Metabolic

Fitness Assessment – Fat Burning Zone

Equipment Required

PC or Mac Computer and USB cable

IX-TA data acquisition unit and power supply

A-FH-1000 Flow head with flow head tubing

A-GAK-201 Reusable mask and non-rebreathing valve

6ft smooth bore tubing (35mm I.D.)

5 Liter Mixing Chamber

iWire-GA CO_2/O_2 Gas Analyzer with filter and Nafion gas sample tubing

A-CAL-200 Calibration kit

ANT+ Heart rate monitor

Treadmill with adjustable speed and gradient or Fitness Bike

3 Liter Calibration syringe

Background

The 'fat burning zone' is a theory that you should maintain your heart rate at just 70 – 80% of your maximum heart rate during exercise to burn more fat.

The fat burning zone theory seeks to help people lose weight by tapping into the body's fat storage rather than its carbohydrates. It is assumed that the body burns a greater percentage of fat with lower-intensity exercises than at higher intensities because the body does not require 'fast energy' from carbohydrates. As such, this theory promotes longer and lower-intensity cardio workouts that maintain your heart rate within the 'fat burning zone'.

However, that is a bit of a misconception. While it is true that the body burns fat during low-intensity workouts, the fat burning rate remains low and you have to exercise longer to burn the same amount of calories you would at higher intensities.

In a high-intensity workout, although your body uses your stored carbohydrates (glycogen) first for 'fast energy', it depletes this rapidly enough to force your body to tap into your fat storage. This means that high-intensity workouts are more efficient in burning way more **total** calories – both glycogen calories and fat calories. Ultimately, the total number of calories you burn leads to the most weight (and fat) loss.

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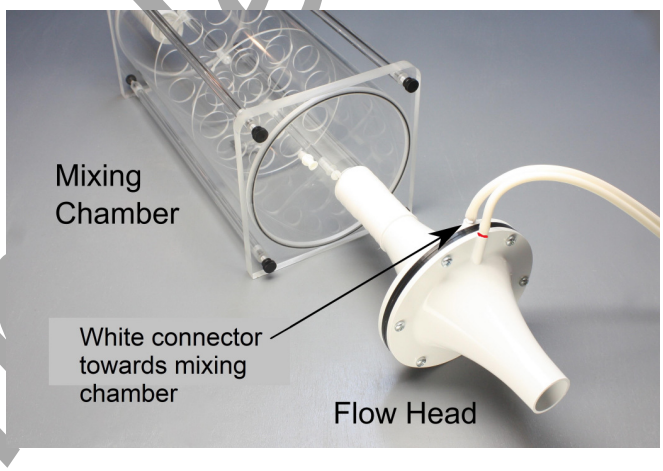
Setup the IXTA and the iWireGA

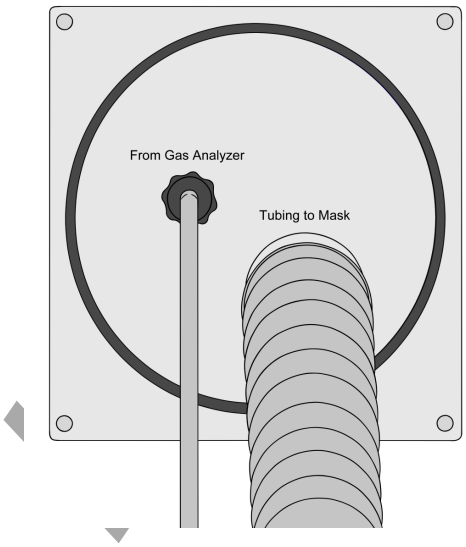
1. Place the IXTA on the bench, close to the computer.
2. Use the USB cable to connect the computer to the USB port on the rear panel of the IXTA.
3. **Connect the iWire-GA unit to the front of IXTA using the iWire-1 port.**
4. Plug the power supply for the iWire-GA into the electric outlet. Insert the plug on the end of the power supply cable into the labeled socket on the rear. Use the power switch to turn on the unit. Confirm that the power light is on.
5. Plug the power supply for the IXTA into the electrical outlet. Insert the plug on the end of the power supply cable into the labeled socket on the rear of the IXTA. Use the power switch to turn on the unit. Confirm that the power light is on.

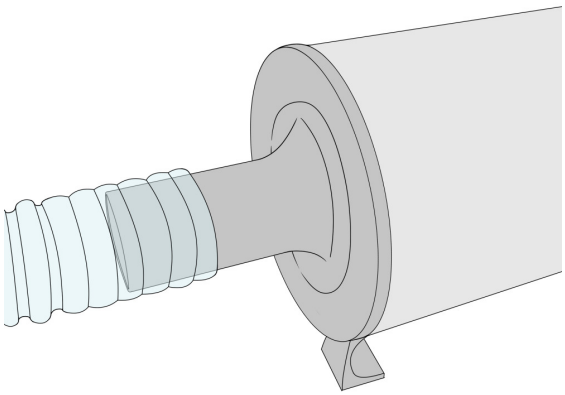
Setup the Metabolic Cart

1. Locate the A-FH-1000 flow head and tubing in the iWorx kit.
2. Plug the flow head tubing into channel A1 of the IX-TA, matching the colors.
3. Connect the other end of the flow head tubing to the flow head, making sure that the ribbed side of the tubing connects the red marked port on the flow head.
4. Locate the mixing chamber in the iWorx kit.
5. Connect end of the flow head to the flow head port of the mixing chamber, making sure that the white port faces the mixing chamber. Make sure the tubing is in an upright direction.



6. Locate the non-rebreathing valve, mask, and smooth bore tubing in the iWorx kit
7. Attach one end of the smooth bore tubing to the "**Tubing to Mask**" inlet of the mixing chamber.
8. Attach the other end of the smooth bore tubing to the calibration syringe.



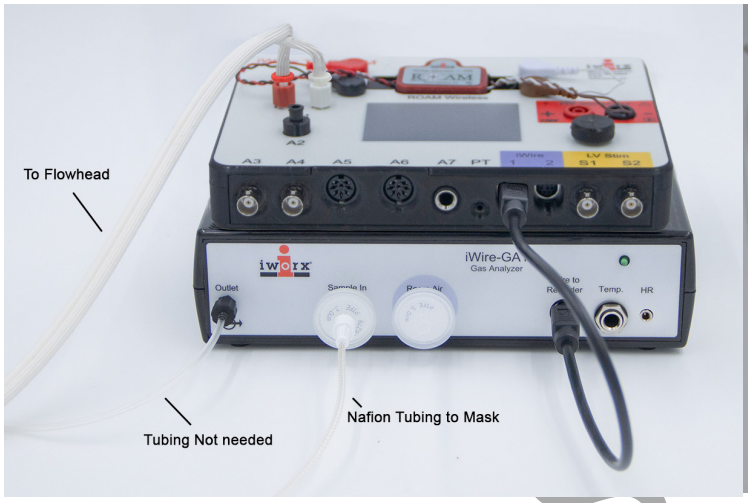


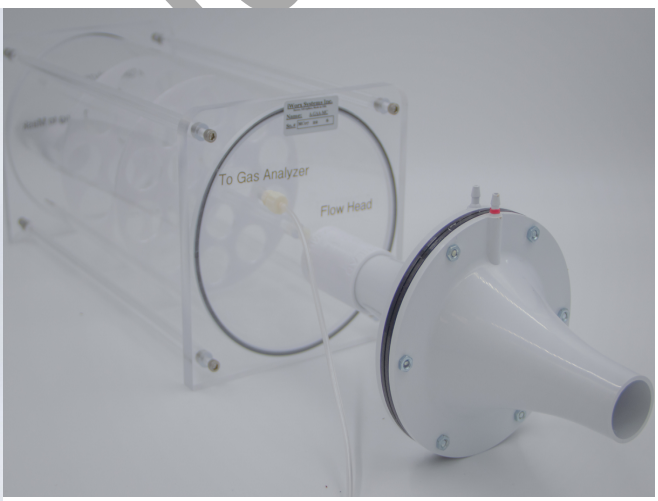
Sample Lab

9. Attach the mask to the side port of the non-rebreathing valve, using the provided adaptor, if needed.

Note: There are arrows on the valve that indicate the direction of air flow. The white port is the inlet and the clear port is the outlet. The Clean Bore tubing will be plugged into the clear port later when testing the subject.

10. Place the filter on the Sample In port of the iWire-GA in the lower right front corner of the gas analyzer. Attach the braided end of the Nafion sampling tube to the filter.
11. Connect the other end of the Nafion sampling tubing to the white "**To Gas Analyzer**" port on the mixing chamber near the Flow Head





12. Attach a Clear tubing to the outlet gas analyzer
13. Attach the other end of the clear gas analyzer tubing to the "**From Gas Analyzer**" connector on the mixing chamber next to the smooth bore tubing

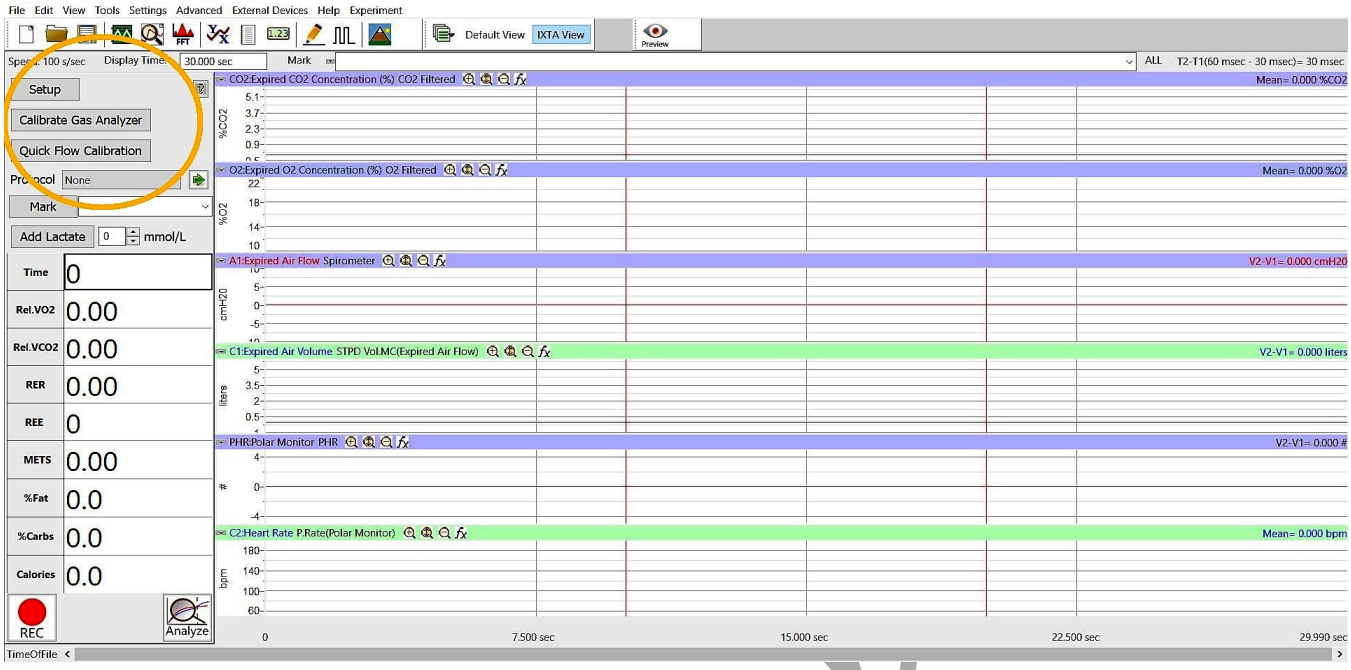
Using the ***ANT+ Heart Rate Sensors*** such as Garmin HR monitor, Scosche Rhythm+ Heart Rate Monitor Armband, etc.

1. Plug the ANT+ USB dongle into the computer. You should have entered the license number for the ANT+ device in LabScribe, using the External Devices menu, during the initial setup. Enable the ANT+ sensor from the External Devices Menu.
2. Get the ANT+ heart rate sensor ready for use, according to the instructions provided with the sensor.

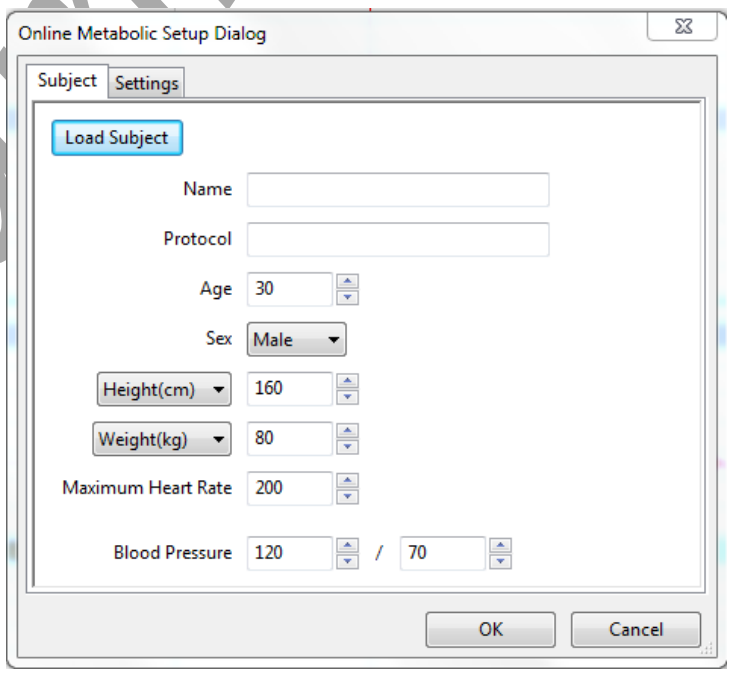
iWorx Sample Lab

Software Setup:

1. Load the Fitness Assessment settings.

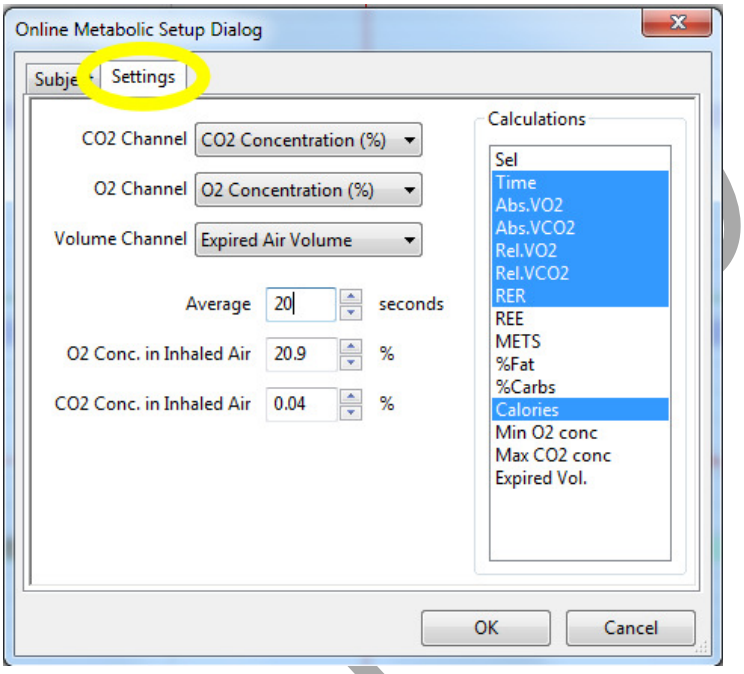


2. Click the **Setup** button shown in the left side window. The Online Setup Dialog window will open
   - Enter your subject's information or Load a subject from a previously saved file.



iWorx Sample

- Click “Settings” to change any parameters you wish to view
- Click OK to save the changes.



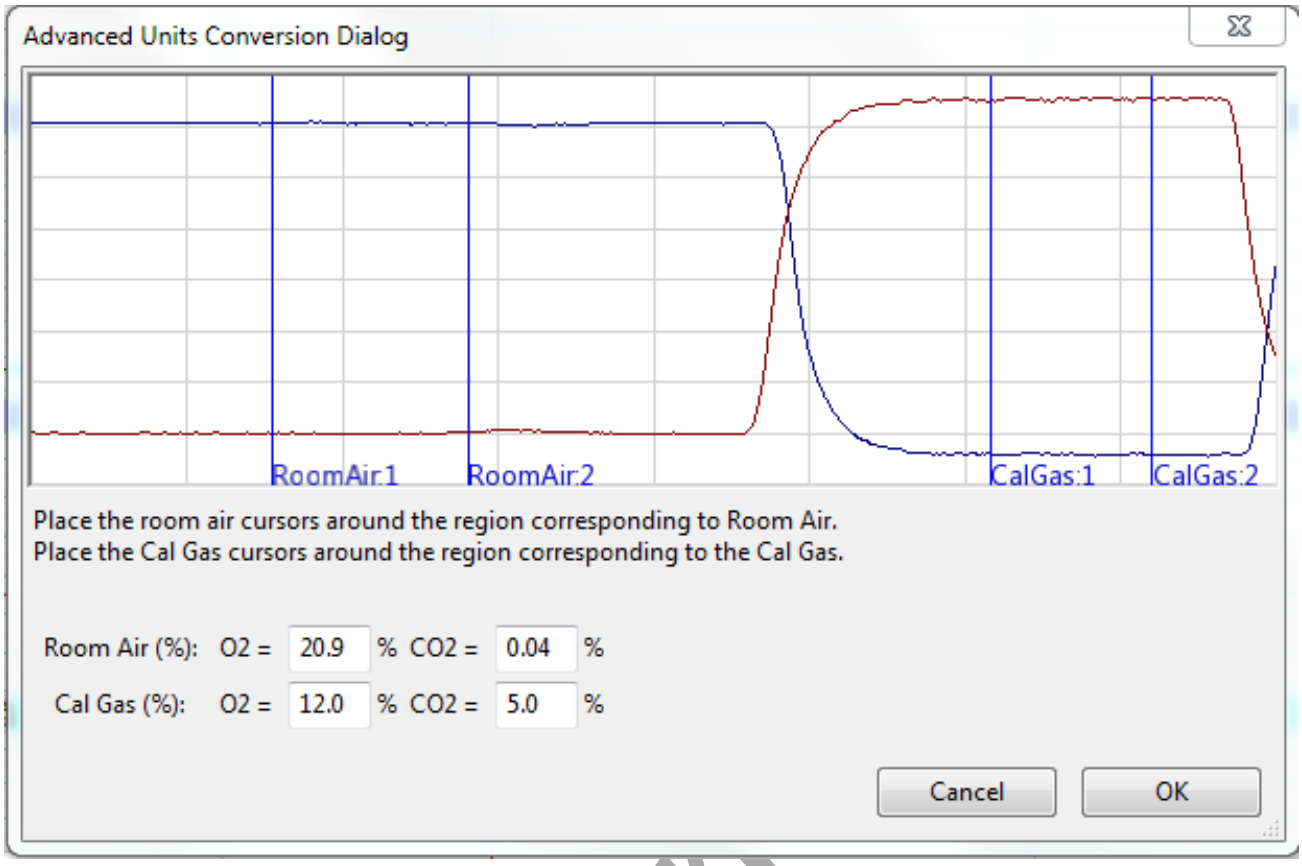
Calibrating the iWire-GA Gas Analyzer

Note: *Warm up the iWire-GA for at least 15 minutes prior to use. Make sure the calibration gas tank is located close to the Fitness Assessment equipment.*

This procedure will calibrate the O_2 and CO_2 channels.

1. Connect the gas sample tubing of the A-CAL-200 Calibration Kit to the output barbed connector of the gas regulator.
2. Click the **Calibrate Gas Analyzer** button. Click Perform Quick Software Gas Calibration.
3. Follow the directions as prompted. Room air will be sampled for 10 seconds. Calibration gas will be sampled for 20 seconds.
4. If necessary, move the cursors into correct position.
5. Click OK.

iWorx Sample



Quick Flow Calibration :

A pre-saved .iwxfcd (file IXTA-longFlowHeadCalibration) is already loaded for you.

If you prefer, click “Load”, to load the .iwxfcd file created when you performed the optional full flow head calibration.

Perform the Quick Flow Calibration by clicking the button and following the prompted directions as they pop up on the LabScribe Screen.

- After the calibration data has been collected, The Spirometer Calibration dialog window will pop-up.
- Position the two cursors on the flat line to either side of the recording shown.
- Change the temperature to 29 deg C
- Click the 'Calibrate difference between cursors to' button.
- Click OK.

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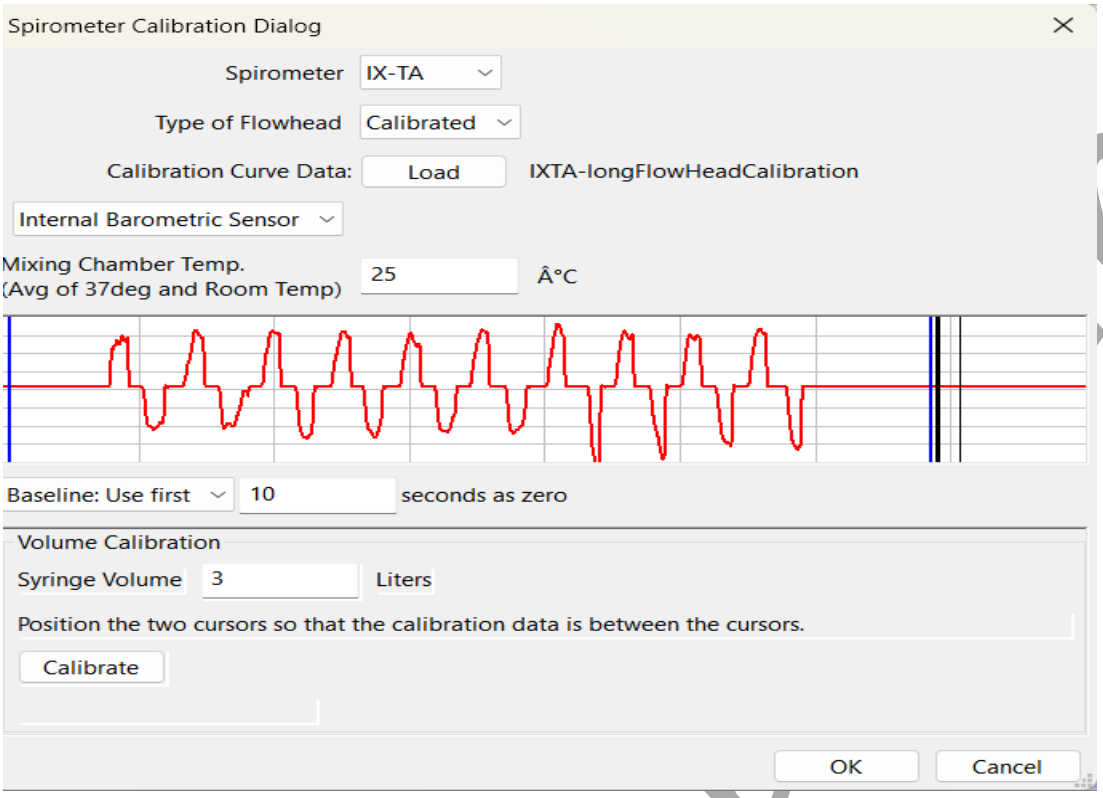


Prior to performing your test:

Determine the correct concentration of O2 in the mixing chamber:

- Click on the Preview button.
- Record room air by sampling air through the mixing chamber. Look at the value for O2 as you record for approximately 10 seconds. It should be reading between 20.7% and 21%.

NOTE – If the O2 channel is not reading between 20.7% and 21% - REPEAT the Quick Flow Calibration.

- Click on the Stop button.

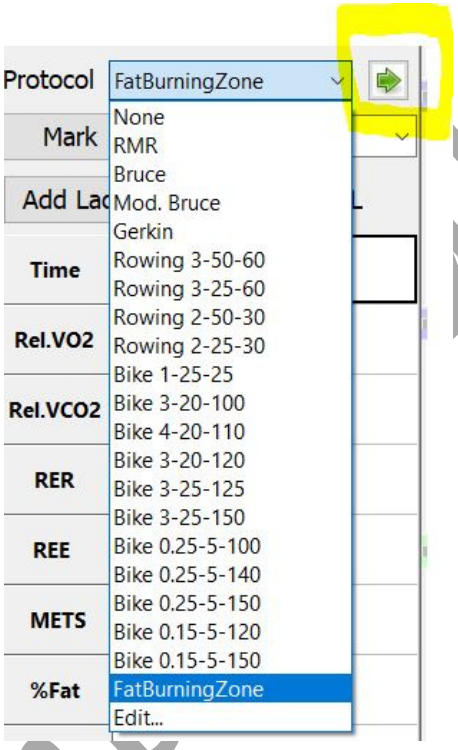
Now you are ready to perform your test.

Performing the Test:

1. Attach the head gear to the mask.
2. Instruct the subject to try on the assembly. Adjust the straps so that the mask fits the subject comfortably. Make sure there are no leaks around the mask.
3. Connect the smooth-bore tubing to the clear outlet of the non-rebreathing valve. There are arrows on the valve that indicate the direction of air flow.
4. Make sure the flaps on the non-rebreathing valve are facing the right way.

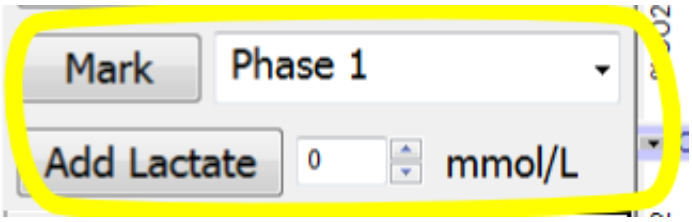
iWorx Sample

5. Remove the smooth-bore tubing from the mixing chamber to record baseline.
6. Choose the Fat Burning Zone Protocol from the Protocol list:



7. Click the Green Arrow to the right of the protocol to start the Exercise
   - The subject will walk for 10 minutes at 1.7 mph
   - The subject will run for 10 minutes at 4.2 mph
8. Wait the 10 seconds at the beginning of the protocol for the system to zero, then reconnect the smooth-bore tubing to the mixing chamber
9. The test has now started

10. The data will automatically be Marked for the protocol chosen. You can make additional marks if you choose by entering text in the text area next to the **Mark** button and clicking on the **Mark** button, or choose one of the preset marks from the drop down list.



11. If lactate values are measured during the test, you may enter them in the record using the **Add Lactate** button.
12. After the 10 minutes of running you can opt to have your subject recover or just Click **Stop** STOP and then Click Save As to save your data.

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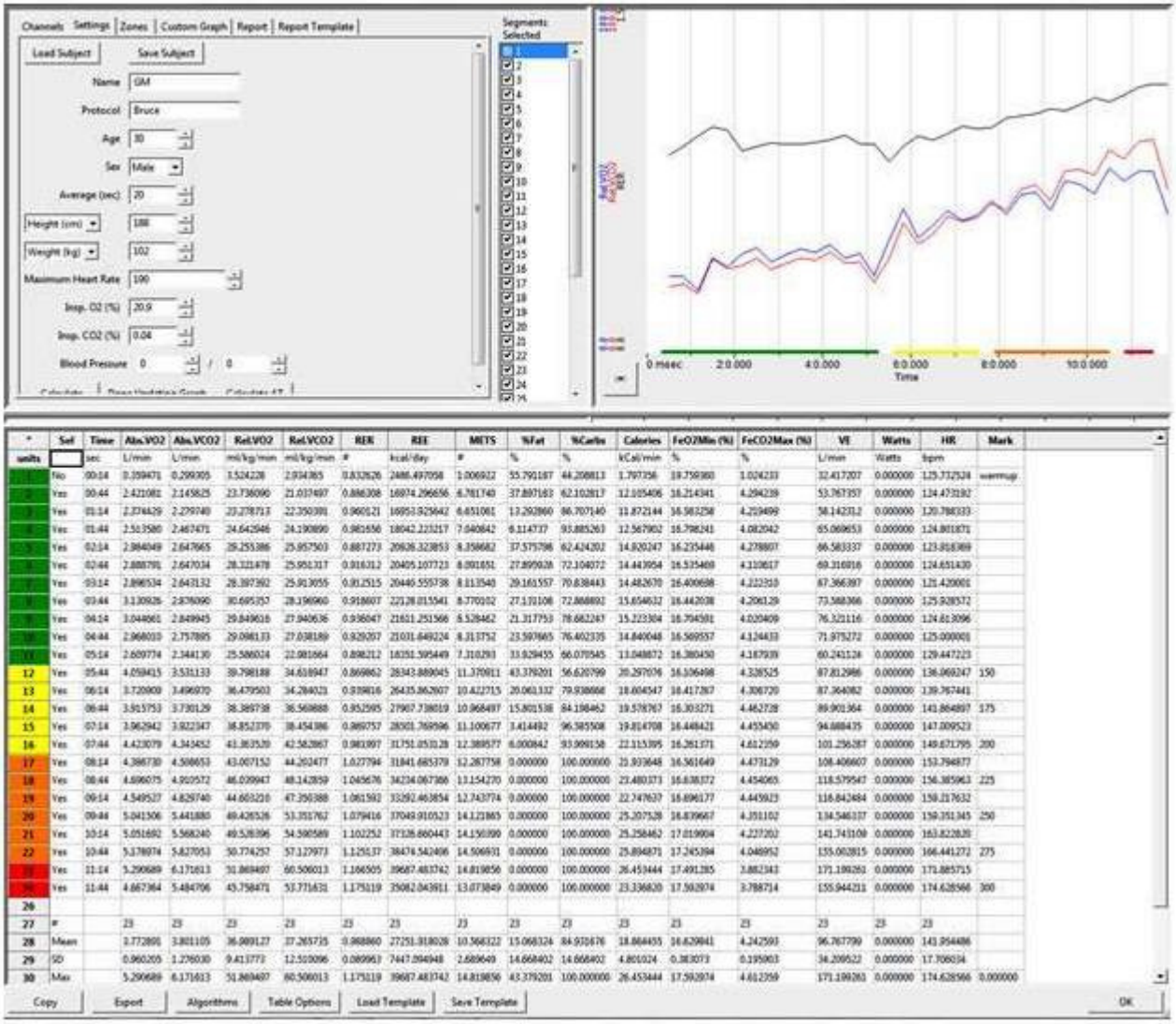
Analyze your data

1. Click **Analyze** to pull up the automated metabolic calculations and chart generator.
2. Make sure channels are set correctly.
3. Click Settings: Your subject information should be automatically populated into the settings.
4. Click Calculate to generate the table as seen below.
5. To generate a Report, click on the Report Tab. Reports can be customized as well.
6. Refer to the metabolic module manual in the LabScribe manual for more information.



Metabolic parameters and plots of VO_2, VCO_2, and RER vs. Time, displayed in the Offline Metabolic Calculations window used to analyze data collected during an aerobic fitness test.

Notice that the VO_2 and VCO_2 values increase quickly as the subject performs more strenuous segments of the test.

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