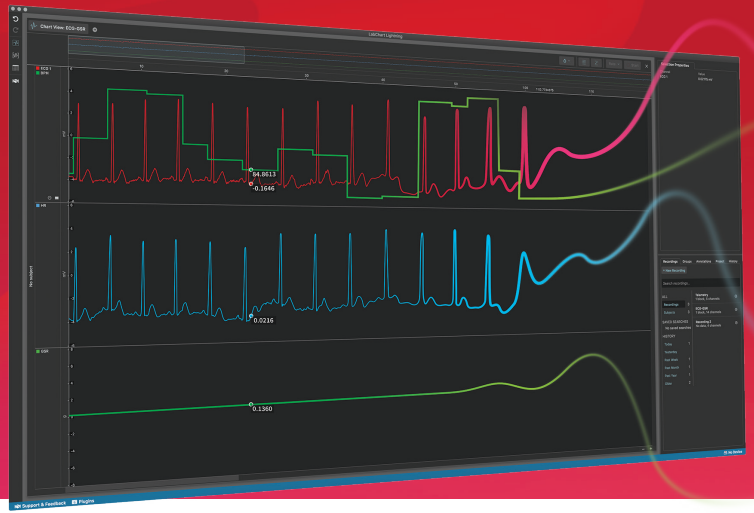






**LabChart**  
LIGHTNING

# Data acquisition and analysis re-imagined



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.

## Unlimited Channels and Overlays

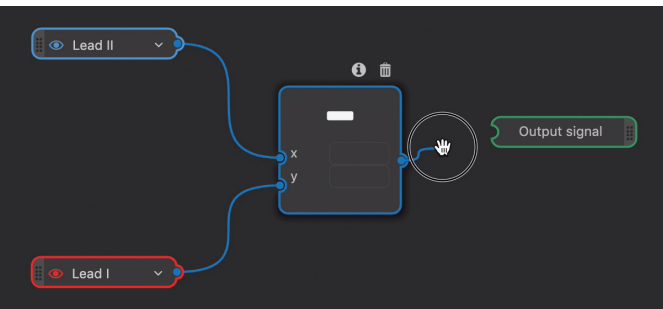
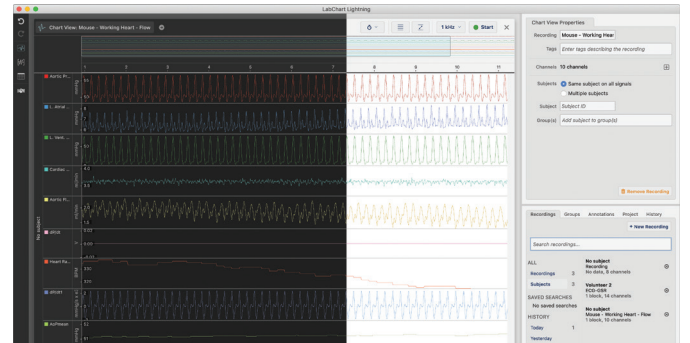
Record data into an unlimited number of channels. Create as many calculated signals as you like. Overlay signals by dragging and dropping them between channels.



Overlay channels with drag and drop.

## Dark View and Light View

Switch between dark view and light view to help reduce eye strain and for research applications where controlled lighting is important.



## Custom Calculations

Create custom calculations by dragging and dropping functions from our extensive function library. See the effect of custom calculations on your original data. Optimise and share your calculations with colleagues.

## More Features

- Cross Platform
- PowerLab integration
- Readouts
- User based licensing

## Cross-Recording Analysis

Analyse data across multiple recordings within a project. Organise recordings and channels by subjects or groups. Convert time-based data from recordings to Discrete values to use in statistical analysis.

Organise data by groups and subjects and assign group data by regions.

	Baseline		Wall Sit		BRS	
	Systolic Mean mmHg	DI Mean ms	Systolic Mean mmHg	DI Mean ms	First Value ms	Final Value ms
Female						
Mean	143.3	833.6	175.6	28.67	633.6	-72.50
01	146.1	740.5	189.0	25	506.0	-50
02	137.2	681.6	133.8	31	558.8	-25
03	149.3	769.7	178.0	15	530.4	15
04	131.1	800.5	154.4	28	507.7	10
05	166.3	768.6	202.4	60	536.1	-30
06	129.0	1,040e+0	175.9	13	792.6	-85
Male						
Mean	128.2	826.8	181.6	29.40	565.9	-68
04	107.0	828.7	172.8	43	606.4	15
07	101.1	961.8	202.7	86	576.5	-186

## Third Party Device Integration



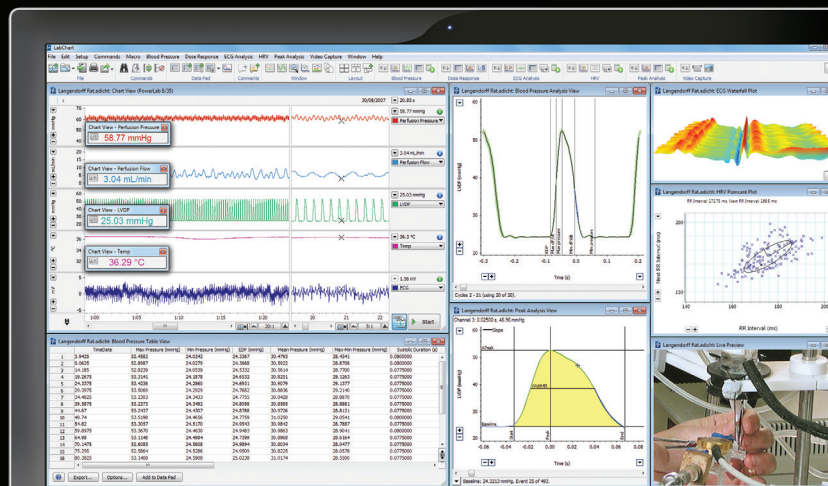
LabChart Lightning enables the integration of multiple devices for data acquisition and analysis. Device manufacturers can follow our SDK available on GitHub to create a TypeScript plugin for their

device to sample directly into LabChart Lightning. There is also the option of customised scripts, comments, and UI for device configuration and control. This flexibility provides researchers an avenue for limitless combinations of data, signals and results!

Sign up for a 30-day free trial at [adi.to/lightning](https://adi.to/lightning)

# LabChart

All your analysis  
in one place



Easily develop an integrated and customised set-up for your unique research requirements.

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

With LabChart analysis software, you can record and display up to 32 channels of data in real time, performing online calculations at high sampling rates, giving you full control of your research.

## Simple to use

- Pre-configured settings files for one-touch recording
- Change recording settings in seconds
- Recall data and experimental settings
- Annotate data with comments
- Smart detection of ADI peripheral devices

## Customise your workflow

- Scripting and automation
- Custom arithmetic
- Import/export data in various formats
- Manual or event-driven sampling
- Generate customised stimulus outputs

## Feature rich

- Wide range of sophisticated add-ons purpose built for life science
  - Extensions eg. Spirometry
  - Modules
  - Device enablers
- Record from multiple PowerLabs or from LabChart compatible devices

## Specialised analysis with Add-On modules

Get the full suite of modules with LabChart Pro (Some modules are not available on Mac).

The range includes:

<b>Cardiac Output</b>	Calculates cardiac output from a LabChart recording of a thermodilution curve measured in animals	<b>Dose Response</b>	Generates dose response curves, EC50 values and additional parameters
<b>Metabolic</b>	Provides real-time measurements of parameters such as $VCO_2$ , $VO_2$ , $V_E$ and RER	<b>Heart Rate Variability</b>	Displays and analyses variation in the interval between heartbeats in human and animal ECG
<b>Blood Pressure</b>	Automatically detects, analyses and reports parameters from arterial or ventricular pressure recordings	<b>Video Capture</b>	Allows the synchronised recording and playback of a QuickTime movie and LabChart data file
<b>Spike Histogram</b>	Detects, discriminates and analyses extracellular spike activity generating a range of plots and statistics	<b>Peak Analysis</b>	Automatic detection and analysis of multiple, but not overlapping, signal waveforms from recording
<b>ECG Analysis</b>	Detects and reports the onset, amplitude and interval times of PQRST from human and animal ECG signals	<b>DMT Normalisation</b>	Calculates and standardises optimal vessel pretension conditions using the wire myograph
		<b>PV Loop</b>	Analyses left and right ventricular pressure and volume data, calculates loop area and a wide range of hemodynamic parameters.

## Hardware Compatibility

LabChart can be used with any ADInstruments PowerLab to sample and analyse data from virtually any analog signal. As well as this, LabChart can also stream data directly from a range of compatible digital and wireless devices. These are available from manufacturers such as DSI, Oxford, DMT, Equival, Delsys and Kent.

Find out more at [adi.to/labchart](http://adi.to/labchart)



# PowerLab


High-performance data acquisition hardware


PowerLabs are capable of high speed sampling and are compatible with instruments, signal conditioners, and transducers supplied by ADInstruments and many other leading brands.


Developed in 1985, PowerLab has been a reliable data acquisition tool for an entire generation of scientists and educators. It has always offered a simple and flexible solution for almost all types of analogue physiological data acquisition. With the addition of PowerLab C for research, we are excited to continue supporting a whole new generation of scientists with unparalleled flexibility for both analog and digital data acquisition.


## PowerLab C PLC01

A digital data acquisition device that provides adaptive mains filtering, power management for peripheral devices (max 100W via USB-PD) and sub- $\mu$ S time synchronisation for up to four C Series compatible USB-C devices.

- 

Modular system
- 

Powerful and portable
- 

Analog compatible
- 

Digital framework for the future



## C Series Interfaces

### Front End Interface PLCF1

Converts analogue data from ADInstruments Front-Ends such as Bridge Amps and Bio Amps so that they can be digitally sampled by the PowerLab C.

### Instrument Interface PLCI1

Provides 4 channels of input capability from any analogue instrument to the PowerLab C.

### Configuration Options

Both C Series interfaces are designed to work with PowerLab C for adaptive mains filtering and sub- $\mu$ S time synchronisation with other C Series compatible devices. Alternatively, for simple setup requirements, you can connect them directly to a computer.



## 26 and 35 Series PowerLabs

Highly functional and adaptable for even the most demanding of applications, there is a research Powerlab to suit your requirements. Available in 2, 4, 8, or 16 channels. PowerLab can sample from virtually any analogue signal.

### 2/26 PL2602

For those requiring minimal channels.

### 4/26 PL2604

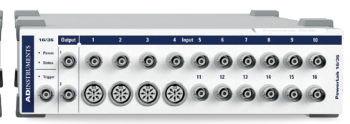
Entry level research grade data acquisition.

### 8/35 PL3508

Our most popular model with advanced feature sets.

### 16/35 PL3516

Our most powerful data acquisition system.



Find out more at [adi.to/powerlab](http://adi.to/powerlab)

# Human Applications

Complete systems by research application

## Wireless EMG in humans

Wireless EMG is ideal for recording muscle tissue contractions and electrical muscle activity in subjects, especially when range of movement and comfort are important. Applicable for tracking a range of movements, e.g. exercise physiology, or 'on the spot' applications when small, difficult to isolate muscles are being assessed.

### Delsys Trigno™ Wireless Foundation System

This LabChart compatible system allows your EMG data (up to 16 sensors) to stream directly into LabChart with the click of a button. You can then choose from a range of Trigno™ wireless sensors to complete your solution (sold separately).

#### Contents include:

- 1 x Trigno™ Base Station Receiver (Digital)
- 1 x USB Cable
- 1 x Trigno™ PowerSupply with Plug Adapter Kit
- 2 x Trigno™ Sensor Adhesive (4-slot, 90 pack)
- LabChart Pro Software
- Trigno™ Wireless Device Enabler Software

#### Sensor options include:

- Trigno Avanti EMG + IMU
- Trigno Mini EMG + IMU
- Trigno Snap-Lead EMG + IMU
- Trigno EKG
- Trigno 4 Contact FSR
- Trigno Quattro



Trigno Base Station, shown with 16 Trigno sensors (purchased separately).



Trigno Avanti EMG + IMU Sensor - for flexible motion detection.



Trigno Mini EMG + XYZ Sensor - for isolating small muscles.



Trigno Snap-Lead EMG + XYZ Sensor - with clamp style connector leads.



## Respiratory / Metabolic

Record cardiorespiratory and metabolic parameters by simultaneously measuring respiratory gas concentrations and airflow either at rest or during exercise. In conjunction with the complete system shown below, you can integrate any of our other systems and devices for even more flexibility in your research.

### Exercise Physiology System

A complete physiology recording system for respiratory/metabolic studies. Monitor and calculate parameters such as RR, volume and flow rates,  $VCO_2$ ,  $VO_2$ , VE, RER, intrathoracic pressure and lung sounds with the BP, HRV, Metabolic and ECG Analysis modules available in LabChart.





## Wireless physiological monitoring in humans

Wireless monitoring allows you to record a wide range of signal types simultaneously whilst providing freedom of movement for your subjects, ensuring you are observing realistic human activity in your research.

### Equivaltal Wireless Physiological Systems

Record a range of signals via a compact and unobtrusive sensor belt plus ancillary options. A long battery life and comfortable design support long sampling periods, and with both live data streaming and access to offline data logging in LabChart for single or multiple subjects - it's the perfect solution for exercise research through to sleep studies. Single or multi-belt starter packs are available. LabChart and ancillary devices are sold separately.

#### Signal options include:

- ECG (2 channel)
- Temp (skin and core)
- Breathing trace
- GSR
- Accelerometer (3 axis)
- SpO<sub>2</sub>



## Wired physiological recording / biopotentials in humans

Collect precise movement data, record joint movement, and measure muscle and brain activity with absolute confidence. We offer a wide range of solutions for studying the mechanics, properties and performance of muscles and joints. Our range of galvanically isolated and high performance Bio Amps are optimised and safe for human use.

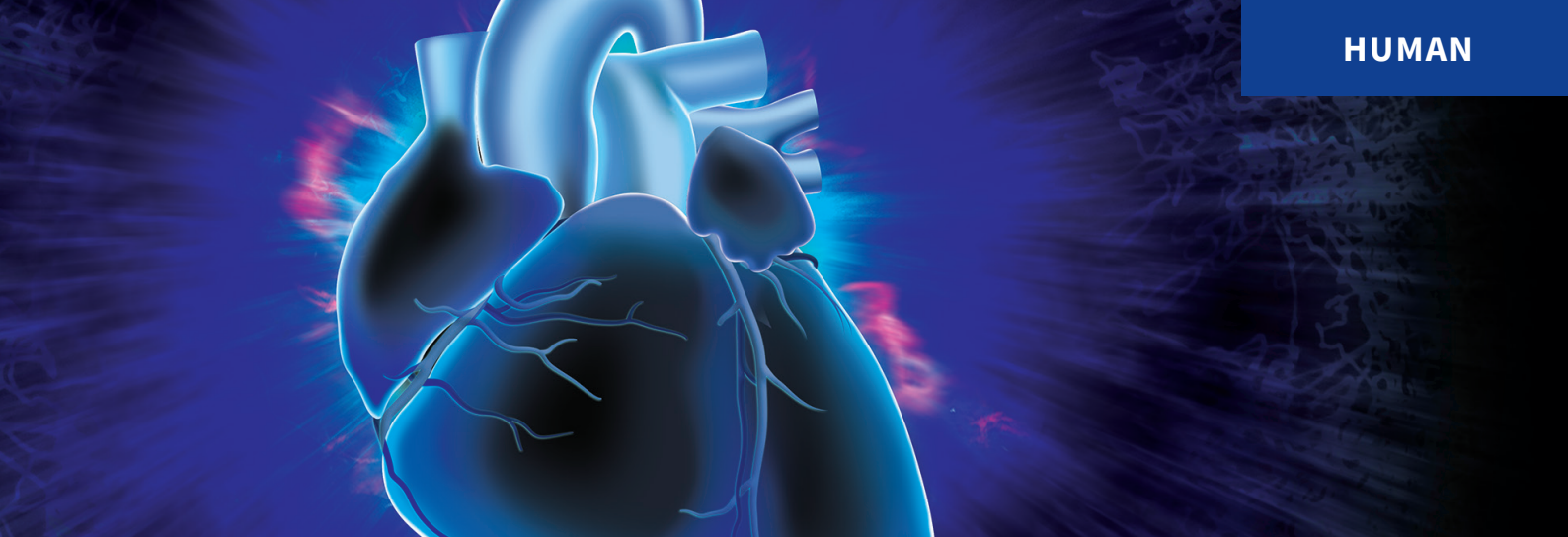
#### Transducer options include:



#### plus:

- ECG
- EMG
- Breathing trace
- Fluid flow
- Temperature
- Angles and ergometer output





## Human NIBP

Monitor trends in blood pressure continuously and non-invasively in humans. Reliably record and monitor trends in response to interventions on finger arterial pressure, systolic, diastolic, mean arterial, heart rate and interbeat interval.

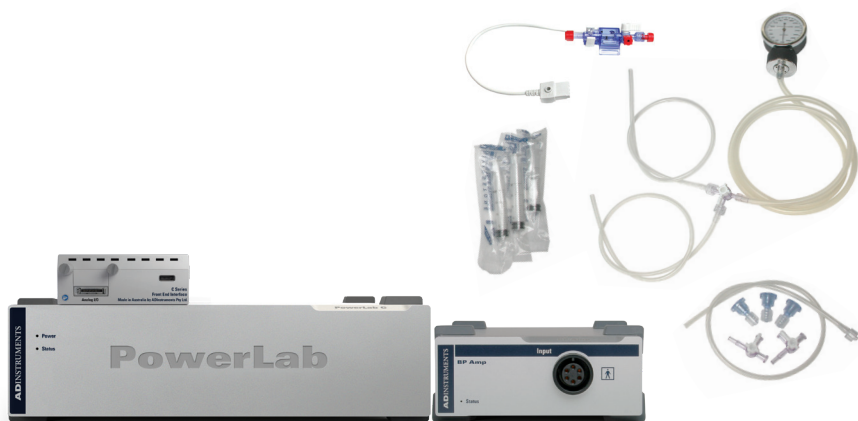
### Human NIBP Nano System

Stream data directly into LabChart or LabChart Lightning for easy analysis of continuous blood pressure signals from an adult human via our non-invasive dual finger cuff system. Cuffs available in a variety of sizes, and LabChart, are sold separately.



## Invasive Blood Pressure

Measure blood pressure intravenously in humans, from atria to arteriole with our human approved BP amplifiers and disposable pressure transducers.



## Pulse Oximetry and Plethysmography

Non-invasive circulatory assessment and monitoring of blood flow and oxygen saturation of the blood.



# HUMAN



## Psychophysiology

Run protocols for a variety of different visual, physical, auditory and electrical stimuli using SuperLab stimulus presentation software from Cedrus.

With the addition of ancillary devices, easily synchronise these events with voluntary responses as well as either wireless or wired psychological response data from our other human application systems using LabChart, LabChart Lightning, and PowerLab.



RESPIRATORY RATE

EOG EEG GSR

NIBP ECG EMG



## Microneurography

Study the neurophysiology of human nerve fibers in the peripheral nervous system.

Microneurography can be performed using a Neuro Amp EX together with LabChart and PowerLab. The Neuro Amp EX is a low-noise, high-gain amplifier which has a wide range of filters and is certified safe for human connection and is supplied with a headstage and six gold connectors for customisation of microelectrode adapters.

A human-approved isolated stimulator is also available for superficial detection and activation of nerves.

This bundle also includes the INL382 Human NIBP Nano System.

*(Finger cuffs sold separately)*



+ Microelectrodes of your choice  
(not stocked by ADInstruments)



# Animal Applications

Complete systems by research application

## Ventricular Pressure Volume

Study PV Loops to assess changes in cardiovascular function for both normal and diseased model conditions to the gold standard for measuring direct, real-time, complete cardiac function. Ventricular Pressure Volume is the only research technique that can fully characterise diastolic conditions.

### MPVS Ultra® Foundation Systems

Simultaneously measure ventricular pressure and volume in large and small animals with a Millar Pressure Volume (MPVS) Ultra Foundation System. Combine this with your choice of over 50 Millar Mikro-Tip® Catheters covering all animals larger than 16 g (all sold separately). This system is supplied with an Instrument Interface, MPVS Ultra Pressure-Volume Unit, and LabChart Pro (with the PV Loop Module for the automated calculation of systolic and diastolic pressures, stroke volume, CO, and more.

The **Large Animal System** includes a PowerLab C and two additional Instrument Interfaces.



### Small Animal System (Rats and Mice)



+ select your choice of Millar Mikro-Tip® Pressure Volume Catheters



LARGE ANIMALS

RATS

MICE

## Invasive Blood Pressure

Measure continuous arterial and vascular pressure signals at the source. Invasive blood pressure is the most commonly used method for high fidelity monitoring of basic cardiovascular parameters.

### Mikro-Tip® BP Foundation System

Provides the essential tools for high fidelity blood pressure measurements in small to large animals. Includes C-Series Front End Interface, LabChart Pro, and low-drift, high impedance Input Bridge Amp. Complete your system by choosing from a wide range of Millar Mikro-Tip® pressure catheters (sold separately). LabChart's BP Module operates seamlessly to determine systolic and diastolic pressures, dichrotic notch, dP/dt and more.



+ select your choice of Millar Mikro-Tip® Pressure Volume Catheters

LARGE ANIMALS

RATS

MICE

### Fluid-filled blood pressure transducers

An alternative option to determine arterial and venous blood pressure in small and large animals. Disposable fluid-filled polyethylene pressure transducers are used with ADInstruments Bridge Amps (single, quad or octal) or the electrically isolated BP Amp that provides BP readings in mmHg.



or



## NIBP

Detect intermittent pressure /pulse for calculation of systemic pressure in awake rats or mice over long sampling periods easily and unobtrusively with a high standard of care. Reliably record and monitor blood pressure using LabChart and PowerLab paired with an NIBP system with specialised tail transducers/cuffs. Rodent restrainer and tail cuff holders are also available.

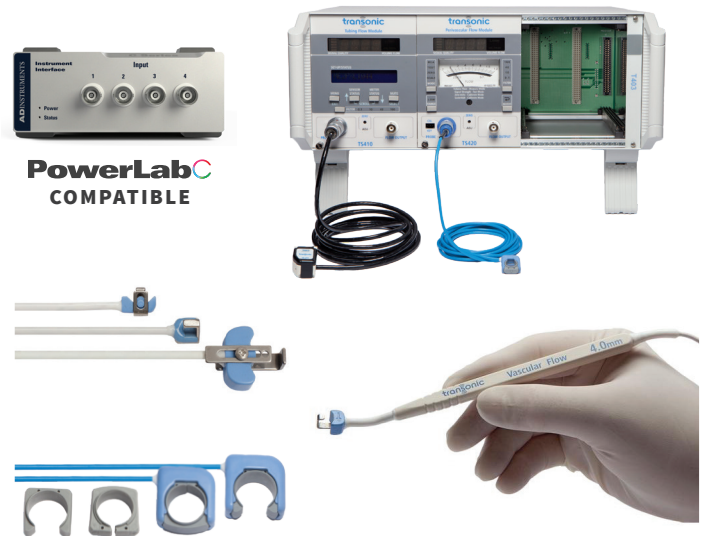


## Invasive Blood Flow

Perform accurate and precise fluid flow measurements in blood vessels in mice through to large animals and even atypical animal models such as fish.

### Transonic Flow Systems

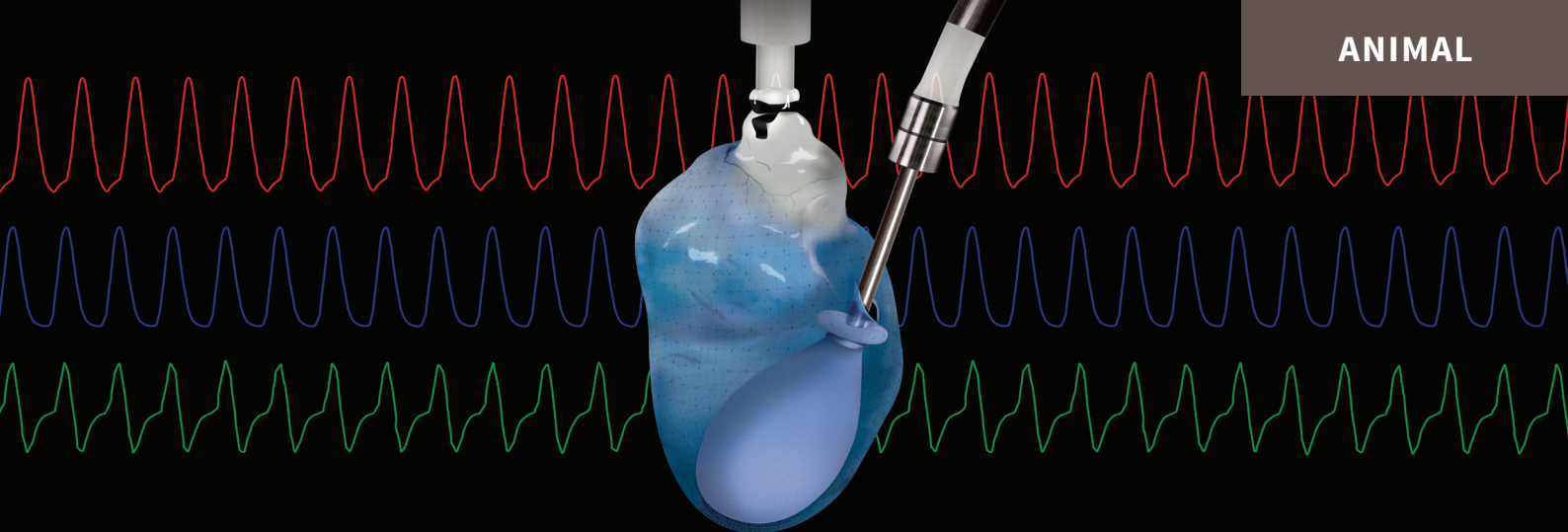
By pairing state-of-the-art ultrasound transit-time technology of Transonic with LabChart and PowerLab, you can reliably measure arterial or venous flow. Single or dual channel options available for both perivascular and tubing flow applications. With minimal signal drift and attenuation, Transonic Flowprobes (available separately) are appropriate for acute and chronic studies. A range of sizes suitable for mice and larger animals are available, as well as inline/clamp-on sensors for tubing applications.



## Laser Doppler Flowmetry

Measure tissue perfusion (blood flow) invasively or noninvasively using a Laser Doppler technology Blood Flowmeter that is compatible with a range of LDF probes for skin, muscle and organs. Easy to use, and highly suitable for monitoring circulation during surgery or studying tissue perfusion in drug or cardiovascular studies. Using our LabChart software, PowerLab, Blood Flowmeter and a suitable LDF probe, you can continuously monitor and rapidly analyse tissue perfusion of microvascular beds.



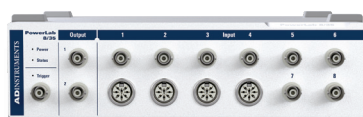


## Langendorff Perfused Heart

Monitor an isolated heart while perfusing the coronary arteries with a nutrient solution. This allows you to record and analyse multiple cardiac parameters such as left ventricular developed pressure, HR and more.

### Langendorff Systems - Panlab

Designed to perfuse isolated small animal hearts such as mouse, rat and guinea pig, this compact system allows easy switching between constant-pressure and constant-flow modes with the convenient pump controller (included with system).

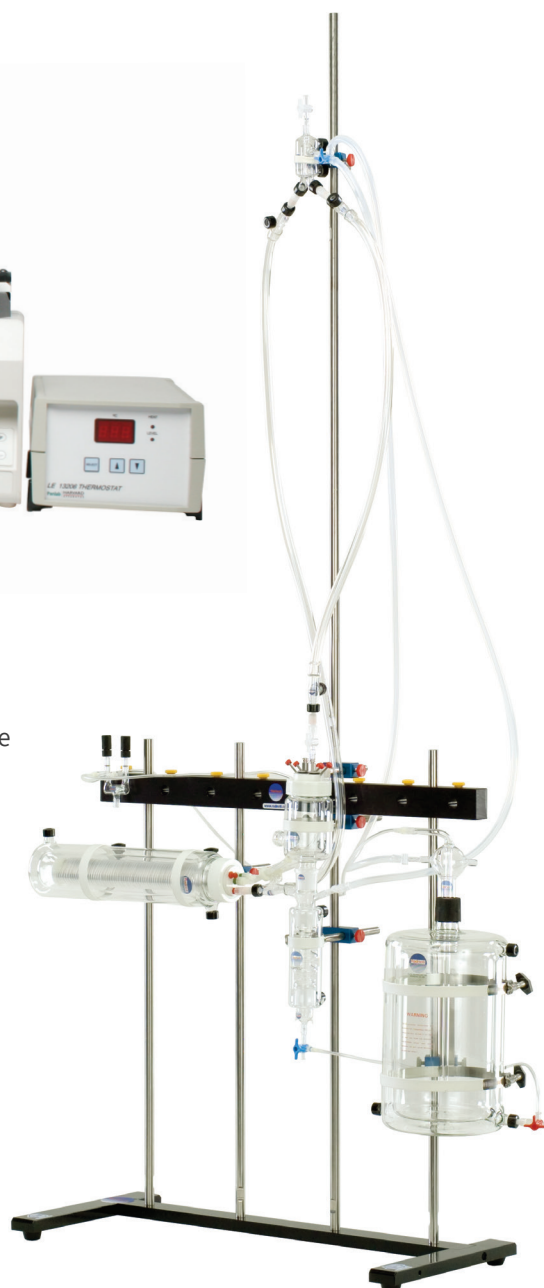
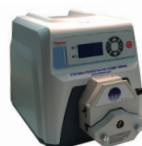
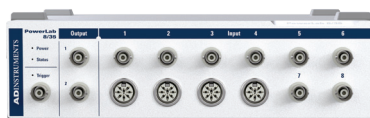


### Langendorff Systems - Radnoti

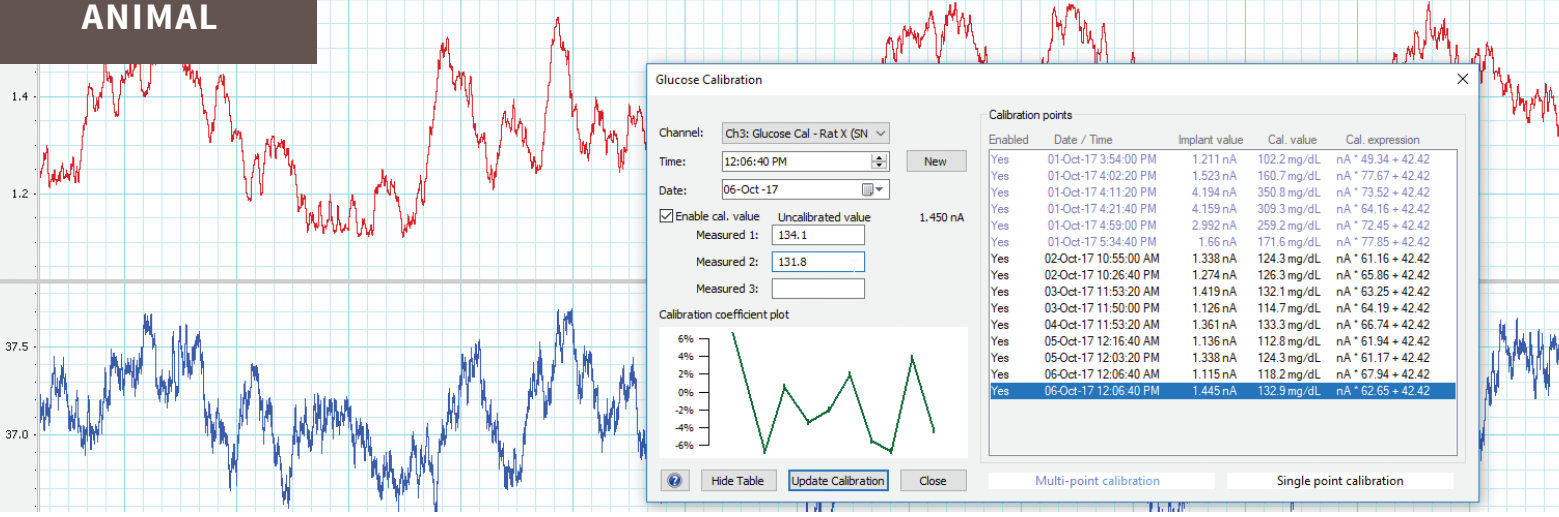
A more traditional modular solution with system options for constant pressure or flow in rat or mouse models. Combining the corresponding high-quality glass apparatus from Radnoti with LabChart Pro and PowerLab. Can be tailored to measure a number of research parameters via streamlined kits.

#### Isolated Heart Kits (purchased separately)

- Isolated Heart Pressure Kits
- Isolated Heart Action Potential Kits
- Isolated Perfusion Temperature and pH Kit
- Isolated Perfusion O<sub>2</sub> and CO<sub>2</sub> Kit
- Isolated Heart Pacing Kits
- Isolated Heart Volume Flow Kits



# ANIMAL

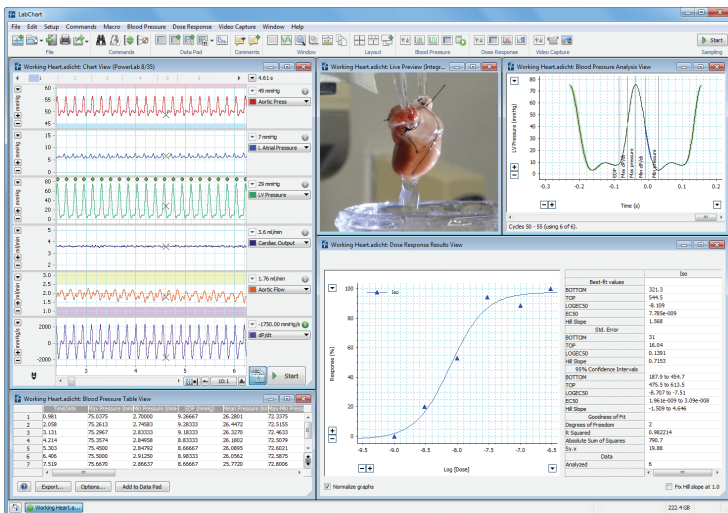


## Working Heart

Simultaneously monitor mechanical and electrical cardiac parameters to examine the influence of preload and afterload on cardiac work during perfusion.

### Working Heart Foundation Systems - Radnoti

Combine the corresponding high-quality glass apparatus from Radnoti with LabChart Pro and PowerLab. With options for mice or rats, systems are capped and water-jacketed to ensure constant perfusate temperature and include ports for the insertion of cannulae and commonly-used packing and ECG electrodes. Can be tailored to measure a number of research parameters via streamlined kits.



Radnoti Cardiovascular Blood Pressure analysis in LabChart

### Isolated Heart Kits (purchased separately):

- Working Heart Pressure Volume Kits
- Isolated Heart Pressure Kits
- Isolated Heart Action Potential Kits
- Isolated Perfusion Temperature and pH Kit
- Isolated Perfusion O<sub>2</sub> and CO<sub>2</sub> Kit
- Isolated Heart Pacing Kits
- Isolated Heart Volume Flow Kits
- Isolated Heart Intracardiac Electrophysiology Kits





KAHA  
SCIENCES

ADINSTRUMENTS

A new standard in quality and power

## Small Animal Telemetry

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 systems combine high fidelity digital telemetry with patented wireless power technology to create high-quality solutions for your physiological monitoring needs. Paired with PowerLab and LabChart, this solution sets the new standard in quality and power for implantable, wireless telemetry in rats and mice.



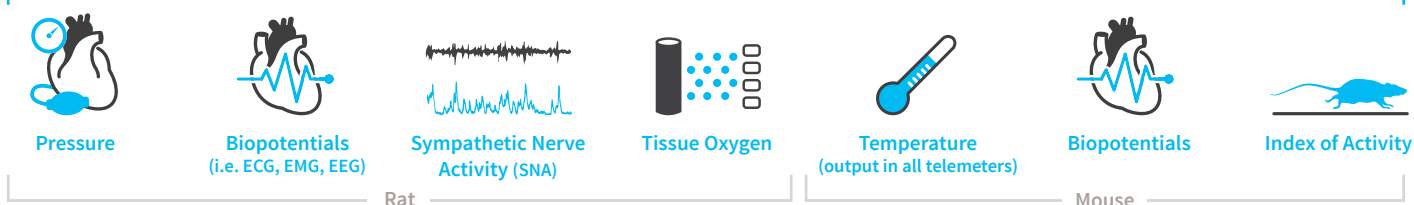
### Power

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

### Quality

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

## Signal Options



## Simple and Customisable 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. Pair with PowerLab and LabChart 8 or LabChart Lightning. Select from up to 40 independent transmission channels with no interference.

### Rat Telemetry

Data transmission range up to 5m with telemeter battery back-up and in vivo recharging. Cohousing feature for two animals in one cage or two implants in one animal (>350g).

#### Cohousing Example Setup



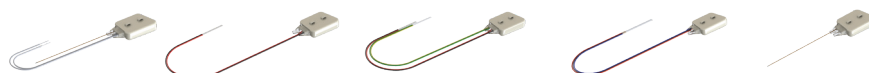
### Mouse Telemetry

Accurately measure biopotential parameters in mice that are traditionally restricted to acute or tethered experiments with a sampling rate up to 2kHz with unmatched data quality.



## Your Choice of Telemeters

RAT



MOUSE



# In Vitro Applications

Complete systems by research application

## Extracellular Recording System

Extracellular recordings measure and characterise the electrical properties of cells and tissues, particularly neurons and neuronal tissue.

Measurements are usually performed either in the extracellular fluid near the cell of interest, or non-invasively; and can include single unit, multi unit, field potential or amperometry recordings. The Extracellular Recording system provides a versatile, low noise differential amplifier with an active headstage that is compatible with either glass or metal microelectrodes (not supplied), as well as a C Series Instruments Interface and LabChart Pro Software.



## Intracellular Recording

Intracellular recording is an electrophysiology technique that inserts a microelectrode into a single cell (usually a neuron) to precisely measure its electrical activity.

Precisely measure electrical activity of single cells. The Intracellular Recording System provides a simultaneous current injection stimulation and recording using a single microelectrode. Systems are also available for two-electrode, whole-cell voltage clamping of large cells and cell structures. Patch clamp recording systems offer a range of resistive-feedback headstages for currents  $\pm 1$ , 10 and 100 nA in whole cells or single ion channels.

### Oocyte Clamp System

Designed for two-electrode, whole-cell voltage clamping of large cells such as *Xenopus* oocytes and cell structures such as squid axons.



### Two Electrode Voltage Clamp Workstation System

A comprehensive system that provides clamping and amplification of measured signals from glass microelectrodes/sharp electrodes.

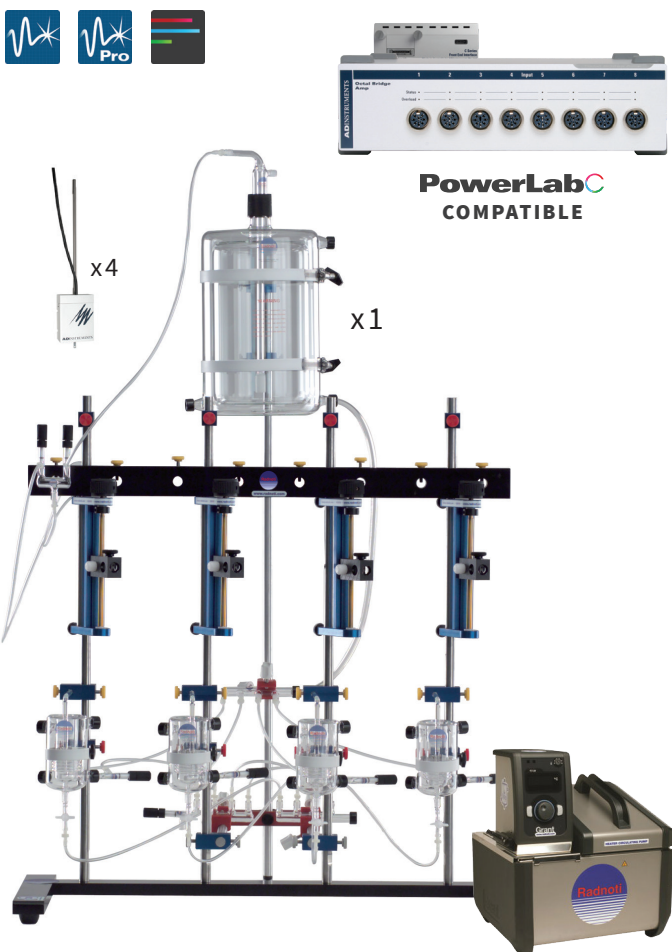


## Isolated Tissue and Organ Baths

Controlling conditions such as temperature, oxygenation, nutrients and pH is a useful way to observe and compare evoked responses to drugs and electrical stimulation. Isolated tissue baths are used to maintain the integrity of muscle tissue for several hours, in a controlled environment, while physiological measurements are performed.

### Tissue-Organ Bath Systems (Radnoti)

A more traditional and highly modular solution that allows for easy substitution of parts, enabling an extensive choice of tissue types and chamber sizes (5 to 300 mL). Systems available in 4, 8 or 16 chamber options. Constant temperature maintenance throughout the system is ensured for accurate study of muscle contraction, dose response and more.



### Tissue-Organ Bath Systems (Panlab)

An all-in-one compact solution that is ideal for striated, smooth and cardiac muscle studies. Systems available in 4, 8 or 16 chamber options. Featuring electrovalves for automated filling and emptying of tissue chambers and assurance of constant system temperature. Systems are provided with isometric transducers, however isotonic transducers and stimulating electrodes are also available.



## Epithelial and Ussing

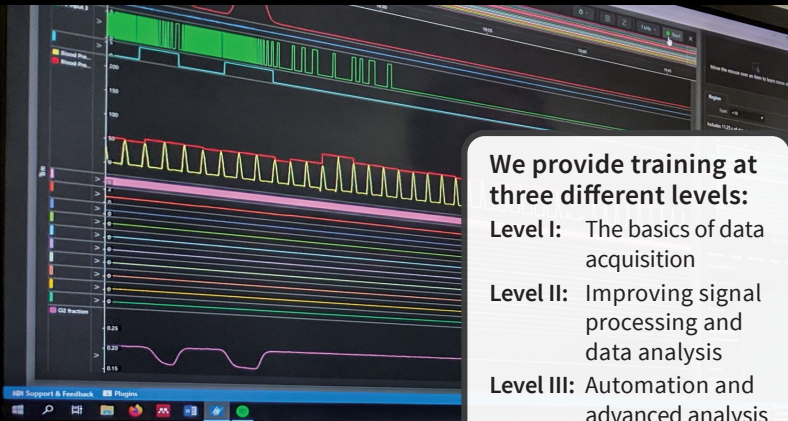
Investigate tissue transepithelial voltage, short circuit current and membrane resistance using epithelial single and dual channel (*pictured*) voltage clamp systems.

Single and dual Ussing chambers are available separately for housing and sustaining living epithelial tissue or a monolayer of cells, as well as a range of inserts to suit your research needs that can be easily changed between experiments.



# ADInstruments Training and Support

Our global support and flexible training options mean that there is always help at hand to streamline your experiments and reach your research goals faster. Whether you are already a career scientist or just starting out, we can help you master best practice techniques for your research.



**We provide training at three different levels:**  
**Level I:** The basics of data acquisition  
**Level II:** Improving signal processing and data analysis  
**Level III:** Automation and advanced analysis



## Software Training

Our software training courses are designed to get you up to speed with relevant, useful skills and knowledge, as quickly as possible.

Training courses are hands-on and delivered by our team of experienced scientists and teach professional best practices to immediately improve data accuracy, problem solving, workflow and efficiency.

## Customised Onsite Training

Increase efficiency with tailored training courses, delivered at your facility. We can customise our curriculum to your needs, and teach the hardware and software best practices for your unique requirements.

Our hands-on training fast-tracks learning, to immediately improve output and efficiency, so you can achieve your research goals, sooner.



## Application Workshops

ADInstruments partners with world class universities, institutes and leading researchers to develop training directed at specific protocols, techniques and applications.

Our hands-on workshops teach you to use our systems in the most relevant, effective and efficient way for your needs.

## Live Product Demonstration

Showcasing powerful and flexible solutions for research. Experience how our integrated hardware and software solutions could help enhance your work.

Take the opportunity to talk to one of our expert team about how we could help you reach your specific goals.



A comprehensive range of product, application, and customer webinar videos are available from our online library. Visit [adi.to/training](http://adi.to/training) to sign up for one of our upcoming live webinars.

For more information contact your local representative at [info@animalab.eu](mailto:info@animalab.eu) or visit [www.animalab.eu](http://www.animalab.eu)