

# Marine Shaft Power Meter Product Overview



# Introduction

## Datum Electronics Limited

ESTABLISHED IN 1989, Datum Electronics Limited is a leading UK manufacturer and supplier of torque, load & shaft power measurement solutions worldwide, spanning all industries including Automotive, Marine, Military, Oil & Gas & Civil Engineering.



## Marine Shaft Power Meter

The Datum Electronics' Marine Shaft Power Meter has been developed to meet the requirements of the Commercial Marine Market, to provide ongoing power monitoring data on ships, including; Propulsion Shafts, Thrusters and even Diesel Generator Shafts.

The most common use of the system is to provide data for fuel economy and equipment maintenance planning programs.

## Key Benefits

- Fully Modular
- 100% Contactless
- Maintenance Free
- Highly Reliable
- 0.1% Accuracy
- Cost-Effective
- Multiple Outputs
- Can Be Installed in 1-2 Days
- One-Time Calibration (no Re-zero or Re-Calibration required)

# What Can a Shaft Power and Torsion Meter provide?

A Shaft Power & Torsion Meter accurately measures the power transmitted through a shaft, enabling the measurement of actual power an engine is delivering to the propeller or generator.

The Shaft Power & Torsion Meter System is an essential tool, helping to reduce the running costs by maximising:

- 1. Fuel Savings**
- 2. Improved Maintenance Scheduling**
- 3. Equipment Protection**

The cost of an accurate permanently installed torsion meter is very small, in comparison with potential savings in operational costs.

## Shaft Power Measurement

Shaft Power is an essential input to Ship Performance Monitoring Systems. The data from monitoring actual power levels provides an accurate reference point, to assist with the assessment of:

- **Engine Performance Monitoring**
- **Hull Condition**
- **Propeller Condition**
- **Specific Fuel Consumption**
- **Operational Efficiency Planning**
- **Ship Condition Changes**

The same system will also provide data to assess the value of new equipment and operating procedures:

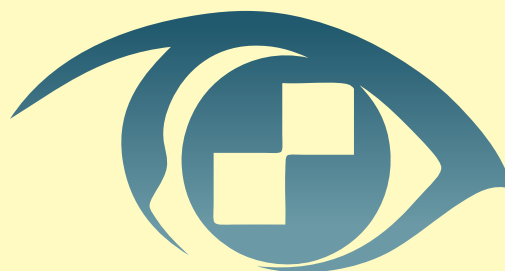
- **Changes to Operation**
- **Changes to Fuel Types**
- **Changes to Hull Coatings**

Fitted at an early stage, the torsion meter system can be used in Ship Acceptance Trials and, from that point on, be a measure of the condition of the ship, throughout its lifecycle.

## Future of Shaft Power Measurement & Condition Based Monitoring

The standard systems can be easily upgraded to dynamic "Diesel Hawk" System for:

- **Real Time Condition Based Monitoring**
- **Predictive Maintenance**
- **Individual Engine Profiling**
- **Live Monitoring of Every Cylinder**
- **Propeller & Intermediate Shaft Condition Monitoring**



**datum Diesel Hawk System**

## Marine Control Unit



The Standard System comes with a Marine Control Unit. This comprises a local display of Torque, Speed & Power and has a multitude of both Analogue & Digital Outputs, for simple integration into any performance monitoring software or data logger.

### Control Unit Features:

- **LCD Display** (Torque, Speed, Power & Status)
- **Analogue Outputs for:**
  - Torque
  - Thrust (optional)
  - Speed
  - Power
  - (0-10V or 4-20mA – Uni or Bi-Polar)
- **Digital Outputs:**
  - RS485 / RS232 / NMEA
  - Modbus RTU
  - Ethernet (Various Options Available)
- **Local USB Logging** (.csv files)

## ECR Display (Optional)



7" TFT Display with Real Time Torque, Speed, Shaft Power & Energy Counters (kWh).

### ECR Display Features:

- **Torque**
- **Thrust** (Optional)
- **Speed**
- **Power**
- **Energy**

### Certification

Datum Electronics Limited issue a system calibration certificate, that defines the accuracy of the instrumentation. A second certificate is issued on installation and this certificate defines the signal to torque relationship for the shaft, and states the values used for the shaft constants.

### Technical Notes

The Torque and Power output from the torsion meter system is dependent on calculations, utilising constants from the shaft. These are:

**Shaft Material** – either as shear modulus, or Young's modulus & Poisson's ratio.

**Shaft Diameter** – by direct measurement of the inside and outside diameter of a hollow shaft.

The absolute accuracy of the system is dependent on the accuracy with which the above parameters are provided. The absolute accuracy is quoted at 0.1% + Ke, where Ke is the combined error from the shaft constants.

Datum Electronics Limited can conduct tests on a sample of the shaft material to determine the shear modulus. Two samples of shaft material, 20mm diameter and 150mm long, are required for this testing.

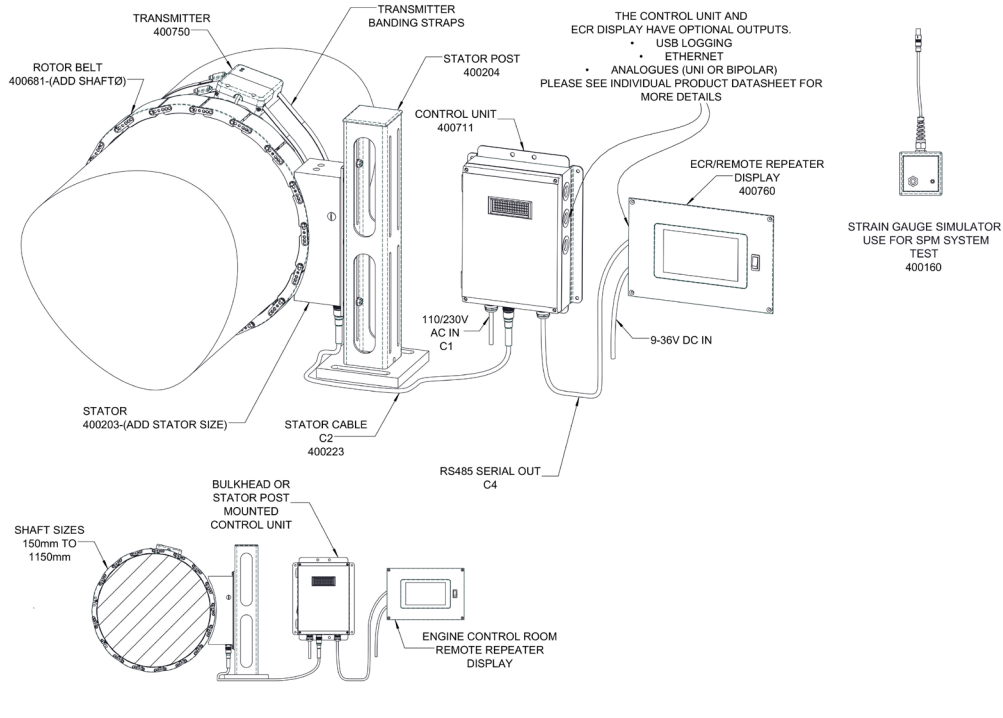


# Technical Specifications

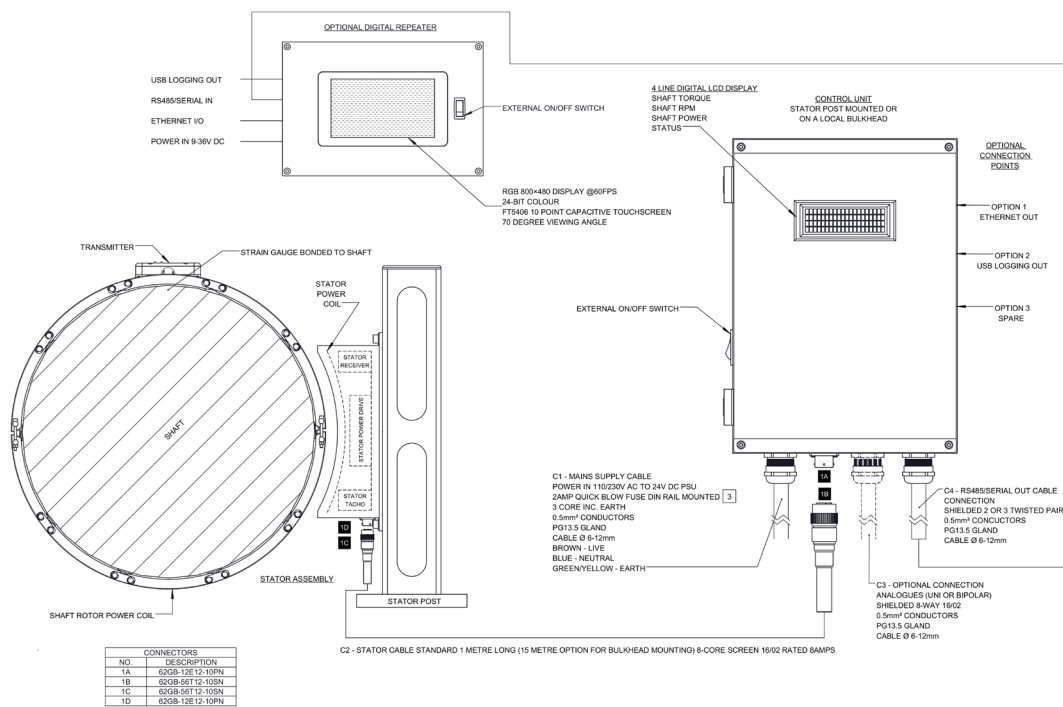
<b>Instrumentation Accuracy</b>	<i>Shaft Torque</i>	0.1%
	<i>Shaft RPM</i>	0.1%
	<i>Shaft Power</i>	0.1%
<b>System Accuracy</b>	<i>Shaft Torque</i>	0.1% + Ke
	<i>Shaft RPM</i>	0.1%
	<i>Shaft Power</i>	0.1% + Ke
	<i>Ke</i>	Total error in shaft modulus constant and shaft diameter measurement
<b>System Repeatability</b>	<i>Shaft Torque</i>	0.05%
	<i>Shaft RPM</i>	0.05%
	<i>Shaft Power</i>	0.05%
<b>Data Output and Display</b>	<i>Power, Torque and Speed Display</i>	The display presents average values of torque, speed and power. The time period of the average values can be configured in the software provided and can vary from 1 second to 15 minutes.
	<i>Total Energy</i>	The total energy is displayed in kWh from the Reset Date, to Today. Previous Totals between resets can be accessed through the menu.
	<i>Average Power</i>	Average Power for a period between resets is displayed in MW.
	<i>Power Measurement Data Output</i>	Average Values of Shaft Power, Torque and Speed are transmitted 10 times per second.
<b>Environmental</b>	<i>Operating Temperature</i>	-15°C to +55°C
	<i>Storage Temperature</i>	-25°C to +70°C
	<i>Temperature Effect on Readings</i>	0.01% per degree centigrade
	<i>Instrument Stability / Time Drift</i>	Less than 0.1% per annum
<b>Environment Sealing</b>	<i>Shaft Unit 106XXX</i>	IP67
	<i>Stator Electronics Unit</i>	IP67
	<i>Bulkhead Control Unit</i>	IP67
	<i>Panel Mounted Display Unit</i>	IP67 from fascia, IP54 from rear of panel
	<i>Contamination</i>	All materials and external components have been tested to DefStan 08-123, contaminants include Diesel oil, Sea water, Hydraulic oil, Gear oil, Grease, Water/ antifreeze.
	<i>Rotor Stator Air Gap</i>	Radial 5 - 10mm, lateral +/-8mm
	<i>Supply Voltage</i>	110-230Vac, III or I, AC, or DC12-24V

# Dimensions

## General Overview

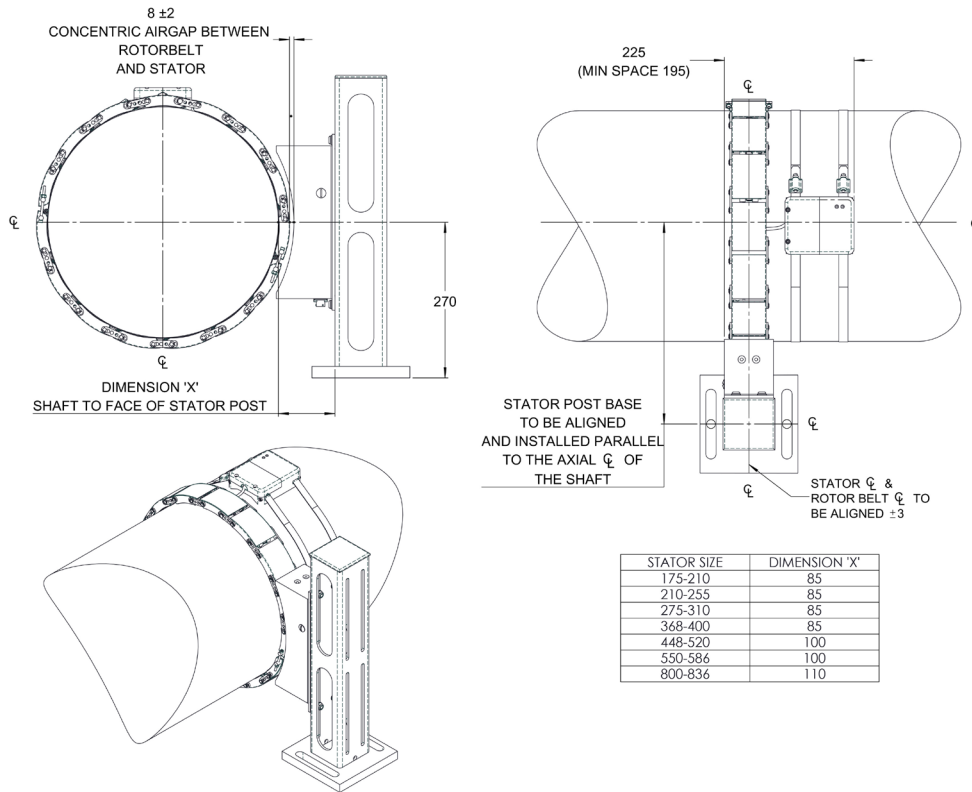


## Block Diagram & Wiring Schematic



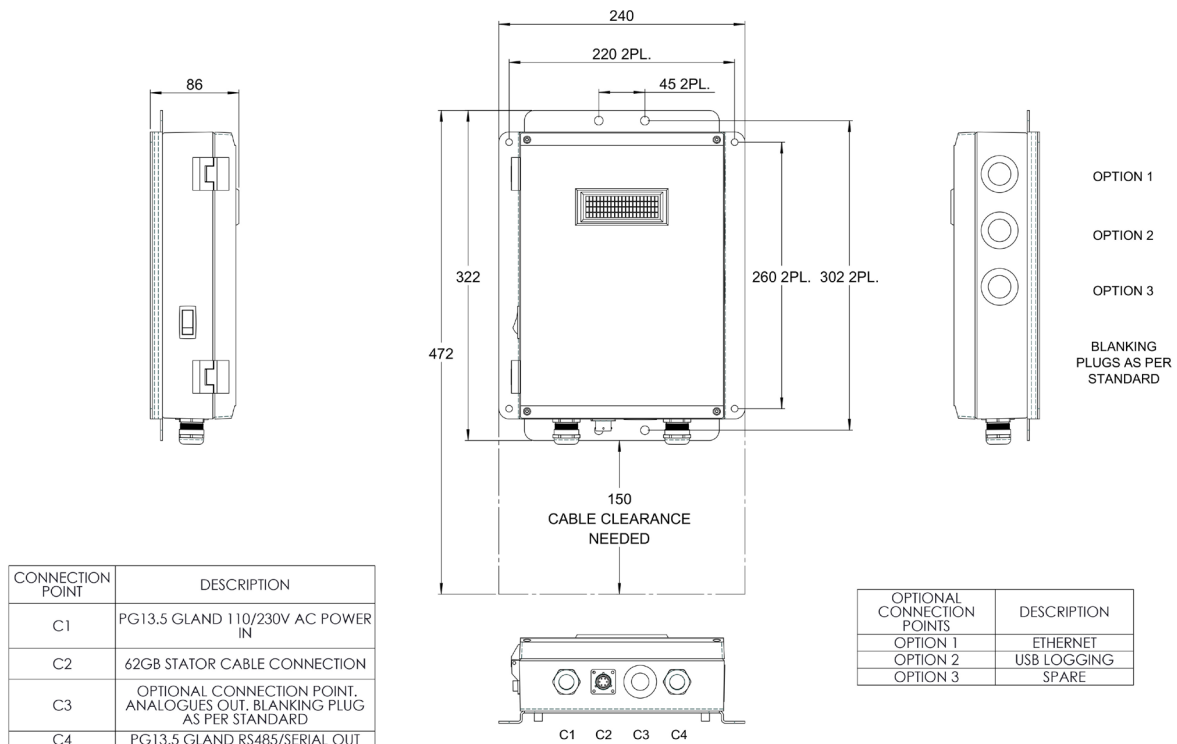
# Dimensions (cont.)

## Alignment Detail



STATOR SIZE	DIMENSION 'X'
175-210	85
210-255	85
275-310	85
368-400	85
448-520	100
550-586	100
800-836	110

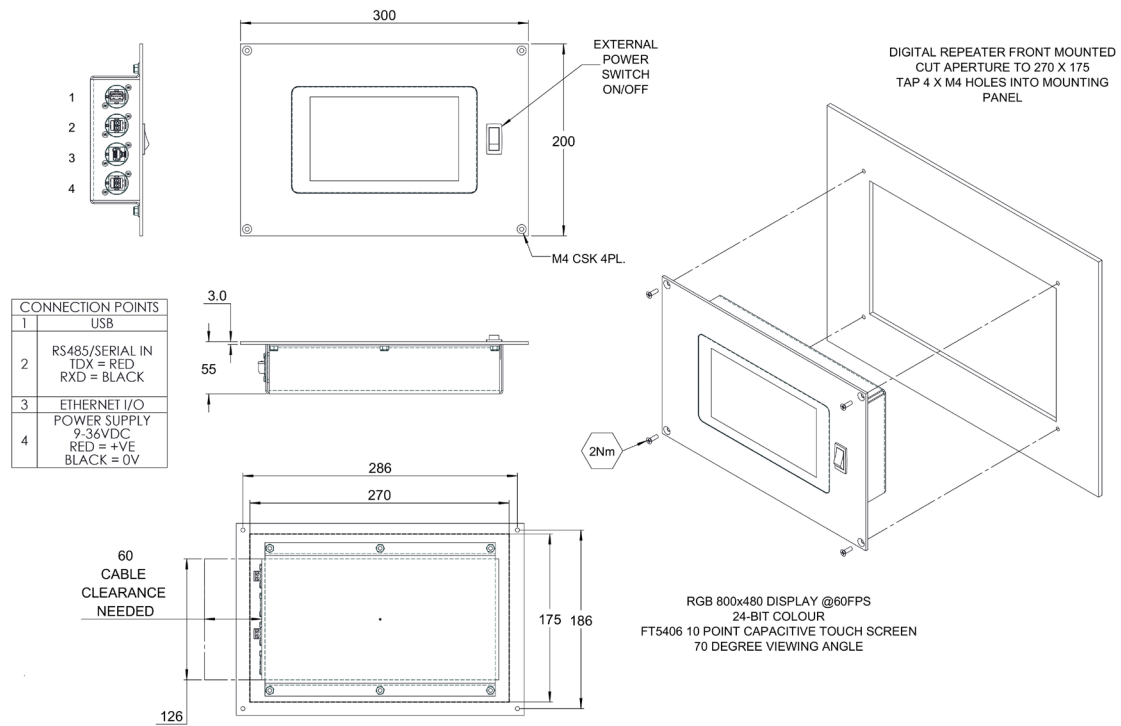
## Control Unit



CONNECTION POINT	DESCRIPTION
C1	PG13.5 GLAND 110/230V AC POWER IN
C2	62GB STATOR CABLE CONNECTION
C3	OPTIONAL CONNECTION POINT. ANALOGUES OUT. BLANKING PLUG AS PER STANDARD
C4	PG13.5 GLAND RS485/SERIAL OUT

OPTIONAL CONNECTION POINTS	DESCRIPTION
OPTION 1	ETHERNET
OPTION 2	USB LOGGING
OPTION 3	SPARE

# ECR Repeater Display (Optional)



# Stator Cable

