

# WISER Model 4000 Wireless Data Sensor

Low Profile • Ultra Low Power • High Accuracy



**TECAT**  
PERFORMANCE SYSTEMS

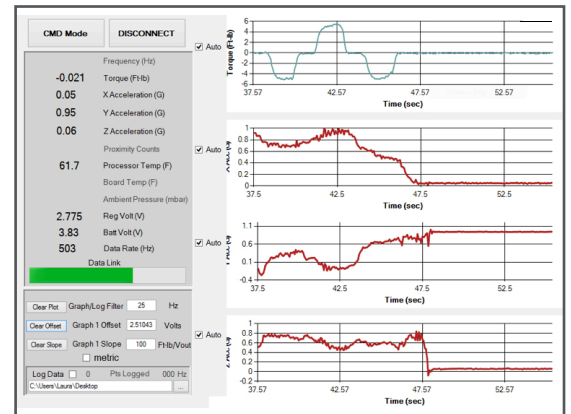
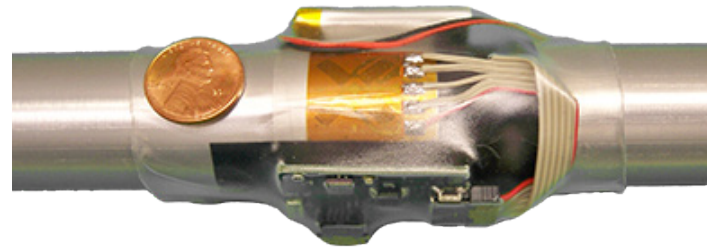
Driveline Flexplate



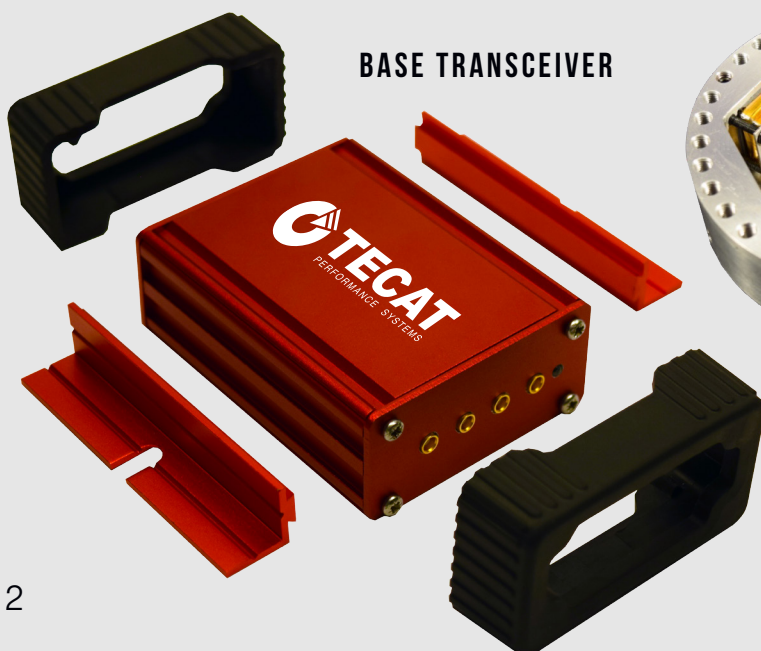
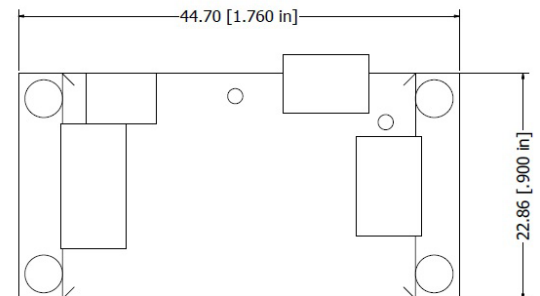
*WIRELESS WITH AN EDGE*

# TECAT WISER Model 4000

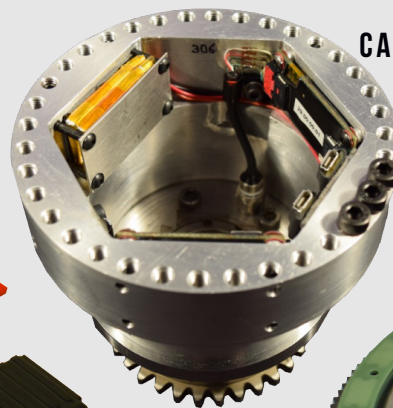
The TECAT WISER Model 4000 strain system is a wireless data acquisition system for measuring and monitoring events like live torque. It is small, light, power efficient, easy-to-use and non-invasive. The wireless system has the optional ability to measure 3-axis acceleration, pressure and temperature all within the same incredibly small footprint. The WISER Model 4000 is comprised of three subsystems. The remote unit consists of the data capture electronics, transceiver and battery. The base unit plugs directly into a PC USB port, and houses an antenna, transceiver, and up to four analog outputs. The WISER Data Viewer software is used for system configuration and calibration, live monitoring, and data logging.



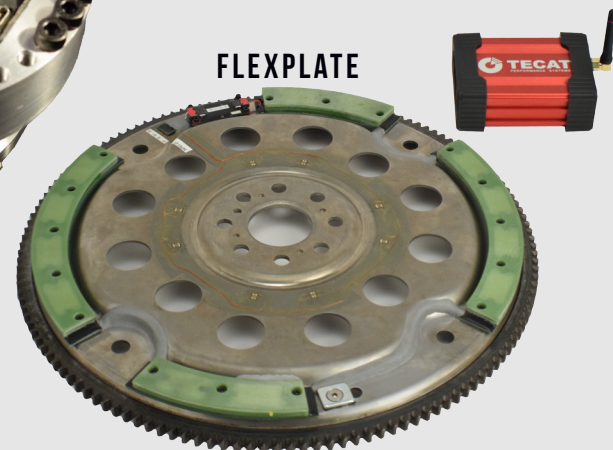
## REMOTE TRANSCIVER



BASE TRANSCIVER



CAM PHASER



FLEXPLATE



# HARDWARE

WISER comes in a rugged carrying case complete with all of the hardware, software, and cables needed to run the system.



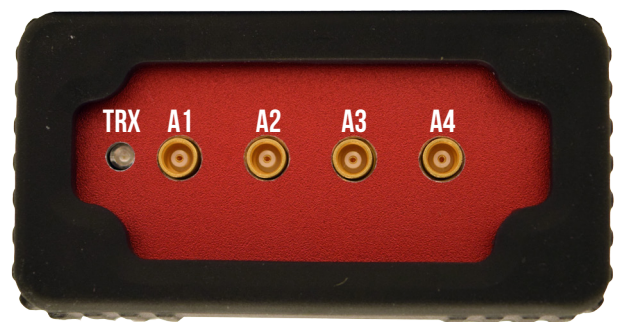
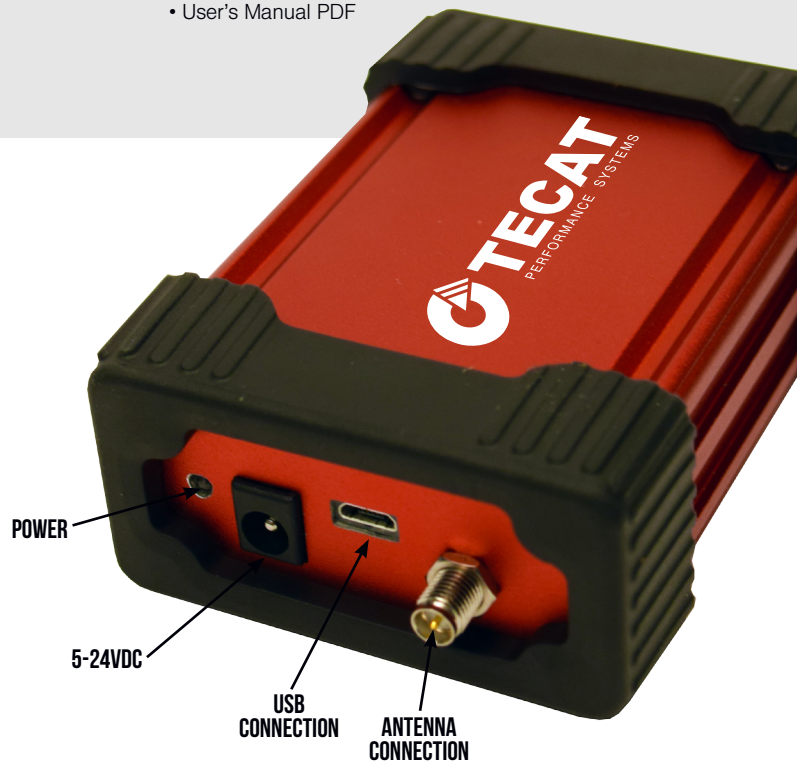
- 1 Remote Transceiver
- 2 Base Transceiver
- 3 Antenna
- 4 Rechargeable Li-Poly Battery
- 5 Car Power Adapter
- 6 AC Power Adapter
- 7 Micro-USB Cable
- 8 Remote Power Cable
- 9 Strain Gauge Cable
- 10 USB drive containing
  - WISER Data Viewer Program
  - Driver for USB Base Unit
  - Microsoft .NET 4.0 Framework Installer
  - User's Manual PDF

Small footprint system enables access to hard to reach places.

Long battery life for uninterrupted testing.

High accuracy enables development work on a wide range of applications.

Non-invasive system can be removed, and does not alter the unit under test.



4 ANALOG OUTPUTS

# BENEFITS

“This is real. This technology could be very important for providing a tool which has the potential to optimize the performance of each cylinder in the engine.”

**DAVID COLE**

CHAIRMAN EMERITUS OF THE CENTER FOR AUTOMOTIVE RESEARCH

# WISER 4000 APPLICATIONS



**DRIVESHAFT**

The WISER system shown here is mounted to the end of the driveshaft, with the strain gauge attached along the shaft itself. Several driveshaft applications require long term testing. With a 1000 mAh Li-Poly battery, the system has been used to obtain over 200 hours of 2kHz data before needing to be recharged. Recharging is accomplished overnight, and the system is sent out again.



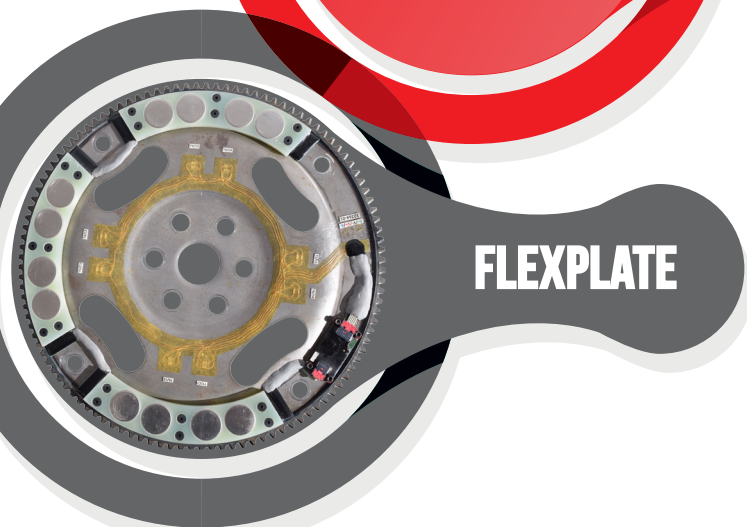
**HALFSAFT**

Measuring torque output to the wheels helps automotive engineers understand torque losses throughout the engine and driveline system. This application requires a durable system, as testing often includes revving the engine and dumping the clutch, sending high load spikes through the halfshafts. In this example, the system is mounted with high strength fiber tape.



**PUMPING**

The WISER telemetry system enables strain gauge based load cell applications that would benefit from wireless connectivity. A custom version was specifically designed for artificial lift oil and gas load cells and is capable of achieving ATEX Zone 0 Intrinsically Safe (IS) certification.



**FLEXPLATE**

Flexplates are a challenging application, given the tight space constraints and high temperatures that flexplates see in the real world. But torque data at the flexplate is highly sought after information, as it can yield insights into real-world, actual engine out torque. TECAT has developed several flexplate solutions, through innovative package designs. TECAT's test facility contains a rig in an environmental chamber, designed specifically for flexplate testing. Each flexplate application requires a custom mounting configuration.

## WISER MODEL 4000 WIRELESS DATA SENSOR

Power	
Power Supply Remote Unit	3V DC to 6V DC, absolute maximum of 6V DC
Power Supply Base Unit	5-24V DC unregulated or USB
DC Sensor Driver	10 mA absolute maximum
Lithium Battery	Standard: 3.7V Single Cell Li-Poly (400mAh) Option 1: 3.7V Single Cell Li-Poly (850mAh) Option 2: 3.7V Single Cell Li-Poly (1000mAh)
Power Consumption	WISER remote with 350 $\Omega$ strain gauge- active gauge: 3.8mA@1kHz, inactive: 25 $\mu$ A (note: current consumption varies with over-sampling)
Physical - Remote Unit	
Dimensions	36 mm x 23 mm x 4 mm (circuit board w/o mounting tabs and connectors) 45 mm x 23 mm x 6 mm (circuit board w/mounting tabs)
Weight	6.5 g (remote transceiver with epoxy coating)
	9.0 g (400 mAh li-poly battery)
Communications	
Radio Frequency Transceiver Carrier	2.45 GHz direct sequence spread spectrum, license free worldwide (2.405 to 2.480 GHz) - 16 channels, radiated power @ 3.5dBm (2.2mW)
RF Data Packet Standard	IEEE 802.15.4 capable, open communication architecture
Range for RF Link	30m (100ft) line-of-sight
Base to Host Transfer	COMM Port via USB – up to 230400 baud; 8 data bits; no parity; 1 stop bit – open
Base Unit	USB (mounts as COM port), 0-5V Analog Output Channels (2.5V nominal centered)
Environmental	
Remote Operating Temp	-40°C to +120°C
Electrical	
Sensor Input	Full Wheatstone bridge gauge 350 $\Omega$ resistance or higher
Accelerometer Range	Standard: none Option 1: +/- 16G Option 2: +/- 400G
Measurement Sensitivity	$\pm$ 0.1% FSR (digital out)
DC Bridge Excitation	Vg = +2.048V DC at 10 mA max (pulsed to sensors to conserve power)
Shunt Calibration	2 independent shunt cal legs: • Signal + to Ground with 100k resistor • Signal - to Ground with 100k resistor
Analog Gain	User selectable: 1X; 2X; 10X; 200X
Digital Gain	User selectable: 1X; 2X; 4X; 8X; 16X
Digital Offset	User selectable: $\pm$ 100% full scale
Differential Input Range	Factory selectable: 0-5mV; 0-10 mV; 0-20 mV
Oversampling	1X, 2X, 4X, 8X, 16X, 32X
A/D	Successive approximation type, up to 16 bit - (higher resolution and accuracy increases current consumption)
Data Rate	User selectable: 250Hz - 4kHz
Compatible Software	WISER Data Viewer or User Supplied (WDV Requires Windows 2000/XP/Vista/Windows 7 or newer; .NET4.0; 512MB memory; 1Ghz processor or faster)

# WISER SHAFT ENCLOSURES

INDUCTIVE CHARGING

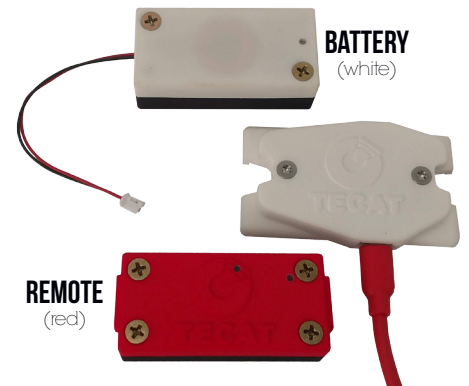
The WISER 4000 inductive charging remote enclosures offer the same protection from debris and ease of installation as our standard shaft enclosure kits with the additional capability to wirelessly recharge the battery with a magnetically attached inductive coil. This feature allows for the shaft mounted components to be fully sealed with an outer wrap without the need to expose the micro USB charge port, ideal for installations which will be exposed to wet conditions.

Max RPM for Enclosure, Based on Shaft Diameter, for Operating Temperatures < 80°C		
Shaft Diameter	Max RPM w/ 2 hose clamp mounting	Max RPM w/ 1 hose clamp mounting
3/4" - 1 1/8" (19mm - 28.5mm)	11,250	9,000
1 1/8" - 2 3/8" (28.5mm - 60.3mm)	7,500	6,000
2 3/8" and Up (> 60.3mm)	See Note Below	

Note: For shafts greater than 2 3/8" in diameter, calculate the centrifugal force for a 27g mass located at the surface of the shaft. This force must be less than 185lb for an enclosure secured with 2 stainless steel hose clamps, and must be less than 115lb for an enclosure secured with 1 stainless steel hose clamp. For example, a 4" shaft would have an RPM limit of approximately 6,000RPM for a 2 hose clamp installation, and a 4,500RPM limit for a single hose clamp installation.

Dimensional Specifications		
Shaft Diameter	Height, H1	Height, H2
3/4" - 1 1/8" (19mm - 28.5mm)	0.73" (18.5mm)	0.52" (13.2mm)
1 1/8" - 2 3/8" (28.5mm - 60.3mm)	0.65" (16.5mm)	0.52" (13.2mm)
2 3/8" and Up (> 60.3mm)	0.59" (15.0mm)	0.54" (13.7mm)
Environmental Specifications		
Operating Temperature	-40° to 80°C	

NOTE: The enclosures are not watertight.



STANDARD ENCLOSURE

Protect the WISER remote unit from damage due to debris with these custom built enclosures. The black base is available in three different sizes, to accommodate a wide range of shaft diameters. The same base is used for both the remote unit, which is housed in the red cover, and the Li-Poly battery, which is housed in the white cover. The base accommodates one or two hose clamps, to secure the units to the shaft under test. The enclosures are made of PA 2200, a plastic material designed for high impact strength.

Max RPM for Enclosure, Based on Shaft Diameter, for Operating Temperatures < 80°C		
Shaft Diameter	Max RPM w/ 2 hose clamp mounting	Max RPM w/ 1 hose clamp mounting
3/4" - 1 1/8" (19mm - 28.5mm)	15,000	12,000
1 1/8" - 2 3/8" (28.5mm - 60.3mm)	10,000	8,000
2 3/8" and Up (> 60.3mm)	See Note Below	

Note: For shafts greater than 2 3/8" in diameter, calculate the centrifugal force for a 27g mass located at the surface of the shaft. This force must be less than 250lb for an enclosure secured with 2 stainless steel hose clamps, and must be less than 150lb for an enclosure secured with 1 stainless steel hose clamp. For example, a 4" shaft would have an RPM limit of approximately 8,000RPM for a 2 hose clamp installation, and a 6,000RPM limit for a single hose clamp installation.

Dimensional Specifications		
Shaft Diameter	Height, H1	Height, H2
3/4" - 1 1/8" (19mm - 28.5mm)	0.73" (18.5mm)	0.52" (13.2mm)
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Environmental Specifications		
Operating Temperature	-40° to 80°C	

NOTE: The enclosures are not watertight.



# THE WISEST FAMILY OF INNOVATIVE WIRELESS PRODUCTS

## WISER-1 STARTER MODEL

The shaft version of TECAT's proven WISER telemetry system is optimized for torque measurement on circular shafts including: Axle Shafts, Half Shafts, Prop Shafts/Drive Shafts, and similar. With a 2kHz data rate, the system offers excellent accuracy, for critical design and development data at a low cost. The system is pre-configured at the factory for plug-and-play ease and simplicity, and is upgradable to a WISER Model 4000 System. Connect with a TECAT Representative to learn more about this starter model.

## WISER MODEL 8000 SYSTEM

This dual strain measurement and monitoring system is a wireless data acquisition system for measuring two external strain channels at high data rates up to 8kHz. The small, light, power-efficient, and non-invasive design enables strain measurements in a wide range of applications. With dual external sensor inputs two strain gauge bridges can be measured by a single system, for example to measure both thrust and torque loads simultaneously. The Model 8000 has a long range data transmission of >1,000 meters with up to +/- 0.025% FSR sensitivity for remote measurements. After initial setup using the WISER software interface, the system can be wired directly to your DAQ system, for seamless data collection. Connect with a TECAT Representative to learn more about this instrument grade system.

## WISER OEM PLATFORM

TECAT's OEM Telemetry System is a sensor fusion platform designed from the ground up for integration into OEM products and is based on TECAT's proven WISER products. This system, consisting of a remote unit (the sensor fusion board), base unit (for output from the OEM product), and configuration software allowing the OEM to configure, calibrate, and display data from the system. Connect with a TECAT Representative to learn more about this platform's capability.

## WISER LC100 SYSTEM

The electronics for this system are designed for integration into artificial lift load cell applications. It is capable of achieving an ATEX Zone 0 Intrinsically Safe certification. In addition to the specifications this system also includes the capability to add the following:

- Second Analog output for voltage or current output
- Digital USB output
- 3 Axis accelerometer
- Ambient temperature
- Battery voltage monitoring
- Over the air (OTA) updating and user configuration
- DC power isolation of the base unit

Connect with a TECAT Representative to learn more about this product.

## WISER TC2-K SYSTEM

This wireless temperature measurement and monitoring system was designed specifically to tackle the challenges of continuous brake rotor and spindle bearing temperature measurements but can be customized to fit other applications. It is small, light, power efficient, easy-to-use and non-invasive. The wireless system has on-board channel amplification and on-board temperature referencing. The system uses 2 K-type thermocouples and offers highly accurate data over a wide temperature range. Connect with a TECAT Representative to learn more about this temperature measurement product.





**TECAT**  
PERFORMANCE SYSTEMS

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