

## Wireless Sensor Telemetry Systems



## Reliability and precision in testing signal transmission



MSC's telemetry transmitters are digital wireless links that provide dependable, accurate, error-free, and spike-free data transmission. Each system operates in the 2.4 GHz broadcast range and is designed to operate in harsh environments. Up to 16 MSC Telemetry Transmitters can operate in proximity without interference.

### STANDARD TELEMETRY TRANSMITTERS

	M320	M460	M540
Number of Channels	2	≤8	≤3
Programmable Gain Option	•		
Resolution	12-bit	16-bit	14-bit
Sample Rate	3.0 ksps	2.2 ksps	7.0 ksps - 15.0 ksps
Power Requirement	36 mA	65 mA	38 mA - 56 mA
Nominal Case Dimensions in (mm)	2.21 x 1.0 x 0.31 (56.1 x 25.4 x 7.9)	2.82 x 1.29 x 0.3 (71.6 x 32.8 x 7.6)	1.71 x .77 x 0.25 (43.4 x 19.6 x 6.4)
Operating Temperature	-40° F to 248° F (-40° C to 120° C)		

MSC Telemetry Transmitters and Receivers can be purchased as stand-alone systems. They are the foundation of our Telemetry Packages and can be integrated into custom systems.



Each Telemetry Receiver picks-up the digital RF signal transmission from its paired Telemetry Transmitter, filters the signal, and provides a  $\pm 10V$  analog output signal. Each receiver has two receiving antenna inputs for more reliable reception, 4 indicator LEDs, and a user adjustable potentiometer for offset adjustment.

The cable bundle includes two receiving antennas with 15 foot cable (longer available), power cable with cigarette lighter plug, and output cable with BNC connectors.

# Telemetry Systems

## BATTERY POWERED SHAFT MOUNTING

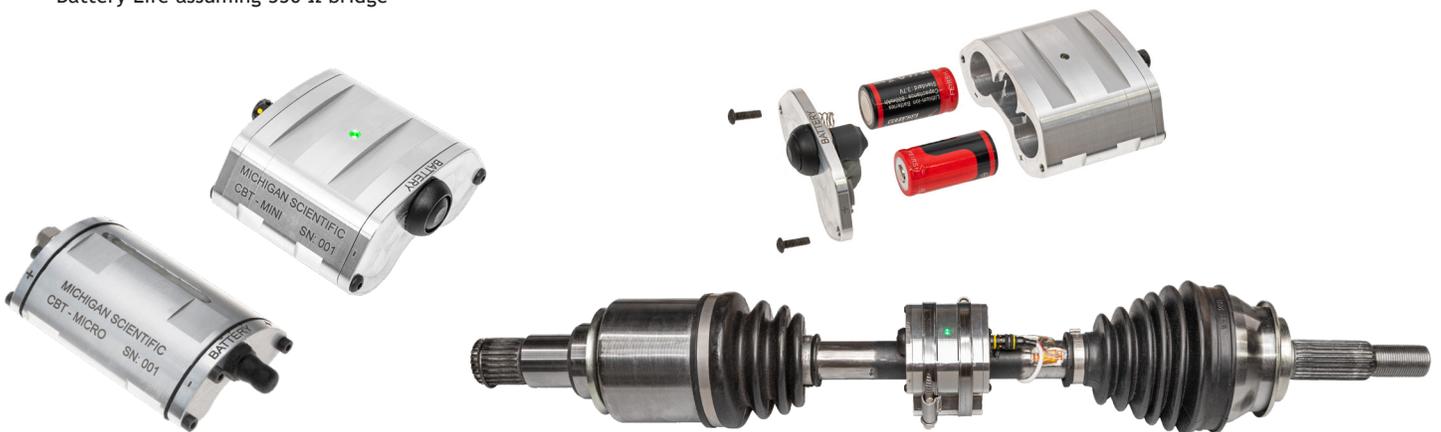
### Clamping Battery Telemetry (CBT)

The CBT-mini & CBT-micro are rugged IP67 rated wireless signal transmitting packages. Each unit contains a telemetry transmitter, easily replaceable lithium batteries, sealed power switch, power indicator LED, and internal antenna. They have been designed for the most demanding shaft applications and validated in hostile environments. Each unit can be easily mounted in a shaft application with cable ties, hose clamps, tape, or metal banding.

Each CBT model is made with a 1.00" (25.4mm) ID, but can be mounted on any shaft that size or larger. A mechanical counterweight can be purchased with each CBT model and mounted directly across from the CBT for mechanical balancing.

	CBT-MINI	CBT-MINI-3	CBT-MINI-3C	CBT-MICRO	CBT-MICRO-3
Number of Channels	1	1	3	1	3
Remote Transmitter	M540 Series				
Bridge Input Range	Fixed. Select at ordering	2, 4, and 20 mV/V bridge and input ranges	Fixed for each channel. Select at ordering	Fixed. Select at ordering	2, 4, and 20 mV/V bridge and input ranges
Battery Type	CR123a rechargeable / non-rechargeable	CR123a rechargeable / non-rechargeable	CR123a rechargeable / non-rechargeable	10440 rechargeable	10440 rechargeable
Battery Life	26 hours / 15 hours	22 hours / 13 hours	17 hours / 9 hours	6 hours	4.5 hours
Housing radial thickness	25.5 mm	25.5 mm	25.5 mm	12.7 mm	12.7 mm
Housing length	52.7 mm	68.6 mm	68.6 mm	66.4 mm	66.4 mm
Connection to bridge	Deutsch Autosport connector	Deutsch Autosport connector	Tinned leads	Tinned leads	Tinned leads

\* Battery Life assuming 350  $\Omega$  bridge



CBT-mini installed on automotive half shaft

# Telemetry Systems

## INDUCTION POWERED SHAFT MOUNTING

### Telemetry Split Collar and Induction System (TEL-SC)

Telemetry Split Collars are made in two halves which clamp onto a shaft and connect by a series of pins and sockets. The Split Collars are each made to order based on customer shafts size with inner diameters of 0.9 inches (23 mm) to 7.85 inches (200 mm) available. They have an internal telemetry transmitter and induction power system. TEL-SC systems can be configured to transmit full strain gauge or thermocouple signals. The systems have a very low-profile design and single or multiple channel models are available. The digital wireless links provide accurate, error-free data transmission in harsh conditions. Either a Primary Induction Coil Loop or Paddle-style Primary are available to provide power to the TEL-SC system.



### Clamping Induction Telemetry (CIT)

The CIT is a clamp on wireless signal transmitter with an internal induction loop that easily mounts to any shaft 1.0 inch (25.4 mm) to 6.0 inches (150 mm). The CIT can be attached to the shaft with cable ties, tape, or stainless steel banding. The built-in amplifier has programmable gain and strain gauge signals are transmitted digitally with error checking to provide stable and accurate measurements. The small rugged housing is intended for hostile environments. The Primary Induction Coil Loop surrounds the CIT to provide power inductively at all times.



## SPECIALIZED APPLICATIONS



### Telemetry Wheel Packages

Most commonly paired with Michigan Scientific Wheel Torque Transducers, these can also be configured to transmit strain gauge or thermocouple signals. The battery powered packages are designed to fit most wheel sizes.



### High Speed Telemetry Package

The T3 is a compact 3 channel inductively powered telemetry package that was specifically designed to minimize size and weight to allow for long term, high speed testing. The system has no wear components and requires no periodic maintenance. The T3 has been proven at 24,000 rpm. An 8 channel version, T8, is also available.

# Custom Telemetry Based Instrumentation System

Michigan Scientific has over 25 years of experience helping customers make complex measurements with custom telemetry based systems. MSC will design, build, and test a complete system with our telemetry in conjunction with transducer design, strain gauging, thermocouple installation and/or other sensor installation. These custom systems often have very challenging requirements which can not be met with an off the shelf solution.



## Design Concept and Proposal

When you bring a measurement application to MSC, our engineers will work with you to define project requirements including desired measurements, packaging limitations, channel count, operating environment, and measurement frequency required. After review and study, MSC will provide a proposal with a design concept and quotation.

## Typical Project Progression

After receipt of Purchase Order and design specifics (3D CAD is preferred), MSC will start the design of a custom transducer, telemetry packaging, and induction power system. After design and FEA have been completed, MSC will machine all required parts from high quality materials that can withstand the operating environment. Strain gauging or sensor installation will occur after parts have been machined or in parallel, if possible. The complete system will then be built up and assembled. Rigorous testing will follow including temperature testing, spin testing, calibration, and cross-talk evaluation. Below are examples of common measurement projects for MSC.

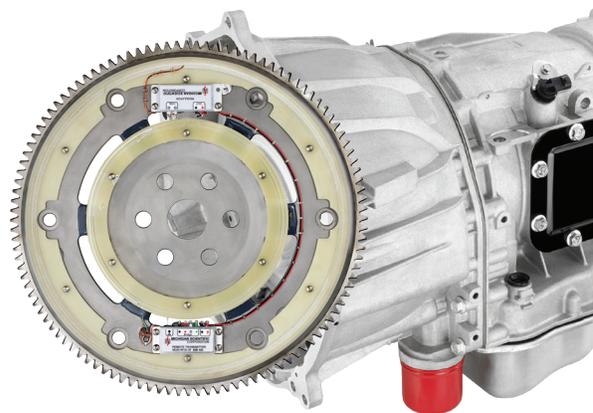
## Common Custom Telemetry Based Systems

### Flexplate Telemetry Measurement Systems

Designed to replace production engine flexplates, these systems are used to measure engine torque harmonics and cylinder firing events. Flexplate Telemetry Measurement Systems can measure thrust and temperature in addition to torque.

### Clutch Plate Temperature Measurement

These systems include installation and routing of thermocouples in clutch plates and connection to a custom telemetry system with induction power.





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