

# Torque Monitoring for Electric Drive Ships (in a high EMI environment)

Torque measurement for new designs of large ships

## **Application: Torque Monitoring for Electric Drive Ships (in a high EMI environment)**

**Wireless torque measurement for new designs of large ships**

**Industry:** Marine

**Product:** [AT-4400](#)

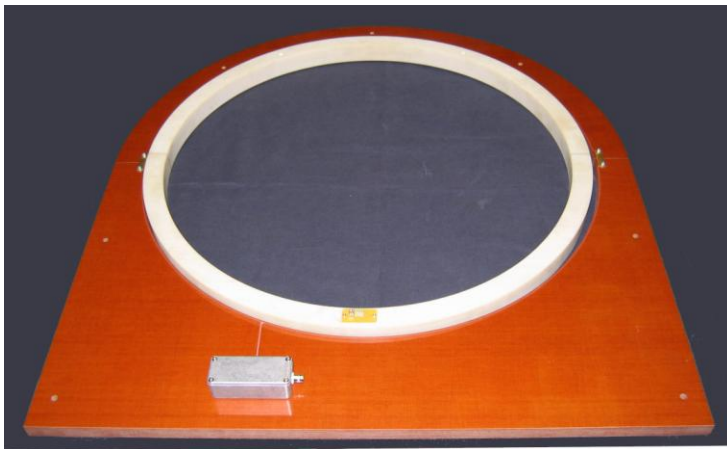
**Parameters measured:** Torque

When a government laboratory needed to monitor torque in the presence of high EMI from variable speed drive circuitry, they found that their legacy FM telemetry systems were not able to reliably transfer data. In searching for an alternative, they found Accumetrics' website, and recognized that digital telemetry would be a likely solution. The AT-4400 was identified as a unit of choice. The needs for the system were:

- No dropouts (gaps in data) or distortion due to EMI interference
- Long term operation (no batteries)
- High resolution

A demonstrator AT-4400 was tested in an EMI susceptibility chamber and found to far surpass the older existing telemetry systems' EMI capability during swept frequency testing. An AT-4400 system was obtained for a large drive shaft and has been shown to be capable of withstanding modern ship operating requirements as seen in DD(X) and other high power/ highly noise prone AC drive designs.

The AT-4400 samples at 26,484 samples per second, and has outstanding accuracy, noise floor, and resolution (16 bit).





- The top picture shows a split clamp-collar glass laminate (G10) transmitter collar surrounded by a rigid phenolic pickup loop for induction power and data.
- The middle picture shows the front of the Receiver, with on-the-fly shunt calibration control (controlling a shunt resistor at the rotating transmitter).
- The bottom picture shows the AT-4400 Receiver rear view. The Receiver is the digital to analog 0 +/- 10V output device. The open panel shows the fine adjust gain, offset, and symmetry controls, the coarse gain and offset controls, and the output signal filter control.

## What are divisions of PCB Piezotronics?

PCB Piezotronics, a member of the PCB Group families of companies, has five major divisions, all of which offer targeted sensor technologies. These divisions are supported by an active outside direct sales force of Field Application Engineers, as well as international direct sales offices throughout the world. Individual PCB Piezotronics divisions, locations and their primary product specialties include:



**Depew, NY, USA** - [www.pcb.com](http://www.pcb.com) – Piezoelectric, ICP®, piezoresistive & capacitive pressure, acoustic, force, torque, load, strain, shock & vibration sensors.



**Depew, NY, USA** - [www.pcb.com/aerospace](http://www.pcb.com/aerospace) – Sensors & Instrumentation for aerospace & defense applications, including air and spacecraft testing.



**Novi, MI, USA** - [www.pcb.com/auto](http://www.pcb.com/auto) – Sensors & Instrumentation for automotive testing, including modal analysis; NVH; component durability; powertrain testing; vehicle dynamics; safety and regulatory testing.



**Depew, NY, USA** - [www.imi-sensors.com](http://www.imi-sensors.com) – Industrial vibration sensors, bearing fault detectors, mechanical vibration switches, panel meters, cables & accessories for predictive maintenance and equipment protection.



**Depew, NY & Provo, UT, USA** [www.larsondavis.com](http://www.larsondavis.com) – Precision microphones, sound level meters, noise dosimeters, audiometric calibration systems.



**San Clemente, CA, USA** - [www.pcb.com](http://www.pcb.com) – Research & development engineering center for special technologies.

**Seattle, WA, USA** - [www.pcb.com](http://www.pcb.com) – Process development and fabrication of MEMS sensors.



**Farmington Hills, MI, USA** - [www.pcb.com/LoadAndTorque](http://www.pcb.com/LoadAndTorque) – Designs and manufactures high quality, precision load cells, wheel force transducers, torque transducers, telemetry systems, and fastener torque-tension test systems.

## PCB® Group Companies:



**Cincinnati, OH, USA** - [www.modalshop.com](http://www.modalshop.com) – Global leader in dynamic calibration offering a complete line of automated calibration systems and recalibration services to support dynamic vibration, pressure and force sensors in applications such as: national standards, commercial labs, government/military research, consultancies, and industrial/plant floor operations.



**Rochester, NY, USA** - [www.sti-tech.com](http://www.sti-tech.com) – Mechanical engineering consulting firm specializing infinite element analysis, advance analytical techniques, experimentation, technology development, & design optimization for turbo machinery, industrial machine systems & mechanical structures.



6 British American Boulevard Suite 103-F, Latham, NY 12110 USA  
 Phone 518-393-2200 ■ Fax 716-684-0987 ■ Email [telemetry@pcb.com](mailto:telemetry@pcb.com)  
 Website [www.accumetrix.com](http://www.accumetrix.com)