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What's New in Innerview™ Research Software Version 4.1?

Battery Level

After a successful data retrieve, IRS and IS now displays the armband's current battery level.

24-Hour Quick Select

From the Summary page and the Graph window, you can now select a midnight-to-midnight time period simply by clicking on the date. This feature is only available if the collected data spans at least one midnight period.
NOTE: In a data set where the first and last days are not complete 24-hour periods, clicking on the either day will select as much of that day as is available.

Data Properties

The Data Properties dialog box (formerly called the "Body Parameters" dialog box) has five tabs:

- Subject Info - Here you can enter information about the subject. This information will be saved in the data file.
- Researcher Info - Like the Subject Info, data entered in the Researcher Info is saved with the data file. Default Researcher Info is saved in (Settings - Application Preferences - Researcher Info).
- Notes - In the Notes field you can enter information specific to this subject or study. This information gets saved in the data file.
- METS - Here you can set the METS value for the data file.
- Timezone - This is a feature which allows you to select the timezone in which the data has been collected.

The Data Properties dialog box is accessible by clicking on the subject or by choosing Data Properties from View in the file menu.

Summary Report

IRS and IS now have the ability to generate a PDF based summary report for the active data file. The summary report contains bar charts with the total and daily values for the following:

- Total Energy Expenditure
- Active Energy Expenditure
- Physical Activity Duration
- Number of Steps
- Lying Down Duration
- Sleep Duration

Selectable METS

The METS threshold for physical activity detection is now customizable from the METS for Physical Activity tab in the Application Preferences dialog window. Allowable values are 1.5 to 20.0, inclusive, with the default value of 2.5.

Locale Settings

You can set the default locale settings for either Western (US) or Europe. This will change the display of times and dates as well as height and weight measurements in the system.

Updated Export

It is now possible to export data from a full armband to Excel! Also, researcher information gets included in the new export.

Channel Configurations

There are now several sets of default configurations to choose as well as custom configurations.

Version 6.0 FirmWare!

- Record configuration will persist, even if the armband battery is rebooted.
- Improved pedometer algorithm

Overview

Congratulations on your purchase of BodyMedia®'s InnerView™ Research Software. The InnerView Research Software is a Java-based software application that enables

researchers to retrieve and save physiological and lifestyle data from the SenseWear® Pro$_2$ Armband and then view, export, print and annotate it for further analysis.

Other notable features include:

- Ability to personalize each Armband according to an individual user for more accurate results.
- Saved data can be exported as .xsl or .csv format for easy data analysis using software applications like Microsoft® Excel and MATLAB®.
- Simple graphical representations can be previewed, manipulated, and saved as .xsl, .csv or jpeg image files for sharing with other researchers.
- Ability to print PDF reports of the user's data.
- Ability to easily annotate data after retrieval.

Installing the Software

1. Insert the CD-ROM titled InnerView™ Research Software into the CD-ROM drive of your computer. If you do not have a CD-ROM drive, please contact BodyMedia® Customer Service.
2. After a few seconds, this will launch an install program. Click *Install InnerView Research Software on your computer* (not firmware) and follow the instructions on your screen.

   NOTE: If the install program does not launch automatically, click My Computer, the CD-ROM drive, and install.exe to launch the program.

3. Once the InnerView Research Software is installed, you may be prompted to restart your computer. Please remove the CD-ROM from your disk drive before restarting.

Once the software has been successfully installed, you are ready to use the InnerView Research Software.

Starting the Software

1. Click the InnerView™ Research icon on your desktop to start the application.
2. The screen below should appear on your desktop. The application always opens on the Retrieve SenseWear® Data screen.

Setting Preferences

The Software has several default settings. If you want to change any of these default settings, you can do so by selecting Application Preferences under the Settings menu, .

1. To set the energy expenditure preference, select the Energy Expenditure tab. Uncheck the box will disable this feature. To enable it again, check the box.

2. You can customize the the METS that determine physical activity by Clicking the "METS for Physical Activity" tab and selecting a value from the list.

3. You can customize the formatting of the saved data name by choosing the Data File Tab.

4. By selecting the Locale Settings tab, you can set the timezone, time and date settings.

5. The Researcher Info tab is where you enter information specific to this data file. This information will appear in the summary report.

SenseWear Sounds

The SenseWear® Pro_2 Armband uses sounds to provide status information. To hear the sounds at the Armband's configured volume, perform the following steps:

1. Remove the Armband from your arm and attach the USB cable to the Armband.

2. Under the Help menu, select SenseWear Sounds. This will display a SenseWear Sounds window.
3. Select the sound to be played.
4. Click "Play" to hear the sound play on the Armband.

Sound Descriptions

- **Welcome:** The Armband has made contact with your skin.
- **Ready:** The Armband is collecting data.
- **Goodbye:** The Armband has lost contact with your skin and is no longer collecting data.
- **Timestamp:** The Timestamp button has been pressed.
- **Alert:** The Armband cannot collect data because of:
    1. Low Memory
    2. Low Battery

    For more information about Armband feedback, refer to the Armband Feedback section of help.

Configuring the SenseWear® Pro$_2$ Armband

The InnerView™ Research Software enables you to configure and reconfigure your Armband for multiple purposes and users. In general, the Configure SenseWear section is where you enter the wearer's personal body stats, customize the Armband's parameters, and optimize your data collection channels. However, the most important thing to know about this section is that the accuracy of the derived data depends on accurate user parameters.

To configure your Armband:

1. Remove the Armband from your arm and attach the USB cable. You cannot configure the Armband wirelessly.
2. Click Configure SenseWear.
3. Next, click Retrieve Configuration. This will pop up a screen indicating retrieval progress.
4. If multiple Armbands are connected to your computer, a dialog box will appear prompting you to choose which one you wish to configure.

5. Once the configuration is retrieved, you should be looking at the SenseWear Parameters tab. From here you can customize the settings for each subject's body parameters.

   NOTE: If you are configuring Armbands for multiple subjects, you may choose to enter body parameters by clicking on the subject when you upload the data. Changing settings here will alter the subject's body parameters for the individual data file.

6. You can configure the data channels for the Armband by choosing the data channels tab.

SenseWear Parameters Tab

1. Click on the SenseWear® Parameters tab
2. First, check to see if the SenseWear® Pro$_2$ Armband is initialized with the correct date and time. If it is correct, proceed to step 5.
3. If the time is not correct, it is due to one of two reasons:
   a. The Armband time was reset due to low battery voltage, indicated by red text. Click Apply and this will set the Armband clock to match the computer clock.
   b. The computer clock is incorrect. To reset your computer clock, double-click on the clock located in the right side of your task bar. This will pop up your computer's Date/Time Properties window. Correct the date and time, then press OK.

4. In the InnerView™ software, click Apply.

Body Parameters Tab

1. Enter the subject (name or code of person wearing the SenseWear® Pro$_2$ Armband), birthdate, height, weight, sex, handedness and smoking preference.
2. Click Apply.

Data Channels Tab

The SenseWear® Pro_2 Armband has 4 configuration options available for data collection.

1. Algorithims - This configuration is the minimum set of data channels need to calculate energy expenditure and lifestyle algorithims at a sample rate of once per minute.

2. High Rate - This configuration is for collecting High Rate data from the Armband.

3. Research - This configuration collects all of the channels necessary for lifestyle and energy expenditure algorithims at the rate of once per minute. This configuration also collects data from proprietary channels that will be used in future versions of this software.

4. Custom Channel Configuration - With this option, you may customize your channel configuration. Once a data channel is turned on, you can customize the sampling rate by using the dropdown menu or you may choose a sample rate for all channels from the dropdown on the left. Keep in mind that changing this value from one will either increase or decrease the estimation of total continuous data collection.

   To turn a data channel on/off, click the checkbox to the left of the data channel name. Keep in mind that turning channels on/off will change (either increase or decrease) the estimation of total continuous data collection. At the bottom of the screen, you will see the estimation of total data the Armband can collect before it runs out of memory for the configuration that you have chosen.

   NOTE: You can save custom settings to a file by clicking the "Save Settings to File" button. You can then use the "Load Settings from File" button to retrieve your custom configurations.

The estimated total collection time is affected by the number of times the Armband is off body. The more times the armband goes off body the more the calculation will overestimate the actual time.

5. Custom Channel Configuration With Lifestyle Algorithms - This is a procedure by which you can create a custom configuration that is capable of utilizing BodyMedia's Lifestyle Algorithms.
    1. Load one of the above standard configurations on the armband (Algorithms, High Rate or Research)
    2. Save the configuration.
    3. Re-Load the Armband Configuration (the screen will show the standard configuration that you just loaded).
    4. Click Custom Configuration.

       NOTE: From here, you can add custom channels at 1 per min sampling rate or faster

    5. Save the configuration.

    You should now be able to collect data and still use BodyMedia's Lifestyle Algorithms. For further assistance on customizing configurations, please contact BodyMedia, Inc.

Description of the Data Channels

The SenseWear® Pro$_2$ Armband contains 24 data collection channels, which can collect physiological data at a rate up to 32 times per second. Usually the Armband is configured to store statistical summaries of many samples over time. The summaries are calculated and stored once per collection period. The default collection period for data is one summary per minute, but this rate may be changed in the Data Channels Tab of the InnerView™ Research Software.

There are two main types of statistical measures available with SenseWear; average and mean of absolute differences (MAD). Average is the sum of the point samples divided by the number of samples in the collection period. MAD is the mean of the absolute values of the differences between adjacent point samples summed over the collection period. For example, if the sample rate of the skin temperature sensor is set to one minute, then the average stored is the average temperature reading from the following samples (32 samples a second X 60 seconds = 1920). The MAD is the mean of differences between adjacent samples. Being means, both average and MAD are sample rate independent.

Averages and MAD's at one minute sample rates are comparable to those taken at any other sample rate.

Additionally, the accelerometers can record peak counts. Peaks are points in the accelerometer signal where acceleration has reached its highest point relative to the samples immediately surrounding it. The point sample channels allow the experimenter to record all accelerometer samples acquired at 32 samples per second.

The Armband measures several basic physiological quantities in the various ways described above. Below are descriptions of each of these physiologic measures.

Accelerometer

- **Description:** An accelerometer measures motion forces exerted on the body in a single plane. Static and dynamic forces are measured in two perpendicular axes: longitudinal which is parallel to the arm and transverse which is perpendicular to the arm.
- **Channels:** There are a total of 8 accelerometer channels. They are:
    1. Transverse Accelerometer - point
    2. Transverse Accelerometer - peak
    3. Transverse Accelerometer - average
    4. Transverse Accelerometer - MAD
    5. Longitudinal Accelerometer - point
    6. Longitudinal Accelerometer - peak
    7. Longitudinal Accelerometer - average
    8. Longitudinal Accelerometer MAD
- **Technology:** The accelerometer is a 2-axis micro-electro-mechanical sensor (MEMS) device that measures motion.
- **Units:** Meters per second squared relative to earth gravity. For example, a data reading of 1 is one earth g, or approximately 9.8 meters per second squared (m/s^2).
- **Calibration:** Two known orientations.
- **Scenario:** The accelerometer MAD is a measure of stillness and movement. For example, while sitting still watching a movie, the accelerometer MAD values will be near zero, but while jogging the accelerometer MAD values will be high. The accelerometer average is a measure of both acceleration and orientation relative to the ground. For example, a sleeping person may not be moving, but can still register 1g acceleration due to gravity. On a roller coaster, a person may be subject to higher than normal average accelerations. The peaks summary is related to the frequency of vibration to which the wearer is subjected. An Armband worn by the person riding the roller coaster will record large counts in the peaks channel whereas the sleeper will likely generate values near zero.

Heat Flux

- **Description:** Heat Flux is the rate of heat exchanged between two areas. In the case of the Armband, this is the heat exchanged from a person's arm to the outside environment.
- **Channels:** There are two heat flux channel.
    1. Heat Flux - average
    2. Heat Flux - MAD
- **Technology:** A proprietary sensor that uses materials with very low thermal resistance and extremely sensitive thermistors.
- **Units:** Watts per meter squared (w/m^2)
- **Calibration:** Zero point at two known temperatures
- **Scenario:** Heat flux records the rate of heat dissipation or absorption by the arm. For example, a person who leaves an air-conditioned building to a hot street will absorb heat and have a negative heat flux. A person who leaves a warm building when it is cold outside will have a high positive heat flux. A person is loosing heat whenever the heatflux is positive, even when the heat flux value is small, falling or near zero.

Galvanic Skin Response (GSR)

- **Description:** GSR is a measure of the electrical conductivity between two points on the skin.
- **Channels:** There is one GSR channel.
    1. GSR - average
- **Technology:** The GSR sensor includes two hypoallergenic stainless steel electrodes measuring the skin's conductivity.
- **Units:** µSiemens (µS)
- **Calibration:** Zero conductivity
- **Scenario:** Skin conductivity is affected by the sweat from physical activity and by emotional stimuli. For example, a person jogging will work up a sweat and have a high GSR. A person who is startled by a car horn may exhibit a startle response spike in GSR.

Skin Temperature

- **Description:** The temperature of the skin under the Armband. Skin temperature is reflective of the body's core temperature, although it is several degrees cooler.
- **Channels:** There is one Skin Temperature channel.
    1. Skin Temp - average
- **Technology:** Skin temperature is measured using a highly accurate thermistor-based sensor.
- **Units:** Degrees Celsius (°C)
- **Calibration:** Calibrated at manufacture.
- **Scenario:** Skin temperature increases while someone is running or biking.

Near-Body Temperature

- **Description:** The air temperature immediately around the arm.
- **Channels:** There is one Near-Body Temperature channel.
    1. Near-Body Temperature - average
- **Technology:** Temperature is measured using a highly accurate thermistor-based sensor located on one side of the Armband.
- **Units:** Degrees Celsius (°C)
- **Calibration:** Calibrated at manufacture.
- **Scenario:** When covered by a jacket or shirt, near-body temperature is similar to skin temperature. When exposed, near body temperature reflects the temperature of the immediate environment.

Step Counter

- **Description:** The number of steps over the collection period.
- **Channels:** Step counter
- **Technology:** On-device algorithm
- **Units:** Steps per period
- **Calibration:** n/a
- **Scenario:** Can be used to determine amounts of ambulatory activity.

Timestamps

- **Description:** Records each time the button is pressed.
- **Channels:** Events
- **Technology:** Clock
- **Units:** Time
- **Calibration:** Synchronized to the time on the user's personal computer.
- **Scenario:** Can be used to record start and end of important events or activities. For example, the time stamp can be used to locate regions of interesting data.

Saving a Custom Channel Configuration

The InnerView™ Research Software has the ability to save the current settings of the data channels so you can apply them to other SenseWear® Pro_2 Armbands quickly. This gives you the flexibility to conduct different experiments with customized configurations.

1. To save the current configuration, click Configure SenseWear.
2. If you need to, attach the Armband, with the settings you wish to save, to the USB cable and click Retrieve Configuration. This will load the configuration of the Armband currently attached via USB cable.

3. Click the Data Channels tab. If you change the settings, make sure to apply them to the Armband currently attached via USB, before saving.
4. Click Save Settings then name and store your file.

SenseWear Maintenance

The InnerView™ Research Software enables you to perform maintenance procedures on the SenseWear® Pro$_2$ Armband. In general, you should never plug the USB cable into the Armband while it is on your or a subject's arm and only use these commands if instructed to do so by the BodyMedia® technical support team.

Clearing Data

To clear data from the Armband, attach the USB cable to the Armband and select Clear Data from the SenseWear Maintenance Menu. This procedure will clear all collected data, but will not change any of the Body Parameters. This command is useful for situations where you want to clear the data from the Armband, but preserve the wearer's settings.

Clearing Data and Body Parameters

To clear data and reset body parameters on the Armband, attach the USB cable to the Armband and select Clear Data & Body Parameters from the SenseWear Maintenance Menu. This procedure will clear all collected data, and reset all of the body parameter values to null. This command is useful for situations where you want to get the Armband ready for a different wearer.

Clearing Data and Body Parameters and Channels

To completely reset the Armband to its original factory settings, attach the USB cable to the Armband and select Clear Data, Body Parameters & Reset Channels from the SenseWear Maintenance Menu. This procedure will clear all collected data, reset all of the body parameter values to null, and reset all of the channels and sampling rates to their original factory settings. This command is useful for situations where you want to quickly reset the Armband and start from scratch.

Rebooting the Armband

To reboot the firmware on the Armband, choose Reboot SenseWear from the SenseWear Maintenance Menu. This command restarts the firmware on the Armband. No data will be lost when performing this procedure. This command is useful in the event that your Armband firmware crashes.

Handling

Though the Armband was designed for wearability and long-term use, it is a sensitive monitoring device. Rough handling can break internal components. Never drop or shock the Armband and always store it in a safe place when not in use.

Avoid exposing the Armband to extreme temperatures, direct sunlight, moisture, sand, dust, or mechanical shock.
To prevent possible damage to the cable, grasp the plug, not the cable, when disconnecting the USB. Replace the cable if it becomes frayed.
The Armband is splash resistant, but it is not designed to be used under water or come in continuous contact with water. To prevent a shock hazard, never use the Armband in water environments (e.g. in the shower, swimming pool, or rain).

Maintenance

Other than the top hatch where you access the battery and USB connection, do not attempt to open the Armband. It contains no user-serviceable parts. Refer all servicing to qualified BodyMedia® Service Personnel. Opening the Armband will void the warranty.

Cleaning

Clean and dry the Armband after sweating or when it becomes noticeably moist or dirty. Failure to keep the Armband clean, or improper cleaning, may irritate the skin and affect the sensor performance.
To clean: moisten a soft cloth or towel with mild soap and water. Wipe and dry the skin-touching side of the Armband. The adjustable strap should be hand-washed with mild soap and warm water, then air-dried. Machine drying may affect the performance and lifespan of the strap.

Disinfecting

Wipe the back of the Armband with a soft dampened cloth with 70% isopropyl alcohol between users. DO NOT STERILIZE THIS UNIT.

Armband Feedback and Features

Battery

The Armband is powered by one AAA battery. During continuous use (24/7), it will last about 14 days before needing to be replaced.
To check the status of the battery, remove the Armband and press the Status button. The light above the word "battery" will turn on as follows:

- Green (solid) = More than 24 hours of battery life remain.
- Amber (flashing) = Less than 24 hours of battery life remain.
- Red (flashing) = The Armband will not collect data. Change the battery before continuing use.

If you are wearing the Armband, a subtle vibration and sound will alert you when there is less than 24 hours of battery life remaining. When the battery is too low to operate, the alert will become more urgent.
In addition to the battery status light on the Armband, you can also view how much battery life is left every time you upload your data. The value is located below the upload status bar.
To replace the battery, lift and rotate the top hatch counterclockwise. Remove the drained AAA battery and replace it with a new AAA battery immediately.
WARNING: Once you remove the AAA battery, you have 30 seconds to replace it with the new one. Failure to do so may lead to loss of data in the Armband.
Remove the battery from the Armband if the Armband is not being used for an extended period of time.
Ensure proper disposal of batteries.

Memory

The Armband has approximately 14 days of data collection memory.
To check the memory status, remove the Armband and press the Status button. The light above the word "memory" will turn on as follows:

- Green (solid) = More than 24 hours memory remain.
- Amber (flashing) = Less than 24 hours of memory life remain.
- Red (flashing) = The Armband will not collect data. Upload your data before continuing use.

If you are wearing the Armband, a subtle vibration and sound will alert you when there is less than 24 hours of memory life remaining. When the memory is full, the alert will become more urgent.

Wearing your Armband

The SenseWear® PRO_2 Armband is designed to be worn on the back of the upper right arm (the triceps), touching the skin.

1. Make sure that your upper right arm is clean and dry. You should not wear any lotion or body oil where the Armband will come in contact with your skin.
2. Slide the Armband onto the back of your upper right arm with the SenseWear logo facing up.
3. Adjust the strap so that it fits on your arm comfortably, then secure the oval pull-tab. Flex the arm a few times to make sure that the strap is neither too tight nor too loose. It should be snug, but comfortable. Once the strap is adjusted to a comfortable tension, you are ready to wear it. You do not need to adjust the strap again in the future. Just slide it on and off.

CAUTION: Be careful not to overtighten the Armband. If, at any time, you feel constriction or loss of circulation, simply loosen the adjustable strap and refasten it to a more comfortable setting.

Understanding Armband feedback

The Armband makes a sound and vibrates when it wants to communicate something to you. Please be aware of main audio and tactile feedback:

Turning ON Sequence

Every time you slide your Armband on, it will make a series of sounds and vibrations indicating when it has turned on. The sequence can best be described as 4 distinct notes (do-de-do deet) ascending in tone, accompanied by a 2 second vibration, followed by an A-OK sequence of 3 more notes (de-de deet). Put your Armband on your RIGHT arm now to hear this sound.

Turning OFF Sequence

Every time you slide your Armband off, it will make a series of sounds and vibrations indicating when it has turned off. The sequence can best be described as 4 distinct notes descending in tone, (de-do-de doot) accompanied by a 2 second vibration. Remove your Armband now to hear this sound.

A-OK Sequence

When you push the status button on the Armband and both your battery level and memory level are OK, it will play the A-OK sequence which can best be described as a series of 3 notes, (de-de deet) the first two of which are the same note, followed by a third ascending note. This sequence of notes is also accompanied by a short vibration, and both green lights will flash.

Battery low Sequence

When you push the status button on the Armband and the battery level is low, it will play the battery low sequence which can best be described as a series of 2 notes repeated 3 times in an alarm fashion (de-do de-do de-do). This sequence of notes is also accompanied by a short vibration, and the battery light will flash yellow.

Battery is very low Sequence

When you push the status button on the Armband and the battery level is insufficient to power the device, it will play the battery OUT sequence which can best be described as a series of 2 notes repeated 3 times in an alarm fashion (de-do de-do de-do). This sequence of notes is also accompanied by a short vibration, and the battery light will flash red.

Memory low Sequence

When you push the status button on the Armband and the amount of available memory is low, it will play the memory low sequence which can best be

described as a series of 2 notes repeated 3 times in an alarm fashion (de-do de-do de-do). This sequence of notes is also accompanied by a short vibration, and the memory light will flash yellow.

Memory is very low Sequence

When you push the status button on the Armband and insufficient memory remains to collect more data, it will play the memory OUT sequence which can best be described as a series of 2 notes repeated 3 times in an alarm fashion (de-do de-do de-do). This sequence of notes is also accompanied by a short vibration, and the memory light will flash red.

Armband features

- Gathers raw physiological data, including movement, heat flux, skin temperature, near body temperature, and galvanic skin response.
- Contains approximately 14 days of battery life when worn continuously.
- Stores approximately 14 days of continuous physiological and lifestyle data.
- Offers sound and vibration feedback for Reminders and alerts.
- Wireless upload available (requires separate purchase of wireless communicator).

Product specifications

- Sensors:
  - Accelerometer (2-axis)
  - Heat Flux
  - Skin Temperature
  - Near Body Temperature
  - Galvanic Skin Response
- Materials:
  - Monitor: ABS, urethane, FDA approved co-polyester, hypo-allergenic grade stainless steel
  - Wireless Station: ABS
  - Adjustable Strap: Nylon, polyester, polyisoprene (no latex content)
- Battery type: 1 AAA battery
- RF Frequency: 916.5MHz
- Transmitter output power: <1mW
- Battery power: about 14 days under continuous use (24/7)
- Memory capacity: about 14 days under continuous use (24/7)
- Monitor size (without wings): (l) 85.3mm x (w) 53.4mm x (h) 19.5mm; [(l) 3.4 in x (w) 2.1 in x (h) 0.8 in]
- Monitor weight (with adjustable strap): 2.8 oz (79 g)
- Water resistance: splash-resistant

- Operating temperature/humidity: 0°C to +45°C (32°F to 113°F)/100% RH non-condensing
- Storage temperature/humidity: 0°C to +45°C (32°F to 113°F)/100% RH non-condensing

Design and specifications are subject to change without notice.

Retrieving the Data

There are two ways to retrieve data from the SenseWear® Pro_2 Armband.

1. Via the USB cable
2. Wirelessly -- up to 10 feet, from the Armband using the wireless communicator.

Once retrieved, the file is saved as an .swd file.

Retrieving the Data Via the USB

1. Click Retrieve SenseWear Data.
2. Attach the USB cable to the Armband.
3. Click Retrieve.
4. If multiple Armbands are connected to your computer, a dialog box will appear prompting you to choose which one you wish to retrieve data from.
5. A status window will pop up indicating retrieval progress. In addition, you will be prompted to provide a name and location for your file once the data is retrieved.
6. Once retrieved, the program will automatically take you to the data summary of the SenseWear data file you just created.

Retrieving the Data Wirelessly

1. Click Retrieve SenseWear Data.
2. Select Via Wireless Communicator.
3. Type the Armband serial number (located underneath the battery).
4. Click Retrieve.
5. A status window will pop up indicating retrieval progress. In addition, you will be prompted to provide a name and location for your file once the data is retrieved.
6. Once retrieved, the program will automatically take you to the data summary of the SenseWear data file you just created.

Viewing, Exporting, and Annotating a Data Series

After the data has been retrieved, the InnerView™ Research Software automatically takes you to the View & Annotate SenseWear® Data section, with the View Summary Tab selected. This section of the software allows you to view the data in various degrees of detail and annotate the data through the following tabs:

View Data Tab

Time Selector

Graph

Annotate Data Tab

View Data Tab

To view a summary of the data, click the View Data Tab.

The following values are calculated for the duration selected by the Time Selector.

1. **Selected Time** - The total duration selected.
2. **On-Body Time** - The cumulative amount of time the Armband was worn and collected data.
3. **Total Energy Expenditure** - The number of calories burned. By default, this value includes an estimate of off-body Resting Energy Expenditure. To turn it off, go to Preferences in the Settings menu.
4. **Active Energy Expenditure** - The number of calories burned due to physical activity. This is based on the METS value selected under the preferences menu.
5. **Physical Activity Duration** - The cumulative amount of time spent during physical activity, including exercise like jogging, playing sports, and weightlifting, as well as low-ambulatory activities such as walking, house cleaning, and gardening.
6. **Number of Steps** - The pedometer reading. The number of steps the taken.
7. **Lying Down** - The cumulative amount of time spent lying in bed or on a couch, sedentary.
8. **Sleep** - The cumulative amount of time spent sleeping.

You may also Graph, Print, Export or Close the data file from the buttons at the bottom of the screen. Clicking Export will enable you to export the selected duration to .xls or .csv format for further graphing and analysis in other analysis software like Microsoft® Excel and MATLAB®.

Data Properties

You may edit information for this data file by either clicking on the subjkect's name or choosing Data Properties from the View file menu.

NOTE: Changes made here will not affect the Armband. To change body parameters on the SenseWear® Pro$_2$ Armband, you must go to the Configure SenseWear section.

1. **Subject Info** - Information about this subject can be checked and edited for the file.

2. **Researcher's Information** - In the Researcher Information tab, you can enter information about the researcher for this data file. Note that this information is specific to this data file and may differ from the default researcher information.

3. **Notes** - Here you can enter notes that will be specific to this data file. These notes may differ from the system's default notes.

4. **METS** - You can set the METS value for the data file here.

5. **Timezone** - The timezone for the InnerView™ Research Software may be different that the timezone in which the data was collected. Here you may change the timezone for this specific data file. This will not affect the locale setting for the system..

Time Selector

The View Summary tab and Graph window contain an interactive widget that lets you specify the time range of the data you want to observe. Here are some useful hints to help you use it.

The widget itself, (picture above) tells you the full length of the .swd file. The date and time of the first recorded data point is located in the upper left of the slider. (In this example its MON MAY 20, 8:46 PM) The date and time of the last recorded point is located in the upper right of the slider (THU MAY 23, 6:30 AM)

To select a time range, simply use your mouse to drag the START and END sliders back and forth. To select a time in one-minute granularity, click on either the right or left slider and then use your arrow keys.

To select an entire day (24 hours midnight to midnight), click on the specific day. For example: in the image above, clicking on "WED MAY 22" Would select the timeframe of Wed, May 22 - 12:00AM to Thur, May 23 - 12:00PM.

The dark blue lines indicate timestamps. More information about these timestamps is located in the drop down list, below the time selector.

The lightly striped areas indicate periods in which the SenseWear® Pro_2 Armband was off body, and therefore, no data was recorded.

Alternately, you can choose your time frame from the drop down list. The time selector will update upon doing so, visually indicating what time frame you've selected.

Graph

To graph your data, click the Graph button located at the bottom of the Summary screen then click the Chooser check box.

> Two new windows will pop up. The larger one is the graph window, which displays the data in time series. The smaller is the data chooser window that lets you select which data you want to graph.
>
> To choose a duration, use the time selector or drop down menus at the top of the graph window. There are three kinds of time: session start, session end, and timestamps. Each session is separated by a gray line that corresponds to the off-body duration, which you can see in the graphs. Off-body times have thin lines running through it. Click here for more information on how to use the Time Selector.

To choose what data you wish to see, select the check-box located next to the data series name. This will turn that data series "on" in the graph window. You can also select the color of the data series by using the color drop down to the right of the data series name.

You can define the range of the y-axis to be the highest and lowest value within entire data file or highest and lowest value within selected time range. To do this, select View and then Preferences from the menu.

To export and print the graph, go to the File menu, and choose either the Export or Print option.

You may also print a detail report by choosing the "Report" option from the file menu.

Lifestyle Data

Annotations

Timestamps

Physical Activity

Step Counter

Lying Down

Sleep

Click here for more information about Lifestyle Data.

Physiological Data

GSR - average

Heat Flux - average

Longitudinal accelerometer - average

Longitudinal accelerometer - peaks

Longitudinal accelerometer - MAD

Near body temp - average

Skin Temperature - average

Transverse accelerometer - MAD

Transverse accelerometer - average

Transverse accelerometer - peaks

Click here for more information about Physiological Data.

Annotate Data Tab

You can annotate the data on the graph with event labels, such as running, walking, driving a car, etc.

1. Click View & Annotate SenseWear® Data.
2. Select the Annotate Data tab.
3. Select the time range of the event that you want to annotate by selecting a start time, hitting the shift key, then selecting the end time.
4. Click Annotate. The Annotate window will pop up.
5. Modify the time range as needed in the editable date and time fields as necessary.
6. Select from the list of annotations, then click Add.
7. If you want to add or edit the annotation list, click Edit Annotation List, type in the name of the annotation, then click Add.

Timestamps - Timestamps are recorded every time the button on the SenseWear® Pro_2 Armband is pressed. The value in parenthesis represents the number of button presses (i.e. double-click, triple-click, etc.).

Troubleshooting

Problem:

The System had an error communicating with the SenseWear® Pro_2 Armband. This may be due to one of the following reasons:

a. Your Armband is in power save mode.

Solution: Press the Armband button and Try Again.

b. Your Wireless Communicator is not plugged into a USB port.

Solution: If it is not plugged in, plug it in and Try Again.

c. Your Armband was not within 10 feet of the wireless communicator.

Solution: Click Try Again and stay within this distance while communicating with the Armband.

d. Your Armband's battery is too low.

Solution: If it is, replace the battery and Try Again. You can tell if the battery is too low by pressing the Armband button and seeing what color the battery light is on the Armband (green=okay, amber=only 24 hours left, red=dead).

e. The USB drivers are not installed on this machine.

Solution: Reinstall them from the CD.

f. If you are using the Wireless Communicator, the serial number you typed may not be correct.

Solution: Verify the number by checking under the battery. NOTE: Be sure to replace the battery in 30 seconds or less or your data may be lost.

Problem:

When you press the Armband button, the Armband does not respond.

Solution: Take the battery out of the Armband, press the Armband button for 10 seconds and then replace the battery. Press the Armband button again to see if there is feedback.

Appendix

Safety

Disclaimer

This product is not intended to be a medical device or intervention and is provided solely for your education and information. This product is not meant to substitute for proper medical diagnosis, care, or treatment related to your physical activity or nutrition. BodyMedia® recommends that you consult your physician before beginning any exercise or weight loss program.

This product is non-defibrillation proof.

This product is a Type B Applied Part complying with the specified requirements of this Standard to provide protection against electric shock, particularly regarding allowable Leakage Current.

For Home Use: When the SenseWear® Pro_2 Armband is on the arm, DO NOT connect the USB cable to the Armband when the other end of the USB cable is connected to the computer.

For Clinical Use: When the Armband is on the arm, DO NOT connect the USB cable to the Armband when the other end of the USB cable is connected to the computer. When you are using the System, each time you log into the computer or add a peripheral device (printer, etc), ensure that the entire end system complies with IEC 60601-1-1. Be sure any and all tests are performed by a qualified technician and verify that the computer system is outside of the patient environment.

Consult your physician

You should check with your physician before you decide to make a change in your lifestyle, exercise, nutrition, sleep, or other routines. This is particularly important if you are taking medication or are under the care of a physician for any medical condition, such as the following: anemia, anorexia, asthma, bulimia, bronchitis, cardiac (heart) symptoms of any kind, chest pain, diabetes, exercise-induced wheezing, high blood pressure, pneumonia, pregnancy, respiratory (lung) symptoms of any kind, seizure disorder, shortness of breath, surgery of any type within the past year, and if you are female, no menstrual periods (unless due to hysterectomy or menopause). Patients who wear pacemakers should always consult their physicians before wearing any electronic device, including the Armband.

Water resistance

DO NOT IMMERSE THE ARMBAND IN WATER. The monitor is splash resistant, but it is not designed to be used underwater or to come in continuous contact with water. To prevent a shock hazard, never use the Armband in water environments (e.g., in the shower, swimming pool, or rain).

Wear comfortably

Be careful not to over-tighten the Armband while on your arm. If, at any time, you feel constriction or loss of circulation, simply loosen the adjustable strap and re-fasten it to a more comfortable setting.

Be sure that both your arm and the sensors on the back of the Armband are clean. To clean the sensors, wipe with a soft, damp cloth. If you develop a rash where the Armband comes in contact with your skin, discontinue use and consult your physician before continuing regular use of the Armband.

The design of the Armband involved many materials experts, physicians, and suppliers who are familiar with wearable materials and products. Each material was chosen for its precedent in other skin contact products or has been independently approved for skin contact. However, everyone's skin is different and wearers with very sensitive skin may experience irritation or redness after wearing the Armband. If this occurs, discontinue use and consult your physician. If you have known metals allergies, you should consult your physician prior to wearing.

Batteries

Batteries may explode or leak and can cause burn injury if recharged, disposed of in fire, mixed with a different battery type, or disassembled. Do not remove the battery label. Dispose of properly.

Care and maintenance

Handling

Though the SenseWear® Pro_2 Armband was designed for wearability and long-term use, it is a sensitive monitoring device. Rough handling can break internal components. Never drop or shock the Armband and always store it in a safe place when not in use.

Avoid exposing the Armband to extreme temperatures, direct sunlight, moisture, sand, dust, or mechanical shock.

To prevent possible damage to the cable, grasp the plug, not the cable, when disconnecting the USB. Replace the cable if it becomes frayed.

The Armband is splash resistant. It is not designed to be used underwater or to come in continuous contact with water. To prevent a shock hazard, never use the Armband in water environments (e.g., in the shower, swimming pool, or rain).

Remove the battery if the Armband is not being used for an extended period of time. Please note that removing the battery will cause any data stored on the Armband to be deleted.

Maintenance

Do not attempt to open the Armband yourself. It contains no user-serviceable parts. Refer all servicing to qualified Service Personnel. Opening the Armband yourself will void the warranty.

Cleaning

Always clean and dry the Armband after vigorous sweating activities or when it becomes noticeably moist or dirty. Failure to keep the Armband clean, or improper cleaning, may irritate the skin and affect the sensor performance.

Moisten a soft cloth or towel with mild disinfectant soap and water. Wipe and dry the skin-touching side of the Armband. Never use solvents to clean the Armband, only for disinfecting (see below). The adjustable strap should be hand-washed with mild soap and warm water, then air-dried. Machine drying may affect the performance and lifespan of the strap.

Disinfecting

Wipe back of Armband with soft dampened cloth with 70% isopropyl alcohol between users. DO NOT STERILIZE THIS UNIT.

Certifications

Disclaimer

This product is not intended to be a medical device or intervention and is provided solely for your education and information. This product is not meant to substitute for proper medical diagnosis, care, or treatment related to your physical activity or nutrition. The System recommends that you consult your physician before beginning any exercise or weight loss program.

FCC STATEMENT

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

  CAUTION: Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

  FCC 47CFR 15C TCB - 47 CFR Part 15 Subpart C Intentional Radiator Certification Test

  FCC 47CFR 15B clA - 47 CFR Part 15 Subpart B Unintentional Radiators Class A Verification

  UL 60601-1 - UL Standard for Safety Medical Electrical Equipment, Part 1: General Requirements for Safety First Edition

  Medical Device Directive 93/42/EEC - Testing and Report Services

CENELEC EN 60601-1-2 - 2001 - Medical Electrical Equipment Part 1-2: General Requirements for Safety - Collateral Standard: Electromagnetic Compatibility - Requirements and Tests IEC 60601-1-2: 2001

CENELEC EN 60601-1-1 - Medical Electrical Equipment - Part 1: General Requirements for Safety - Collateral Standard: Safety Requirements for Medical Electrical Systems.

CAN/CSA-C22.2 No.606.1-M90

EN 60601-1-4

Radio & Telecommunications Terminal Equipment Directive (R&TTE) 1999/05/EC - European Union (EU)

CENELEC EN 60950-1 - Information Technology Equipment - Safety Part 1: General Requirements IEC 60950-1: 2001, Modified; Supersedes EN 60950: 2000

ETSI EN 301 489-1 - Electromagnetic Compatibility and Radio

ETSI EN 301 489-3 - (Draft) Electromagnetic Compat. and Radio Spectrum Matters (ERM); Harmonized EN for ElectroMag. Compatibility (EMC) of Radio Comms. Equip. & Srvs.; Pt. 3: Specific Conditions for Short-Range Devices (SRD) Operating on Freqs Between 9 KHz and 40 GHz V1.3.1
Notes: Included when the evaluation is performed concurrently with EN 301 489-1

ETSI EN 300 220-3 - EMC and Radio Spectrum Matters (ERM); Short Range Devices (SRD); Radio Equipment to Be Used in the 25 MHz to 1 000 MHz Frequency Range with Power Levels Ranging up to 500 mW; Part 3: Harmonized EN Covering Essential Req.

Sensor Sampling Rates

Data Channel	**(Max Sample Rate)**
Accelerometer_Longitudinal	(32 Hz)
Accelerometer_Transverse	(32 Hz)
Heat Flux	(32 Hz)
Skin Temperature	(32 Hz)
Near-Body Temperature	(32 Hz)
Galvanic Skin Response (GSR)	(32 Hz)

Timestamp	(100 Hz)
On/Off Body	(32 Hz)
Pedometer	(32 Hz)

System Requirements

PC with Pentium II processor or higher

Windows 98/2000/XP/ME

128 MB RAM or higher

SenseWear® Pro_2 Armband

One available USB port

Algorithm Accuracy

For a complete set of accuracy statements and the latest white papers, visit our website at www.bodymedia.com. There, you can view and download the white papers.

Acknowledgments

- This product includes software developed by the Apache Software Foundation (http://www.apache.org).
- This product includes software developed by the JDOM project (http://www.jdom.org).
- This product includes code licensed from RSA Security, Inc.
- Some portions licensed from IBM are available at http://oss.software.ibm.com/icu4j/.

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