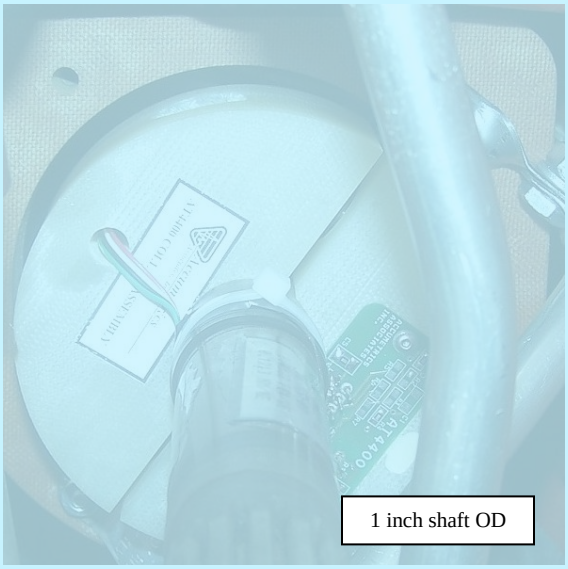

Applications:

- **Replacement of slip rings for torque measurement**
- **Torsional vibration testing**
- **Automotive driveshaft testing**
- **Off-road vehicle driveshafts**
- **Marine prop shafts**
- **Dynamometers**
- **Industrial drives- process monitoring**
- **Machine tools**

Benefits:

- **Simplicity** - the AT-4400 is easy to apply, easy to operate, requires no calibration, and requires no battery changes.
- **Superb data quality** - 16-bit resolution/ high bandwidth, with data that is digitized before transmission, provides incomparable data quality with very high EMI resistance.
- **Rugged, trouble-free construction** Unlike sliprings or rotary transformers, the AT-4400 has no bearings or sliding contacts and can operate in corrosive or dirty environments.
- **Design flexibility** - Have a special need? Accumetrics will customize to meet your special or OEM requirement.

Accumetrics Associates, Inc.

High Resolution/ High Accuracy Torque Telemetry

AT-4400 Series High Performance Wireless Torque Telemetry System

The AT-4400 is a precision 16-bit digital telemetry system designed specifically to measure torque on existing shafts without machine modification or precision alignment.
By mounting strain gages directly on their shafts and clamping the AT-4400 split collar around the shaft, users can obtain torque measurements without needing to break existing shaft systems to install in-line torque transducers.

The AT-4400 provides:

- 16 Bit Resolution Digital Telemetry
- Very Low Noise/ Very High Accuracy
- 26484 Samples/second continuous sampling rate/ DC to 8.3 kHz bandwidth available (standard bandwidth is 2 kHz)
- High EMI immunity (usable near variable frequency drives)
- Induction Power for Continuous Use (no batteries)
- Analog Voltage Output, with serial digital and Frequency outputs available
- Flexible Output Gain, Offset, and Filtering
- Remote Shunt Calibration

Unlike older analog FM rotary telemetry systems that are limited in accuracy and also subject to noise and dropouts, the AT-4400 conditions and digitizes strain gage signals within a miniature transmitter module right on the rotor. With precision signal conditioning circuitry, 16-bit digital resolution, and digital data transmission off of the rotor, the AT-4400 provides dependable high precision torque transducer measurements. This single-channel telemetry system is inductively powered, allowing long-term monitoring without the need for batteries. A built-in shunt calibration function ensures the highest levels of accuracy and integrity.

AT-4400 systems may be customized to meet a wide variety of applications. All systems include a rotor-mounted transmitter/signal conditioning module, a rotating power/data transfer coil, a non-rotating pick-up coil, and a remote receiver unit. Measurement outputs from this receiver are provided in both analog, digital, and frequency formats.

- When supplied as a shaft-mounted system, the transmitter module and rotating coil are mounted in a split clamp-on collar customized to match the shaft diameter. This collar requires just 1.25 in. (~32mm) of shaft length and 1.25 in. (~32mm) of radial height. Users need only to adhesive bond strain gages to the shaft, clamp on the collar and mount the pick-up stationary coil to make torque measurements.

- Alternatively, AT-4400 series OEM-style telemetry kits allow the manufacturers of precision torque transducers to configure their products without the use of sliprings, bearings or rotary transformers, creating an entirely new class of rotary torque transducers. A cylindrical transmitter module is typically mounted within the transducer body and the transmitter data/power coil is supplied in a pressed on collar, available in various sizes. This style of construction also lends itself to custom non-shaft-mounted collar end user applications.

Transmitter: (shown mounted on a 21.3” OD, 3000 RPM shaft)
--Rotating clamp-collar assembly supplying excitation to user-installed strain gage and transmitting digital strain gage data to stationary Pickup coil.

Pickup coil:
--Stationary machined phenolic induction power/ coax data connection to Receiver

Receiver: (rear view)
--Digital to Analog conversion and +/- 10 V output

AT-4400 Receiver
showing gain, offset, symmetry, gain range, zero/added offset, and output filtering controls

AT-4400 Receiver Power Supply
(120VAC to 12VDC output)

Specifications:

Input

- Full Scale Input: ±1.51mV/V FS standard; also available +/-2.78 and 16.6 mV/V (755, 1390, and 8300 microstrain for a full strain gage bridge output with a Gage Factor of 2.0). Custom input ranges are available, but with reduced gain/ drift performance.
- Bridge Excitation: 5VDC (ratiometric input measurement is used)
- Bridge Resistance: 350 ohms minimum

System Performance (typical)

- Digital Sampling: 16 bit data; 26484 samples per second
- Bandwidth: DC to 2 kHz standard, with custom filtering up to 8.3 kHz available. Anti-alias filtered on-rotor.
- Zero Drift: <.001%/°F
- Gain Drift: <.001%/°F
- DC Resolution: <.003%FS (full scale)
- Noise Spectral Density: <.0005%FS per √Hz typical (of signal at transmitter input, at 1.51mV/V range).
- Noise 0.33 microvolts/V RMS typical input noise (at full scale of 1.51mV/V, with 2 kHz bandwidth)
- Linearity: .05%FS

System Outputs

- Output interface: DB-25 female connector
- Analog Voltage: ±5V to +/-10V output for a full scale signal input to the transmitter
- Digital Output: QSPI high speed streaming digital data output
- Frequency Output: (Optional) 10 kHz ±5kHz can be provided as an analog signal alternative to voltage output data
- AC Output: (Optional) AC coupled output in addition to the DC coupled output. High pass filtering: 5 to 725 Hz. AC output gain: 1 to 9X
- Analog Output Filter: Five user-determined output filter frequencies may be selected. (2000 Hz default; with filtering: 1000, 200, 20 and 2 Hz selections).

Calibration

- Shunt Calibration: Unipolar shunt calibration may be invoked from the receiver during rotor operation

User Adjustments

- Gain: User selectable factors of 0.25 to 1.5 based on +/- 10V FS output
- Zero (offset): Trim pot and coarse adjustment total of ±40% of FS range
- Symmetry: Trim pot adjustment ±0.25% of FS adjustment range

Indicator LED’s

- AC Power: Yellow
- Shunt Calibration On: Green
- Transducer Power Low: Red (indicates insufficient power transfer to transmitter)
- Data: Green (indicates detection of data stream from transmitter)

Power

- 9 to 18 VDC input, 15 watts. 0 to 40°C , 90-240VAC 50-60 Hz desktop style adapter is supplied

Temperature

- Receiver: 0 to 50°C (0 to 122°F)
- Transmitter: -40 to 85°C (125°C available)

Accumetrics Associates, Inc.

Contact us: Telemetry@Accumetrix.com
www.Accumetrix.com
Phone:518-393-2200 Fax: 518-393-3622
409 Front Street, Schenectady NY 12305