BIONOMADIX

Wireless, Wearable Physiology Monitoring

For the Life Sciences

CATALOG

- Full-bandwith, high-quality data for a wide range of signals
- Comfortable for the subject and empowering for the researcher
- Use for in-lab or real life studies, including active or long-term protocols

NEW!
LOGGER
&
BIOSHIRT

BIOPAC® Systems, Inc.
Registered to ISO 9001:2008

COMPLETE SYSTEM SOLUTIONS FOR HUMAN RESEARCH

BIOPAC Systems, Inc.

EXPERIENCE THE FREEDOM OF DISCOVERY

BIONOMADIX

Advanced Wireless, Wearable Solutions for Noninvasive Physiology Measurement

Exercise Physiology	**Psychophysiology**	**Cardiology—HRV**
Biomechanics	**Neuromarketing**	**Evoked Response**

Dual-Signal Wireless Transmitters for Life Science Data

ECG	**EDA**	**EEG**
EMG	**EOG**	**EGG**
Respiration	**Accelerometry**	**Cardiac Output**
Temperature	**Heel & Toe Strike**	**Clench Force**

Use with MP160 System Matched Receiver or Logger

Record Great Physiology Data Where, When, and How You Want

BioNomadix Module Sets

Matched Transmitter/Receiver sets deliver data in a wireless system

- Wireless, wearable physiology anywhere
- Small & unobtrusive
- Reduces cables for greater flexibility
- Record from multiple subjects without interference

BioNomadix BioShirt

Sensing shirt transmits ECG and Respiration data

- Quick set up—no messy leads or gels!
- Natural responses—Unobtrusive transmitter placement lets participants move freely
- Lightweight and comfortable
- Great for short or long-term studies

BioNomadix Logger

Wirelessly record great data in the real world

- Get great physiological data while participants live their lives
- Built-in color display, speaker, vibration, voice journal, event markers, alarms, and accelerometer for activity info
- Perfect tool for applications that demand greater degrees of subject freedom and complex experimental design
- Add GPS tracking and synchronize with subject's audio

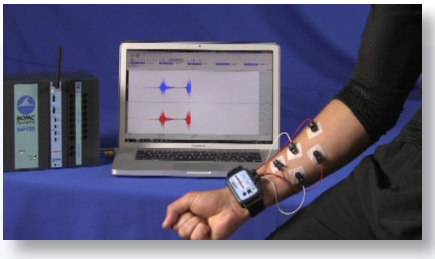
BioNomadix with AcqKnowledge deliver the quality data your research demands

BioNomadix high-fidelity wireless recording and Acq*Knowledge* software provide a powerful, complete, wireless solution that supports advanced analysis for applications and measurements for a variety of physiological parameters, including: EDA, Heart rate, respiration rate, Heart rate variability (HRV), Respiratory Sinus Arrhythmia (RSA), etc. Combine BioNomadix data with other signals for a comprehensive analysis of the participant's experience—GPS, Eye Tracking, Video, etc.

Unlock the Power of BioNomadix

Physiology where, when, and how you want

The BioNomadix® system of wearable wireless devices delivers the freedom to discover the data the researcher desires, in the environment and at the scale of the researcher's choosing, with the quality scientific research demands, and an unparalleled ease of use for both researcher and subjects.



Record great wireless data in the lab and in the real world!

The latest generation of BioNomadix Transmitters can operate with the BioNomadix Logger or a matched BioNomadix Receiver to noninvasively record full signal bandwidth physiology data (existing Transmitters require a firmware update for Logger capability).

Dual-Signal Transmitters

ECG	Respiration
EEG	Temperature
EMG	Cardiac Output
EOG	Heel & Toe Strike
EGG	Clench Force
EDA	Accelerometer
Pulse	Goniometry

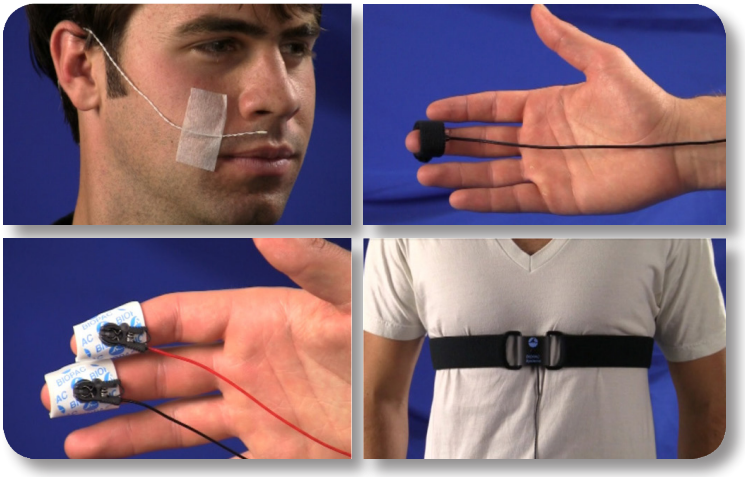
Complete Platform

The new Logger allows participants to wear BioNomadix devices and live their lives while it records the data that your research demands. Record subjects' data, including activity, using BioNomadix transmitters and track them with GPS while they also record their personal synchronized audio notes and mark events of interest.

Focus on the science

The BioNomadix Logger features a small form factor, simple to attach, rugged construction. Recieve in-lab telemetry and out-of-lab logging. Easy setup and interface with Acq*Knowledge*® software and MP160 systems. The unhindered setup significantly improves the quality of the data and makes it much easier for subjects to respond naturally.

BioNomadix is the next generation of quality BIOPAC research systems

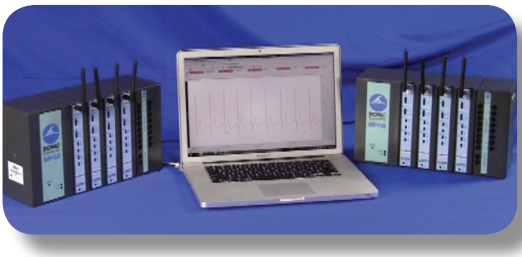


BioNomadix is the perfect tool for applications that demand greater degrees of subject freedom and complex experimental design!

Acq*Knowledge* software displays, controls, analyzes, replays, and exports BioNomadix data in one convenient program. Plus, Acq*Knowledge* provides the power of sophisticated automation and scoring routines for each signal type, and customization options.

When used with a BIOPAC MP System, up to 16 channels of BioNomadix® data can be recorded for multi-subject or multi-parameter protocols. The system also works with multiple MP160 systems or third-party data acquisition hardware via an isolated power supply module.

BioNomadix accessory items include transducers, electrode leads, straps, and shirts. The new BN-BIOSHIRT contains a respiration sensor and fabric electrodes to simultaneously acquire Respiration and ECG data from freely roaming participants, and for multi-sensor protocols, the pocketed, stretch-mesh BN-SHIRT comfortably holds multiple devices.



Record BioNomadix data with one or multiple MP Systems, Logger, or 3rd-party hardware

Your Total Solution — with Powerful Analysis Tools!

For greater freedom, use BioNomadix wireless physiology with a BIOPAC Research System

Combine the sophistication and performance of BIOPAC data acquisition hardware with the power and flexibility of Acq*Knowledge* software to customize your acquisition and analysis system for life science research.

MP160 data acquisition system

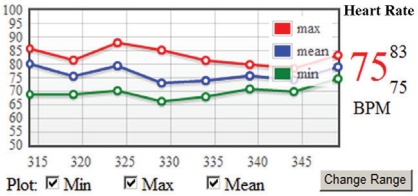
- High resolution — 16 bit
- High speed — up to 400 kHz aggregate
- Variable sample rates (analog & calculation channels)
- 16 analog inputs and 2 independent analog outputs
- Digital I/O lines (receive/send TTL triggers)
- 16 online calculation channels
- Ethernet connectivity — fast and efficient
- Safety

ACQKNOWLEDGE

The Acq*Knowledge* software included with each MP System is a highly interactive user-friendly application with intuitive controls to instantly view, measure, analyze, and transform data.

Perform complex data acquisition, triggering and analysis using simple pull-down menus and dialogs — no need to learn a programming language or new protocol.

- ***Acquisition Features*** — variable sample rates, pause mode, and stimulation design and control. Online analysis settings, filters and transformations provide real-time recording feedback.
- ***Rich Display Features*** — multiple display modes, advanced grid system, journal facility for note taking, textual event markers, and measurement tools. Mouse-over tool tips (for sample rate, channel rate, measurement results, etc.) help guide application use.
- ***Automated Analysis Routines*** — save time and standardize intrepretation of results with scoring and analysis routines for ECG, HRV, EDA, EMG, EEG, ICG, BP, LVP, Pulmonary Function, and more!
- ***BIOPAC Developer*** — Customize and automate your analysis routines with new Developer tools including BIOPAC Basic Scripting, Network Data Transfer, or API.
- ***Analysis Features*** — signal averaging, sophisticated pulmonary integration routines, filtering, FFT, histogram, automatic data reduction, template analysis, peak detection features, find rate settings, and an equation generator
- ***Remote Monitor*** — view subject data on another machine – bedside monitor display. Simplified user interface tracks the welfare of the subject with alarms to warn when signals fall out of range. The system will work on any device that has access to the same IP based network as the MP160 or MP150.



- ***Multi-media Support Tools*** — videos for analysis, automation routines, hardware setup, and scripting; real-time, searchable user guides and application notes (PDF), as well as extensive online support, knowledge base, and training options. Plus, Module Setup Wizard and QuickStart template files are included to make it even easier to start your experiment.

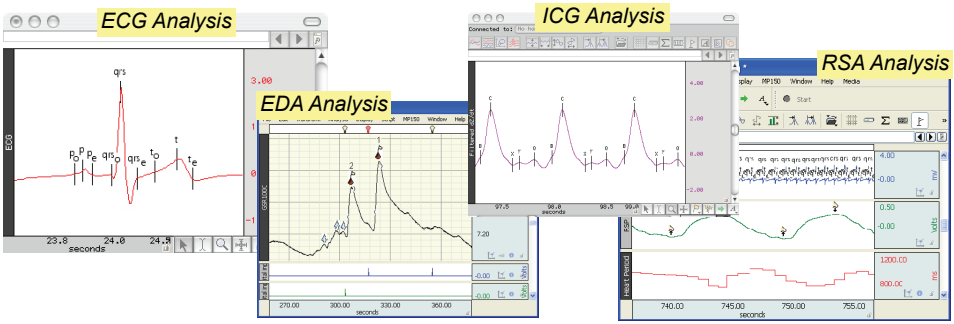
Download a free Acq*Knowledge* demo at www.biopac.com

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

Standard Analysis Tools

Cycle/Rate Detector	Expression Evaluator	Autoregressive Modeling
Digital Filters	Ensemble Averaging	AR Time-Freq Analysis
FFT & PSD	Template Analysis	Independent Component Analysis
Histogram	Wavelet Analysis	Principal Component Analysis
Stim-Response	Nonlinear Modeling	Plotting options - 3D, overlap, X/Y

Automated Advanced Analysis



ECG - Electrocardiography
- ECG Interval Extraction
- Heart Rate Variability
- Chaos Analysis
- Detect & Classify Heartbeats

EEG - Electroencephalography
- Compute Approximate Entropy
- Delta Power Analysis
- Derive Alpha-RMS
- Derive EEG Frequency Bands
- EEG Frequency Analysis
- Remove Artifact - EOG/eye blink

EMG - Electromyography
- Derive Average Rectified EMG
- Derive Integrated EMG
- Derive Root Mean Square EMG
- EMG Frequency & Power Analysis
- Locate Muscle Activation

EDA - Electrodermal Activity
- Derive Phasic EDA from Tonic
- Event-related EDA Analysis
- Locate SCRs

NICO - Impedance Cardiography
- Derive dZ/dt from Raw Z
- Classify dZ/dt : B, C, X, Y, and O
- Remove dZ/dt Motion Artifacts
- ICG Analysis
- VEPT (electrically participating tissue)
- PEP Pre-ejection Period
- Body Surface Area & Ideal Body Weight

RSP - Respiration
- Respiratory Sinus Arrhythmia

EGG - Electrogastrography
- Gastric Wave Analysis
- Gastric Wave Coupling

TUTORIALS

Watch dozens of tutorial screencasts and learn more online!

Comfortable for Subjects & Empowering for Researchers

Researchers can increase the complexity of experimental design and create complex, real-world scenarios.

- BioNomadix provides excellent signal quality with digital transmission and short leads placed close to the signal source.
- Eliminating the cables helps with sensitive study populations that don't like to be tethered.
- The small and unobtrusive nature of the BioNomadix helps to relax the subject and reduce stress and anxiety.
- For multi-subject applications, BioNomadix allows multiple devices to work seamlessly inside an enclosed area.
- The lightweight, comfortable BioShirt transmits ECG and Respiration data and delivers quick setup, great data, and long-term comfort.
- Subjects can freely move around without cables anchoring them to recording devices and the fear of tripping over other subject's cables.
- BioNomadix is small and easy to transport for offsite and home recording.
- The BioNomadix system scales extremely well, from limited-channel applications to multi-sensor studies.

Exercise Physiology Applications — BioNomadix allows a natural, unhindered environment, which significantly improves the quality of the data and makes it much easier for subjects to achieve peak performance.

No matter what your application, BioNomadix help provide a more natural, relaxed environment

BioNomadix work extremely well for protocols that demand movement, such as exercise physiology or virtual reality immersion studies

Psychophysiology Applications — the untethering of the subject and elimination of major cables greatly enhances the recording experience and helps to provide a relaxed environment for subjects.

In-lab telemetry and out-of-lab logging.

Full-bandwith Wireless Data

BioNomadix wearable, wireless solutions for life science data record and analyze a variety of physiological parameters in data logging or telemetry modes. Devices incorporate internal, non-distorting, highpass and lowpass filters to provide for high quality amplification of the complete waveform resulting in exceptional quality data. The signal is transmitted via an ultra-low power, 2.4 GHz bi-directional digital RF transmitter. The recording transmitter is extremely safe to use because there is no physical connection to supply mains. Interference with other recording modules or systems is greatly minimized because the module transmitter is completely battery operated and operates totally independently of any other recording grounds or power. Use with leads, electrodes, transducers, and accessories.

Logger BN-LOGGER

Each BioNomadix Logger can record from 1, 2, or 3 Transmitters plus the built-in Accelerometer for up to 10 channels of data. Wirelessly record from participants in a controlled lab environment or while they live their lives in the real world. Use as a stand-alone system with Acq*Knowledge* or combine with BioNomadix Module Sets.

Module Sets & Transmitters

BioNomadix Module Sets offer either two of the same signal or a combination of signals. Each paired set consists of a BioNomadix Transmitter that the subject wears and a matched Receiver module that connects to an MP System. Record up to 16 channels of BioNomadix data for multi-subject or multi-parameter protocols. Also works with multiple MP160/MP150 systems or third-party data acquisition hardware via an isolated power supply module (IPS100C).

Signals	*Module Set*	*Transmitter Only*
Dual ECG	BN-ECG2	BN-ECG2-T
Dual EEG	BN-EEG2	BN-EEG2-T
Dual EGG	BN-EGG2	BN-EGG2-T
Dual EMG	BN-EMG2	BN-EMG2-T
Dual EOG	BN-EOG2	BN-EOG2-T
Dual Respiration	BN-RSP2	BN-RSP2-T
Dual Skin Temp	BN-SKT2	BN-SKT2-T
Goniometry	BN-GONIO	BN-GONIO-T
Pulse+EDA	BN-PPGED	BN-PPGED-T
Resp+ECG	BN-RSPEC	BN-RSPEC-T
Heel/Toe	BN-STRIKE	BN-STRIKE-T
Clench-EMG	BN-DYNEMG	BN-DYNEMG-T
dZ/Dt	BN-NICO	BN-NICO-T
Accelerometry	BN-ACCL3	BN-ACCL3-T

Use with BioNomadix Wireless Transmitters

Dynamometry ***BN-CLENCH-XDCR*** Clench bulb dynamometer measures proporrionality of clench force to pressure on the bulb.

EEG Cap System ***BN-EEGCAP-SYS*** Cap system (19 electrodes, 10/20 montage) with accessories. Requires BN-ADAPT-TP2/TP3. BN-CAP-SIZE Small 50-54 cm, Medium 54-58 cm, Large 58-62 cm

Goniometry* ***BN-GON-110-XDCR, BN-GON-150-XDCR***

Twin-axis transducer with two separate outputs — measure flexion/extension and/or radial/ulnar deviation. Choose 110 mm or 150 mm.

BN-GON-F-XDCR Finger goniometer, 35 mm, measures polycentric joint movement.

Pulse ***BN-PULSE-XDCR, BN-PULSEEAR-XDR***

Infrared emitter and photo-diode transmit changes in infrared reflectance from varying blood flow; finger or ear.

Respiration ***BN-RESP-XDCR*** Measure changes in thoracic or abdominal circumference as subject breathes.

Strike ***BN-STRIKE-XDCR*** Record heel/toe strike activity as subject walks.

Temperature ***BN-TEMP-A-XDCR*** Skin temp - reponse time 1.1 sec. Stainless steel banjo design; tape to body.

Torsiometry* ***BN-TOR-110-XDCR, BN-TOR-150-XDCR***

Torsiometers measure axial rotation about a single plane. Choose 110 mm or 150 mm.

Adapters BN-GON/BN-TOR include required adapter(s) to interface with BioNomadix transmitter. To use existing BIOPAC or 3rd-party goniometers/torsiometers, order one ***BN-ADAPT-GONIO*** per channel.

Leads and Electrodes

Mini-pinch leads two-lead or three-lead in 15 cm, 30 cm, or 45 cm

BN-EL15-LEAD2 ***BN-EL30-LEAD2*** ***BN-EL45-LEAD2***

BN-EL15-LEAD3 ***BN-EL30-LEAD3*** ***BN-EL45-LEAD3***

EDA leads 2 x 15 cm or 2 x 25 cm, use with disposable EDA electrodes

BN-EDA-LEAD2 ***BN-EDA25-LEAD2***

NICO leads 50 cm clip leads - 2 x alligator or 4 x mini-pinch

BN-EL50-LEAD2 ***BN-EL50-LEAD4***

Touchproof adapters 15 cm, sockets accept TP leads

BN-ADAPT-TP2 (+, -) ***BN-ADAPT-TP3*** (+, -, GND)

Disposable electrodes vinyl or cloth, pre-gelled or dry ***EL500 series***

Shirts

Sensing Shirts ***BN-BIOSHIRT-SIZE***

BioShirts provide simultaneous ECG and Respiratory signals from sensors that are fully integrated into the shirt's textile structure; use with BN-RSPEC-T Transmitter and paired Receiver or Logger (separate purchase)—shirt pocket holds transmitter. Comfortable shirts can be worn under clothing. Ideal for exercise and long-term studies.

FXS 69-73 cm (27.1-28.7 in)	MS 82-86 cm (32.2-33.8 in)
FS 73-77 cm (28.7-30.3 in)	MM 86-90 cm (33.8-35.4 in)
FM 77-81 cm (30.3-31.9 in)	ML 90-94 cm (35.4-37.0 in)
FL 81-85 cm (31.9-33.5 in)	MXL 94-98 cm (37.0-38.6 in)
FXL 85-89 cm (33.5-35.0 in)	MXXL 98-102 cm (38.6-40.1 in)

Shirt ***BN-SHIRT-size (XS, S, M, L, XL)***

When multiple transmitters are used, this custom stretch-mesh shirt provides a greater degree of comfort and mounting flexibility. Pockets, zippers and bands help to place and hold transmitters. Select size for compression fit to hold the BioNomadix transmitter and sensors in place; wear as is or under clothing.

Accessories

Straps ***BN-STRAP-size (20, 33, 76, 137 cm)***

Each system includes a strap for common signal type applications. Additional straps are available to fit wrist, head, leg, chest, etc. (sized in cm: BN-STRAP-20 is 20 cm).

Chargers ***BN-BAT-CHRG*** for Transmitters ***BN-LOG-CHRG*** for Loggers

Transmitter charger typically provides full charge (70-90 hrs) in one hour; 500 cycles. Logger charger typically reaches full charge (24 hr acquisition, 30 day standby) in 12 hrs.

Table 1: BioNomadix Logger & Logger Charger

BN-LOGGER	BioNomadix Logger
Transmitter:	Ultra-low power 2.4 GHz bi-directional digital RF transmitter
Rate:	2 kHz, maximum Screen: Color, 6 cm diagonal
Operational range:	1 meter (line of sight, approx.)
Memory:	8 GB
Battery:	1800 mAh Lithium-ion
Weight:	121.2 grams
Dimensions:	9.42 cm x 5.76 cm x 2.3 cm
Compliance:	FCC, CE, IC, - FCC Part 15 B - FCC ID: ZWIBNXT1, IC: 9901A-BNXT1
BN-LOG-CHRG	Logger Charger
Charger style:	Integrated USB charger with AC wall adapter
Operating time:	acquisition 24 hours; standby ~30 days
Time to full charge:	~ 12 hours

Table 2: Common BioNomadix Specs—Receiver Modules & Transmitters

Operational Range:	10 meters (line-of-sight) typical in standard laboratory setups See also: *Operational Range and Characteristics*
Delay:	Fixed latency 15.6 ms and small variable component ±0.5 ms RMS
Temp & Humidity:	Operating Temperature: 5-45° C Humidity: 95% non-condensing
Size & Weight:	Transmitter (approx.): 6 cm x 4 cm x 2 cm 54 grams Receiver (approx.): 4 cm x 11 cm x 19 cm 380 grams
Transmitter:	Type: Ultra-low power, 2.4 GHz bi-directional digital RF transmitter Rate: 2,000 Hz (between transmitter and receiver)
Receiver Power:	Use with an MP Research System or with isolated power supply IPS100C for 3rd-party data acquisition system.
Battery:	BioNomadix transmitters use an L-ion battery: full charge takes ~1 hour to provide maximum operating time.
Transmitter Charger:	A battery charger is included with each module pair. See BN-CHARGER for charge time and recharge cycle details.
Compliance:	FCC, CE, IC, - FCC Part 15 B - FCC ID: receiver: ZWIBNXR1, transmitter: ZWIBNXT1 IC: receiver: 9901A-BNXR1, transmitter: 9901A-BNXT1

See Also

BioNomadix Dual Transducer Pairs
Table 4, page 13

BioNomadix Signal Combo Pairs
Table 5, page 13

BioNomadix Accelerometer
Table 6, page 14

Table 3: BioNomadix Dual Biopotential Pairs

BioNomadix	BN-ECG2	BN-EEG2	BN-EGG2	BN-EMG2	BN-EOG2
Signal type:	Dual Channel ECG	Dual Channel EEG	Dual Channel EGG	Dual Channel EMG	Dual Channel EOG
Bandlimits *Max*:	0.05 Hz to 150 Hz	0.1 Hz to 100 Hz	0.005 Hz to 1.0 Hz	5 Hz to 500 Hz	0.005 Hz to 100 Hz
***Factory preset*:**	1 Hz to 35 Hz	0.5 Hz to 35 Hz	0.005 Hz to 1.0 Hz	10 Hz to 500 Hz	0.005 Hz to 35 Hz
Filter options:	0.05 or 1 Hz HP, 35 or 150 Hz LP	0.1 or 0.5 Hz HP, 35 or 100 Hz LP	0.005 Hz HP, 1 Hz LP	5 or 10 Hz HP, 250 or 500 Hz LP	0.005 or 1 Hz HP, 35 or 100 Hz LP
Alternative signal:	Heart Rate Mode	Delta, Theta, Alpha, Beta		Envelope Detection Mode	Derivative Mode
Notch filter:	50/60 Hz user-controlled switch; typically not required—factory preset OFF. *See Appendix for more hardware-specific output options.*				
Noise Voltage (shorted inputs)**:**	0.9 µV rms (bandwidth of 0.05 Hz to 150 Hz)	0.2 µV rms (bandwidth of 0.10 Hz to 100 Hz)	0.5 µV rms (bandwidth of 0.005 Hz to 1 Hz)	1.5 µV rms (bandwidth of 1.0 Hz to 500 Hz)	0.9 µV rms (bandwidth of 0.005 Hz to 100 Hz)
Input Voltage:	up to 10 mV P-P	up to 2 mV P-P	up to 10 mV P-P	up to 10 mV P-P	up to 10 mV P-P
Output Voltage:	±10 V (receiver output)				
CMRR	110 dB typical at 50/60Hz; 90dB minimum for ECG, EEG, EMG, and EOG, 100 db minimum for EGG				
CMII	1000 MΩ (50/60 Hz)				
Fixed Gain:	2,000	10,000	2,000	2,000	2,000
Operating Time:	72-90 hours				
Included strap:	137 cm BN-STRAP137	76 cm BN-STRAP76	137 cm BN-STRAP137	33 cm BN-STRAP33	76 cm BN-STRAP76
Size (approx.) **& Weight:**	Transmitter: 6 cm x 4 cm x 2 cm 54 grams		Receiver: 4 cm x 11 cm x 19 cm 380 grams		
Input:	See BioNomadix electrode lead cable options (BN-ELxx-LEADx). Each biopotential transmitter requires at least one GND. To eliminate redundant biopotential GND, use a 3-lead electrode lead cable for one input (CH A or B) and a 2-lead electrode lead cable for the other input (CH A or B) on each BioNomadix transmitter. Use BN-ADAPT-TP2/3 for Touchproof connections, including BN-EEGCAP-SYS.				

Table 4: BioNomadix Dual Transducer Pairs

BioNomadix	BN-SKT2	BN-RSP2	BN-GONIO	BN-STRIKE
Signal type:	Dual Channel SKT *temp*	Dual Channel RSP *respiration*	Dual Channel Goniometry	Dual Channel Strike Data
Bandlimits ***Max*****:** ***Factory preset*****:** ***Filter Options:***	DC to 10 Hz DC to 1 Hz DC, 0.5 Hz HP, 1 or 10 Hz LP	DC to 10 Hz DC to 1 Hz DC, 0.5 Hz HP, 1 or 10 Hz LP	DC to 100 Hz DC to 10 Hz DC, 3 Hz, 10 Hz, or 100 Hz LP	DC to 100 Hz DC to 10 Hz DC, 3 Hz, 10 Hz, or 100 Hz LP
Notch filter:	50/60 Hz user-controlled switch—factory preset OFF; typically not required. *See Appendix for additional hardware-specific output options.*			
Resolution:	0.01° C (rms)	FSR/4096; (4.88 mV)	0.01° rotation (rms)	N/A
Signal range:	13 to 51° C	± 10 V (at output)	± 180°	± 10 V (at output)
Output Voltage:	± 10 V (receiver output)			
Operating time:	72-90 hours			
Included strap:	137 cm BN-STRAP-137	137 cm BN-STRAP-137	76 cm BN-STRAP-76 & BN-STRAP-33	33 cm BN-STRAP-33
Input:	BN-TEMP-A/B-XDCR	BN-RESP-XDCR	BN-GON-110-XDCR BN-GON-150-XDCR BN-GON-F-XDCR BN-TOR-100-XDCR BN-TOR-150-XDCR	BN-STRIKE-XDCR

See Also

BioNomadix Logger & Logger Charger
Table 1, page 11

BioNomadix Common Specs — Receiver Modules & Transmitters
Table 2, page 11

BioNomadix Dual Biopotential Pairs
Table 3, page 12

Table 5: BioNomadix Signal Combo Pairs

BioNomadix	BN-RSPEC	BN-PPGED	BN-NICO	BN-DYNEMG
Signal type:	RSP plus ECG	PPG plus EDA	Z and dZ/dt	Dynamometry plus EMG
Bandlimits*Max*: ***Factory preset*:** ***Filter Options*:**	Respiration (CH A): *see BN-RSP2 spec* ECG (CH B) : *see BN-ECG2 spec*	DC to 10 Hz: 0.5 Hz to 3 Hz DC to 3 Hz DC, 0.5 Hz HP, 3 or 10 Hz LP 1 Hz LP	Both: DC to 50 Hz* Both: DC to 50 Hz* DC, 1, 3, 5, 50 Hz* LP *Units shipped before 11/2016 are bandlimited to 10 Hz.	DYN: DC 100 Hz DYN: DC to 10 Hz DYN: DC, 3 Hz, 10 Hz, or 100 Hz LP EMG: see BN-EMG2 specs
Notch filter:	50/60 Hz user-controlled switch; typically not required—factory preset OFF. *See Appendix for additional hardware-specific output options.*			
Resolution:	*see BN-RSP2 and BN-ECG2 specs*	PPG: FSR/4096; (4.88 mV) EDA: 0.012 µS (min step)	Z: nominally ~0.05 Ω (rms) at 10 Hz BW dZ/dt: ~0.0075 Ω/sec (rms) at 10 Hz BW	DYN: 35 micro kg-f/cm2 (0.0005 psi) (rms) EMG: see BN-EMG specs
Signal range:	*see BN-RSP2 and BN-ECG2 specs*	PPG: ±10 V (at output) EDA: 0 to 50 µS; *excitation*: 0.5 V constant V	Z: 5 to 100 Ω (mag) dZ/dt: ±10 Ω/sec	DYN: 0-1.055 kg-f/cm2 EMG: up to 10 mV P-P
Output Voltage:	± 10 V (receiver output)			
Operating time:	72-90 hours	24 hours	24 hours	75 hours
Included strap:	137 cm BN-STRAP137	33 cm BN-STRAP33	137 cm BN-STRAP137	33 cm BN-STRAP-33
Input:	CH A: BN-RESP-XDCR CH B: BN-ELxx-LEAD3	CH A: BN-PULSE-XDCR or BN-PULSEEAR-XDR CH B: BN-EDA LEAD2 or BN-EDA25-LEAD2	2 x BN-EL50-LEAD4 or 2 x BN-EL50-LEAD2	CH A: BN-CLENCH-XDCR CH B: BN-ELxx-LEAD3

Table 6: BioNomadix Accelerometer

BioNomadix	BN-ACCL3
Signal type:	G (X, Y, Z)
Signal range:	*Selectable:* ±2, ±4, ±8 or ±16 G
Bandlimits*Max*: ***Factory preset*:** ***Filter Options*:** **Alternative:**	±2, ±4, ±8 or ±16 G ± 16 G at 400 Hz LP DC to 3.13 Hz LP up to 400 Hz LP (in power of 2 steps) Tap Event Mark Mode (*replaces* G)
Resolution:	X: 5 mg rms, Y: 6 mg rms, Z: 9 mg (rms) (±2 G scale at 400 Hz LP)
Output Voltage:	±10 V (receiver output)
Operating time:	72-90 hours
Included strap:	33 cm - BN-STRAP33
Input:	Attach BioNomadix transmitter to subject—no additional hardware input required; sensor is internal to transmitter

BIONOMADIX

Wireless, Wearable Physiology Life Science Monitoring Devices for Live or Logged Data

Two-Channel Sets

- *Dual ECG*
- *Dual EEG*
- *Dual EOG*
- *Dual EMG*
- *Dual EGG*
- *Dual Temperature*
- *Dual Respiration*
- *Respiration with ECG*
- *Electrodermal Activity with Pulse*
- *Impedance Cardiography*
- *Heel/Toe Strike*
- *Dynamometry with EMG*
- *Goniometry*
- *Torsiometry*
- *Accelerometry*

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