



# Fatigue Science



*ReadiBand® Hardware User Guide*

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## Warnings & Safety Information

- Do not wear ReadiBand on broken, damaged, or irritated skin. Remove immediately if skin irritation or rash occurs.
- Do not dispose of the ReadiBand by incinerating it or by placing it in the trash.
- If pod is punctured or damaged, immediately cease use.
- Do not wear ReadiBand while playing very rough contact sports.
- Battery charging should always be monitored.
- Charge indoors only.
- Clean ReadiBand with soap and warm water or an isopropyl alcohol wipe. Do not submerge ReadiBand in alcohol or other solvent.

	<b>WARNING:</b> Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the ReadiBand and charger.
	<b>WARNING:</b> The charger is designed with adequate safeguards to protect you from shock and other hazards when used as specified within this documentation. If you use the charger in a manner not specified by this document, the protection provided by the charger may be impaired. Please read the documentation before using the charger.
	<b>WARNING:</b> If you transport the charger in checked baggage, be sure to remove the ReadiBand from the charger before packing it.
Battery Temperature	<ul style="list-style-type: none"> <li>The temperature of the air around the ReadiBand being charged should be between 0°C and +55°C (+32°F to +131°F). Charging the ReadiBand outside this range may increase charge time, harm battery performance, or reduce battery life.</li> </ul>
Charge time	<ul style="list-style-type: none"> <li>The charger will charge a ReadiBand in less than 1 hour if the ambient temperature is inside the operating ambient temperature specification.</li> <li>If the ambient temperature is above or below the operating ambient temperature range, the charger may eventually charge the ReadiBand, but the charge time will be longer than 1 hour.</li> </ul>
Power Input	Power the charger only with the AC/DC power supply provided with the charger. Failure to do so could damage the charger, void the warranty, and cause a safety hazard.
User Serviceability	Do not disassemble the charger or the ReadiBand. There are no user-serviceable parts.
Liquids	Avoid spilling liquids on the charger. Liquids spilled onto the charger could cause it to short circuit. If liquids are accidentally spilled, let the charger dry before use.
ReadiBand Disposal	Dispose of used ReadiBands according to the manufacturer's instructions and local or national regulations.

Cleaning	Wash the ReadiBand with warm water and mild soap. If additional cleaning is necessary, wipe the entire ReadiBand with an isopropyl alcohol wipe. Do not use liquid alcohol or other harsh cleaners to clean the ReadiBand.
<b>NOTE:</b>	The ReadiBand 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.
<b>NOTE:</b>	<p>The ReadiBand 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. The ReadiBand 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 the ReadiBand does cause harmful interference to radio or television reception, which can be determined by turning the ReadiBand off and on, the user is encouraged to try to correct the interference by one or more of the following measures:</p> <ul style="list-style-type: none"> <li>- Reorient or relocate the receiving antenna.</li> <li>- Increase the separation between the ReadiBand and receiver.</li> <li>- Connect the ReadiBand into an outlet on a circuit different from that to which the receiver is connected.</li> <li>- Contact support or consult an experienced radio/TV technician for help.</li> </ul>
<b>NOTE:</b>	<p>This Class B digital apparatus complies with Canadian ICES-003.</p> <p><i>Cet appareil numérique de la classe [*/] est conforme à la norme NMB-003 du Canada.</i></p>

## *Technical Specifications*

Model	SBV2 ReadiBand Actigraph
Power Input: Individual charger	5 VDC, 0.25 amp MAX
Power Input: Multi-charger	5 VDC, 2 amp MAX
Internal Battery	Li-ion rechargeable coin cell
Transmitter	2.4 GHz ISM Band
Operating Environment	0°C to +55°C (+32°F to +131°F), 0-95% relative humidity (non-condensing)
Storage Environment	-40°C to +75°C (-40°F to +167°F), 0-95% relative humidity (non-condensing)

## ***Introduction***

### **Purpose of this guide**

This guide covers key aspects for ReadiBand users, including:

- How to start using ReadiBand
- How to wear ReadiBand
- Recording and downloading data
- How to charge ReadiBand
- Troubleshooting information

### **ReadiBand Overview**

The ReadiBand is a wrist-worn device that collects actigraphy data to determine how active an individual is during the course of a day. Actigraphy data measures movement using an accelerometer. With this movement information, the ReadiBand is able to determine when a user goes to bed and a general fatigue or rest score over time. The ReadiBand uses the ANT wireless protocol to send data and obtain configuration information from a PC.

The ReadiBand uses only an accelerometer sensor to collect movement data. There is no GPS, no audio monitoring, no video, and no tracking devices. The ReadiBand *only* measures wrist movement.

The ReadiBand system is made up of several parts: a pod with the electronics and sensors, a soft and flexible wrist strap, a multi or individual charger, and the software.



## ***Getting Started***

### **Included contents**

Before getting started wearing the ReadiBand, please inspect and verify that all of the following components are included. If any items are missing, please contact Fatigue Science support staff immediately.

- ReadiBand pod (installed in strap)
- ReadiBand rubber wrist strap

Optional accessories:

- USB ANT dongle with extension cord
- Individual charger with power adapter or multi-charger
- Software installation CD

## Using the ReadiBand

### LED Status Indicators

The ReadiBand has four LEDs to notify users of the state of the ReadiBand.

Top LED – Communicating with PC

Right LED – Low battery warning

Bottom LED – Communicating with charger

Left LED – Device Error



### Wearing the ReadiBand

The ReadiBand should be worn on the wrist of the non-dominant hand on the tightest setting that feels comfortable. It should not cut off circulation; if there is any discomfort, move to a larger setting. If the device is too loose on the smallest setting, use a sharp pair of scissors to cut off the end of the strap with the marking on the inside to be able to use the smallest settings. If the device is too tight on the largest setting, use a strap extender.



The ReadiBand is made of high-grade flexible plastic and is completely waterproof. The device may be worn in the shower, bath, or while swimming. It should be taken off when playing rough contact sports but otherwise should be worn at all times, including during light exercise. If the ReadiBand pod is damaged, the entire ReadiBand should be replaced immediately.

The ReadiBand can be used as a wrist watch to display the current date and time. This is presented through a 5 x 19 pixel LED display on the top of the pod.

### Cleaning the ReadiBand

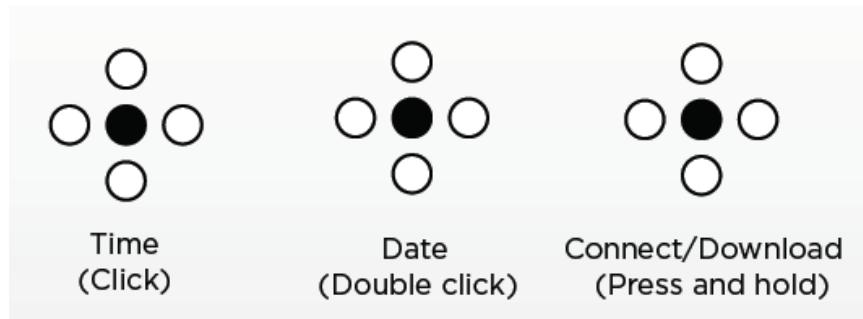
During normal wear, clean the ReadiBand with soap and warm water or an isopropyl alcohol wipe. If dirt and stains do not come off, use a mild, non-abrasive cleaning pad or cloth to remove any stains. Never submerge the ReadiBand in alcohol or other solvents.

If excessive residue or dirt becomes trapped between the pod and the band, the pod can be removed from the band. To remove the pod from the ReadiBand, hold the pod in one hand and push back against the band to strip off the band.

To place the pod back in the band, put the pod on the band as shown at right and pull the band over the pod.



## Basic ReadiBand Functionality



### Date/Time Display

To display the current time, press the middle button once and the time will be displayed for one second. To display the time for up to three seconds, hold the button down.

To display the current date, double click the middle button and the date will scroll across the screen.



### Communicating with PC software

The ReadiBand uses ANT wireless connection to communicate with the PC. This is used to start and download a recording session.

To wirelessly sync with a PC, press and hold down the middle button for more than three seconds. When arrows scroll across the display, release the button. [Note: attempting to sync with the PC on a continuous basis when it is not available will decrease battery life. Sync is disabled when the battery level is below 60%. Charge the ReadiBand above 60% charge to sync.]



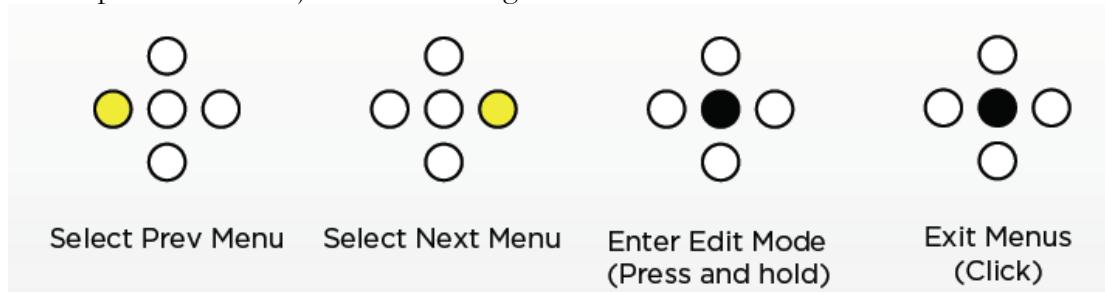


## Menu Navigation

The ReadiBand has five buttons used for menu navigation. The right button displays next menu items, the left displays the previous menu items and the center button selects the current menu item displayed. The first four letters of the menu item will be displayed for two seconds before the entire text scrolls across.

[Note: push the center button during time or date scroll to terminate scrolling text. When a menu heading is scrolling, pressing the center button will select that menu.]

Press up or down to adjust the LED brightness.

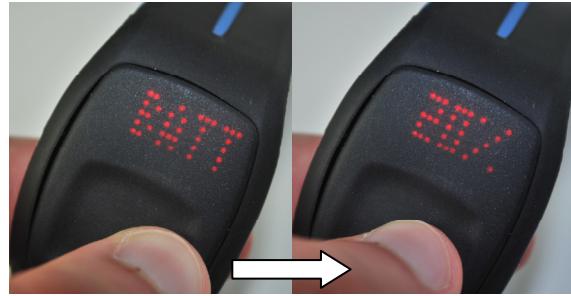


The four menu items include Status, Battery Level, Time Set and About

- 1) **Status** – This menu item displays the current mode that the ReadiBand is operating on. It will display one of the following modes.
  - **SESSION IS IDLE** – This indicates that the ReadiBand is idle and not actively recording any data. This occurs when a session has not been configured with the PC software or a previous session has been stopped.
  - **X HOURS/DAYS/MONTHS RECORDED** – This indicates that the ReadiBand is actively recording data and for how long. This occurs when a session has been configured with the PC software.
  - **SESSION IS STARTING IN TIME/DATE** – This indicates that the ReadiBand is waiting to start a recording session on the time or date displayed. The ReadiBand has been configured with the PC software but the start date/time has not been reached yet.



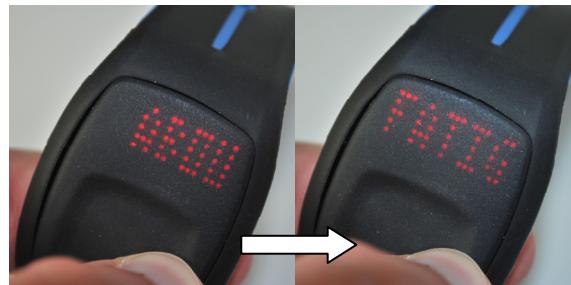
- 2) **Battery Level** – This menu item displays the percentage of battery remaining on the ReadiBand in increments of 10%.



- 3) **Time Set** – This menu item allows the user to modify the current time displayed on the ReadiBand. After selecting it, press up/down to increment/decrement the hours/minutes and right/left to select between modifying the hours/minutes. When the time has been adjusted, press the middle button to confirm the new time. The current time will flash along with AM or PM followed by the date. To select a new date, increment or decrement the time to the correct time on the correct date, like selecting the date on an analog watch.



- 4) **About** – This menu item displays a configurable scrolling message, such as the user name or a contact website. This message may be modified through the ReadiBand PC software.



### **Starting a recording session**

Before recording a data session, configure the ReadiBand and set a recording session start time using the PC software. The software also allows the user to specify a custom About tag or user name to identify the ReadiBand.

- 1) Plug the ANT dongle with extension cord into an available USB port and the device will be automatically recognized. If the device is not recognized, restart the computer or reinstall the driver software. Driver software only needs to be installed once.
- 2) Launch the PC software.
- 3) Select “Start Session.”
- 4) Customize the following startup requirements if desired and click “Connect.”
  - *Start time* – To start immediately, do not modify the default field. Specify a date and time in this field for a delayed start.
  - *Wearer’s name* – Input a custom name to help identify the ReadiBand.
- 5) Hold down the middle button on the ReadiBand until arrows flash through the display for approximately 4 seconds.
- 6) “SESSION STARTING” will scroll across the ReadiBand display.
- 7) Verify that the session has started properly by checking the Status Menu. Press the right button then the middle button. If the session has started, the screen will display “0 Hours Recorded.”
- 8) Refer to “Downloading a recorded session” when ready to download and analyze recorded data.

### **Downloading a recorded session**

The ReadiBand allows downloading recorded data at anytime during a recording session. Downloading recorded data will NOT stop the recording process. After downloading, all prior data will be preserved and recording will continue.

- 1) Plug the ANT dongle with extension cord into an available USB port and the device will be automatically recognized. If the device is not recognized, restart the computer or reinstall the driver software. Driver software only needs to be installed once.
- 2) Launch the PC software.
- 3) Select “Download Data.”
- 4) Hold down the middle button on the ReadiBand until arrows flash though the display for four seconds.
- 5) Wait for the progress bar on the computer and the ReadiBand display to complete. The ReadiBand LEDs will flash green when download is finished successfully. Push the middle button to stop the flashing green LEDs.  
“Download Complete” will scroll across the ReadiBand display. [Note: if button is not pressed within one minute, LEDs will stop flashing and device will return to normal state.]
- 6) Data has been saved to the PC.
- 7) Refer to the software manual for analysis instructions.
- 8) If there is a download error, red LEDs will flash for one hour or until a button is pressed. If a button has not been pressed after one hour, the flashing will stop and a “Download Unsuccessful” message will display when the center button is pressed. To dismiss the message, press the center button again.

## Battery Charging

### Battery Information

An internal rechargeable lithium-ion coin cell battery powers the ReadiBand. Under typical use, a fully charged ReadiBand can run for more than 30 days before a recharge is required. The battery life of a fully charged battery is dependent on how often the menu display is used and how often it is synced with a computer. The ReadiBand battery is not user replaceable.

Charge the ReadiBand for one hour before using it for the first time.

### When to Charge

The ReadiBand may be recharged at anytime. Charge the ReadiBand prior to starting a new record session when the battery is below 60% (see Menu Navigation to display battery level). A fully charged battery displays 100%.

The ReadiBand displays a low battery warning when the battery level drops to 10% battery level or less. This warning will be displayed only after a user presses the middle button to display the time/date. This indication notifies the user to immediately charge the ReadiBand.

The ReadiBand will stop an active recording session if the battery level drops to 5%. The ReadiBand will go into a low battery mode by disabling all menu items and flashing a red LED. While the ReadiBand may sync up with a PC to offload recorded data, it is highly recommended to recharge the battery first in order to avoid connection problems.

- A full charge lasts for more than 30 days
- Charges in one hour from fully depleted.



### How to Charge

- Use the individual or multi-charger to recharge the ReadiBand battery (see appropriate charger user guide).
- Do not charge the ReadiBand when attached to the body.

## ***Support***

### **Frequently Asked Questions**

Please refer to the following frequently asked questions about the ReadiBand.

**Question:** “Does the ReadiBand come in different colors?”

**Answer:** Yes, the ReadiBand is available in a variety of colors, please contact support for special order information.

**Question:** “Is it safe to take the ReadiBand on an airplane?”

**Answer:** Yes, the wireless transmitter on the ReadiBand is normally disabled. Wireless transmitting is only enabled when the middle button is held down for over three seconds. Transmission lasts for less than 10 seconds when a PC receiver is not present. Consider the ReadiBand as always being in a default “Airplane Mode.”

**Question:** “Can I change the display name or about information after a session has already started?”

**Answer:** No, the display name can only be set when a recording session is initialized. To set a new display name, the session must be restarted.

**Question:** “How long does it take to charge the ReadiBand?”

**Answer:** The ReadiBand takes about one hour to charge from fully depleted.

### **Troubleshooting**

Please refer to the following troubleshooting guide before contacting support.

**Problem:** “My ReadiBand is not responding to left or right button presses and has a blinking red light.”

**Solution:** The ReadiBand is in low power mode and will not allow access to any menu items. Recharge the device in order to gain access to the menus again.



**Problem:** “My ReadiBand is not responding to any button presses.”

**Solution:** The ReadiBand battery has completely drained and must be recharged before further use. If the problem persists after recharging the device for over an hour, disconnect the ReadiBand from the charger and contact support.

**Problem:** “My ReadiBand does not display my name when I select it.”

**Solution:** The ReadiBand has not been configured with a name or has been set incorrectly. Reconfigure the band by starting a new session. [Note: this will delete all recorded data.]

**Problem:** “The date is incorrect on my ReadiBand after I set a new time.”

**Solution:** The ReadiBand functions similar to an analog wrist watch; when the hour is increased beyond midnight, the date will jump one day in advance. For example, if traveling to a time zone two hours behind (e.g. EST to RMT) and the ReadiBand time is currently set to 10am, decrement two hours to 8am. Do not increment ten hours to 8pm.

**Problem:** “My ReadiBand cannot connect to the SleepAnalyzer software.”

**Solution:**

- 1) Remove ReadiBand and place it next to the USB ANT dongle. Radio interference may cause wireless communication problems at a distance. If this still does not work, try step 2.
- 2) Be sure that the middle button is firmly pressed for more than 4 seconds.
- 3) Be sure that the battery level remaining on the ReadiBand is above 20%. If it is not, recharge ReadiBand before attempting to reconnect.
- 4) Shut down SleepAnalyzer software, unplug USB ANT dongle, plug USB ANT dongle back in and start up SleepAnalyzer software again. If this still doesn't work, try step 3.
- 5) Restart computer and software and try again.
- 6) Contact support

**Problem:** “My ReadiBand appears to be having a short battery life.”

**Solution:** The battery life is greatly dependent on the display usage of the ReadiBand. Try to fully charge the battery and access the menu displays only when needed. If the battery life is still significantly short, please contact support.

**Problem:** “The download time seems to be taking forever.”

**Solution:** The download time is dependent on the amount of data that it needs to download from the ReadiBand. Expect 30 days of data to take several minutes to download.

**Problem:** “There is a RED LED blinking on the charger when I clip it onto the ReadiBand.”

**Solution:** The charger pin contacts are not aligned with the ReadiBand contacts. Adjust the device until a GREEN LED appears. If this does not work, unplug and then re-plug the AC adaptor into the wall outlet and try to realign the contact pins again until a GREEN LED appears. If the problem persists, DO NOT leave the charger clipped on to the ReadiBand. Disconnect and contact support. See below for contact details.



**Problem:** “The ReadiBand does not respond to button presses and there are no LEDs blinking to indicate low battery.”

**Solution:** The battery is completely depleted. Please contact technical support for replacements. Do not charge the ReadiBand.

## Contact Information

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