which will strap the Electronics/battery power supply to the shaft.

All of the above is supplied as standard, additional quantities can be supplied for additional shafts.

Simple and easy to install logging directly to a PC or laptop with the aid of its installation software disk

ADDITIONAL INFORMATION

DIGITAL DATA OUTPUT
The digital data telemetry system will give digital data as standard. Additional outputs are also available including analogue (4-20mA or 0-10VDC).

CALIBRATION
Full calibration can be achieved providing the customer is able to supply accurate information regarding Shaft Dimensions, Shaft Material specifications, i.e. Poisson’s Ratio and Young’s Modulus. (Value of Torque is calculated from the “Strain signal” from the shaft in mV/V X Shaft data X a Constant value.) A simple spreadsheet utility is provided with the software CD

WARRANTY
All Datum Electronics products include one year’s warranty against faulty components and manufacturing as standard, and will include all user handbooks in English.

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