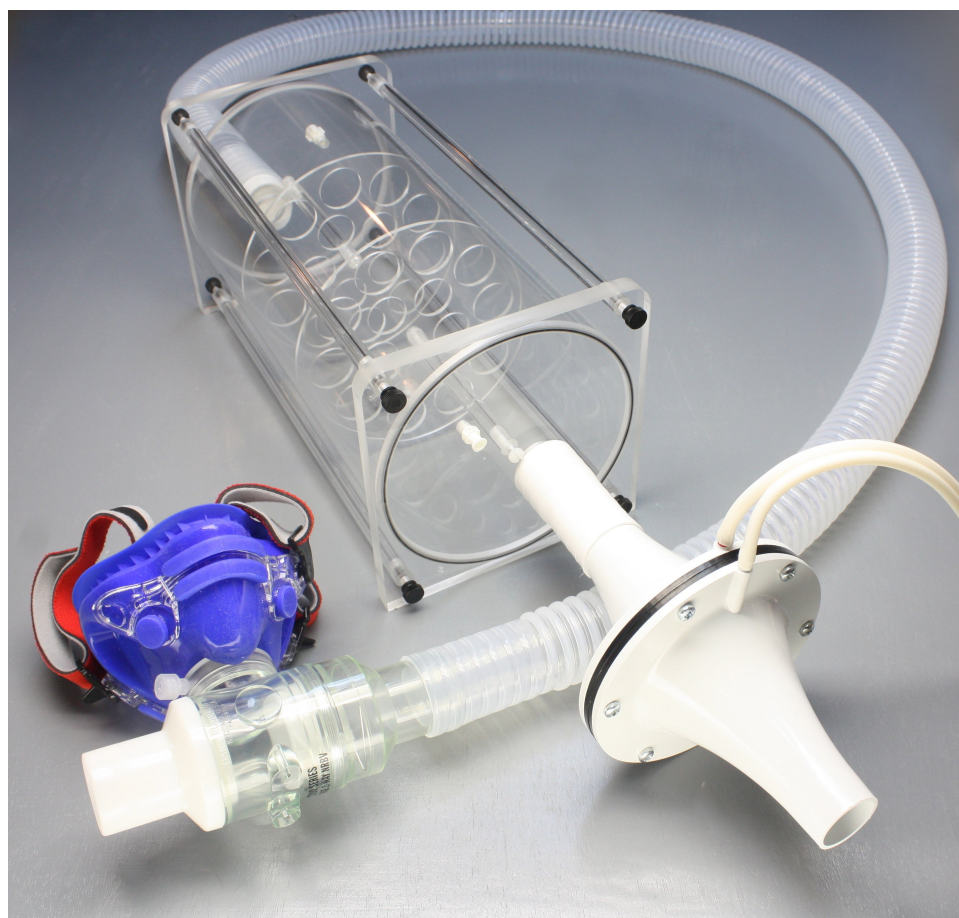


GAK-100 Metabolic Accessory Kit

Technical Note



GAK-100

Overview

The GAK-100 is an accessory kit for use with iWorx data acquisition systems, including the iWorx TA and the iWorx 214, that are capable of measuring basal and resting metabolic rates using the GA-200 or GA-300 Gas Analyzer.

The GAK-100 contains the necessary components to measure the volumes of oxygen consumed (VO_2) and carbon dioxide produced (VCO_2) during the segments of light, moderate, and strenuous exercise that are part of an aerobic fitness test. The components include: a mixing chamber, a 1000 liter/min capacity flowhead, a non-rebreathing mask, and smooth interior tubing.

How It Works

The GAK-100 contains components that permit the measurement of VO_2 , VCO_2 , and other metabolic parameters during exercise without the need for expensive heated flowheads and heater controllers.

When using the GAK-100 with a spirometer (either the SP-304 or the internal spirometer of the iWorx TA), the subject breathes directly through a non-



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rebreathing mask, and not a flowhead. The non-rebreathing mask permits the subject to inhale fresh air from the environment as it prevents the rebreathing of exhaled air. When the subject exhales, a valve directs the expired air through the outlet of the valve and down a large tube to a mixing chamber.

As the mixing chamber nears capacity with expired air, air is pushed out of the mixing chamber by the expired air from new breaths. The volume of air that moves out of the mixing chamber is measured by the flowhead and spirometer attached to the outlet of the mixing chamber. The volume of air expelled from the mixing chamber is equal to the volume of expired air entering the chamber from each new breath.

Since the mixing chamber has a capacity that is 5 to 10 times larger than the tidal volume of the subject, the concentrations of oxygen and carbon dioxide in the mixing chamber are the averages of the concentrations of those gases in the last 5 to 10 breaths exhaled into the chamber. When these concentrations are joined in an algorithm with the volumes of air expired by the subject, accurate values for the subject's rate of oxygen consumption and carbon dioxide production can be calculated.

How to Use the GAK-100

Equipment Setup

If you are using the SP-304 Spirometer with an iWorx 214 data acquisition system:

Connect the airflow tubing from the SP-304 Spirometer to the inlets of the A-FH-1000 Flowhead. Connect the red ports on the spirometer and the flowhead with the ribbed side of the tubing.



A-FH-1000 Flowhead, connected to the SP-304 Spirometer



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If you are using the iWorx TA with its internal spirometer:

Connect the end of the iWorx TA airflow tubing without the Luer-Lock connectors to the inlets of the A-FH-1000 Flowhead, attaching the ribbed side of the tubing to the red port on the flowhead.



A-FH-1000 Flowhead connected to the spirometer airflow tubing

After attaching the flowhead to the spirometer tubing, complete the following steps:

- 1) Connect the inlet of the A-FH-1000 Flowhead to the outlet of the mixing chamber.



A-FH-1000 Flowhead, connected to the outlet of the mixing chamber

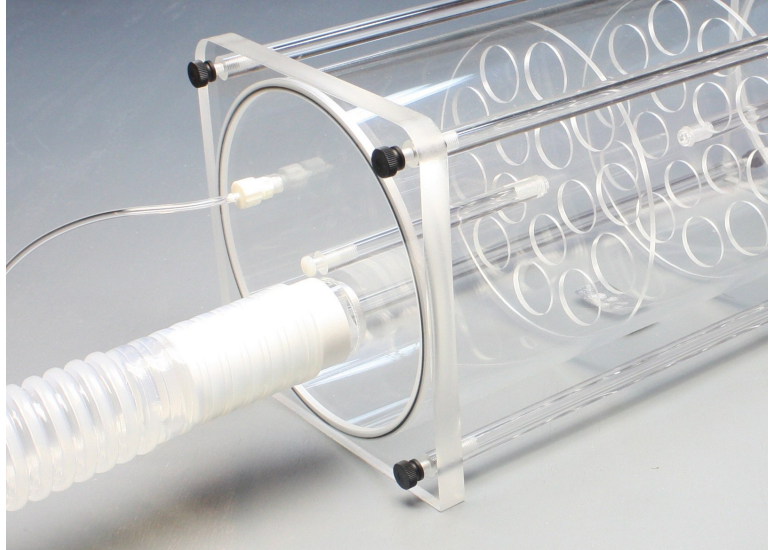


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- 2) Connect the 35 mm I.D. smooth interior tubing from the GAK-100 kit to the inlet of the mixing chamber.



35 mm tubing connected to the inlet of the mixing chamber

- 3) Connect the other end of the smooth interior tubing to the outlet of the non-rebreathing mask.



Non-rebreathing mask, connected to the other end of the 35 mm tubing

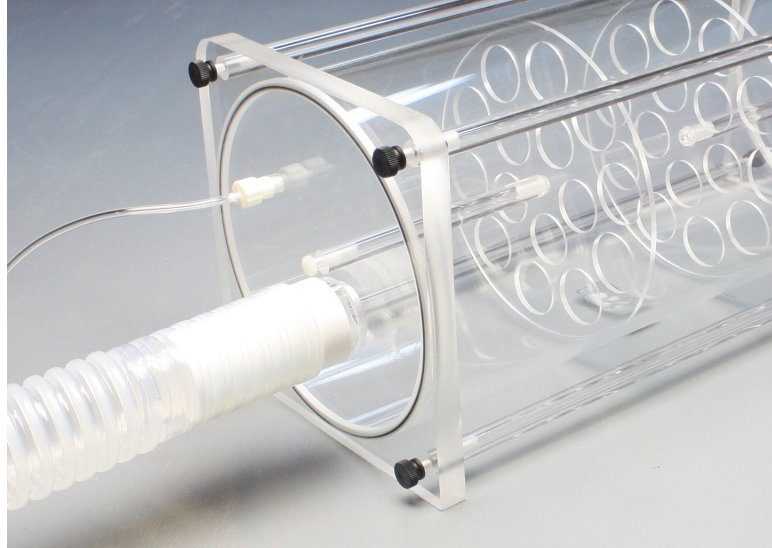


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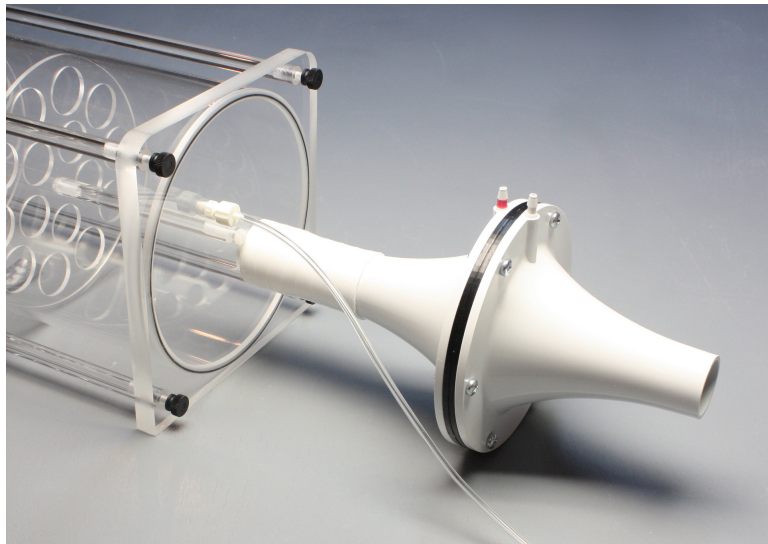
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- 4) Connect one of the lengths of gas sampling tubing to the Luer-Lock sampling port on one end of the mixing chamber.



Gas sampling tubing attached to one of the Luer-Lock connectors on the mixing chamber

- 5) Connect the other end of the gas sampling tubing to the filter on the inlet of the GA-200 or GA-300 Gas Analyzer.
6) Connect the other length of gas sampling tubing to the Luer-Lock sample port on the other end of the mixing chamber.



Gas sampling tubing attached to the second Luer-Lock connector on the mixing chamber



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- 7) Attach the other end of the gas sampling tubing to the outlet of the GA-200 or GA-300 Gas Analyzer.

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If you are using the SP-304 Spirometer with an iWorx 214 data acquisition system:

Connect the SP-304 Spirometer to the Channel 4 DIN8 transducer input of the iWorx 214 data acquisition system.

If you are using an iWorx TA with its internal spirometer:

Connect the Luer-Lok connectors on the airflow tubing from the flowhead to Channel A1 on the TA by attaching the Luer-Lok connectors on the tubing to the connectors of the corresponding color (red-to-red and white-to-white) on the iWorx TA.

Once you have made these connections:

Connect the outputs of the GA-200 or GA-300 Gas Analyzer to the inputs of an iWorx data acquisition system.

From the GA-200:

- Connect the CO₂ output using a BNC-BNC cable to Channel 1 of the iWorx 214 or Channel A3 of the iWorx TA.
- Connect the O₂ output using a BNC-BNC cable to Channel 2 of the iWorx 214 or Channel A4 of the iWorx TA.

From the GA-300:

- Connect the CO₂ output using the BNC-BNC cable to Channel 2 of the iWorx 214 or Channel A4 of the iWorx TA.
- Connect the O₂ output using the DIN8-DIN8 cable to Channel 3 of the iWorx 214 or Channel A5 of the iWorx TA.

Components of the GAK-100

- (1) 5 liter mixing chamber (A-GAA-MC2)
- (1) Mask, valve, and headgear with 35 mm O.D. openings (A-GAK-201)
- (1) Smooth interior tubing with 35 mm I.D. openings (A-CBT-1011)
- (1) 1000 liter/min flowhead (A-FH-1000)



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