

## Exercise Physiology Application and Systems Overview



# Balancing high quality data and intuitive design with ease of use, allowing you to take your exercise research further, faster.

Providing the perfect balance of data integrity and ease, our wireless solutions can stream a broad range of signals direct into LabChart so that you can simultaneously display and analyze multiple signals in real-time.

ADInstruments wireless solutions are ideal for a wide range of applications and signal types from measuring electrical skin conductance (GSR) to recording muscle contractions and joint angles - all without limiting your subject's ability to function naturally. Our solutions provide extended recording time with long battery life, while always keeping your subjects comfortable.

For studies with more than two subjects; long term; or distance studies, you also have the option to record data offline and then easily import time synchronized data files into LabChart when ready for analysis.

ADInstruments can help you take your physiological research even further with easy analysis of your data against response signals like EOG, ECG, EMG, EEG, and skin conductance.



#### **Typical studies:**

- Accelerometery (3 axis)
- Blood Pressure
- ECG / EKG
- EMG
- Goniometry
- GSR
- Heart Rate
- Metabolic (VO<sub>2</sub>, VCO<sub>2</sub>, RER etc)
- Respiration
- SpO<sub>2</sub>
- Temperature

Left: Exercise Physiology recordings taken from a subject on an exercycle in LabChart Lightning's Chart View

### **Applications include:**

Anaerobic Threshold • Baroreflex Posture, Gait and Limb Movements Ergonomics • Exercise Testing • Kinesiology • Muscle Physiology Performance Testing • Pulmonary Function Analysis • Respiratory Gas Analysis



## Human NIBP

Monitor trends in blood pressure continuously and noninvasively 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.

**Kit includes:** Human NIBP Controller, Wrist Unit, 2 x Finger Cuffs, Height Correction Unit, LabChart Pro, Human NIBP Device Enabler.



# 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 optimized and safe for human use.

## **Reflex Kit**

This kit is ideal for use in tendon jerk, reflex, and nerve stimulation experiments. Designed to connect to LabChart analysis software via the PowerLab data acquisition unit.

**Kit includes:** Tendon hammer, Goniometer, Recording Bar Electrode, Stimulator Rod with Cable.

## Bio Amps (single, dual, and octal)

Approved for human connection, ADInstruments range of isolated, high-performance differential biological amplifiers are optimized for measuring ECG and EMG activities along with other biological signals.

# 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, 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<sub>2</sub>, VO<sub>2</sub>, VE, RER, intrathoracic pressure, and lung sounds with the BP, HRV, Metabolic, and ECG Analysis modules available in LabChart.













# Wireless Physiological Monitoring

Wireless physiological recording ensures freedom of movement for your subjects so that you are observing realistic human activities and actions. Providing a perfect balance of data integrity and ease, our wireless physiological recording solutions are able to stream a broad range of signals direct into LabChart so that you can simultaneously display and analyze multiple signals in real-time.

## **Equivital 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 multibelt starter packs are available. LabChart and ancillary devices are sold separately.

Signal options include: ECG (2 channel), Skin temperature, Breathing trace, GSR, Accelerometer (3 axis), Sp.O.





# 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<sup>™</sup> 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<sup>™</sup> wireless sensors to complete your solution (sold separately).

#### Sensor options include:

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



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



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



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



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

with 16 Trigno sensors (purchased separately).

Trigno Base Station, shown

# LabChart

# All your analysis in one place

Easily develop an integrated and customized 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.

Quick to set up and simple to use, LabChart tracks every action you take and never modifies your raw data, ensuring the integrity of your results so you can focus on the true insights of your research. LabChart allows you to 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.

- Record data via PowerLabs and other compatible data acquisition devices
- Preview and optimize recordings
- Import and export data easily
- Annotate data with comments
- Automate recording and analysis tasks
- Convert raw data into useful units
- Change recording settings in seconds
- Recall data and experimental settings
- Generate customized stimulus outputs



## **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 analog 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 and C Series Interfaces

PowerLab C is 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 synchronization for up to four C Series compatible USB-C devices.

#### **Front End Interface**

Converts analog 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

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

#### **Configuration Options**

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

#### 26 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 and 4 channels, PowerLab can sample from virtually any analog signal.

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