Aerobic Fitness Testing

Equipment Required

PC or Mac Computer and USB cable

iWorx Peak or PeakPro system 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

Nafion gas sample tubing

A-CAL-200 Calibration kit

PHRMP-220 Heart rate monitor or ANT+ Heart Rate Sensor.

3 Liter Calibration syringe

Treadmill with adjustable speed and gradient or Fitness Bike

Setup the Peak or PeakPro

1. Place the iWorx Peak on the bench, close to the computer.

2. Use the USB cable to connect the computer to the USB port on the rear panel.

3. Plug the power supply for the Peak into the electrical outlet. Insert the plug on the end of the power supply cable into the labeled socket on the rear of the Peak. Use the power switch to turn on the unit. Confirm that the power light is on. The power led will blink, while the device is warming up.

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 the Flow connectors on the front of the Peak, 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 flowhead port of the mixing chamber, making sure that the red 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

Mixing
Chamber

Red Connector
with ribbed tubing

Flow Head

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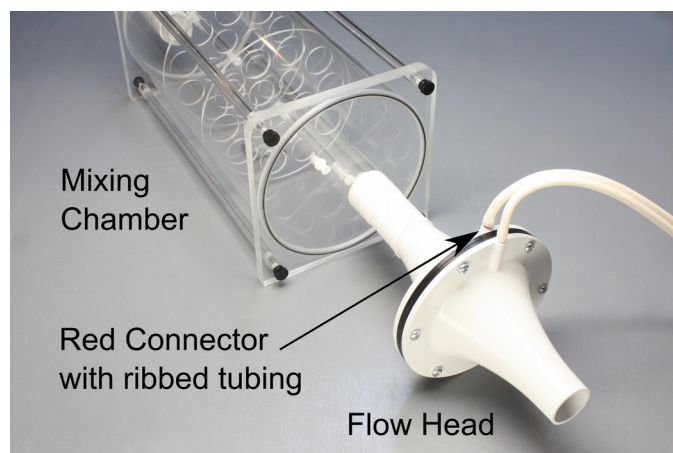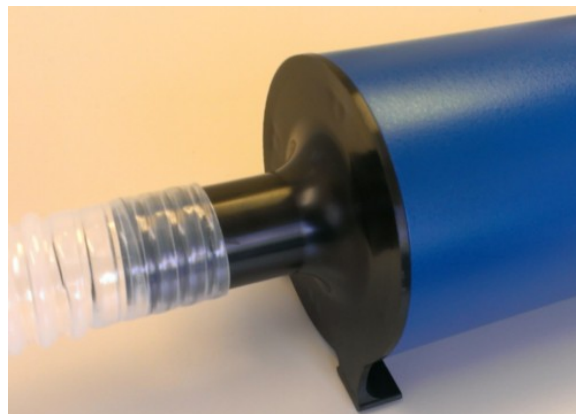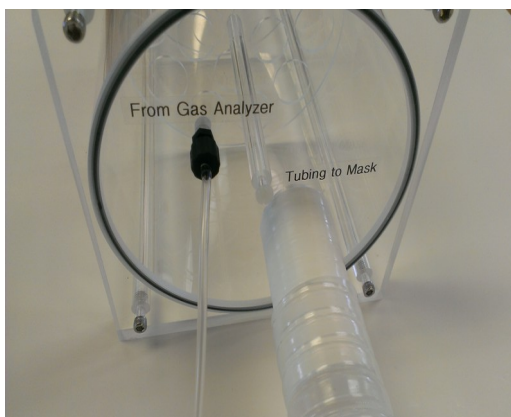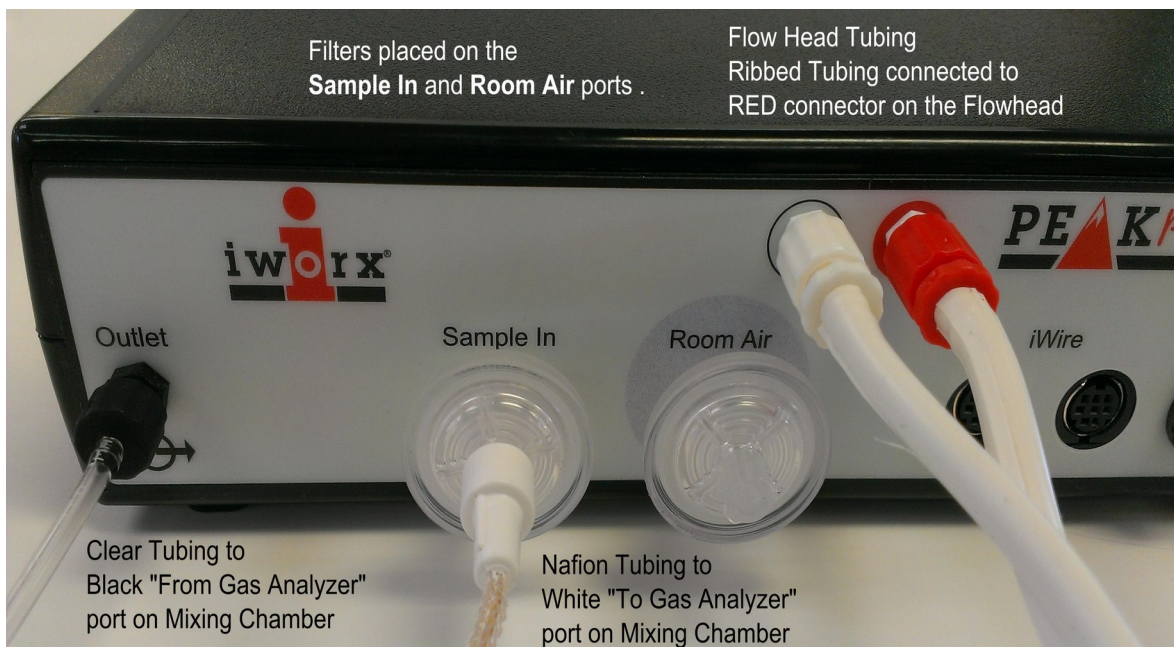
9. Attach the mask to the side port of the non-rebreathing valve, using the provided adaptor, if needed.

   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 filters on the **Sample In** and the **Room Air** inlet port of the Peak.

Filters placed on the **Sample In** and **Room Air** ports.

Flow Head Tubing
Ribbed Tubing connected to RED connector on the Flowhead

Outlet

Sample In

Room Air

iWire

Clear Tubing to Black "From Gas Analyzer" port on Mixing Chamber

Nafion Tubing to White "To Gas Analyzer" port on Mixing Chamber

11. Attach the braided end of the Nafion sampling tube to the filter on the **Sample In** port.

12. Connect the other end of the Nafion sampling tubing to the white "**To Gas Analyzer**" port on the mixing chamber near the Flow Head

13. Attach a Clear tubing with black connectors to the **Outlet** on the Peak

14. 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
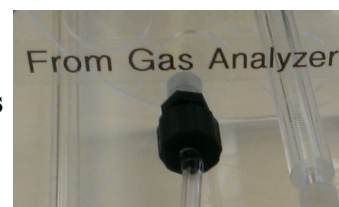
15. If using the Polar Heart Rate Monitor.

    1. Locate the PHRM-220 Polar^{tm} heart rate monitor transmitter, electrode belt and receiver.

    2. Plug the phono connector of the extension cable of the PHRMP-220 into the **HR** input on the Peak. Plug the polar receiver into the other end of the extension cable.

    Note: The polar receiver needs to be within 3 feet of the transmitter. It is helpful to attach the receiver to the clean bore tubing near the mask, with a twist tie during the test.

16. If 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.

Software Setup :

1. Load the Fitness Assessment settings, by clicking on the Settings menu and then choosing the **Fitness Assessment Polar HR** or **Fitness Assessment ANT+** settings
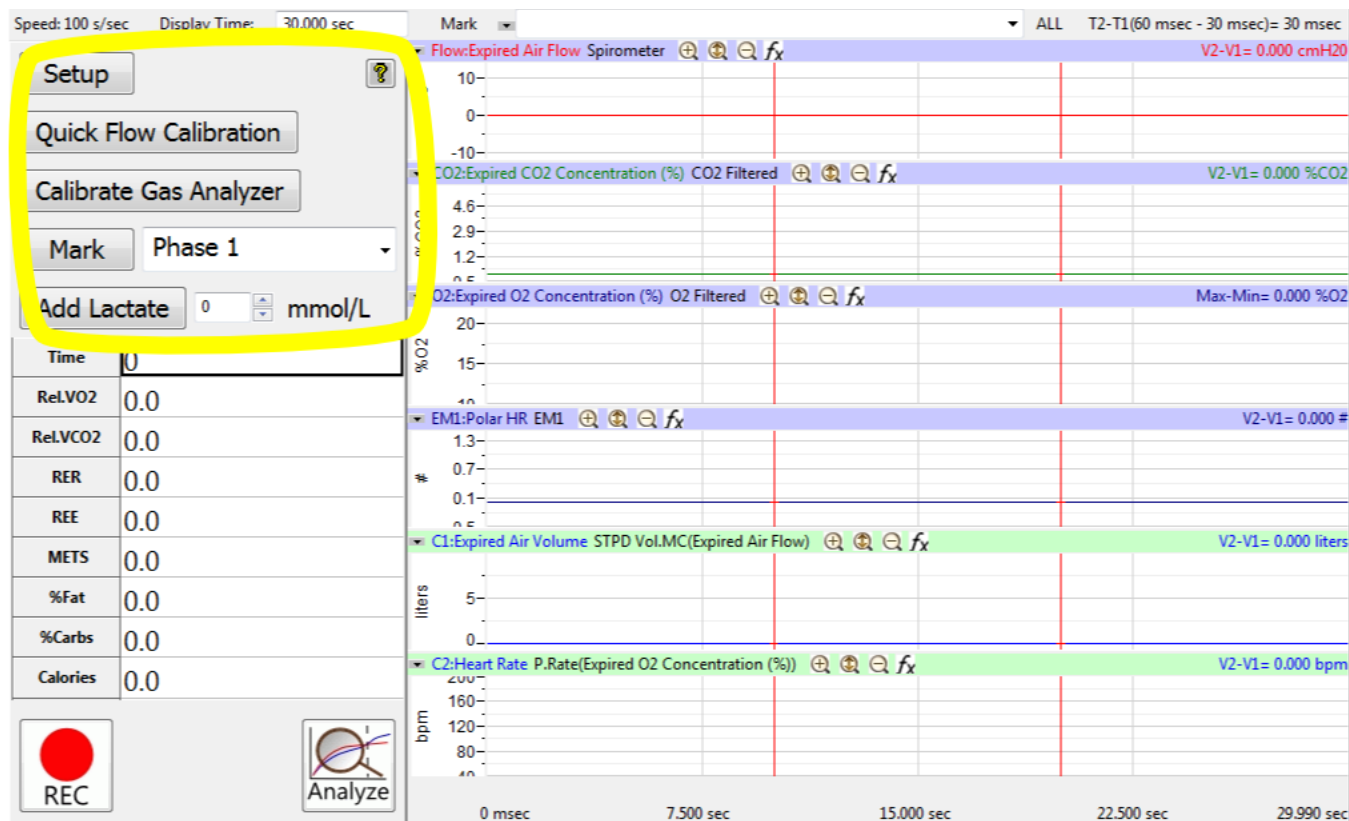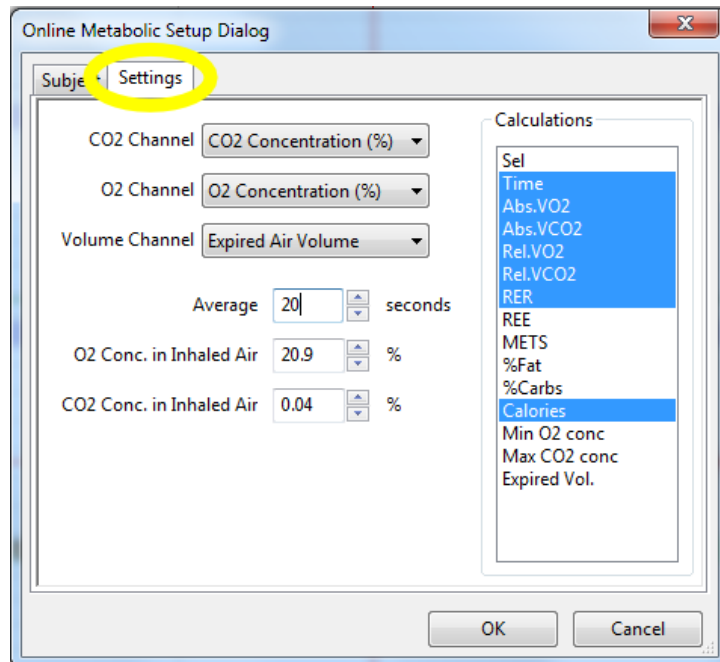

2. Click the **Setup** button shown in the left side window. The Online Setup Dialog window will open

   - Enter your subject's information or Load a subject from a previously saved file.

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

Quick Flow Calibration :

This procedure requires the PreSaved Flow Head Calibration (*.iwxfcd) File, that was created with the Initial Setup.

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.
- Load the presaved Flow Calibration File that was created with the Initial setup, by clicking on the Load button.
- Position the two cursors on the flat line to either side of the recording shown.
- Click the 'Calibrate difference between cursors to' button.
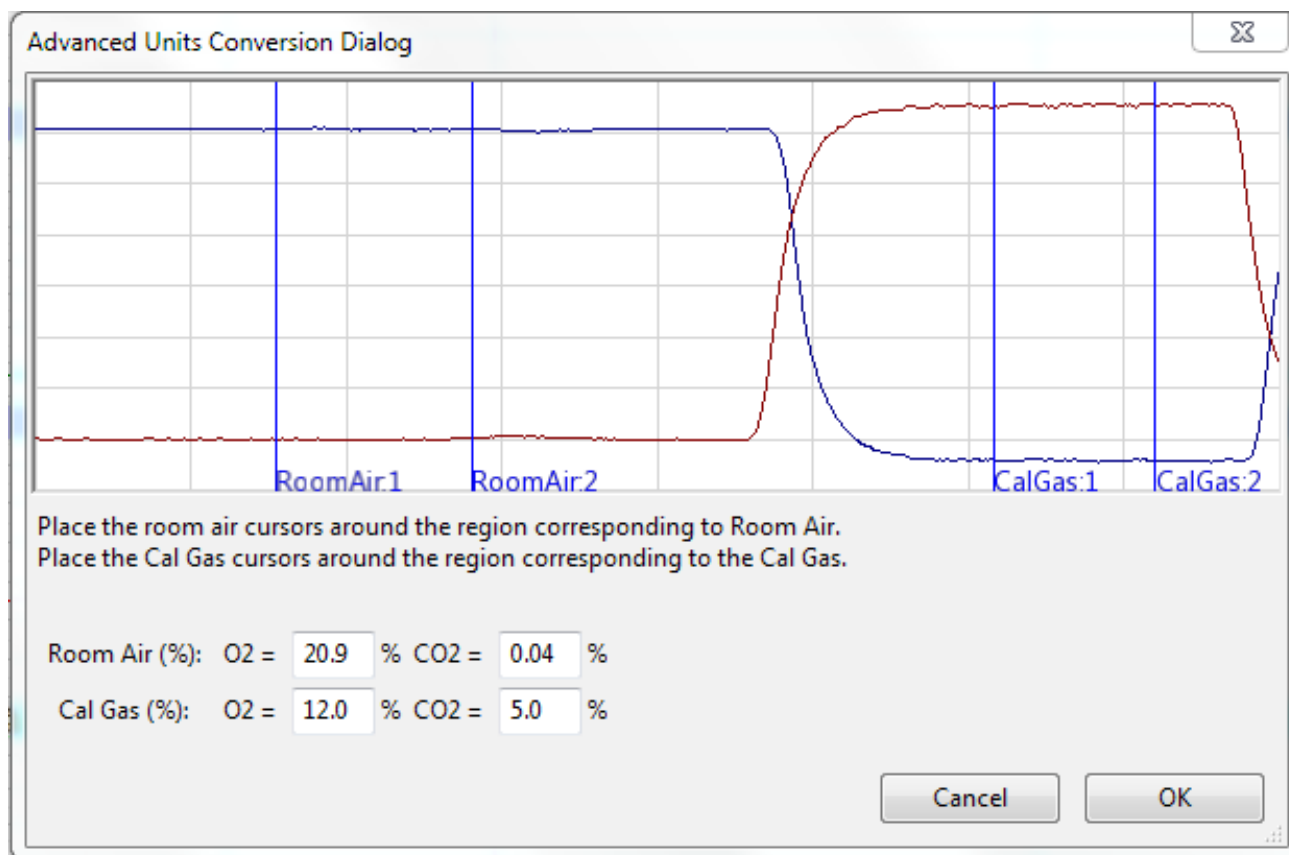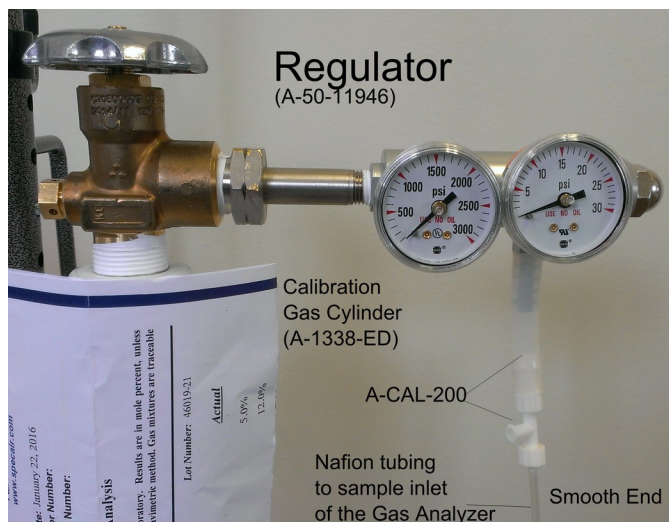- Click OK.
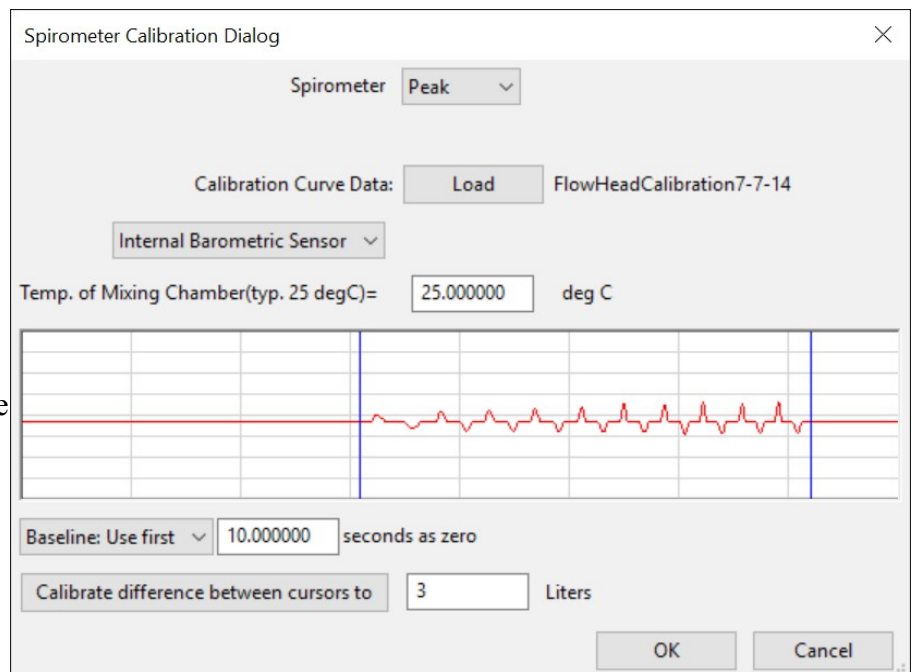
Calibrating the Gas Analyzer

Note: Warm up the Peak or PeakPro. The power led will stop blinking when the device is warmed up. Make sure the calibration gas tank is located close to the Fitness Assessment equipment.

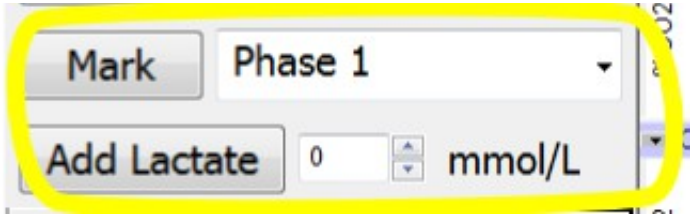This procedure will calibrate the O_2 and CO_2 channels**.**

1. Connect the 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.

Regulator (A-50-11946)

Calibration Gas Cylinder (A-1338-ED)

A-CAL-200

Nafion tubing to sample inlet of the Gas Analyzer

Smooth End

Advanced Units Conversion Dialog

RoomAir:1   RoomAir:2   CalGas:1   CalGas:2

Place the room air cursors around the region corresponding to Room Air.
Place the Cal Gas cursors around the region corresponding to the Cal Gas.

Room Air (%): O2 = 20.9 % CO2 = 0.04 %

Cal Gas (%):   O2 = 12.0 % CO2 = 5.0   %

Cancel   OK

6. Disconnect the Nafion tubing from the Regulator and connect it back to the white "To Gas Analyzer" port on the mixing chamber, near the Flow Head

Now you are ready to perform your test. Some sample protocols are provided on the CD and on the website.

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.

5. Remove the smooth-bore tubing from the mixing chamber to record baseline.

6. Click the **Record** Button to start recording data

7. Wait at least 10 seconds for the system to zero, then reconnect the smooth-bore tubing to the mixing chamber

8. The test has now started.

9. Mark the data for each stage of the exercise protocol you have chosen to use. You can enter text in the text area next to the **Mark** button and click on the **Mark** button, or choose one of the preset marks from the dropdown list.

10. If lactate values are measured during the test, you may enter them in the record using the **Add Lactate** button.

11. Click **Stop** and then Click Save As to save your data

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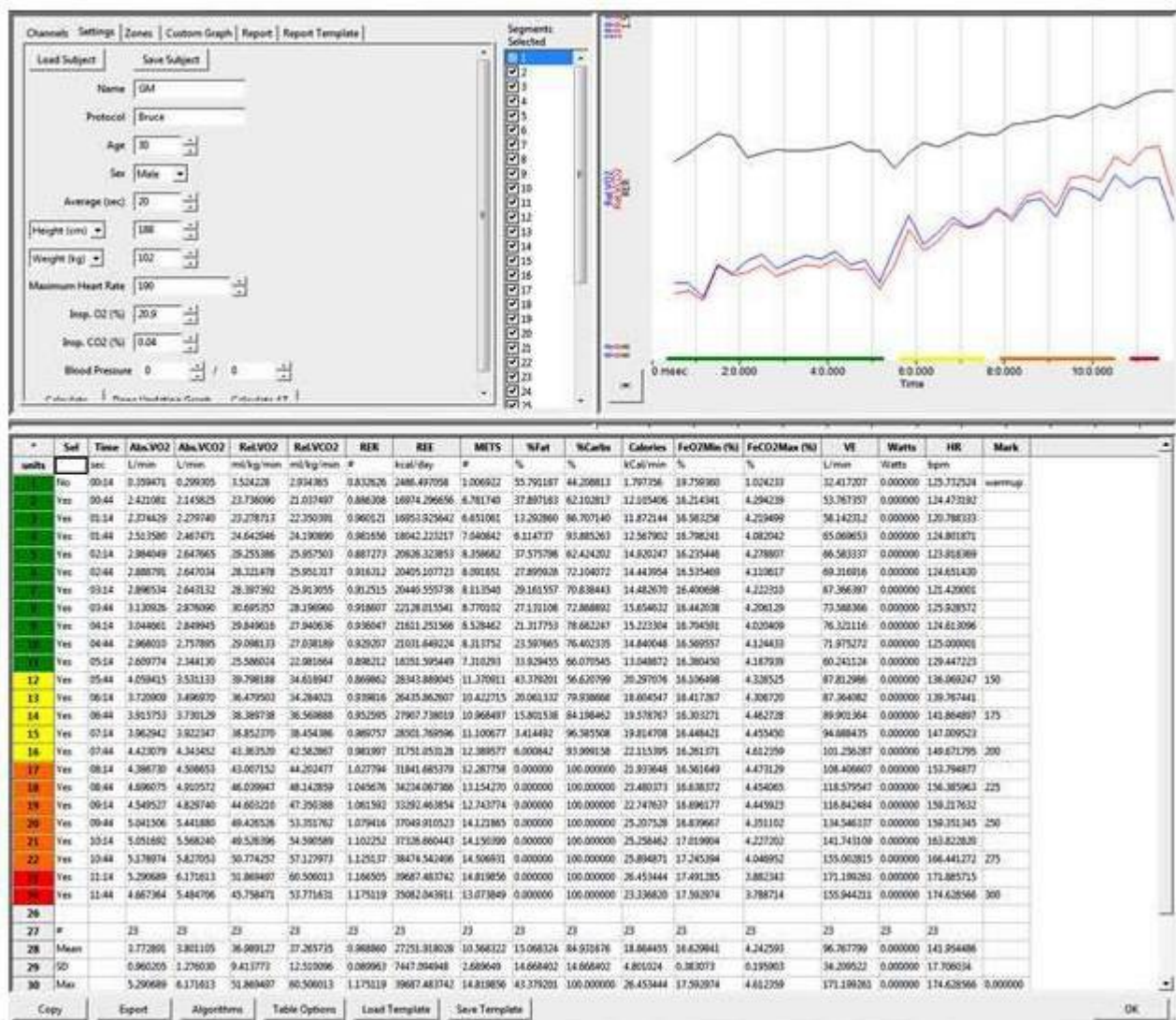
Metabolic parameters and plots of VO_2, VCO_2, and RER vs. Time, displayed in the Offline Metabolic Calculations window used to analyze data collected during an aerobic fitness test.

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