



Data Display Options

Purpose:

The purpose of this document is to help you figure out the best way for you to incorporate the data from Moxy into the rest of your training data system.

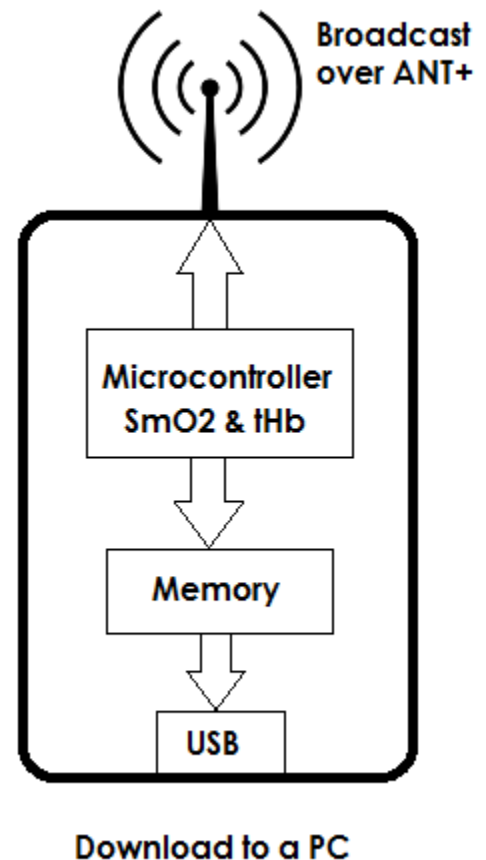
Background on Moxy Data:

The Moxy microcontroller calculates a new SmO₂ and tHb reading every 2 seconds (or 0.5 seconds in Fast Update Mode). It sends every new data set to two places as shown in the sketch to the right.

- 1) It gets stored in the memory that is inside the sensor
- 2) It gets broadcast wirelessly over ANT+

Stored Data:

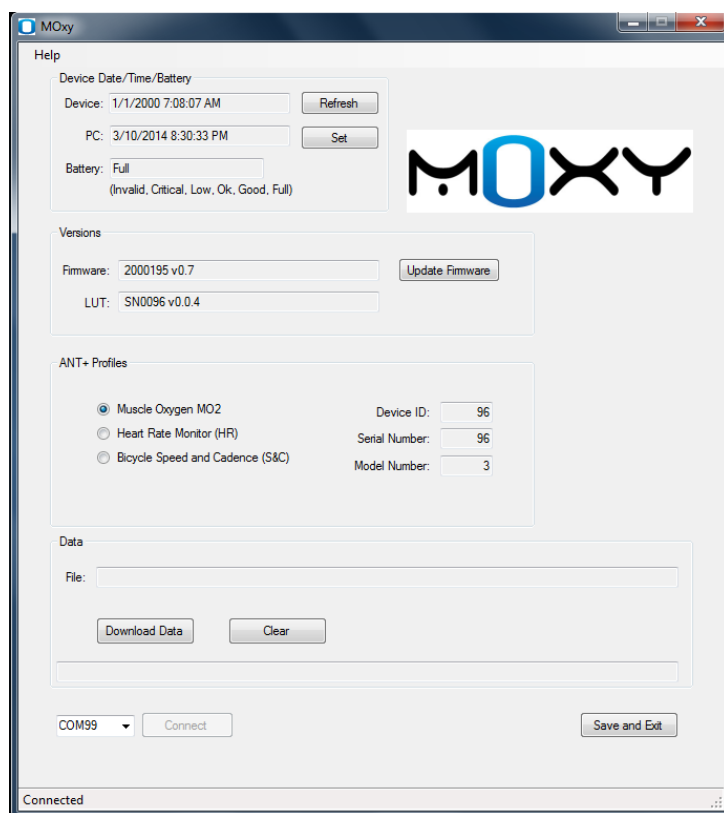
The stored data is put in a list. Every row on the list contains the date, time, SmO₂ Live, SmO₂ averaged, tHb, and lap data. Every time a new reading is calculated, it gets put on the bottom of the list. When the list gets full, the row of data at the top of the list gets discarded and the new data is added to the bottom. The list can hold a maximum of 15000 rows. If a no reading is calculated due to the sensor being off tissue or the sensor being turned off, no data is added to the list. The list is always kept in the order that the readings were calculated. It is not sorted by time stamp so if the clock on the sensor is reset to an earlier date or time, the time data may be out of order.



When the stored data is downloaded to a PC as a .csv file, the file will contain all of the information from the data list in the same order that it is stored on the sensor. The following format is used for the .csv file.

mm-dd, hh:mm:ss, SmO2 Live, SmO2 Averaged, THb, Lap

The only way to download data from the sensor is through the USB port. The Moxy PC App has the capability to download stored data. Note that downloading the data does not clear it. There is a separate clear data button in the Moxy PC App. The following is a screen shot of the Moxy PC App.



ZeroPace software is a 3rd party application that can download data directly from the Moxy sensor and import .csv files that were downloaded through the Moxy PC App. It creates a graph of the data and allows you to log workouts on a calendar for later review.

ZeroPace can be purchased at <http://www.zeropace.com/>.

Here is a video that shows the capabilities for displaying Moxy Data in ZeroPace.

[ZeroPace Video](#)

ANT+ Data Profiles

Moxy has 3 options for sending the data out over ANT+. Each option uses a different ANT+ profile for encoding the data. This allows Moxy to send data to devices that don't yet utilize the Muscle Oxygen Profile. The 3 profile options are

- 1) Muscle Oxygen Profile
- 2) Heart Rate Profile
- 3) Bicycle Speed and Cadence Profile



Muscle Oxygen Profile – This is the preferred profile to use whenever your display device is compatible. It sends the SmO₂ and tHb data and it sends other data about the sensor like the battery charge level.



Heart Rate Profile – This sends only the SmO₂ data over the Heart Rate Profile. In this case, 100 is added to all SmO₂ values because most display devices have a filter that rejects heart rate values lower than 30 beat per minute. For example, 57% SmO₂ will show up on the watch as 157 beats per minute. The user has to remember to disregard the leading 1. In this mode, you can pair the Moxy to any ANT+ Heart Rate display device. The primary use for this profile would be if you wanted to use a Heart Rate wrist watch display that had upper and lower limit audible alarms. For example, you could set the alarm levels to 180 and 130 to guide strength training to deoxygenate to 30% and reoxygenate to 80% SmO₂.



Bicycle Speed & Cadence Profile – This profile sends the SmO₂ data in the Cadence field and tHb in the Speed field. This is the second best option when the Muscle Oxygen Profile is not available. The SmO₂ and tHb data are encoded as number and timing of revolutions. When the display device decodes this data, SmO₂ shows up as cadence RPM and tHb shows up as speed. In order for the tHb data to show up properly, the wheel size needs to be set on the display device to 2070 mm if speed is in km/hr or 3330 mm if the speed is in mi/hr. The auto wheel size feature on some GPS watches must also be turned off.

PC Display Software

In order to use a PC as a display device, you need to have a USB ANT+ dongle like the one shown below. If you already have a dongle from another ANT+ device like a Garmin watch, you can use that. If not, the dongles are available on the Moxy website or at many places online.

You also need to have software that is capable of reading the data from the dongle and displaying on the screen. The following three software packages are compatible with the Muscle Oxygen Profile. All offer free trials for a short time so you can check them out.





Peripedal is an indoor cycling software that is capable of recording Muscle Oxygen, Heart Rate, Speed & Cadence and Power data over ANT+. It can also estimate power based on the speed values and the model of trainer.

Peripedal has a mode where it only displays Muscle Oxygen and Heart Rate data which make it work well for applications other than cycling.

www.peripedal.com



PerfPRO Studio[®]
The Total Performance Training Software

www.perfprostudio.com

PerfPro is an indoor cycling software that is capable of recording Muscle Oxygen, Heart Rate, Speed & Cadence and Power data over ANT+. It can also estimate power based on the speed values and the model of trainer. PerfPro also has some more advanced features for analyzing cycling data.



TrainingMate is a fitness tracking software that is designed to work with a wide range of fitness devices such as cycling trainers, rowing machines and Nordic ski trainers.

www.training-mate.com

Android Phone Apps

Some Android phones such as the Samsung Galaxy Note3, S4, and S5 and the Sony Xperia series have ANT+ capability built in. For a complete list of such phones, see [this link](#).

Other Android phones can use an ANT+ USB dongle with a USB OTG cable like shown below.



Refer to this [Connection Guide](#) for more information on the plugins you need to download.



The IpBike App is designed to use the Muscle Oxygen profile. It can record Muscle Oxygen, Heart Rate, Speed & Cadence, Power, and GPS data and display it on your phone. It's available on the Google Play Store.

IpBike ANT+™ Bike Computer

Other phone apps that don't yet use the muscle oxygen profile can be used if the Moxy is set to use the Cycling Speed and Cadence Profile.

ANT+ to WiFi Bridges

There are 2 available devices that serve as ANT+ to WiFi bridges. WiFi signals can be transmitted hundreds of feet compare to tens of feet for ANT+.

Wimu is a device available from [Real Track Systems](#). It collects data from up to 8 ANT+ sensors of various types like Muscle Oxygen, Power Meter, Heart Rate, and Speed and Cadence. It also contains accelerometer, gyro, and GPS motion sensors. All of the data it transmitted to Quiko software via WiFi where it can be recorded and analyzed.

Wasp is a device available from [North Pole Engineering](#). It has several operating modes where it can collect data from multiple ANT+ devices and send the data to an iPad or other iOS device.

iPhones and iPads

iPhones and iPads require an ANT+ iPhone Accessory like one that is [available here](#).

At this point, we are not aware of any iPhone apps that use the muscle oxygen profile so the Moxy would need to be set to use the Cycling Speed and Cadence profile to work directly with iPhones or iPads.

Sport Watches and Bike Computers

Moxy connects with Garmin wristwatches that use the ConnectIQ system via the ANT+ Muscle Oxygen Profile. Watch models that support ConnectIQ include the FR920XT, VivoActive, Fenix3, and Epix.

These watches require an app to be installed in order to interface with the Moxy. Here are links to 2 available apps. Check back on the Garmin App store as new apps are being added regularly.

<https://apps.garmin.com/en-US/apps/9b47ad5f-9705-4297-9cc8-86b618f6f2ed>

<https://apps.garmin.com/en-US/apps/705bcbcc-c2f1-41bc-8065-05c9f43b3fec>