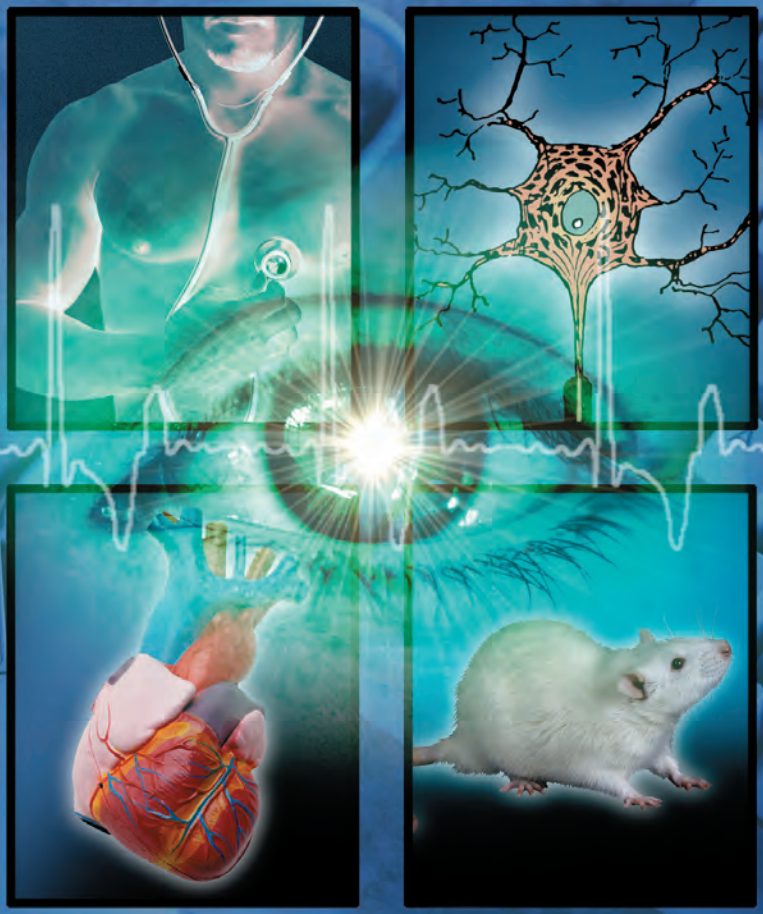
NEW PRODUCTS

CATALOG

For the Life Sciences



INNOVATIVE PRACTICAL SOLUTIONS FOR DATA ACQUISITION AND ANALYSIS

FOR PC WITH WINDOWS AND MACINTOSH

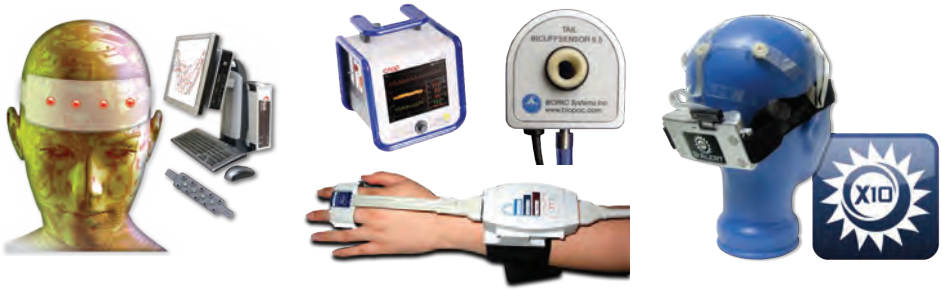
BIOPAC Systems, Inc.

Registered to ISO 9001: 2008

New Lab Solutions from BIOPAC!

Powerful and Efficient Tools for Life Science Research

BIOPAC is recognized around the world as a premier choice for life science hardware and software. Our data acquisition & analysis systems support nearly every physiological recording scenario and are used in thousands of labs worldwide — and cited in thousands of publications!



- ***MP36R 4-channel system with universal recording amplifiers*** - Use this new data acquisition system with BIOPAC transducers and accessories, or with your existing equipment
- **Acq*Knowledge* 4 *software with scoring & automation routines*** - Perform complex data acquisition, stimulation, triggering, video sync, and analyis using simple pull-down menus and dialogs... recent updates include customization options, scripting, and user-friendly reporting tools
- ***Wireless Physiology Solutions*** - new BioNomadix Dual Signal Amplifiers, B-Alert EEG & Cognitive State Analysis, BioHarness multi-parameter monitoring, TEAM Systems for simultaneous monitoring of up to 64 subjects
- ***f*NIR *Systems*** - functional near infrared spectroscopy for real-time monitoring of tissue oxygenation in the prefrontal cortex of human subjects
- ***Noninvasive Blood Pressure Systems*** - human or animal — plus MRI
- ***MRI Physiological Signal Processing*** - new MRI Smart Amplifiers minimize artifact and Dual Channel Gating systems ensure reliable triggering for quality images
- ***Pulse Oximeters*** - human 18-321 bpm, veterinary 18-450 bpm
- ***Vibromyography*** - breakthrough technology for muscle monitoring
- ***Eye Tracking*** - turnkey systems for monocular or binocular eye movement data

See the full line of BIOPAC amplifiers, transducers, and accessories at

WWW.BIOPAC.COM

Power & Flexibility — No Programming Required

The Acq*Knowledge* software included with each MP System is a highly interactive, user-friendly application with intuitive controls that let users instantly view, measure, analyze, and transform data. Perform complex data acquisition, triggering, and analysis using simple drop-down menus and dialogs — no need to learn a programming language or new protocol to get powerful, report-ready results!

Record and analyze physiological, behavioral, and subjective response data. Apply analysis automation tools to save hours (or days!) of processing time and standardize analysis procedures. Analysis routines score and mark the data file. Easily annotate the graph. Output multiple file formats including Acq*Knowledge* graph, Excel®, MATLAB®, text, and more!

Use with an MP150 or MP36R Research System.

MP150 — 16 channel system supports 20+ amplifiers / stimulator

MP36R — new four-channel system with built-in universal amplifiers can record a wide range of physiological signals

Acq*Knowledge* supports multiple hardware units — combine systems for more inputs... two MP150s for up to 32 channels, three MP36Rs for up to 12 channels, etc.

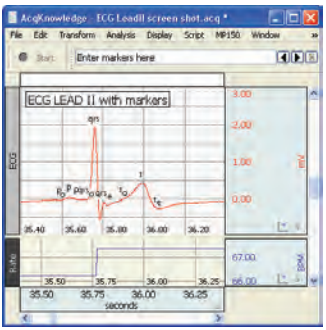
Acq*Knowledge* Software Enhancements

Rich Display Features — multiple display modes, advanced grid system, journal facility for note taking, spreadsheet table functionality in the journal, textual event marker, and measurement tools. Mouse-over tool tips guide application use.

MP150 Wizard — users are prompted to establish parameters as modules/transducers are added. Acq*Knowledge* detects potential channel conflicts between software assignment and the module channel switch setting and scales the signal to the correct value and units.

Video and Sound Interface — Use USB or Firewire connected cameras for frame-by-frame synchronization and control features. Place the cursor in Acq*Knowledge* data to advance the movie frame or select a movie frame to advance/locate data (Windows 7 or Vista only).

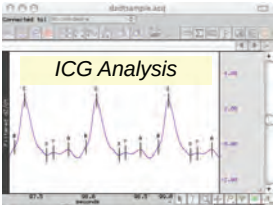
User Interface Enhancements — MP150 Help Button, Transformation history/cancel/progress options, Event tools & label drawing enhancements, customization options for chart track dividers/ Transform toolbar/Analysis toolbar, Tooltip improvements, toolbar retention, and more!



Plus — Remote Monitor (page 4); Analysis Automation (page 3); B-Alert X10 (page 6)

Analysis Automation & Scoring Tools

AcqKnowledge software is included with BIOPAC Research Systems and provides comprehensive tools to simplify & standardize advanced analysis.

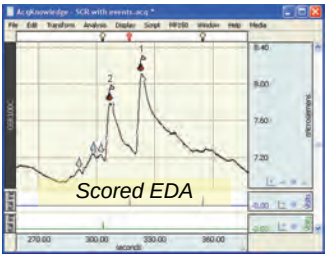


ECG
Detect and Classify Heartbeats; Locate ECG Complex Boundaries; Heart Rate Variability; Chaos Analysis—Detrended Fluctuation Analysis; Optimal Embedding Dimension; Optimal Time Delay; Plot Attractor; Correlation Coefficient; ECG Interval Extraction

EEG
Compute Approx. Entropy; Delta Power Analysis; Derive Alpha-RMS; Derive EEG Frequency Bands; EEG Frequency Analysis; Remove EOG Artifacts

EGG
Gastric wave analysis; Gastric wave coupling

EMG
Derive Avg. Rectified EMG, Derive Integrated EMG; Derive RMS EMG; EMG Frequency & Power Analysis; Locate Muscle Activation



EDA
Derive Phasic EDA from Tonic; Event-related EDA Analysis; Locate SCRs

Impedance Cardiography
Adaptive template matching; C point location; Body Surface Area; Ideal Body Weight; ICG Analysis; VEPT; PEP Pre-ejection Period; dZ/dt from Raw Z; dZ/dt Classify B, C, X, Y, and O Points; dZ/dt Remove Motion Artifacts

Respiration
Compliance & Resistance; Penh Analysis; Pulmonary Airflow

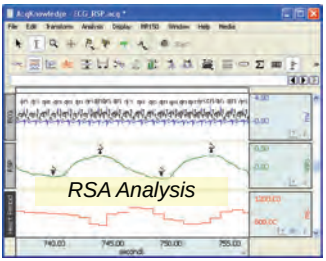
Hemodynamics
Classify ABP, LVP, and MAP; Arterial BP; Left Ventricular BP; Monophasic Action Potential; Respiratory Sinus Arrhythmia

Neurophysiology
Amplitude Histograms; Classify Spikes; Avg. Action Potentials; Dwell Time Histograms; Generate Spike Trains; Locate Spike Episodes; Find Overlapping Spike Episodes; Set Episode Width & Offset

MRI
Artifact Frequency Removal; Artifact Projection Removal; Median Filter Artifact Removal; Signal Blanking; Slew Rate Limiter

Stimulus Response
Digital Input to Stim Events; Stim-Response Analysis

Specialized Automation
Ensemble Average; Epoch Analysis; Principal Component Denoising; Remove Trend; Spectral Subtraction; Waterfall Plot; Wavelet Denoising



Acq*Knowledge* — Standard Analysis Tools

Cycle/Rate Detector
Digital Filters
FFT & PSD
Histogram
Expression Evaluator
AR Time-Freq Analysis
Principal Component Analysis
Independent Component Analysis
Plotting options - 3D, overlap, X/Y
Autoregressive Modeling
Nonlinear Modeling
Template Analysis
Wavelet Analysis (DWT)
Fourier Linear Combiners

Do it your way... BIOPAC Developer tools give you greater access to your data and developer tools for customization.

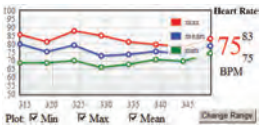
BIOPAC Basic Scripting

Consolidate many tasks into one automated routine that eliminates the potential for human error with a BIOPAC Basic Script. Significantly reduce analysis time and improve consistency by standardizing procedures. Use BIOPAC Basic Scripting to customize the display and simplify the user interface.

Customize – Acquisition setup and analysis, include user prompts to guide tasks
Automate – Create fully automated analysis routines & combine complex tasks
Expedite – Reduce analysis time and publish faster
Quality – Improve results with greater consistency

Acq*Knowledge* is very intuitive and has a wide range of tools for filtering, transforming, measuring and analyzing the data, but performing the same task on multiple files can become very tedious. Use a script to eliminate repetitive and monotonous tasks that lead to errors and shortcuts that compromise results. Scripts are easily created within Acq*Knowledge* and do not require programming experience, but a familiarity with scripting will certainly help. Support packs available.

Remote Monitor



Simplified view of subject data on another computer or mobile device. Convenient "bedside monitor" displays trend data and current data to track the welfare of subjects and offers alarms to warn when signals fall out of range. Remote Monitor works on any device that has access to the same IP based network as the MP150.

Real-Time Network Data Transfer (NDT)

The new NDT license integrates network data transfer functionality with the existing Acq*Knowledge* environment for applications that require real-time subject feedback. NDT allows 3rd-party applications to tap into the data stream generated by the MP unit and Acq*Knowledge* during acquisitions and provides basic controls to query and control the Acq*Knowledge* application state. Networking facilities allow for integration into a distributed application environment.

API for Hardware & Software

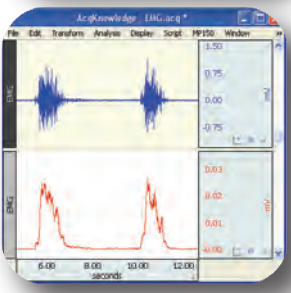
Windows only — Developer tools to control BIOPAC MP150 and MP36R acquisition units and File Format library to identify and parse information in BIOPAC's ACQ binary file format.

New! BioNomadix from BIOPAC

Powerful Dual-Channel Wireless Physiology Monitoring

- All the benefits of wireless with the signal quality & integrity of a wired system
- Comfortable for subjects, empowering for researchers
- Full-bandwidth, high-quality data

Electrocardiogram	Respiration
Electroencephalogram	Temperature
Electrogastrogram	Pulse
Electromyogram	Tri-Axial Accelerometry
Electrooculogram	Gyroscope
Electrodermal Activity	
Impedance Cardiography	



Dual-channel BioNomadix amplifiers include a wireless transmitter and receiver for either two of the same signal or a combination of signals.

Acq*Knowledge* software adds the power of sophisticated automation and scoring routines for each signal type, plus customization options.

BioNomadix are optimized for specific signal types. You don't have to adjust settings on the hardware or software for high-quality data suitable for advanced analysis, such as heart rate variability.

BioNomadix is the perfect tool for applications that demand greater degrees of subject freedom and complex experimental design. The unhindered setup significantly improves the quality of the data, and makes it much easier for subjects to respond naturally.

Use BioNomadix with single or multiple MP150 systems or with third-party data acquisition hardware via the isolated power supply module (IPS100C).

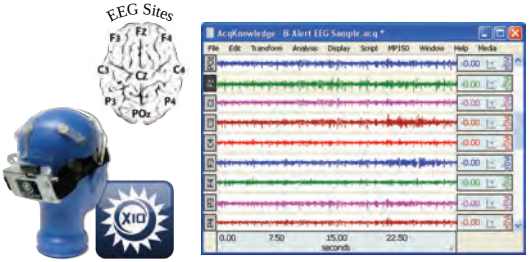
VIDEO DEMO
ONLINE!
BIOPAC.COM

Request your complete BioNomadix catalog!

B-Alert X10

B-Alert X10 provides wireless acquisition of 9 channels of high fidelity EEG plus ECG

AcqKnowledge adds powerful analysis tools, including automated scoring and reporting options

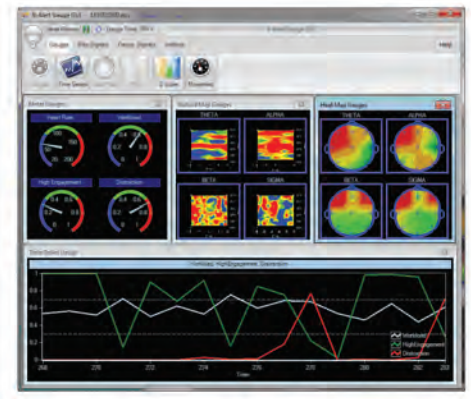


- Comfortable and nonintrusive—set up in less than 5 minutes!
- Patented real-time artifact decontamination
- Automated EEG analysis routines for filtering & displaying EEG frequency bands, removing EOG artifacts, and performing a complete frequency analysis
- Multiple options for data synchronization with up to six simultaneous subjects
- Real-time cognitive state metrics add-on available for engagement, confusion/distraction, drowsiness, workload, and stress
- Neurocognitive assessment of susceptibility to effects of sleep deprivation & apnea

Cognitive State Metrics

For real-time monitoring of subject fatigue, stress, confusion, engagement and workload, add the B-Alert Cognitive State software with proprietary metrics to classify data from B-Alert Wireless EEG systems. The GUI intuitively represents both the raw and processed data for greater clarity and understanding.

Easy-to-read B-Alert dashboard facilitates analysis and is fully customizable:
- Gauges display B-Alert's highly validated second-by-second metrics
- Heat maps display EEG power spectral densities (PSD) for the traditional Hz bands



GAUGES
Engagement, Workload, Drowsiness, Heart Rate

HEAT MAPS
Spatial & Temporal EEG PSD
Beta, Alpha, Theta, Sigma

Real-time GUI displays B-Alert Cognitive State gauges with timeline, as well as EEG heat maps and spectograms

Runs on Windows 7 or XP.

*f*NIR Lab-ready Optical Brain Imaging

NEW Functional Near Infrared Systems to Study Brain Activity

Emerging *f*NIR technology monitors cortical hemodynamic changes to brain activation and provides objective real-time response data. ***Request a demo!***

Noninvasive, safe, and portable functional near infrared spectroscopy.

Measure oxygen level changes in the prefrontal cortex of human subjects.

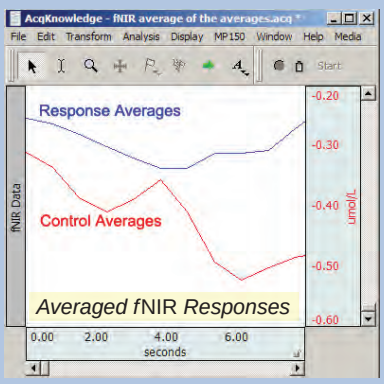
Monitor hemodynamic changes that occur during cognitive tasks in real-life environments.

- ***Convenient setup!*** Headband has sources and detectors that provide oxygenated and deoxygenated hemoglobin values.
  Adult sensor: Four sources and 10 detectors provide 16 channels ***RXFNIR***
  Pediatric sensor: One source and two detectors provide 2 channels ***RXFNIR-PED***
- **Applications include:** Human Performance Assessment, Neuro-rehabilitation, Brain Computer Interface, Pain Assessment, and VR – Immersive Environments.
- Combine *f*NIR data with signals from BIOPAC's data acquisition systems, such as ECG, EEG, cardiac output, respiration, blood pressure, and electrodermal activity.

The *f*NIR system provides researchers with real-time monitoring of tissue oxygenation in the brain. It allows researchers to quantitatively assess brain functions—such as attention, memory, planning, and problem solving—while individuals perform cognitive tasks.

*f*NIR is a powerful near-infrared spectroscopy imaging tool for in-lab cognitive tests. This technique measures NIR light absorbance in blood of hemoglobin with and without oxygen and provides information about ongoing brain activity similar to functional MRI studies. It eliminates many of the drawbacks of *f*MRI and provides a safe, affordable, noninvasive solution for cognitive function assessment.

AcqKnowledge Software



Isolated Linear Stimulator *STMISOL*

Constant Current or Constant Voltage Isolated Linear Stimulator
Modes: Voltage or Current (unipolar or bipolar)
Output unipolar or bipolar arbitrary waves such as pulse (single or train), square, sine, triangle, exponentially decaying, modulated envelopes, and fully user-specified types. Connect to any analog output signal drive (±10 V input), including an MPI50 system.

Haptic (Tactile) Stimulation Transducer *TSD190*

The Haptic Transducer connects to the STM100C stimulation module and uses an electromagnetically actuated plunger to mechanically stimulate a 1.5 mm diameter area of skin surface. Plunger activation force, width of stimulus pulse, and pulse repetition rate are set in Acq*Knowledge*.

Stimulus Presentation Packages

E-Prime Stimulus Presentation Systems

Stand-alone systems measure subject responses to visual or auditory stimuli. Stimulus Presentation Systems include E-Prime 2.0 Professional or Standard experiment generator and an Isolated Digital Interface (STP100C) with cables to work with a BIOPAC MP System.

E-Prime Experiment Generator

Professional or standard software versions available.

Programmable Electrical Stimulation System for E-Prime

Interface the Constant Current or Constant Voltage Isolated Linear Stimulator (STMISOL) with E-Prime to control the stimulus frequency and stimulus intensity for real-time stimulus delivery changes based on a subject's responses.

SuperLab Stimulus Presentation Systems

Stand-alone systems measure subject responses to visual or auditory stimuli. Stimulus Presentation Systems include SuperLab 4 and an Isolated Digital Interface (STP100C) with cables to work with a BIOPAC MP System.

StimTracker — Stimulus Presentation Marker Interface

StimTracker universal marker interface works with your existing SuperLab software to provide digital trigger marks. Connects via USB and includes two photocells for precise event marking. Requires one Isolated Digital Interface (STP100C).

SuperLab & StimTracker — Stim Presentation Marker System

Provides digital trigger information from SuperLab to Acq*Knowledge*. Systems include SuperLab, StimTracker, and an Isolated Digital Interface (STP100C) with cables to work with a BIOPAC MP System.

Max/MSP/Jitter Interface *MAXACQ-M*

Permits data collection into Max/MSP/Jitter from MP Systems for Mac (MP150WS or MP36RWS) via Network Data Transfer protocol; compatible with Mac OS X 10.5-10.6.

Noninvasive Automated BP

Noninvasive Blood Pressure Monitoring System

Real-time, continuous, noninvasive blood pressure

- Accurate noninvasive blood pressure values
- Comfortable for subjects to wear
- Set up & calibrate in less than three minutes
- Suitable for small children (~4-5 years) to large adults

The ***NIBP100D*** provides a continuous, beat-to-beat, blood pressure signal recorded from the fingers of a subject — uses a double finger cuff that is comfortable for the subject to wear and easy to place on the hand. The cuffs (included with system) come in three sizes. The system outputs a continuous blood pressure waveform that is similar to a direct arterial pressure waveform and displays values for systolic, diastolic, mean blood pressure, and heart rate.

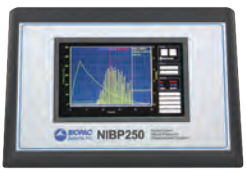
Noninvasive Blood Pressure for MRI

Wireless and noninvasive physiological monitoring system

- Track blood pressure using Pulse-Decomposition Analysis (PDA) technology.
- The system provides relative, real-time, beat-to-beat pressure measurement values during magnetic resonance imaging.

The ***NIBP-MRI*** operates passively at a low constant coupling pressure of 40 mmHg. After being provided a calibrated blood pressure reading, the device tracks blood pressure by analyzing the timing and amplitudes of the primary left ventricular ejection pulse as well as the arterial pulse reflections, at the upper arm. The system runs on a computer using Windows OS and sends analog signals back to a BIOPAC MP Device or third-party A/D converter. Add ***NIBP-MRI-SPLINT*** to hold arm in optimal position.

Small Animal Tail Noninvasive Blood Pressure Measurement



tail cuff sensors for 9.5 mm to 13 mm

- ***NIBP250*** Touchscreen LCD controls & displays data for local analysis and storage of systolic, diastolic, and mean BP values. Use as a stand-alone system or interface to BIOPAC or third-party A/D hardware.
- ***NIBP200*** Interface to BIOPAC or third-party A/D hardware and computer

Both systems provide two analog outputs: pressure and pulse. Systems incorporate a built-in pump that automatically inflates the blood pressure cuff to occlude the vessel in the tail of a rat or similar small animal. Once the pump reaches the inflation point it deflates the cuff, providing a linear drop in pressure. A single control runs both the inflation and deflation cycles, making the system very user-friendly. Systems include one cuff sensor, one restrainer, and interface cables. Optional heater and MRI-compatible sensors.

SpO_2 Measurement

- Measure beat-by-beat, blood oxygen saturation (SpO_2) level in a noninvasive fashion
- Output SpO_2, Pulse Wave, Pulse Rate, and Module status simultaneously

Amplifier Modules

Human SpO_2	18-300 BPM	***OXY100E***
Veterinary SpO_2	18-450 BPM	***OXY200***

SpO_2 Transducers

Human: Finger clip ***TSD124A***; Ear clip ***TSD124B***; Flex wrap ***TSD124C***
Veterinary: Reflectance ***TSD270A***; Wrap ***TSD270B***

OXY amplifier modules have built-in calibration for a simplified setup procedure that permits easy scaling of all these signals when used with an MP System. The OXY modules operate in accordance to the principles outlined by the Beer-Lambert law. This is an empirical relationship that relates the absorption of light to the properties of the material through which the light is traveling.

The SpO_2 transducers incorporate light-emitting diodes (LEDs) which face photodiodes through a translucent part of the subject's body. One LED is red (wavelength of 660 nm) and the other is infrared (approximately 910 nm). Light absorption at these wavelengths is different between oxyhemoglobin and its deoxygenated form.

Optional module extension cable adds 3 meters. ***OXY100E-200 EXT***

Eye Tracking Systems

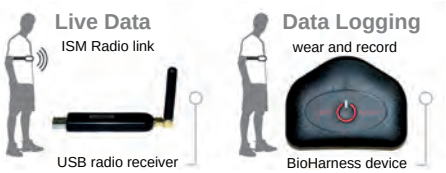
A range of solutions for fixed head, moveable head, scene camera, and head mounted display (HMD) applications. Use with existing HMD1, HMD2, or 3rd-party HMDs for stimulus presentation, VR environments, and other media. Systems are binocular or monocular and include cables and analog outputs required to interface to BIOPAC data acquisition systems or 3rd-party A/D converters.

Fixed Head System	***EYEFIXBINO***	or	***MONO***
Fixed Head System with Clamp	***EYEFIXBINOCLAMP***	or	***MONOCLAMP***
Frame Mounted Scene Camera	***EYEFRAMESCENEBI***	or	***MO***
Moveable Head System for HMD1	***EYETRAKHMD1BINO***	or	***MONO***
Moveable Head System for HMD2	***EYETRAKHMD2BINO***	or	***MONO***
Moveable Head System for 3rd-party HMD	***EYETRAKHMD3RDBI***	or	***MO***

Multi-parameter Telemetry & Logging

BioHarness™ with Acq*Knowledge*®

Eliminate complex setup, maximize subject comfort & data quality
Smart Fabric sensor technology | Lightweight transmitter | Wireless



State-of-the-art lightweight portable biological data logger and telemetry system. Easily attach the BioHarness™ strap to subjects and start collecting data in virtually any environment — from the lab to the sports field. Great for single or multiple subject applications.

BioHarness maintains performance under extreme activity and offers fast, accurate collection and analysis of high-quality, in-depth data. Live data viewing features include a variety of selectable waveforms and trend data including ECG, heart rate, R-R values, respiration, respiration rate and depth, skin temperature, accelerometer (X, Y & Z), Activity level, and Posture (attitude of device in degrees from vertical).

TEAM Systems

TEAM Systems provide simultaneous real-time physiological monitoring for multiple subjects across a wide area. Each subject wears a BioHarness system that telemeters back to a TEAM central recording station.

- Simultaneous monitoring of up to 64 subjects
- Logging or Radio (RF) transmission
- Works under extreme activity
- Fabric-based, dry contacts—no skin breakdown
- Comfortable over long periods, washable
- Unobtrusive, light and small — no wires
- Multi-subject, color-coded tab display
- Detect ventilatory (anaerobic) threshold
- Fitness and fatigue using well known methods
  - – Heart Rate reduction at end of activity
  - – Anaerobic threshold detection
- Biomechanical markers give context (at rest vs. active)
- Individually configurable thresholds and bio alarm algorithms for prioritization
- Acq*Knowledge* 4 software with advanced analysis automation tools

VIDEO DEMOS
ONLINE!
BIOPAC.COM

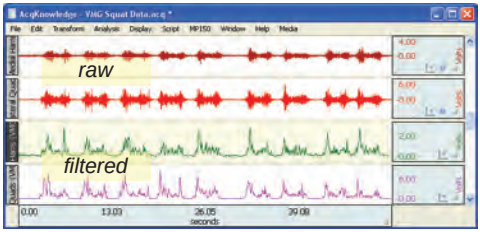
New Vibromyography Systems

Breakthrough Muscle Measurement Technology!

Use Vibromyography (VMG) to record vibration data received from precision accelerometers and proprietary software algorithms to capture muscle force data in real time.

VMG Benefits

- Ability to perform muscle balance assessments
- Convenient setup — no electrodes, no skin prep
- Improved reproducibility between muscles and individuals
- Measure absolute muscle effort up to 100% of maximum voluntary contraction



Reliable and reproducible muscle effort recordings between muscles and across subjects

VMG provides extremely reproducible results and a major benefit is the ability to perform muscle balance assessments.

VMG systems use sensitive accelerometers, about the size of a quarter, and advanced signal analysis algorithms to monitor muscle vibration. The technique allows researchers to study muscle performance and strength balance. Accelerometers record the small vibrations that occur when the muscle is activated and Acq*Knowledge* software extracts the vibrational components that correlate with the effort generated by the muscle being studied. Acq*Knowledge* includes automated VMG analysis filters to simplify the analysis process.

Vibromyography Systems

Complete systems for muscle monitoring using Vibromyography include an MP data acquisition and analysis system with VMG analysis filters and VMG transducers. Add transducers to extend up to 16 channels. *WSW for Windows, WS for Mac.*

VMG System	2-Channel	4-Channel
with MP150 System	***VMG102WSW*** or ***WS***	***VMG104WSW*** or ***WS***
with MP36R System	***VMG36R2WSW*** or ***WS***	***VMG36R4WSW*** or ***WS***

Transducer & License Packs *for existing MP System users*

Add to compatible BIOPAC data acquisition system; HLT100C also required.

Large Muscle Vibromyography Transducer	***TSD250***
Facial Muscle Vibromyography Transducer	***TSD251***
VMG Transducer & License for MP150	***VMG150PACK-W*** or ***-M***
VMG Transducer & License for MP36R	***VMG36RPACK-W*** or ***-M***

Physiology in the MRI

BIOPAC provides physiological data acquisition and analysis systems specifically for human and small animal MRI life science research applications.

BIOPAC offers data acquisition systems, MRI Smart Amplifiers, transducers, stimulus options, electrodes, and leads with advanced software tools for safe data collection, subject monitoring, and clean physiological signals in the MRI environment.

MP Systems and amplifiers are placed in the MRI Control Room, and specialized cable systems optimize data quality with isolated and RF filtered interfacing between the subject/MRI Chamber and the Control Room. Filter leakage currents and dielectric isolation satisfy IEC60601-1.

MRI-Compatible Amplifiers & Transducers

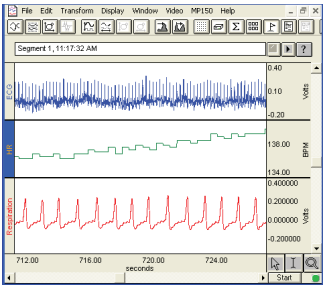
Solutions for Human & Animal Studies

Biopotentials
ECG, EEG, EGG, EMG, EOG
Airflow
Respiratory Gas Analysis
CO_2 ($ETCO_2$) and O_2
Blood Pressure
Micro Pressure Measurement
Electrodermal Activity (EDA)
Force
Gating Units (Trigger/Synch)
Respiration
Temperature
Pulse
Stimulation
Laser Doppler Flow
Differential Pressure
Subject Feedback
finger twitch
pressure-based signals
grip strength

Request the MRI Catalog Today!

MRI Smart Amplifiers

Record high-quality physiological data in the MRI



Features

- Less sensitivity to electrode and transducer lead placement
- Improved gain selectability
- No missing spectra in physiological signal frequency band
- No requirement for acquisition oversampling
- Minimized computer-based real-time or post-processing signal processing
- Clean data available as real-time analog output

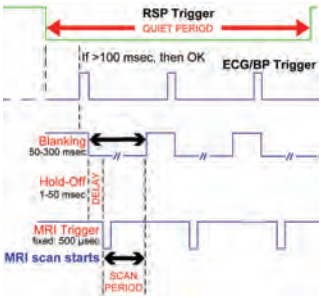
Advanced signal processing circuitry removes spurious MRI artifact from the source physiological data. Signal processors are able to distinguish between physiological signal and MRI artifact as manifested by gradient and RF power switching during MRI sequences, such as echo planar and spiral imaging. Record physiological signals at the normal (non-MRI) rate and eliminate the need for secondary computer-based processing steps to remove artifact. In every aspect, data recording is easier and final results are cleaner when using MRI Smart Amplifiers to record physiological data in the fMRI/MRI.

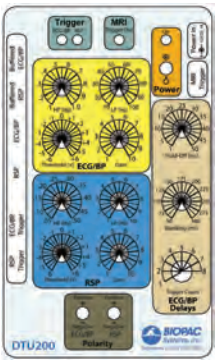
ECG100C-MRI EMG100C-MRI EEG100C-MRI EDA100C-MRI PPG100C-MRI

Watch demo videos at BIOPAC.COM

Improve MRI image quality with Dual Channel Gating Systems

The DTU system sends cardiac trigger pulses to the MRI when a respiration signal is in the quiet phase. Pre-processing filters and gain controls further refine the quality of the signal and ensure reliable triggering.





Gating systems require two analog input signals:

Cardiac Signal

Electrocardiogram Smart Amplifier (***ECG100C-MRI + MECMRI-BIOP***) or Micro Pressure System (***MPMS100A-1 + TSD173A/B***)

Cardiac Phase: The ECG or blood pressure signal passes through a user-selectable threshold in both directions and creates a square wave (0-5 V) cardiac trigger signal.

Respiration Signal

Small animal respiration pad transducer (***TSD110-MRI + DA100C***) or Human respiration transducer (***TSD201 + RSP100C + MECMRI-TRAN***)

Respiration Phase: The respiratory signal passes through a threshold to create a square wave when the signal crosses the threshold in both directions. The quiet period is the interval between rising and falling edges or falling and rising edges.

MRI Trigger Output

The MRI trigger channel only outputs a cardiac trigger when the respiration trigger channel goes into the quiet period, which occurs when the subject is between breaths and still. Onboard Hold-Off, Blanking, and Monitoring improve trigger precision. The system will output a precise number of cardiac triggers between each respiratory period by adjusting the trigger count control (1-8). Buffered outputs for the cardiac and respiration conditioned signals are BNC outputs ±10 V. The respective triggers are TTL 0-5 V. Seven BNC to 3.5 mm monitoring cables (CBL102) are included.

Cardiac/Respiratory Gating Units

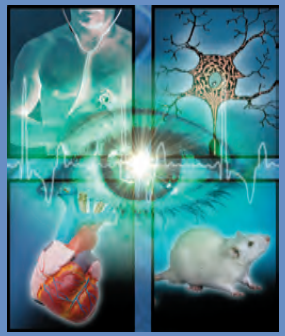
Small Animal MRI Gating ***DTU200*** Human MRI Gating ***DTU300***

Complete Gating Systems

Complete systems include an MP150 data acquisition & analysis system, cardiac/respiratory dual channel gating unit, and appropriate amplifiers, transducers, cables, electrodes, and leads:

Gating System with Electrocardiogram Amplifier ***GATE-CARDRESP-E***
Gating System with Micro Pressure Measurement System ***GATE-CARDRESP-B***

New Solutions



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- Gating Systems for MRI
- MRI Smart Amplifiers

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