BioNomadix® Smart Center with Acq*Knowledge* Guide

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Registered to ISO 9001:2015

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BIONOMADIX SMART CENTER

Congratulations on your purchase of a BIOPAC BioNomadix Smart Center and welcome to the BIOPAC community of researchers and educators ï BIOPAC is confident that Smart Center will be a useful and vital addition to your lab.

What is Smart Center?

BioNomadix Smart Center is a small-form data acquisition unit and wireless receiver that connects to a computer USB port and records simultaneous physiological data from up to three BioNomadix Transmitters. Unlike standard BioNomadix Systems requiring multiple receiver units connected to an MP Data Acquisition System, Smart Center offers a compact, all-in-one data acquisition solution. Smart Center does not contain a battery and is entirely powered by a computer USB port. No additional components or amplifiers are necessary. All that is needed to record high quality data is the Smart Center, Acq*Knowledge* software, and transmitter(s).

Transmitter pairing and setup is configured in an easy-to-use Acq*Knowledge* Setup Wizard with guided prompts.

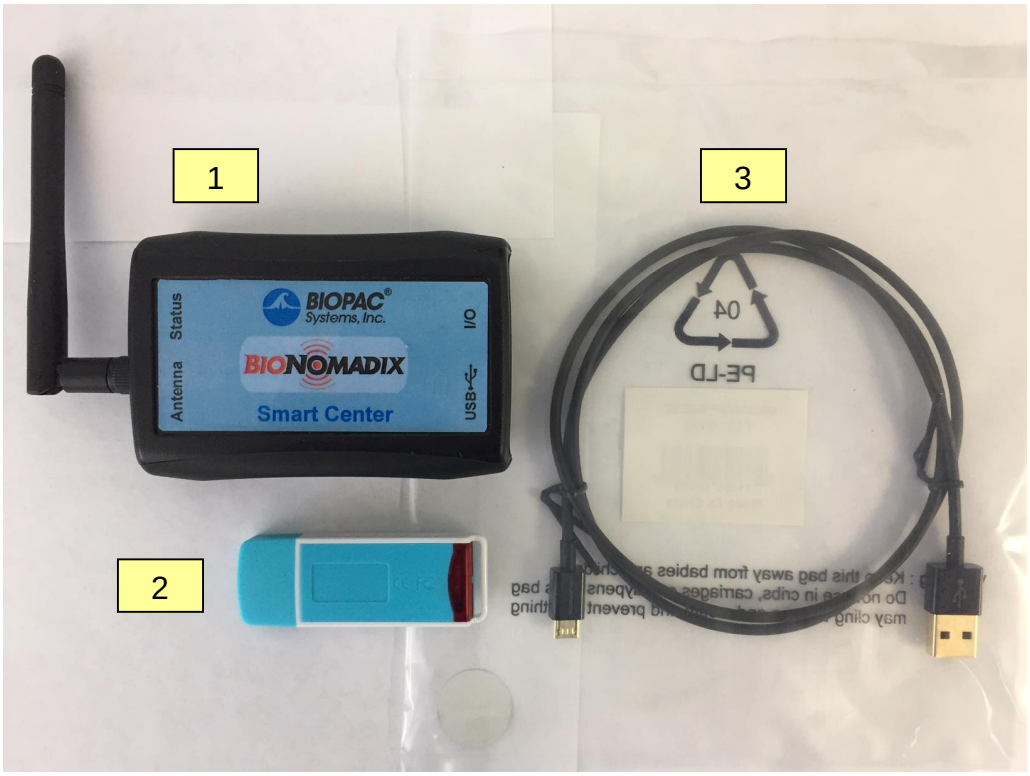
Smart Center supports all BioNomadix Transmitter types. When connected, Smart Center appears in the Acq*Knowledge* hardware menu as a stand-alone hardware option, and supports most of the same advanced software features as BIOPACôs MP160 and MP36R Research Systems.

Smart Center functionality can be extended via the integrated I/O port, which provides access for up to up to 8 TTL digital channels. This is useful for recording synchronization signals from SuperLab and E-Prime stimulus/response studies, without the need for an additional transmitter.

High Level Benefits:

- Small form factor (card deck sized)
- Direct connection to computer
- 9 Channels of wireless data
- Simple to use and easy to connect
- 10 meter range
- Up to 2 KHz data acquisition speed
- Digital Input

Smart Center System and Included Components



1. Smart Center unit and antenna
2. Acq*Knowledge* software installer and USB license key (see Quick Start document for installation instructions)
3. Micro-USB to USB cable
4. Adhesive rubber feet (4, not pictured)
5. Adhesive Velcro® hook-and-loop discs for mounting on wall, side of monitor etc., (2 pairs, not pictured)
6. BioNomadix Transmitter(s) (not pictured), transmitters include AC wall charger
7. Carrying case (not pictured) to hold Smart Center, Logger, transmitters, leads, and electrodes

Left panel: Status LEDs, foldable antenna

LEDs:

Green = power on (blinking or steady)

Amber = connected to Acq*Knowledge* (steady)

Right panel: Micro-USB port (left) for connecting Smart Center to computer and I/O port (right) for inputting digital signals

Configuring Smart Center

Basic steps for configuring Smart Center:

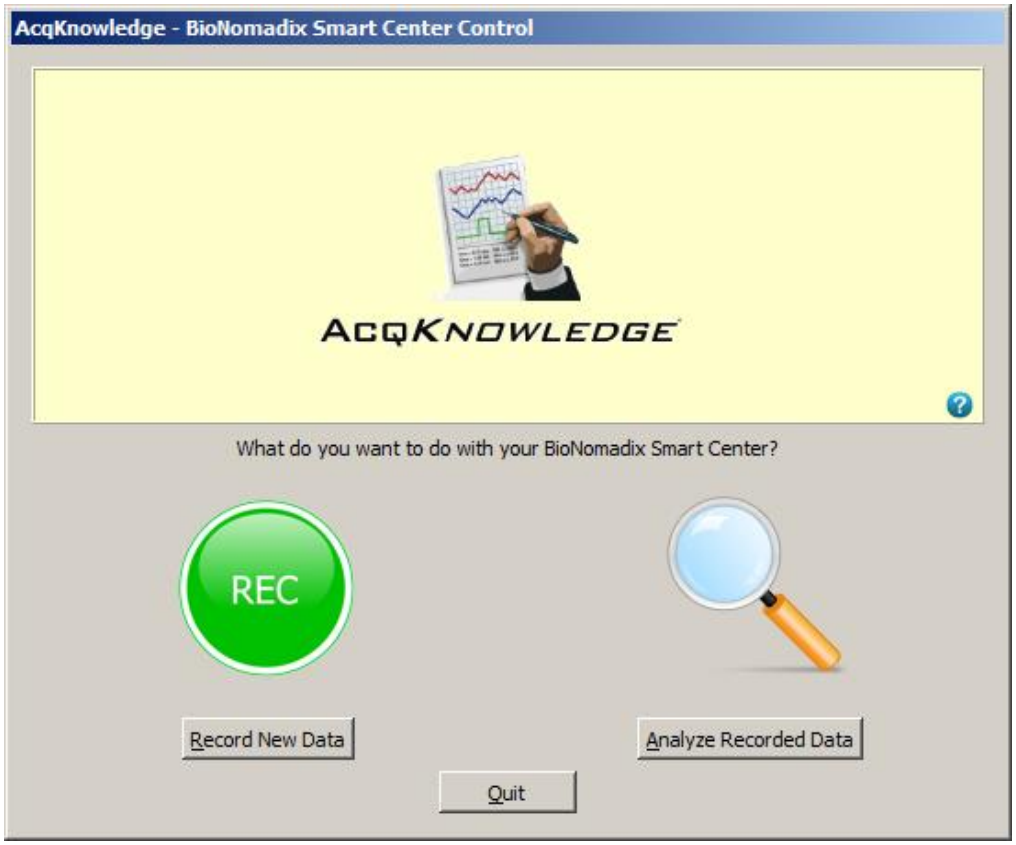
1. Install Acq*Knowledge* software.
2. Connect Smart Center to a USB port.
3. Launch Acq*Knowledge* (the USB license key must be connected to launch and use Acq*Knowledge*).
4. Pair the desired BioNomadix transmitters (or use a saved or previously-used configuration).

It is important to note that all electrodes and transducers must be correctly attached to the participant in order to record accurate, high quality data. See the accompanying electrode/transducer guides available in the Smart Center Setup Wizard. These guides correspond to the connected BioNomadix transmitter type(s) and accessible by clicking the button in the lower right corner of each paired transmitter setup in the Setup Wizard.

Steps 1-3: Launching Smart Center

1. If Acq*Knowledge* software is not yet installed, complete the installation per the Quick Start instructions.
2. Connect Smart Center unit to a computer USB port using the provided micro-USB-to-USB cable.
3. Make sure the Acq*Knowledge* License key is connected to a USB port and launch Acq*Knowledge* via the Desktop shortcut. The following ñSmart Center Controlò welcome screen will be displayed. Before continuing to Step 4 (Pairing), review the Control screen options on the following page.

NOTE: When the Smart Center is connected to the USB port, the green power light should blink. If the power light does not blink, try connecting the Smart Center directly to a computer USB port. (Connecting through a USB hub may not provide enough power to the unit.)



Smart Center Control Screen Options

Record New Data	Launches the Setup Wizard for pairing transmitters and configuring other options.
Analyze Recorded Data	Launches a list of the 10 most recently-opened data files. The default number of 10 listed files can be modified by choosing ñDisplay > Preferences > Otherò in Acq*Knowledge*. • Highlighting any file in the list and clicking ñOpenòwill open the selected file for analysis in the Acq*Knowledge* application. • Selecting ñSearch Diskòlaunches a window for navigating to files not appearing in the recent file list.
Quit	Exits application.
	Clicking the ñquestion markòicon opens a dialog with information about the software build and connected Smart Center unit.

Steps 4-8: Pairing

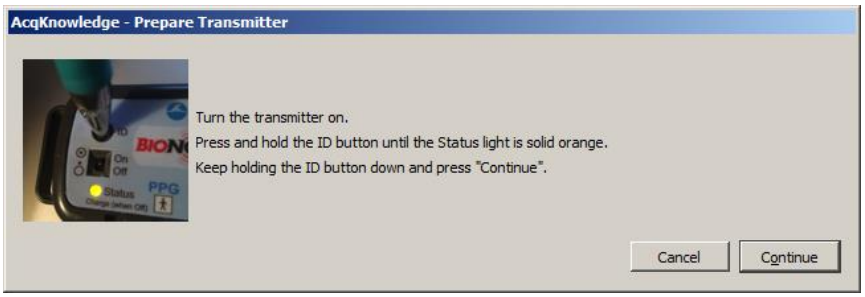
In order to record data, a transmitter must be paired to the Smart Center. If using Smart Center for the first time, Acq*Knowledge* will guide you through initial transmitter setup and pairing as shown below.

4. To begin transmitter pairing, click the 

button in the Smart Center Control screen and choose ñ**Pair Now**ò in the subsequent prompt.

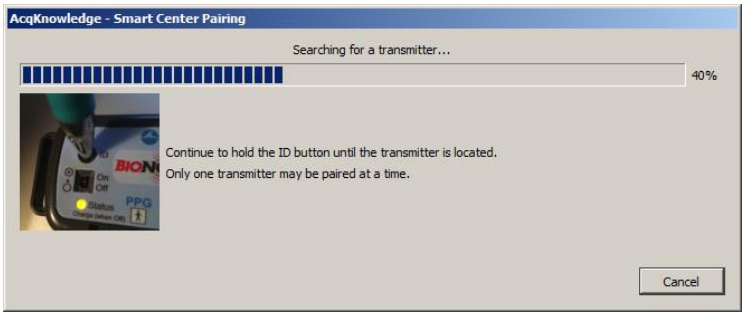
*Choosing "**Pair Later**" will advance to the Smart Center Setup Wizard where pairing can be initiated at user's convenience. (See following page for details.)*

5. Follow the steps displayed in the onscreen prompts.
(Turn on transmitter, hold the ñIDò button down with a pen or other slim object, click ñContinue.ò)

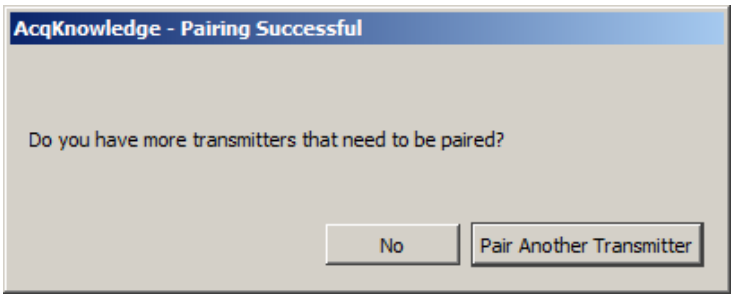


6. Continue to hold the ID button while the transmitter is located.

***NOTE:** If a pairing connection error appears, make sure the transmitter is powered on, within close range of the Smart Center, and the ID button fully depressed. Then follow the prompts to repeat the pairing process.*



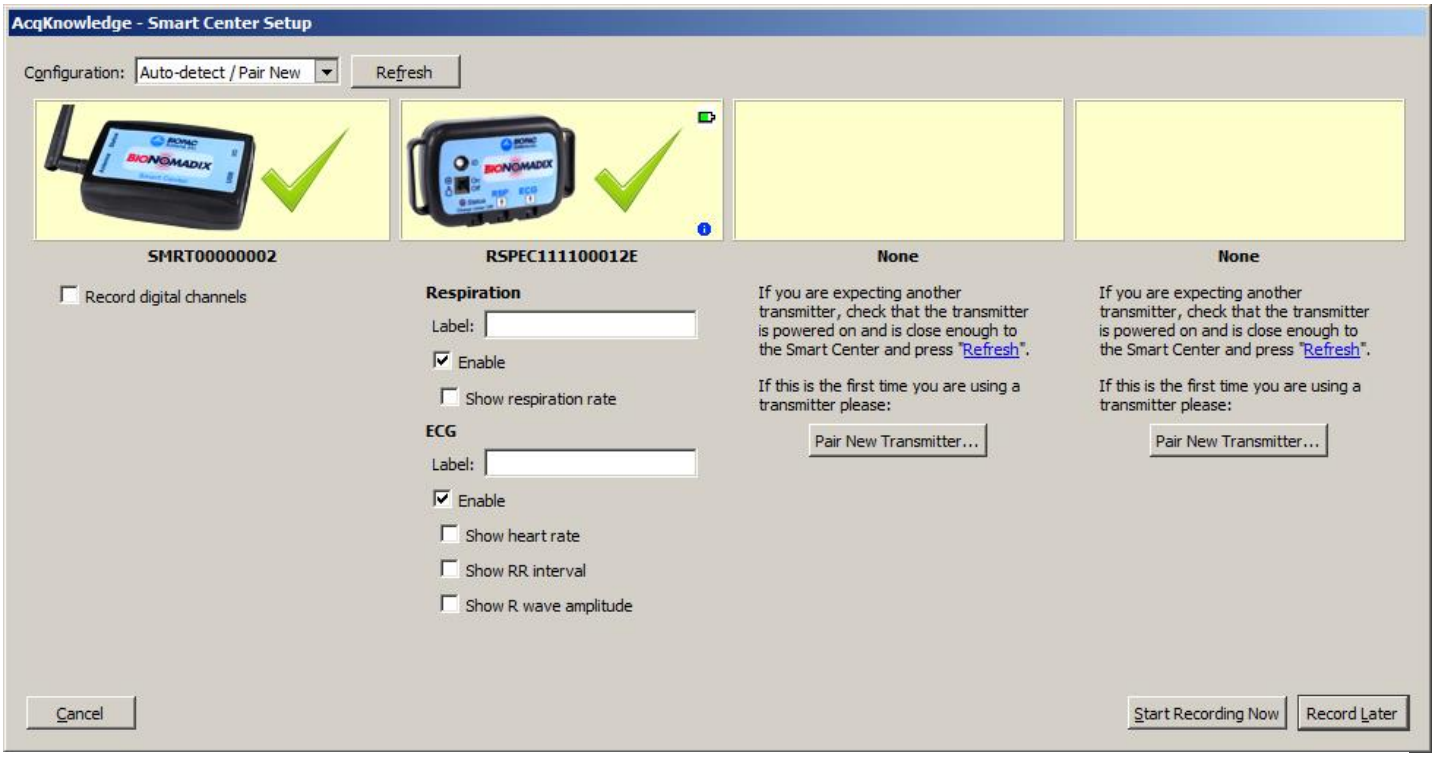
7. Click ñ**Pair**ò when the ñTransmitter Foundò prompt appears. (You may release the ID button down once this prompt appears.)

8. A ñ**Pairing Successful**ò prompt will appear when pairing is complete. *If additional transmitters are to be paired, click "Pair Another.." and follow the prompts shown in Steps 4-8.* *If no additional transmitters are required, click "No" to continue to the Setup Wizard.*	

Setup Wizard

Once pairing is complete, the paired transmitter icon will appear in the Acq*Knowledge* Setup Wizard along with available signals and recording options. The BioNomadix Respiration and ECG transmitter is depicted in the below example. Note that transmitter options will vary depending on transmitter type.

If ñ**Pair Later**ò was selected in Step 4 on the previous page, this Setup Wizard can be used as an alternate location for pairing up to three transmitters. To pair within the Wizard, make sure ñ**Auto-detect/Pair New**ò is selected in ñ**Configuration:**ò and click the ñ**Pair New Transmitter**ò button under an empty transmitter column (ñNoneò). The subsequent pairing prompts are identical to those shown in Steps 4-8 on the previous page.



Recording Options for Paired Transmitter(s)

Once transmitters are paired and electrodes and transducers are properly connected to participant, data recording can proceed using the following options.

Start Recording Now	Launches an Acq*Knowledge* graph and immediately begins recording data using the selected transmitter options (labels, derived signals, etc.).
Record Later	Launches an Acq*Knowledge* graph using the selected transmitter options, but the graphôs ñStartò button must be clicked in order to begin recording. This allows other parameters to be set within the Acq*Knowledge* application prior to recording.
Record digital channels	Checking this box adds eight digital channels to the graph for displaying TTL level lines. This option is used when recording event marking information from external devices. If external devices are not being used, selecting this option is not necessary.

See following page for additional Setup Wizard options.

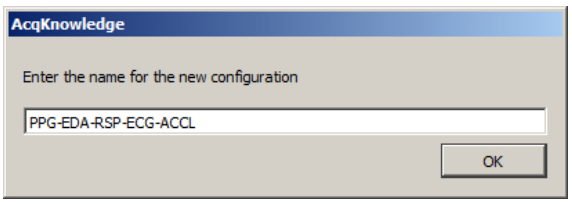
Smart Center Configuration Menu

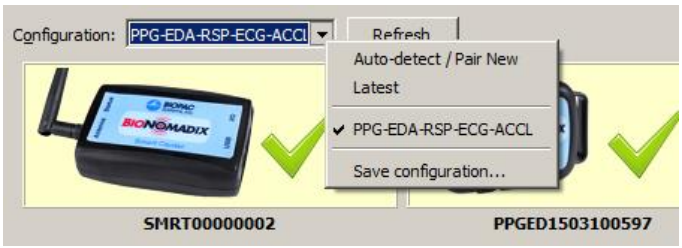
The Configuration pop-up menu (upper left corner of Setup Wizard above Smart Center icon) offers various options for setting defaults for future data recordings.

Auto-detect / Pair New: In this mode, Acq*Knowledge* automatically searches for transmitters, displays any that are located, and offers pairing prompts. Auto-detect is useful for initial hardware setup, creating new configurations, and for users dynamically using different sets of transmitters. Note that transmitters must be powered on to be detected.

Latest: This setting retains the most recently used transmitter configuration and automatically connects to those transmitters each time Acq*Knowledge* is launched. The ñLatestò configuration is recommended for users who repeatedly record the same protocol. Note that transmitters must be powered to be detected.

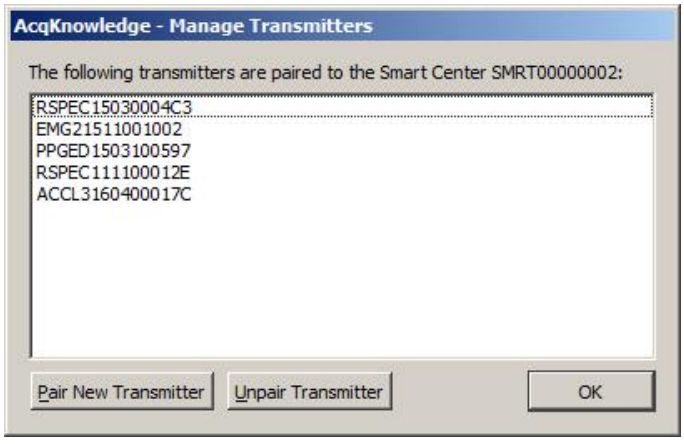
Save configuration: Allows any number of transmitter configurations to be saved under unique names as custom setups. Saved setups are subsequently stored in the ñConfigurationò pop-up menu for easy retrieval (see below).





Refresh: The Refresh button (right of the ñConfiguration:ò pop-up menu) reloads the selected configuration setting. Changing the configuration menu option automatically refreshes the Setup Wizard to that setting.

Managing Transmitters and RF Channels

Paired transmitters and Smart Center RF channels can be modified by right-clicking over the Smart Center icon in the Setup Wizard.	
Manage transmitters… - Displays a list of paired transmitters and offers options for adding or deleting transmitters. To add a new transmitter, click ñ**Pair New Transmitter**ò and follow the prompts. To remove a transmitter, select a transmitter from the list, click ñ**Unpair Transmitter**,ò and click OK in the confirmation prompt. Unpaired transmitters can be re-paired at any time. **NOTE:** To pair a transmitter, it is necessary for it to be powered on. To unpair, the transmitter may be on or off.	

Change RF channel… RF channels are automatically-assigned communication frequencies stored in Smart Center to ensure that multiple Smart Center or BioNomadix Logger units in the same lab are assigned different channels.

However, it may sometimes be necessary to change an assigned RF channel due to interference from nearby units. To manually reassign the channel:

1. Right-click the Smart Center icon in the Setup Wizard and choose ñ**Change RF channel**.ò
2. Highlight a new channel in the list.
3. Click ñ**Set RF Channel**ò and follow the subsequent prompt.

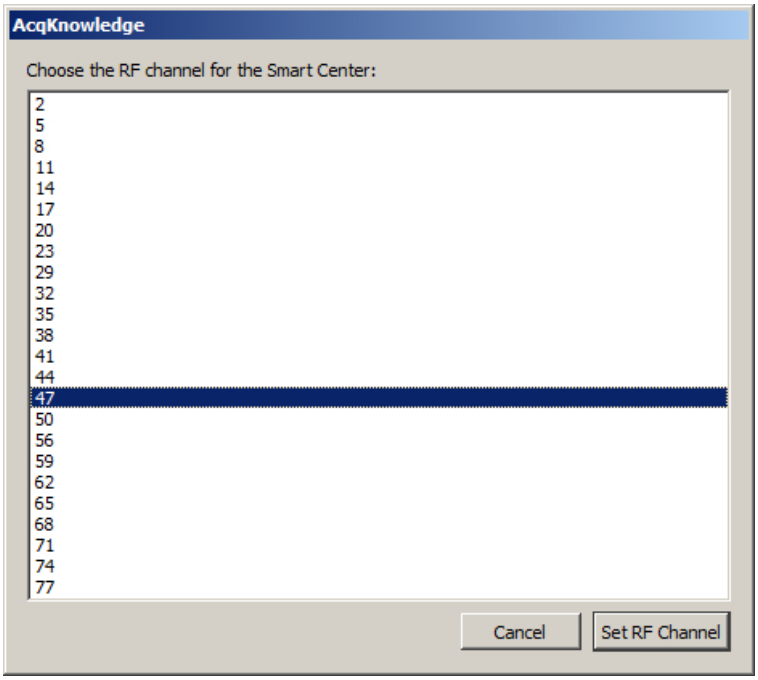
NOTE: The closer together multiple Smart Center units are, the higher likelihood of conflicts and interference. To help avoid this:

- Whenever possible, increase the physical space between units.
- Assign RF channels of multiple units as follows:

2 Smart Centers: RF channels 2 and 41

3 Smart Centers: RF channels 2, 41, and 77

4 Smart Centers: RF channels 2, 29, 56, and 77



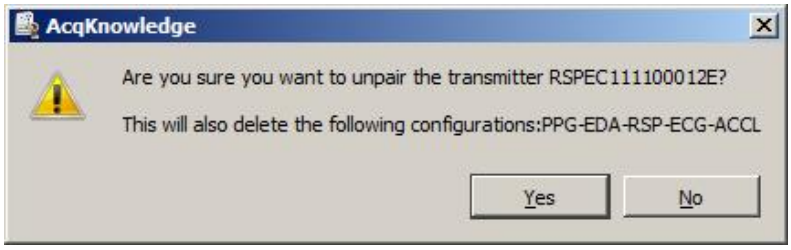
Unpairing Transmitters

Existing transmitters are stored in Smart Center memory and do not need to be re-paired on subsequent uses. Simply turn on the transmitter and launch Acq*Knowledge*.

Should it become unnecessary to unpair one or more transmitters:

1. Right click over the transmitter icon in the Smart Center setup screen and choose ñ**Unpair transmitter**.ò

2. Follow the confirmation prompt.

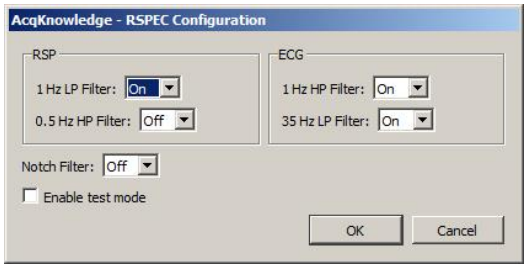


NOTE: Single or multiple transmitters can also be unpaired via the Smart Center ñ**Manage Transmitters**ò contextual menu option. (See ñManaging Transmitters and RF Channelsò on page 6.) It is not necessary for a transmitter to be powered on in order to unpair it.

Advanced Configuration

NOTE: All BioNomadix Transmitters are shipped with all factory presets established for recording optimal data, and modifying these settings is *not recommended*. It is possible to adjust these configurations, but note that doing so can adversely affect data quality and accuracy.

Right-clicking the transmitter image at the top of the Setup Wizard will display the ñ**Advanced configuration**ò contextual menu, allowing access to additional settings.



Like the Basic transmitter options, Advanced transmitter options vary by transmitter type, but an option common to all transmitters is ñ**Enable test mode**.ò When selected, the transmitter will output a continuous 4 Hz sine wave signal. This test mode signal may be used to check radio performance and other communications issues.

The Advanced Configuration menu also provides an option for unpairing the selected transmitter. To unpair the selected transmitter, choose this option and follow the prompts.

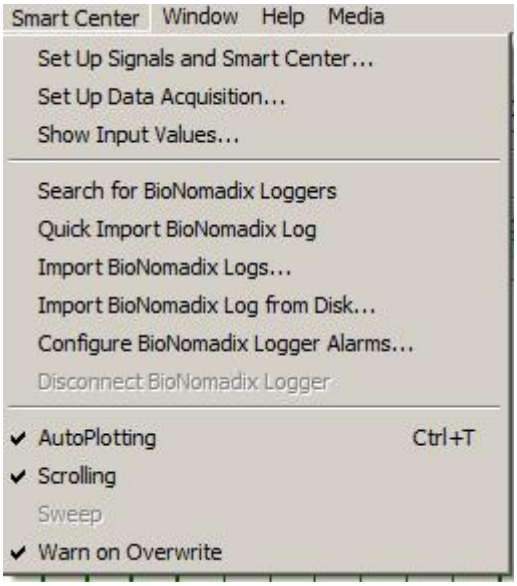
The Advanced Configuration menu adds a Calibration option for the following transmitters only:

- Pulse Plethysmogram and Electrodermal Activity (BN-PPGED-T)
- Goniometer (BN-GONIO-T)
- Dynamometer and Electromyogram (BN-DYNEMG-T)

The Calibration option can be used manually to initiate the transmitter calibration sequence in the Acq*Knowledge* software. If calibration is performed manually, the settings are stored for as long as the transmitter remains paired and does not need not be repeated. See page 18 for more information about calibration of the above transmitters.

For default advanced configurations for all transmitters, see pages 22-25 of the BioNomadix Spec PDF.

Accessing Smart Center Setup within the Acq*Knowledge* application



All Smart Center Setup Wizard options referenced on the previous pages can also be accessed within the Acq*Knowledge* application. When Acq*Knowledge* is launched with Smart Center connected, Smart Center appears as a stand-alone hardware menu option.

Choose the ñ**Smart Center > Set Up Signals and Smart Center…**ò menu item to access the Setup Wizard for transmitter pairing and other configuration options without having to exit the application.

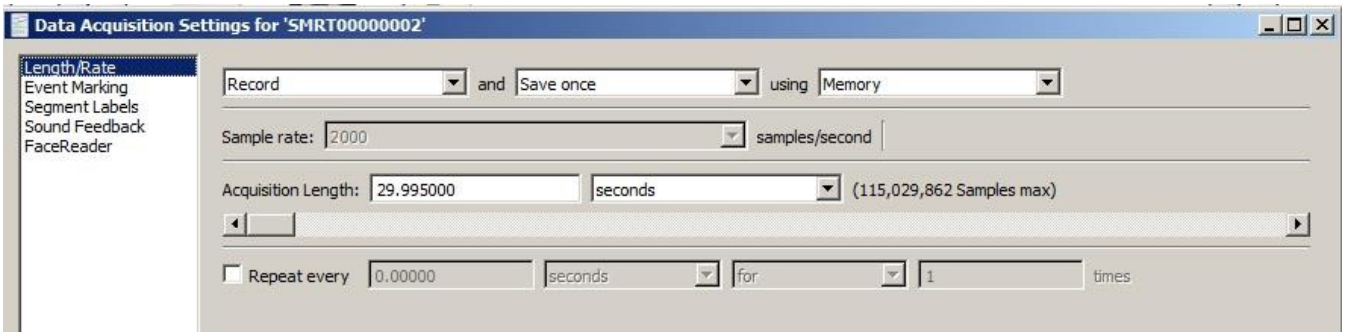
NOTE: After changing configuration options in the ñ**Set Up Signals and Smart Center**ò screen, click the Change Settings button in the lower right of the screen to apply the changes.

Limitations when Smart Center is connected:

- If a transmitter is paired to both a BioNomadix Logger and a Smart Center, note that only one of these units should be powered on at a time. To use the paired transmitters with a Logger, the Smart Center should be disconnected from the computer. Conversely, to use the transmitters with the Smart Center, the Logger should be turned off.
- The ñ**Set Up Signals and Smart Center**ò and pairing options are not available during data recording. A warning dialog will appear if these options are selected during recording.

Set Up Data Acquisition Options in Acq*Knowledge*

The following options are available in the Acq*Knowledge* ñ**Smart Center > Set Up Data Acquisition…**" menu.



Length/Rate	Available Record modes: • Record > Save once > Memory • Record last > Save once > Memory • Record > Autosave > Memory • Record > Autosave > Disk • Record last > Autosave > Memory • Record last > Autosave > Disk • Record > Append > Memory • Record > Append > Disk See the Recording Mode section of the Acq*Knowledge* Software Guide for more information. **Sample rate:** The sample rate is locked to the specified transmitter sample rate and is not adjustable in Acq*Knowledge*. (2000 samples/second for all transmitters except Accelerometer, which is 1000.) **Acquisition Length:** Adjustable from 0 seconds to the maximum length that computer memory or disk space will support. (Normally many hours.) **Repeat every** (checkbox): Sets the time interval and number of times to repeat a trial.
Event Marking	See the Event Marking section of the Acq*Knowledge* Software Guide for details.
Segment Labels	See the Segment Label section of the Acq*Knowledge* Software Guide for details.
Sound Feedback	See the Sound Feedback section of the Acq*Knowledge* Software Guide for details.
FaceReader	Available only if FaceReader (Facial Analysis) Licensed Functionality is enabled. See the FaceReader Chapter in the Acq*Knowledge* Software Guide for details.

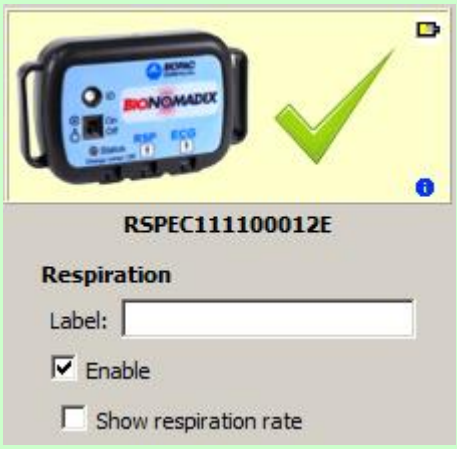
Unlike other Acq*Knowledge* hardware types (MP160/150/36R, etc.), no separate ñChannelsò option is available under the Smart Center ñSet Up Data Acquisitionò menu. All Analog and Calculation channel options (derived signals) are configured in the Smart Center Setup Wizard prior to recording.

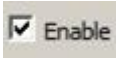
Other Acq*Knowledge* Smart Center Menu Items

Show Input Values	Displays channel data values in real time in a color bar graph format. Input values are only displayed while data acquisition is in progress. See the ñShow Input Valuesòsection of the Acq*Knowledge* Software Guide for more details.
BioNomadix Logger Options	These configuration options are only applicable when the BioNomadix Logger is being used. For more information, see the BioNomadix Logger Guide or contact BIOPAC.
Autoplotting	Controls options for displaying data during an acquisition. See the ñAutoplotting, Scrolling, and Sweep Display Modesòsection of the Acq*Knowledge* Software Guide for details.
Warn on Overwrite	When checked, a prompt will appear each time a new acquisition is started warning that existing data will be erased. See the Acq*Knowledge* Software Guide for more details.

Transmitter Options and Derived Signals

Setup options and derived signals for each paired transmitter can be configured in the Acq*Knowledge* Setup Wizard prior to recording data. These options will vary according to transmitter and signal type. For example purposes, the BioNomadix Respiration setup is shown below.



Options common to all transmitters	
Battery icon 	Indicates status of transmitter battery charge. very good good fair poor, charging required It is strongly recommended that the transmitter battery always be fully charged before use.
Information icon 	Clicking this icon opens a PDF guide or web page with information about the selected transmitter.
Status icons  	**Green check mark:** Transmitter is communicating successfully with Smart Center. **Red circle:** Transmitter cannot be found and is not communicating. Check that the transmitter is powered on and within 10 meters of the Smart Center. Click the **Refresh** button to repeat the communications check. It may take a few seconds for the transmitter to connect to the Smart Center.
	Text field for assigning a label to the signal's channel.
	Allows selected signal to be acquired and plotted in an Acq*Knowledge* graph channel.

Additional transmitter options are dictated by transmitter type and selectable by enabling the various checkboxes. These can be additional channels to extract a derived signal, such as respiration rate extracted from the Respiration signal, or heart rate, RR interval, and R wave amplitude extracted from the ECG signal. See following pages for a full overview of all BioNomadix transmitter setup options.

Smart Center BioNomadix Transmitter Options in Acq*Knowledge* Software

Accelerometer (BN-ACCL3-T) Transmitter Options and Derived Signals

X: Enables recording of X-axis measurement channel (horizontal)

Y: Enables recording of Y-axis measurement channel (vertical)

Z: Enables recording of Z-axis measurement channel (three-dimensional, oriented vertically)

Dynamometer/EMG (BN-DYNEMG-T) Transmitter Options and Derived Signals

Dynamometer: Measures pressure signal from a bulb clench force transducer (BN-CLENCH-XDCR) and plots the data in a separate channel. No basic configurable options aside from enabling or disabling the channel.

EMG:

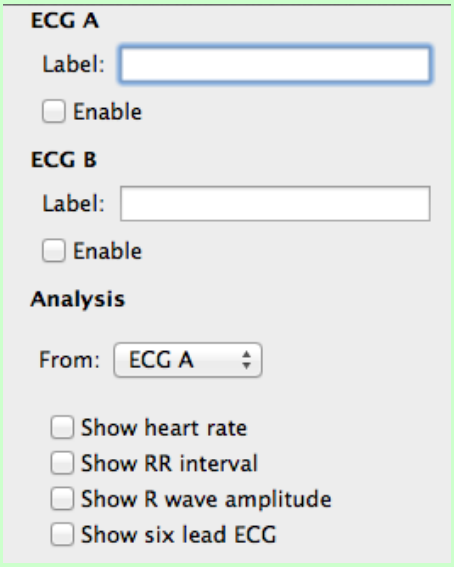
Enable: Enables recording of EMG signal and plots it in a graph channel.

Show integrated: Calculates integrated EMG and plots in a separate channel.

Show root mean square: Calculates the root mean square of the EMG signal and plots in a separate channel.

NOTE: This transmitter must be calibrated (for Dynamometer signal) prior to use. Calibration prompts will appear at the start of the recording. (See pages 18-19).

Dual-channel Electrocardiogram (BN-ECG2-T) Transmitter Options and Derived Signals



ECG A and ECG B: One or both channels of ECG data can be enabled for recording. The following derived ECG signals are also available:

Show heart rate: Calculates the heart rate in beats-per-minute (BPM) and plots in a separate channel.

Show RR interval: Calculates the RR (inter-beat) interval in seconds and plots in a separate channel. For more information about Heart Rate Variability and RR intervals see the BIOPAC HRV Analysis video tutorial.

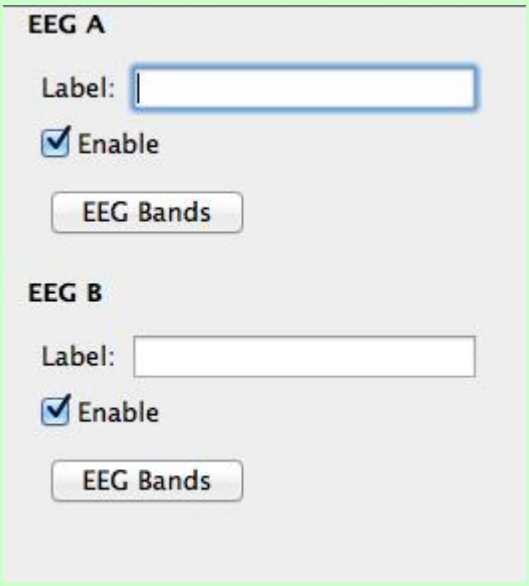
Show R wave amplitude: Calculates the amplitude (height) of the R wave in millivolts and plots in a separate channel.

Show six-lead ECG: Both ECG A and ECG B must be selected for this option to become available. The six-lead ECG algorithm assumes that the first channel (A) is recording Lead I and second channel (B) is recording Lead III. The algorithm then mathematically extracts Lead II, aVR, aVL, and aVF and plots these signals in separate channels. For more information about ECG leads, see the ECG2 Informational PDF.

Dual-channel Electrogastrogram (BN-EGG2-T) Transmitter Options and Derived Signals

Electrogastrogram (EGG): Measures Electrogastrogram (EGG) datað the peristaltic, wavelike contractions of the stomachð on one or both channels (A or B). No additional configurable options aside from enabling or disabling the channels.

Dual-channel Electroencephalogram (BN-EEG2-T) Transmitter Options and Derived Signals

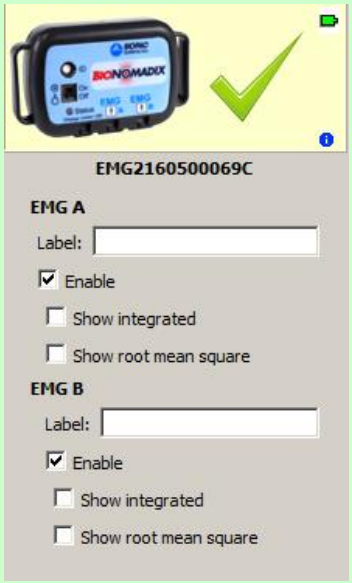


Electroencephalogram (EEG): Measures one or two channels of EEG data. Click the ñEEG Bandsò button to display a popup menu containing the following EEG band signals:

- Alpha: 8 Hz ï 13 Hz
- Beta: 13 Hz ï 30 Hz
- Theta: 4 Hz ï 8 Hz
- Delta: 0.5 Hz ï 4 Hz
- Gamma: 30 Hz ï 90 Hz

To display an EEG band signal in its own channel, check the box to enable the desired signal.

Dual-channel Electromyogram (BN-EMG2-T) Transmitter Options and Derived Signals



EMG: Measures one or two channels of EMG (Electromyogram) data.

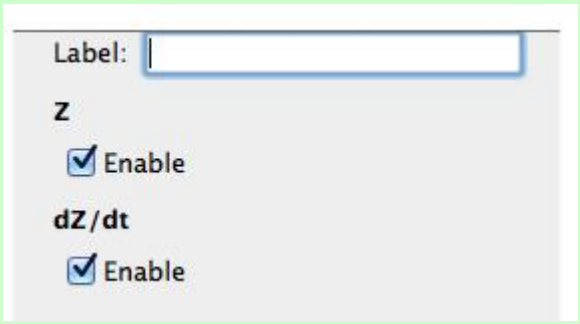
Show integrated: Calculates integrated EMG and plots in a separate channel.

Show root mean square: Calculates the root mean square of the EMG signal and plots in a separate channel.

Dual-channel Electrooculogram (BN-EOG2-T) Transmitter Options and Derived Signals

EOG (Electrooculogram) A or B: Measures one or two channels of EOG data. **Show derivative:** Measures a derivative of the EOG signal using an IIR band-pass filter and plots in a separate channel.
Dual-channel Goniometer (BN-GONIO-T) Transmitter Options and Derived Signals

Goniometer A or B: Measures one or two channels of goniometer or torsiometer data. No additional configurable options aside from enabling or disabling the channels. **NOTE:** The Goniometer transmitter must be calibrated prior to use. Calibration prompts will appear at the start of the recording. (See pages 18-19).

Cardiac Output (BN-NICO-T) Transmitter Options and Derived Signals

BioNomadix Cardiac Output provides noninvasive cardiac output specifically designed to measure impedance magnitude and derivative of impedance, for the purposes of beat-by-beat impedance, stroke volume and cardiac output measurements. **Z:** Measures Impedance magnitude and plots in a separate channel. **dZ/dt:** Measures derivative of impedance and plots in a separate channel.
Pulse Plethysmogram/Electrodermal Activity (BN-PPGED-T) Transmitter Options and Derived Signals

PPG/Pulse: The PPG channel measures Blood Volume Pulse (BVP) for heart rate, inter-beat interval and vasodilation/constriction data. **Show pulse rate:** Displays the pulse rate derived from the PPG signal and plots in a separate channel. **Electrodermal Activity:** The EDA channel measures eccrine (skin sweating) activity. **Show phasic EDA:** Measures short term, abrupt changes in EDA and plots in a separate channel. **NOTE:** The PPGED transmitter must be calibrated for EDA signal prior to use. Calibration prompts will appear at the start of the recording. (See pages 18-19).

Respiration/ECG (BN-RSPEC-T) Transmitter Options and Derived Signals

Respiration: This channel measures the respiration signal.

Show respiration rate: Displays the respiration rate in breaths-per-minute (BPM) derived from the respiration signal and plots in a separate channel.

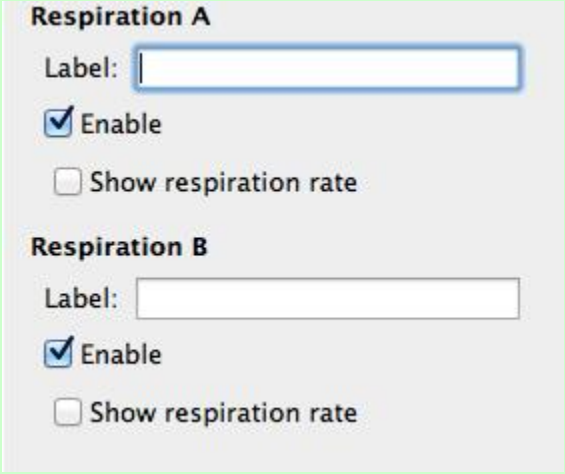
ECG: This channel measures the electrocardiogram signal (heart activity).

Show heart rate: Displays the heart rate in beats-per-minute (BPM) derived from the ECG signal and plots in a separate channel.

Show RR interval: Displays the RR (inter-beat) interval in seconds and plots in a separate channel.

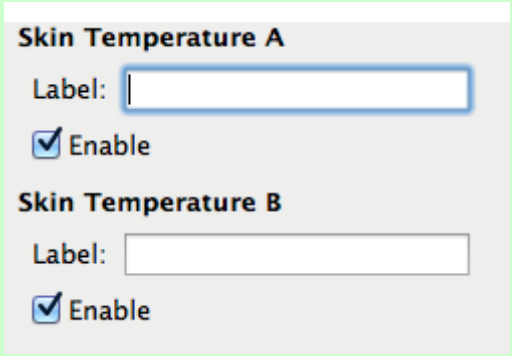
Show R wave amplitude: Displays the R wave peak in millivolts and displays in a separate channel.

Dual-channel Respiration (BN-RSP2-T) Transmitter Options and Derived Signals



Respiration A and B: Measures one or two channels of respiration signal.

Show respiration rate: Displays the respiration rate in breaths-per-minute (BPM) derived from the respiration signal(s) and plots in a separate channel.

Dual-channel Skin Temperature (BN-SKT2-T) Transmitter Options and Derived Signals

Skin Temperature A and B: Measures one or two channels of skin temperature data. No additional configurable options aside from enabling or disabling the A or B channels.
Dual-channel Strike Heel-Toe (BN-STRIKE-T) Transmitter Options and Derived Signals

Strike A and B: Measures one or two channels of strike data. The system will record heel/toe strike activity via two force sensitive resistors (FSRs) located in the associated transducer (BN-STRIKE-XDCR). No additional configurable options aside enabling or disabling the channels.

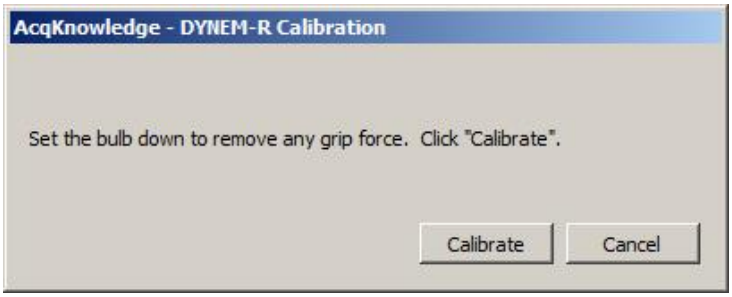
Transmitters Requiring Calibration

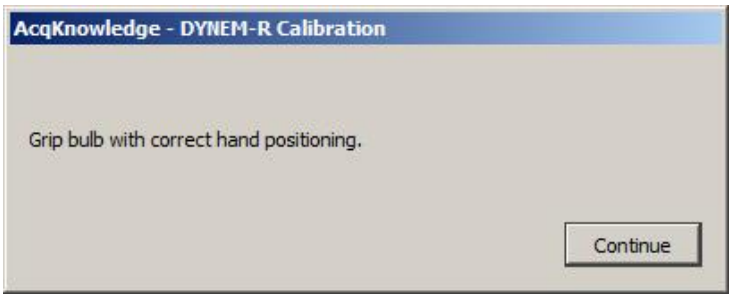
The following BioNomadix transmitters require calibration prior to starting a data recording:

- Dynamometer and Electromyogram (BN-DYNEMG-T)
- Goniometer (BN-GONIO-T)
- Pulse Plethysmogram and Electrodermal Activity (BN-PPGED-T)

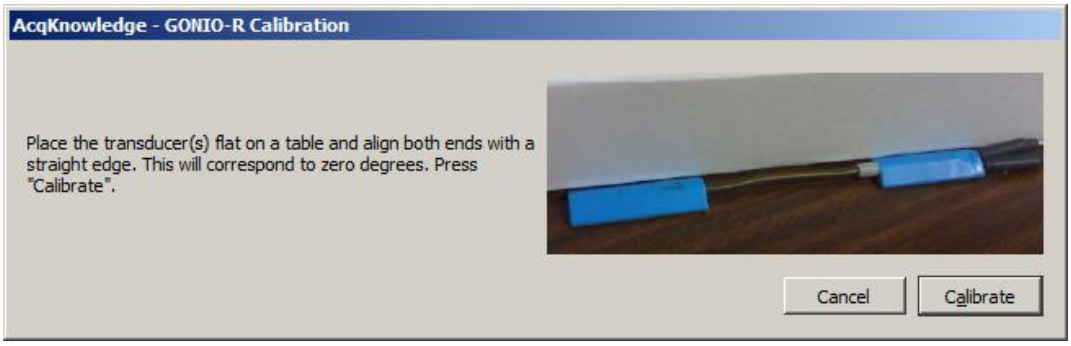
Calibration prompts will appear after clicking the ñ**Start Recording Now**ò button in the Setup Wizard, or after clicking ñ**Start"** in the Acq*Knowledge* graph (if the ñ**Record later**ò option was selected in the Setup Wizard).

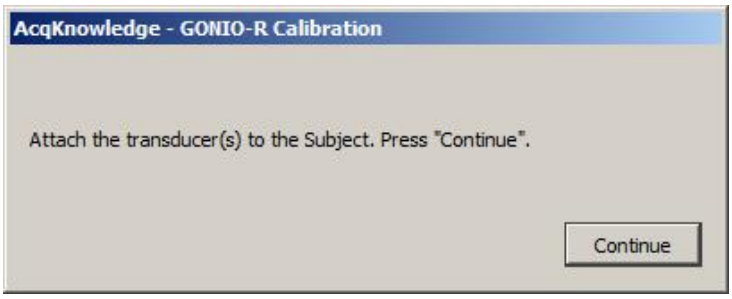
Calibration Prompts for Dynamometer and Electromyogram (for EMG signal):



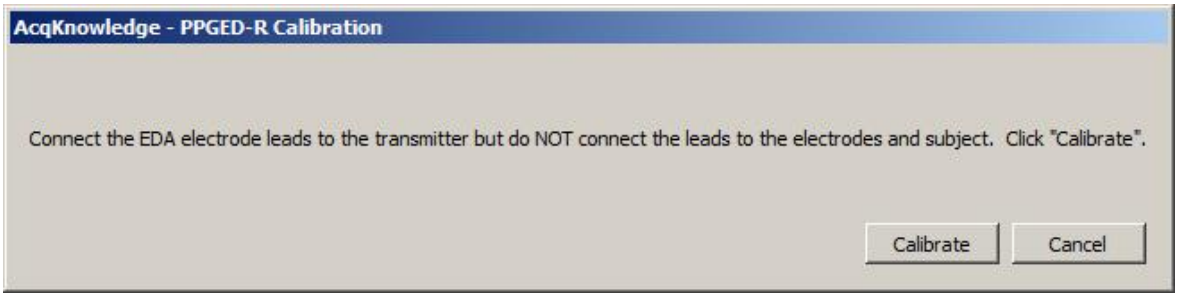


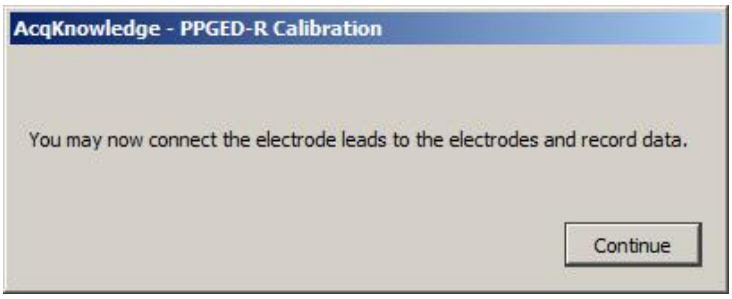
Calibration Prompts for Goniometer:





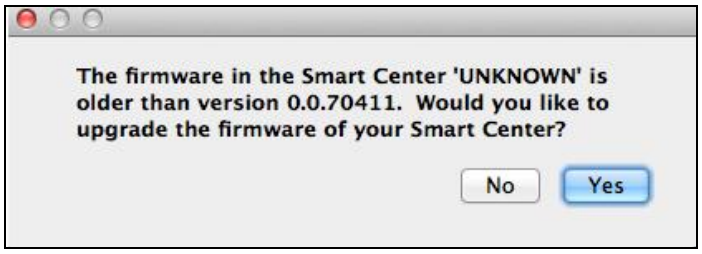
Calibration Prompts for Pulse Plethysmogram and Electrodermal Activity (for EDA signal):

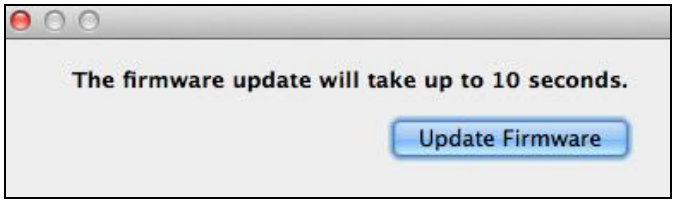


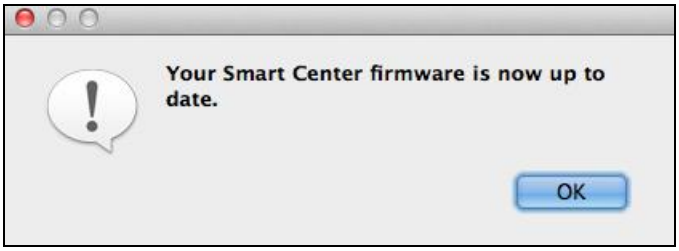


Upgrading Firmware

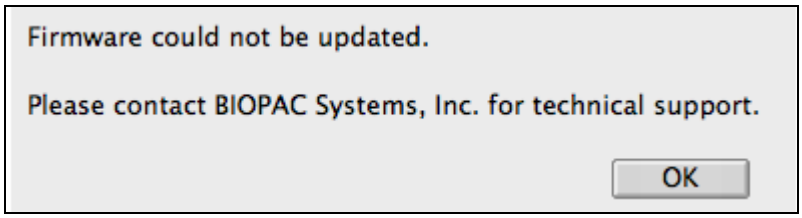
Occasionally, the Smart Center firmware may require updating. A series of prompts will automatically display if the firmware needs to be updated.





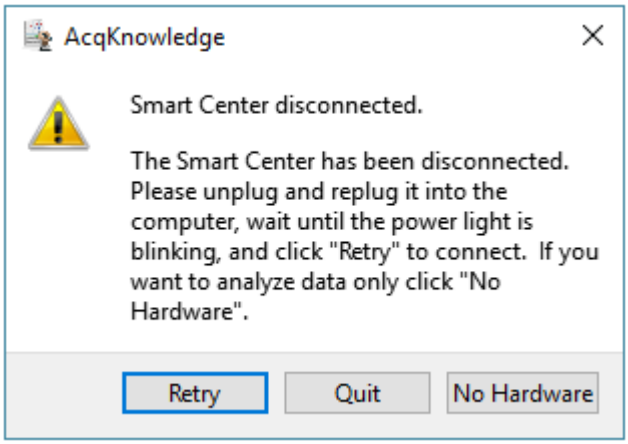


If the firmware update is unsuccessful, the following prompt will appear:



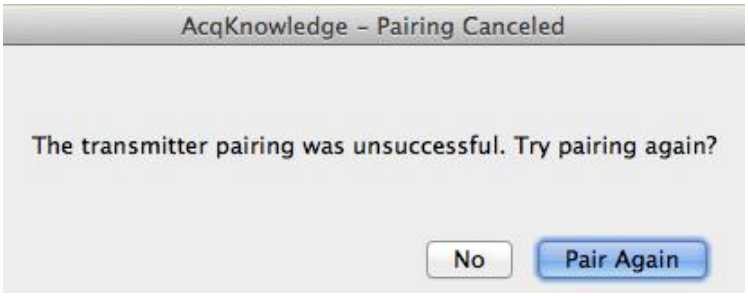
Troubleshooting

Q: Smart Center is not being recognized by the computer and Iôm seeing the following message:



A: Make sure the micro-USB end of the cable is firmly connected to the Smart Center port and the opposite end is fully seated in the computer USB port. If the issue persists, try connecting to another USB port.

Q: I tried to pair a transmitter and got a message that pairing was unsuccessful. What should I do?



A: Make sure the transmitter is in close proximity to the Smart Center and that no objects (or the subjectôs body) are in a position to block the signal. Then make sure the transmitter is powered on (turn switch to ñON,ò the green light will illuminate) and press firmly down on the transmitterôs recessed ñIDò button with a pen or other pointed object and continue to hold pressure. Click ñContinueò and follow the pairing prompts. If the pairing is still unsuccessful, check to make sure the transmitter battery is fully charged. You may also click ñRefreshò in the Setup Wizard and initiate pairing from that location. (See above right figure.)

Q: I sucessfully paired my transmitter but it is not showing up in the Setup Wizard. What should I do?

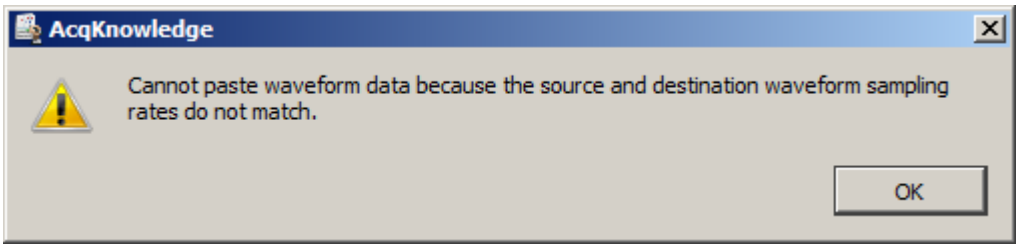
A: This can occur if you continue to hold the transmitter ñIDò button down after the ñTransmitter Foundòprompt appears. To remedy this, click the ñRefreshò button in the Setup Wizard. The transmitter icon should appear.

Q: Iôm getting a noisy signal on my data recordings.

A: This can occur if electrodes or transducers are improperly attached or if the subject moves during the recording, which can add unwanted artifact. Make sure all electrodes are correctly applied and that all transmitter leads are properly connected.

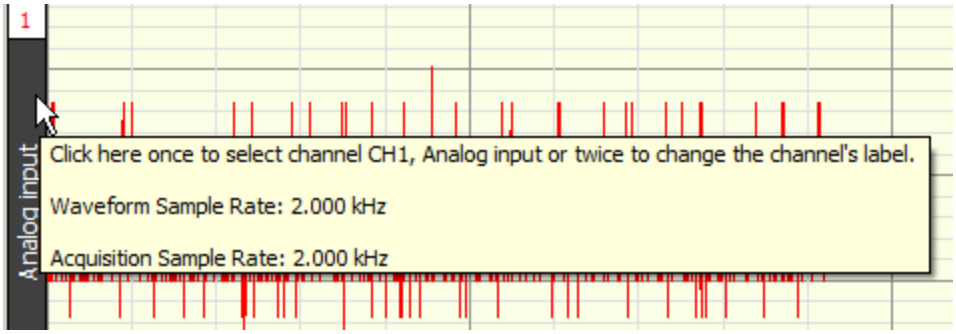
This can also occur due to RF channel conflicts when multiple Smart Centers are used in the same lab, or if a Smart Center is being used with a BioNomadix Logger. To address this problem, the RF channels can be manually reassigned in the Acq*Knowledge* software Setup Wizard. See pages 6-7 for information on how to manually reset the channels.

Q: I tried to copy some data into another channel in Acq*Knowledge* and got the following error message. What does this mean?



A: When using Smart Center, the data acquisition rate is locked to 2000 samples/sec for all transmitters with the exception of the Accelerometer (1000 samples/sec). If you see this message it most likely means you have attempted to paste Accelerometer data into a channel containing another type of data sampled at a different rate, or you have resampled a waveform in Acq*Knowledge* following the recording (Transform > Resample Waveform). Data from a waveform sampled or resampled at one rate cannot be pasted into a channel containing data sampled or resampled at a different rate.

The sample rate of a waveform can be determined by mousing over the channel label and noting the tooltip information (see example below).



If the graph channel has been resampled to a lower sampling rate, the original sampling rate can be restored by using the ñTransform > Resample Waveformò feature. For more information about resampling graph or waveform data, see the ñTransformò chapter of the Acq*Knowledge* Software Guide.

Smart Center Specifications

Dimensions:	92 mm (length) x 60 mm (width) x 27 mm (depth)
Maximum Sample Rate:	2 kHz per channel
Transmission Range:	10 meters line-of-sight
Bit Rate:	12 bits per sample
Frequency:	2.4 GHz
Ports:	USB (1), I/O (1)
Model:	BN-RX
FCC ID:	ZWIBNXR1
IC:	9901A-BNXR1
VCCI:	211-128161

For further assistance about using Smart Center, contact BIOPAC and submit a Support Request

BioNomadix compliance Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

INDUSTRY CANADA INFORMATION

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter (IC: 9901A-BNXR1) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

WLAN antenna, maximum gain 1.5 dBi, 50 ohm

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent émetteur radio (IC: 9901A-BNXR1) de modèle s'il fait partie du matériel de catégorieI) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

réseau local sans fil antenne, le gain max 1.5 dBi, 50 ohm

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

CLASS A ITE

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