

## Setting the new standard in quality and power for implantable, wireless telemetry in rats and mice

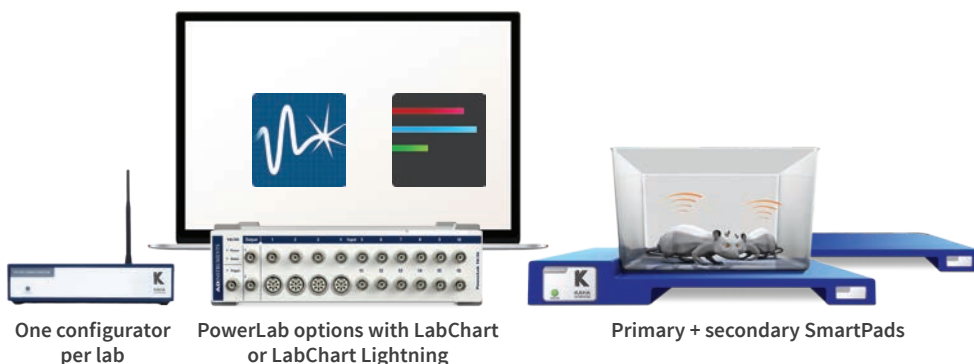
The use of telemetry in animal research is a recommended industry practice for improved animal welfare. Continuously record data over extended periods with conscious, freely moving animals, and reduced stress artifacts in your research data.

For the wireless recording of a variety of biological signals in small animals, ADInstruments offers our telemetry brand, Kaha Sciences. Kaha Sciences is the best telemetry option for research scientists wishing to record continuous, high-resolution, reliable data from freely moving animals.

### Simple and Customizable System Setup

Configure a telemetry system to meet your exact needs. A typical setup requires one telemeter and one SmartPad (rats) or tBase (mice) per animal. Each lab requires one Configurator System for all equipment, paired with PowerLab and LabChart 8 or LabChart Lightning. Select from up to 40 independent transmission channels with no interference.

### Example Rat Cohousing



Kaha Sciences is a brand of ADInstruments NZ Ltd. ADInstruments gives researchers access to a trusted global sales and support network with over 30 years of industry experience.

### Power

- Wireless power
- Higher sampling rate - 2 kHz
- Continuous recordings
- Unique signal technologies

### Quality

- Millar solid-state pressure sensors
- ISO-9001 Certified
- Durable, biocompatible hard-shell casing



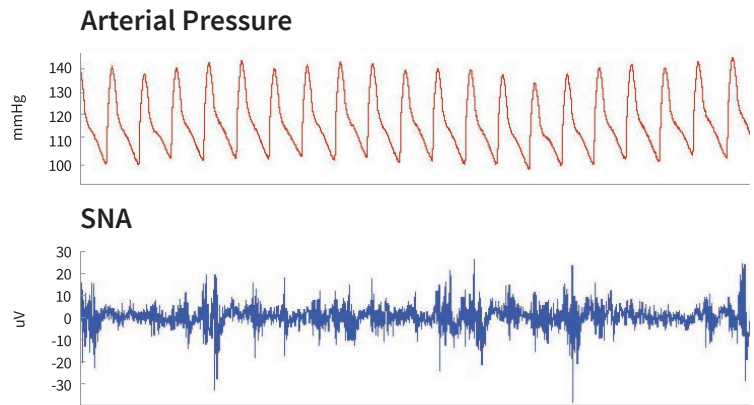
# Telemeters

All of our Kaha Sciences telemeters are robust, reliable, and quality assured. Each telemeter is powered by a SmartPad (rat) or tBase (mouse) using patented wireless inductive technology, providing higher sampling rates (2 kHz) and temporal resolution for superior data quality. Encased in durable, biocompatible hard-shell materials, our telemeters are fully software controlled to reduce handling/impact, and shipped sterile and ready for use.

## Rat Telemeters

### Features

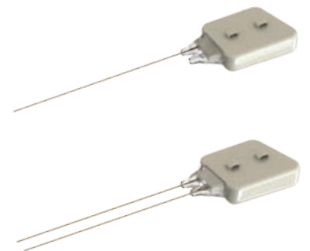
- Wireless power and battery backup provide 24/7 data recording at 2 kHz
- Solid-state pressure sensor tipped catheters - accurate and sensitive, ideal for low pressure recordings i.e. Intracranial
- Cohousing capability
- Suitable for rats >175g
- Rechargeable, reuseable



## Pressure TRM54P, TRM54PP

All of our pressure recording telemeters measure high fidelity pressure using a solid-state Millar Mikro-Tip™ sensor at the catheter tip (2 Fr, 0.66mm). This technology provides superior accuracy and fidelity, with no pressure signal attenuation in long-term recordings or effects of hydrostatic pressure.

Record high quality, reproducible signals including arterial (aortics, pulmonary, femoral, carotid), left and right ventricular (dP/dT calculations), venous, bladder, intracranial, and intrapleural.



## Pressure and Biopotential TRM54PB

Ideal for cardiovascular investigations, particularly in pharmacology and toxicology studies requiring measurements over weeks and months.

Applications can include arterial pressure and ECG, left ventricular pressure and ECG, intracranial pressure and EEG, and arterial pressure and EMG.



## Pressure and Sympathetic Nerve TRM56SP

The rat SNA and pressure telemeter is the only device on the market that provides accurate concurrent measurement of sympathetic nerve activity and arterial pressure. This is a valuable tool in the study of cardiovascular control and function.



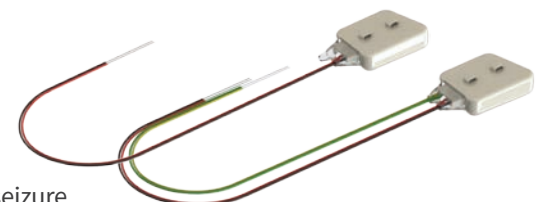
## Tissue Oxygen TR57Y

Our tissue oxygen telemeter is the only device available on the market that can measure long-term tissue oxygen concentration *in vivo*. Utilizing a stable carbon paste electrode, this telemeter is ideal for measuring oxygen concentration in the brain and kidney.



## Biopotentials TR50B, TR50BB

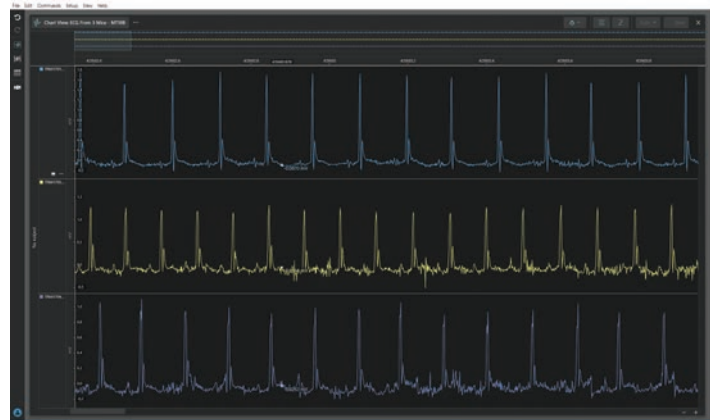
The stainless-steel electrodes in our single and dual electrode telemeters are ideal for recording ECG, EEG or EMG, and combinations thereof in conscious animals during unpredictable or spontaneous conditions such as epilepsy and seizure.



## Mouse Biopotential Telemeter MT10B

### Features

- Wireless power and battery-less design for long term 24/7 recordings
- High-fidelity biopotential recordings (2kHz)
- Contoured shape for easy subcutaneous implantation
- Suitable for mice >22g
- Single use



ECG recording from three mice

Kaha Sciences mouse telemeters provide the ideal solution for research scientists looking to record high quality wireless biopotential signals (ECG, EEG, or EMG) and index of animal activity in mice. Long-term recording capabilities are useful when measuring brain activity and signals (EEG) in conscious animals during unpredictable or spontaneous conditions such as epilepsy and seizure.

## System Components



### Configurator System TR190

- Channel allocation and diagnostics for SmartPad, tBase and all telemeters
- Rat telemeter battery indicator and Safe Mode for storage



### SmartPad TR181

- All-in-one universal receiver and wireless power supply for all Kaha rat telemeters
- Automatically recognizes telemeters and configures analog outputs
- Optimized to fit standard rat cages



### tBase MT110

- All-in-one universal receiver and wireless power supply for Kaha mouse biopotential telemeters
- Automatically configures analog outputs

## Flexible Data Acquisition

ADInstruments systems provide an integrated solution to advance life science research. By pairing Kaha Sciences with PowerLab data acquisition and LabChart or LabChart Lightning, you have the flexibility to collect and synchronize a wide range of signals for analysis.

### LabChart

All your analysis  
in one place

LabChart data analysis software creates a platform for all of your recording devices to work together, allowing you to acquire biological signals from multiple sources simultaneously and apply advanced calculations and plots as your experiment unfolds.



### LabChart LIGHTNING

LabChart Lightning is the latest iteration of our 34 year history of creating easy to use data acquisition and analysis software. LabChart Lightning empowers innovative researchers to make unique scientific discoveries with unlimited freedom and flexibility.

### PowerLab

Data with  
integrity

PowerLab is engineered for precise, consistent, reliable data acquisition for life science research, giving you the reproducible data you need while meeting the strictest international safety standards.



## Rat Telemeter Specifications

Pressure sensor range	-40 to 300 mmHg (accuracy $\pm 2$ mmHg)
Pressure sensor drift	<4 mmHg per month
Pressure sensor frequency response	DC to 500 Hz (-3 dB)
Pressure catheter dimensions	Distal tip; 660 $\mu$ m OD (2Fr), optional lengths 9cm/15cm/25cm
Biopotential Input range	+2 mV
Biopotential electrode leads	1 mm ( $\varnothing$ ), 25 cm (L), coiled stainless steel
SNA input range	$\pm 60$ $\mu$ V
SNA high pass filter	-3dB point at 1.5 Hz
SNA input impedance	500 kOhms at 1000 Hz
SNA electrode lead dimensions	0.15 mm ( $\varnothing$ - wire), 25 cm (L), Multi-stranded stainless steel
Oxygen potentiostat set potential	-650 mV (voltage controlled current source)
Oxygen potentiostat current measurement range	0 to -600nA
Oxygen potentiostat electrode leads	1 mm ( $\varnothing$ ), Coiled stainless steel (~28 cm L)
Temperature operating range	8°C to 41°C (Oxygen 20°C to 41°C)
Sampling	2000 Hz
Channels	40 independent
Telemeter resolution	12 bit A/D
Transmission signal	Fully digital at 2.4 GHz, range up to 5 m
Outer material	Liquid Crystal Polymer (LCP)
Volume	8.3 cc
Battery life	Continuous on SmartPad. If the animal is away from the SmartPad battery life is ~4-6 hrs. Recharge time minimum 3 hours.
Calibration	No user intervention required (calibration values stored in each telemeter)

## Mouse Telemeter Specifications

Biopotential input range & resolution	+2.5 mV, 12 bit A/D
Biopotential high pass characteristics	AC coupled, single pole, -3dB point at 2 Hz
Biopotential low pass characteristics	AC coupled, single pole, -3dB point at 440 Hz
Biopotential electrode leads	0.42 mm ( $\varnothing$ ), 8 cm (L), coiled stainless steel
Temperature operating range	34 °C to 41 °C
Sampling	2000 Hz
Channels	40 independent
Low pass filtering by tBase	Cut off frequency 1 kHz
Transmission signal	Fully digital at 2.4 GHz
Minimum animal weight	22 grams
Outer material	Ceramic
Volume	1.8 cc
Power/on/off	Telemeter powered on tBase and deactivated when removed from tBase
Calibration	No user intervention required (calibration values stored in each telemeter)

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