

Application of *iWorx LabScribe2* in Animal Physiological Data Monitoring

Rajni Devi, A.K. Singh, Lovely Sharma, Yogendra Kumar, S.V. Singh and R.C. Upadhyay

*Climate Resilient Livestock Research Center,
National Dairy Research Institute, Karnal-132001 (Haryana) INDIA*

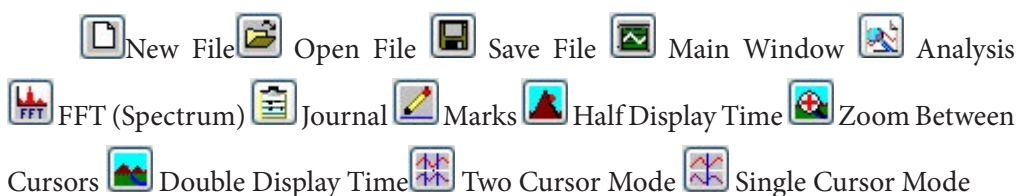
IWorx LabScribe2 is data recording and analysis software in which we can analyze oxygen, carbon dioxide, oxygen saturation, respiration rate, ECG, heart rate, skin temperature, air-flow and lung volume (STPD) etc. Large amount of data can be recorded with *IWorx LabScribe2* software.

Equipment required

- PC or Mac Computer
- IWX/214 data acquisition unit
- SP-304 Spirometer with long flowhead tubing
- A-FH-1000 Flow head
- Animal face mask
- 5 Liter Mixing Chamber
- GA-300 CO₂/O₂ gas analyzer with filter
- PHRM-100 Heart rate monitor
- 3 Liter Calibration Syringe
- IWX/214 Recorder,
- ECG Electrodes

Various tool bars

In *IWorx LabScribe2* various tool bars use for various function. The functions of *IWorx LabScribe2* can be accessed via the icons in the toolbar, which is directly beneath the menu headings on the main window display. These tool bars and their functions are described following:



Experiment protocol

Start the software

1. Click on the *IWorkx LabScribe2* shortcut on the computer's desktop to open the program.
2. On the *IWorkx LabScribe2* main window, pull down the settings menu and select load group (IWX/214).
3. Click on the settings menu, again. Select the Aerobic Fitness-GA300-LS2 settings file in Human Exercise-GA300.
4. For your information, the settings used to configure the *LabScribe2* software and IWX/214 units for this experiment are programmed on the preferences dialog window, which can be viewed by selecting preferences from the edit menu on the *LabScribe2* main window.
5. After loaded, settings file click the experiment button on the toolbar to open any documents like: Appendix, Background, Labs and Setup (opens automatically).

Flow head calibration before experiment

1. Click on *LabScribe2* than *iWorkx/214*
2. Load setting file select GA300 Spirometry Calibration
3. Click on edit prefances
4. Select A4 channel bar and click OK
5. Go to display time and manage time 10-30 sec and click ok
6. Pull the plunger on the 3L calibration syringe outside
7. Click the record button
8. Wait for at least 10 seconds of recording

9. Push the plunger in all the way until it stops. Pull the plunger out all the way until it stops
10. Repeat the above procedure for 5-10 time
11. Wait 5 seconds after the final stroke, then click Stop
12. On the expired air volume channel, click on STPD Vol. mixing chamber
13. Click on add function
14. Open the spirometer calibration dialog box

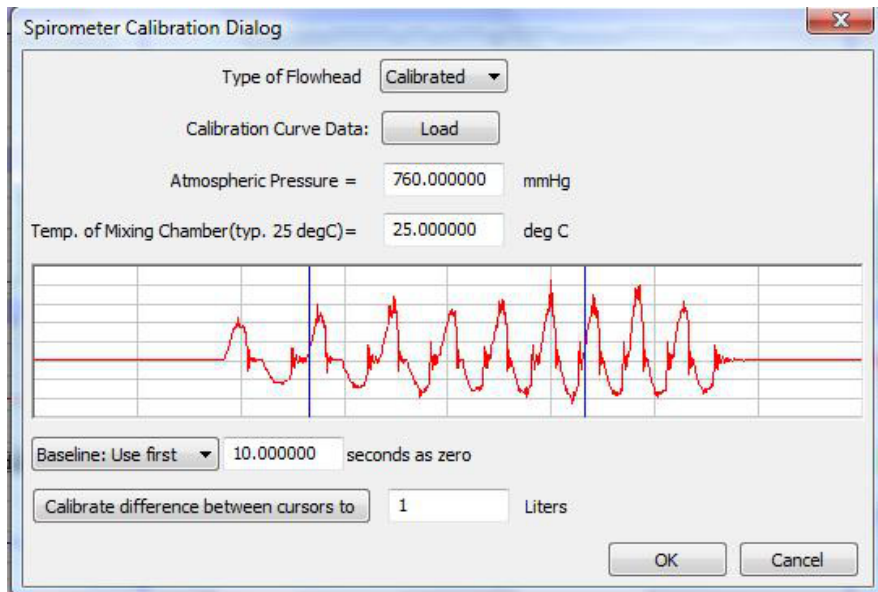


Figure: Spirometer Calibration dialog window

15. Enter these values:
 - a. Type of flow head- Calibrated
 - b. Click Load a new window will open so the *.iwxgcd file that was previously generated can be loaded into your settings. Choose the file and click Open.
 - c. Atmospheric Pressure - enter your local atmospheric pressure.
 - d. Temperature of Mixing Chamber (typically 25 deg C)
 - e. Baseline use first 10 seconds as zero.
 - f. Calibrate difference between cursors to 3 Liters.

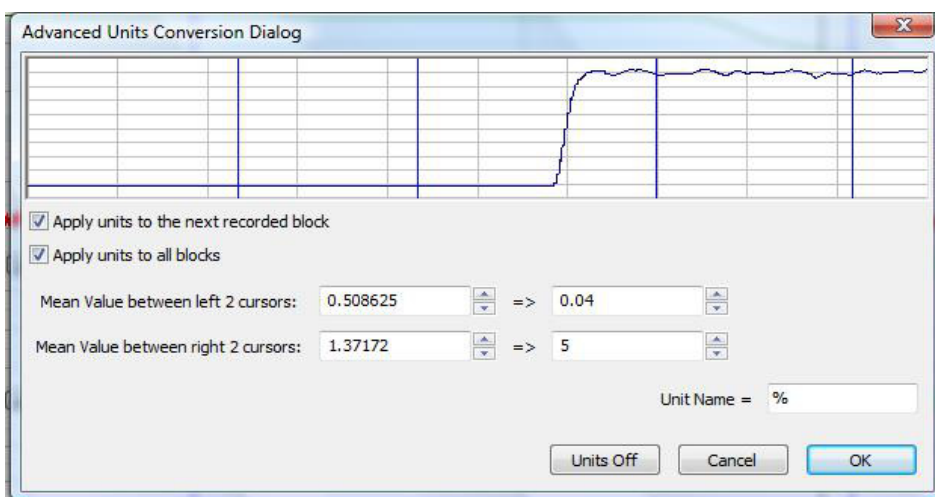
16. Move the left hand cursor to the flat line at the beginning of the calibration recording.
17. Move the right hand cursor to the flat line at the end of the calibration recording.
18. Click OK and select save as in the file menu

Calibrating the GA-300 Gas Analyzer and Calibrate the O₂ and CO₂ Channels

1. Note: Warm up the GA-300 for at least 30 minutes prior to use.
2. Clamp and secure any gas cylinders that will be used to provide gas samples near the GA-300 gas analyzer.
3. Place the gas sampling tubing away from the users to prevent the sampling of exhaled air. Allow room air to be pumped through the gas analyzer for about 10 seconds before recording the outputs of the sensors.
4. Type “Room Air” in the Mark box to the right of the Mark button.
5. Click on the Record button. The recording should scroll across the screen.
6. While recording, press the Enter key on the keyboard to mark the recording for the room air gas sample.
7. Measure the oxygen and carbon dioxide sample of gas mixture containing known concentrations of oxygen and carbon dioxide.
8. Open the secondary valve on the regulator of the cylinder providing the gas sample.
9. Type known gas in the mark box.
10. While continuing to record with the sample gas flowing into the GA-300, press the enter key on the keyboard to mark the recording for the known gas sample.
11. Once the recordings of the gas concentrations reach a steady level, record for another ten seconds.
12. This can take up to 30 seconds or so.
13. Click the stop button.
14. Select save as in the file menu, type a name for the file. Choose a destination on the computer in which to save the file, like your lab group folder). Designate the file type as *.iwxdata. Click on the Save button to save the data file.

Convert the units on gas concentration channels

1. Use the Display Time icons to adjust the display time. The required data can also be selected by: Placing the cursors on either side of data required.
2. Click the double cursor icon. Place one cursor on the section of data recorded of room air and the second cursor on the section of data recorded when the known gas was recorded.
3. Click on the arrow to the left of the carbon dioxide channel to open the channel menu. Select units and select advanced, next click to apply units to all blocks.
4. Click on and move the cursors so that they are in position such that: the first cursors are on the area where room air was recorded. The second cursors are on the area where the known gas sample was recorded.



- a. Room air concentration of CO₂ = 0.04
 - b. The second gas concentration will be the known one from the gas cylinder. Generally a 5% CO₂ concentration is recommended.
 - c. Enter the name of the units, %,
 - d. Click the OK button
5. Repeat steps on the expired O₂ concentration (%) channel.
 - a. Room air = 20.9
 - b. Second gas concentration will be the known one from the gas cylinder. Generally a 12%

- c. O₂ concentration is recommended.
- d. Click on the Save button.

Metabolic parameter calculation

Values for VO₂, VCO₂, RER, TV and other parameters from the segments of the test can be calculated automatically by using the metabolic calculation window.

To use the metabolic calculation window, pull down the advance menu and select metabolic. Select mixing chamber: Offline calculation from the submenu to open the metabolic calculation dialog window.

1. on the left side of metabolic calculation window: pull down the CO₂, O₂, volume, heart rate, and energy channel menus to select the channels on which the CO₂ and O₂ concentrations, lung volumes, heart rates, and workload were recorded.
2. Enter the time (in secs) in the Average box to 0 select the time length of each segment.
3. Click on calculate button on the left side of metabolic calculation and calculate the average value of each parameter for the recorded data and to plot the selected parameter against each other in the plot panel.

Measurement of oxygen saturation heart rate and ECG

Oxygen saturation

1. Click on the *LabScribe2*
2. On the main window, pull down the settings menu and select load group.
3. Pull down the settings menu, again. Select the O₂ saturation-exercise-LS2 settings file.
4. After a short time, *LabScribe2* will appear on the computer screen as configured by the O₂ saturation-exercise-LS2 settings.
5. Put up O₂ saturation sensor on animal tail.
6. Click on the record button and then on the auto scale button

ECG Recording

1. Click on the *LabScribe2*

2. Pull down the settings menu again. Select the ECG-PulseOx-LS2 settings file from human circulation.
3. Click on the record button.
4. Click on the auto scale button
5. Click stop to halt recording, recording file should look like the figure.

Data Analysis

- a. Click on analysis window icon in the tool bar
- b. Click on add function button
- c. Adjacent ECG/Pulse cycles can also be selected by: placing the cursors on either side of four complete ECG/Pulse cycles.



Figure: ECG, pulse, oxygen saturation level, and heart rate displayed on the analysis window

- d. Look at the function table that is above the uppermost channel displayed in the analysis window.
- e. The names of the mathematical functions used in the analysis, T2-T1, Max, Min.
- f. Once the cursors are placed in the correct positions for determining the oxygen saturation levels and heart rates on the ECG/Pulse cycles, the values of the parameters can be recorded in the online notebook of *LabScribe2* by typing their names and values directly into the journal, or on a separate data table.

- g. The functions in the channel pull-down menus of the analysis window can also be used to enter the names and values of the parameters from the recording to the journal. To use these functions:
- h. Transfer the values for the saturation levels, rates, and intervals to the Journal using the Add Ch. Data to journal function in the ECG channel pull-down menu.
- i. Click on the save button in the file menu.

