



OWNERS MANUAL

Model: Moxy5

# Introduction

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Thank you for purchasing the Moxy Muscle Oxygen Monitor.

**Warning:**

Always consult your physician before starting or altering any exercise program.

**Applications:**

Moxy is not a medical device. It is intended for non-medical fitness use only.

**Technical Support:**

There is technical support on our Forum at <http://forum.moxymonitor.com/>. Contact technical support by emailing [info@moxymonitor.com](mailto:info@moxymonitor.com) or by calling 320-296-1010.

**Moxy Settings App:**

Go to <http://www.moxymonitor.com/settings-app> to download a PC application that allows you to setup your Moxy and download data from it.

**Warning:**

There are no user serviceable parts inside the Moxy Sensor. Do not attempt to open the case.

**ANT+ Compatibility:**

This product is ANT+™ certified for Muscle Oxygen. Visit [www.thisisant.com/directory/](http://www.thisisant.com/directory/) for a list of compatible products and apps.



**Bluetooth Compatibility:**

This product uses Bluetooth low energy technology.



# Muscle Oxygen Monitoring

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Moxy uses Near Infrared Spectroscopy (NIRS) to measure oxygen levels in muscle. Hemoglobin is the molecule in red blood cells that carries oxygen; it changes color depending on whether it is carrying oxygen or not. Near-Infrared light generated by the Sensor travels from the emitter through the skin to interact with the muscle, after which the light is scattered back to the detectors in the Sensor. The Moxy Algorithm uses the information from the light striking the detectors to determine the Muscle Oxygen Saturation.

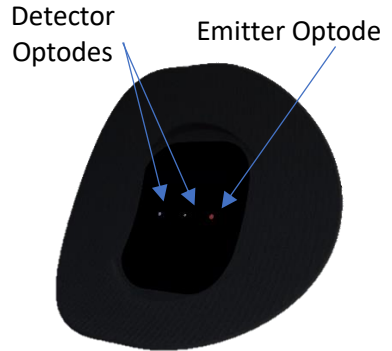
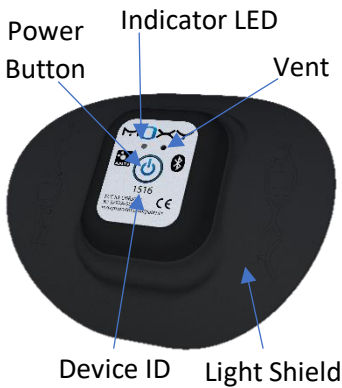
The terms Muscle Oxygen Saturation, Muscle Oxygenation, and Muscle Oxygen are the abbreviation,  $SmO_2$  are used interchangeably.  $SmO_2$  is the percentage of hemoglobin in the capillaries of the muscle that is carrying Oxygen. The number can be from 0 to 100%. Total hemoglobin, THb, is a relative measure of the amount of hemoglobin in the optical path of the sensor

Muscle Oxygenation is a localized measurement. Even muscles that are close to each other, such as the Rectus Femoris and the Vastus Lateralis in the Quadriceps group, can have different values. Contralateral muscles may also have different readings.

Muscle Oxygen Monitoring can be used to determine optimal training zones, to monitor training intensity, and to set an optimal race pace. Refer to the Moxy website at [www.moxymonitor.com](http://www.moxymonitor.com) for more information.

# Moxy Sensor

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## **POWER BUTTON FUNCTIONS:**







- Turn ON / OFF
  - Press and Hold Power Button for 3 Seconds
- Indicate Charge Level and ON/OFF State
  - Short Click Power Button

## **VENT FUNCTION:**

- The vent is waterproof, but it allows the air pressure inside and outside of the sensor to equalize.
- Do not stick sharp objects into the vent hole.

# Indicator LED

The Moxy sensor has a multi-color indicator LED to the upper left of the power button. Note that the similar black circle on to the upper right of the power button is a vent and does not illuminate. The following table shows what each illumination pattern indicates.

Color	Pattern	Indication
Green	 <p>Short Flash Every Second when on charger</p>	Sensor is Charging
Green	 <p>Solid Green when on charger</p>	Charging is Complete
Green	 <p>Blink Every Half Second After a Button Press</p>	<u>Charge Level</u> 4 Blinks = Full 1 Blink = Near Empty
Red	 <p>Red Blink After Long or Short Button Press</p>	Indicates Sensor is ON
Blue	 <p>Blue Blink after a LONG Button Press</p>	The sensor has been turned off
Blue	 <p>Blue Solid</p>	The sensor is in communication with the Moxy Settings App

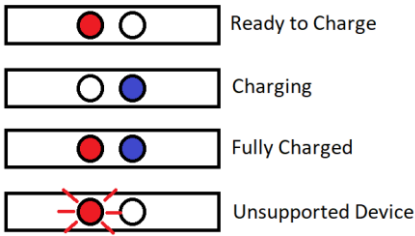
# Wireless Charger

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The Moxy 5 uses a Qi format wireless charging system. It is recommended to use the charger that is shipped with the system or a Qi Certified Charger. Non-certified chargers may not have all the safety features implemented such as Foreign Object Detection. Other chargers may also interfere with the light shield.

Place the sensor with the Optodes toward the charger. The light shield has a relief that fits around the outside of the charger to keep the sensor centered. If the light shield is not installed, the sensor should be placed in the center of the charger.

The Charger disk has a Red and Blue Indicator LED. The following chart shows the function of these indicators.



The charger may occasionally return to charging after the charges is completed to top off the battery. The Moxy sensor and the charger disable charging when the battery is full so there is no harm in leaving the sensor on the charger after it is full.

# Moxy Sensor Settings

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The sensor settings can be adjusted using the Moxy Sensor Settings App. This app can be run on Windows, Android, and Mac devices. At this point, it does not run on iOS devices. You can access the App at [www.moxymonitor.com/settings-app](http://www.moxymonitor.com/settings-app)

You MUST access the Sensor Setting App using the browser indicated on the web page for your device's platform to connect to the sensor via Bluetooth.

If the sensor is set in ANT+ broadcast mode, it will still advertise in Bluetooth mode for the first 10 seconds that it is turned on. You must connect to the Settings App during this 10 second window. If you miss the window, turn the sensor off and back on to try again.

## Settings and Features

**Time:** This allows the stored data time stamps to be set correctly. A hard reset or a completely dead battery on the sensor will cause it to lose its time setting.

**Broadcast Mode:** The primary broadcast modes are ANT+ MO2 Profile and Bluetooth.

**Update Rate:** The Moxy sensor has 4 update rate modes

- Default: Updates every 2 seconds with 10 second Smoothing
- No Smooth: Updates every 2 seconds with No Smoothing
- Low Power: Same as Default except fewer LED cycles are used to save power
- High Speed: Updates every 0.5 seconds with No Smoothing

# Moxy Sensor Settings

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**Battery Charge Level Indicator:** Shows the charge status of the battery.

**Versions:** Shows the sensor firmware and lookup table versions

**Download Stored Data:** All measurements are broadcast over ANT+ or Bluetooth and a copy of all measurement is also stored on the sensor. The stored data is downloaded and saved to a Dropbox folder using this app. If you don't already have a Dropbox account, you can sign up for one at [www.dropbox.com](http://www.dropbox.com)

**Firmware Updates:** This allows you to install the latest version of the sensor firmware. The app will go to the Moxy website to find the latest firmware files.



# Smart Watches and Bike Computers

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Garmin devices support the display and recording of Moxy Data three different ways.

- 1) Native Support – A small number of devices support muscle oxygen data natively. This is limited to 1 Moxy at a time and it does not support recording of the sensor location. It pairs to the Moxy just like a Heart Rate sensor or Power Meter.
- 2) ConnectIQ Data Fields. These can be downloaded from the Garmin App store and installed on your ConnectIQ compatible device. After they are installed, they are inserted into the display of your regular activities like any other data field. Pairing is done through the App settings feature in Garmin Express or Garmin Connect Mobile. All devices support 2 Moxys at once and some support 3.
- 3) ConnectIQ Apps. These can be downloaded from the Garmin App store and installed on your ConnectIQ compatible device. Apps are like adding another activity to your device so where you have a Run or Indoor Cycle Activity, you would see an additional Moxy activity. The Moxy 5-1-5 Apps can guide a 5-1-5 Assessment. The Moxy Run or Moxy Cycle Apps have additional capabilities like SmO2 alarms and a live graph of the data.



The Wahoo Elemnt bike computers support the display and recording of one Moxy Sensor at a time by pairing the Moxy like any other sensor.

# Data Display & Collection Software

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Moxy is compatible with several data display and collection software systems that are used for training studio and research applications. All of these applications use the ANT+ MO2 profile setting on the Moxy



PerfPro Studio supports multiple Moxy sensors per user and multiple users. It can collect the Moxy data using multiple ANT+ dongles and/or multiple NPE Wasp devices. It allows viewing of the muscle oxygen data and has an automated Muscle Oxygen report that is generated at the end of a workout. It supports automated transfer of the data to many popular online services like Garmin Connect, TrainingPeaks and others. PerfPro is compatible with most smart trainers, Concept II Rowers and some treadmills. It also collects power, cadence, speed and heart rate data. The data can be exported in .FIT or .CSV formats.



PeriPedal software supports one Moxy per user and multiple users. It also collects power, cadence, speed and heart rate data via 1 ANT+ dongle. It supports exporting the data in .FIT and .CSV formats.



The Omnia software package from Cosmed collects and displays the Moxy data along with the VO2 and other data from their devices.

# Data Display & Collection Software

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Golden Cheetah software is freeware that supports live display of Moxy data and importing of FIT files with Moxy data. It allows powerful customization of the data display and analysis. It is compiled for Windows and Mac.



Maximum Trainer is a free indoor cycling software that supports live display of Moxy data and saves the data in the FIT file. It has Windows and Mac versions.

# Wearing the Sensor

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There are 4 Primary methods for wearing the Moxy Sensor.

**Under Compression Clothing:** The sensor may simply be tucked under compression clothing. This is primarily for measuring on the Quadriceps. It may be used with or without the light shield in this mode. However, the light shield can help stabilize the sensor placement.

**Large Adhesive Attachments:** The Large Adhesive attachments are used with the Light shield. The tape should have good contact with the skin all around the light shield.

**Small Adhesive Attachments:** These are a lighter duty attachment and are typically used without the light shield. The circular ring of double stick tape is attached to the sensor and the rectangle tape is attached to the skin.

**Taping over the entire sensor:** This can be done with or without the light shield. This is typically only required for extremely aggressive motion for very long periods. It can also be used for more awkward positions like on the back for swimmers.

The Moxy sensor is waterproof to 1 meter of depth. It can be used inside of a clear zipper baggie if more protection is desired.

## **Videos on Sensor Attachment:**

<https://youtu.be/vwgewBF134lo>

<https://youtu.be/b1DG6nNraRc>

# Declaration of Conformity

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Hereby, we: Fortiori Design LLC

1155 West Shore Dr SW  
Hutchinson, MN 55350 USA  
320-296-1010

Declare: under our sole responsibility that the following labelled products

Muscle Oxygen Monitor: Moxy5

to which this declaration is related, are, when used as specified, in conformity with the technical requirements of the standards and the provisions of the essential requirements of the Directives detailed below.

Directives: Radio Equipment Directive (2014/53/EU)

Standards used: EN 301 489-17 V3.1.1:2017 Bluetooth Low Energy Radio  
EN 303 417 V1.1.1:2017 Wireless Power Transmission (WPT) Radio  
DRAFT EN 301 489-3 V2.1.1:2017 Wireless Power Transmission (WPT) Radio  
EN 55032:2012/AC:2013 Class B  
EN 61000-3-2:2014  
EN 61000-3-3:2013  
FCC 15.107:2018 Class B  
FCC 15: 109:2018 Class B  
FCC 15:109(g):2018 Class B  
ICES-003:2016 updated April 2017 Class B

Date of Issue: 20 July 2018



Roger W Schmitz  
CEO – Fortiori Design LLC

# FCC Compliance Statement

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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.

## FCC WARNING

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 the receiver.
- Connect the equipment into an outlet different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

# Industry Canada Compliance

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Category I radio communication devices comply with Industry Canada Standard RSS-210. Category II radio communication devices comply with Industry Canada Standard RSS-310. This device complies with Industry Canada license-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.

## Conformité aux normes d'Industrie Canada

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Les appareils de radiocommunication de catégorie I sont conformes à la norme RSS-210 d'Industrie Canada. Les appareils de radiocommunication de catégorie II sont conformes à la norme RSS-310 d'Industrie Canada. **Cet appareil est conforme aux normes RSS sans licence d'Industrie Canada.** Son fonctionnement est soumis aux conditions suivantes: (1) cet appareil ne doit pas causer d'interférences et (2) doit accepter toute interférence, y compris les interférences pouvant entraîner un fonctionnement indésirable de l'appareil.

# License Agreement

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## END USER LICENCE AND TERMS OF USE AGREEMENT

Certain of the device firmware, including a SoftDevice software package, embedded in and the software (the firmware and software collectively the "Software") loaded on your device (the "Device") is owned by or licensed to Garmin Ltd. or its subsidiaries (collectively, "Garmin"). The Software is protected under copyright laws and international copyright treaties. The Software is licensed, not sold. The Software is provided under this Agreement. Your use of the Software and the Device is subject to the following terms and conditions which are agreed to by you as the end user of the Software and the Device, on the one hand, and Garmin and its licensors and affiliated companies of Garmin and its licensors, on the other hand. Garmin's licensors, including the licensors, service providers, channel partners, suppliers and affiliated companies of Garmin and its licensors, are each a direct and intended third party beneficiary of this Agreement and may enforce their rights directly against you in the event of your breach of this Agreement.

**IMPORTANT: CAREFULLY READ THIS ENTIRE AGREEMENT BEFORE USING THE DEVICE. USING THE DEVICE INDICATES YOUR ACKNOWLEDGMENT THAT YOU HAVE READ THIS AGREEMENT AND AGREE TO ITS TERMS AND CONDITIONS. IF YOU DO NOT AGREE, RETURN THE COMPLETE PRODUCT WITHIN 7 DAYS OF THE DATE YOU ACQUIRED IT (IF PURCHASED NEW) FOR A FULL REFUND TO THE DEALER FROM WHICH YOU PURCHASED THIS PRODUCT.**

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3. Compliance with Laws and Regulations: You covenant that your use of the Software will comply with applicable laws and regulations. Garmin will not be responsible for your use of the Device in violation of any Laws or regulations.
4. Confidentiality; Prohibitions



4.1 Confidentiality: You acknowledge the confidentiality of the Software. At all times during the Term and thereafter, you shall keep confidential and not disclose, directly or indirectly, and shall not use for your benefit or any other individual or entity, confidential information of Garmin.

4.2 Prohibitions: All intellectual property rights in the Software shall remain with Garmin. You shall not remove, obscure or alter any copyright, trademark, restrictive legend or other proprietary rights notices contained in the Software or the Device. You shall not reverse engineer, de-compile, disassemble or create derivative works of the Software or the Device.

5. Indemnification: You agree to indemnify, defend and hold harmless Garmin and its directors, officers, employees, independent contractors and agents (each a "Garmin Indemnified Party") from any and all claims, losses, liabilities, damages, expenses and costs (including without limitation attorney's fees and court costs) (collectively "Losses") incurred by a Garmin Indemnified Party as a result of your breach of this Agreement, a breach of any certification, covenant, representation or warranty made by you in this Agreement, or claims otherwise related to or arising from your use of the Device.

## 6. Term and Termination

6.1 Term: The term of this Agreement shall continue for as long as you use the Device. However, this Agreement and all rights granted by Garmin hereunder will terminate automatically without notice from Garmin if you fail to comply with any of its terms or conditions. Garmin also reserves the right to discontinue offering any data or services provided by a third party if such supplier ceases to supply such data or services to Garmin or Garmin's contract with such supplier terminates for any reason.

6.2 Effect of Termination: Upon the termination of this Agreement for any reason, you shall immediately cease all use of the Device, and erase and destroy all copies of Garmin confidential information in your possession or control. The provisions of Sections 3, 4, 5, 6, 7 and 8 will survive any termination of this Agreement. Garmin will not be liable for compensation, indemnity, or damages of any sort as a result of terminating this Agreement in accordance with its terms, and termination of this Agreement will be without prejudice to any other right or remedy Garmin may have, now or in the future.

## 7. NOW ARRANTY; DISCLAIMER OF ACTUAL AND CONSEQUENTIAL DAMAGES

(a) EXCEPT FOR THE MANUFACTURER'S LIMITED WARRANTY APPLICABLE TO THE DEVICE AND EXCEPT AS OTHERWISE SPECIFICALLY SET FORTH HEREIN, THE SOFTWARE IS PROVIDED ON AN "AS-IS", "WHERE IS" AND "WITH ALL FAULTS" BASIS. GARMIN AND ITS LICENSORS SPECIFICALLY DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY, ACCURACY, FITNESS FOR A PARTICULAR PURPOSE AND NON-

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## 8. General Legal Terms

8.1 Assignment: This Agreement may not be assigned, nor may any of your obligations under this Agreement be delegated, in whole or in part, by you by operation of law, merger, or any other means without Garmin's express prior written consent and any attempted assignment without such consent will be null and void.

8.2 Severability: If a court of competent jurisdiction finds any clause of this Agreement to be unenforceable for any reason, that clause of this Agreement shall be enforced to the maximum extent permissible so as to effect the intent of the parties, and the remainder of this Agreement shall continue if full force and effect.

8.3 Waiver and Construction: Failure by Garmin to enforce any provision of this Agreement shall not be deemed a waiver of future enforcement of that or any other provision. Any laws or regulations that provide that the language of a contract will be construed against the drafter will not apply to this Agreement.

8.4 Government End Users: If you are an agency, department, or other entity of the United States Government, or funded in whole or in part by the U.S. Government, then use, duplication,

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8.5 Export Control: You agree not to export or re-export the Software to any country in violation of the export control laws of the United States of America.

8.6 Dispute Resolution: Any litigation or other dispute resolution between you and Garmin arising out of or relating to this Agreement or your use of the Software will take place in the State of Kansas. You and Garmin agree to submit to the personal and exclusive jurisdiction of the United States District Court for the District of Kansas and the Kansas state courts located in Johnson County, Kansas with respect any such litigation or dispute resolution. This Agreement will be governed by and construed in accordance with the laws of the United States and the State of Kansas, except that body of Kansas law concerning conflicts of law. This Agreement shall not be governed by the United Nations Convention on Contracts for the International Sale of Goods, the application of which is expressly excluded. If either party takes legal action to enforce any right under this Agreement, the prevailing party shall be entitled to recover all reasonable costs, including attorney's fees.

8.7 Entire Agreement: This Agreement constitutes the entire agreement between you and Garmin with respect to the use of the Software and the Device, and supersedes all prior understandings regarding such subject matter. Any translation of this Agreement is done for local requirements and in the event of a dispute between the English and any non-English version, the English version of this Agreement shall govern. If you are located in the province of Quebec, Canada, the following clause applies: The parties hereby confirm that they have requested that this Agreement and all related documents be drafted in English. Les parties ont exigé que le présent contrat et tous les documents connexes soient rédigés en anglais.

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