

SET 4: EMG Learning

- **EMG Learning:** This screen consists of five graphs. The top graph displays the raw EMG signal. The middle graph displays an EMG signal for evaluating and learning new breathing mechanics. The bottom three graphs provide ongoing histories of PetCO₂, EMGrms, and breaths per minute.
- **EMG Training - Somatic:** This screen is identical to the EMG Learning screen described above but also includes chest or diaphragmatic breathing (strain gage) superimposed on EMG in the middle graph.

SET 5: PCO₂ - HRV Learning

- **PCO₂ - HRV Learning:** This screen consists of six graphs. The top graph displays the raw PPG signal, that is, the blood volume pulse. The middle graph displays the PCO₂ waveform together with beat-to-beat calculated heart rate which permits observation of breathing-regulated heart rate variability (HRV), the breathing heart wave (BHW). The bottom four graphs provide ongoing histories of PetCO₂, breaths/minute, heart rate, and breathing heart wave amplitude (BHW, the high frequency wave).
- **Somatic HRV Training:** This screen consists of five graphs. The upper graph displays beat-to-beat heart rate (breathing-regulated HRV) along with chest or diaphragmatic breathing (strain gage), providing for observation of breathing and heart rate synchrony. The bottom four graphs provide ongoing histories of PetCO₂, breaths/minute, heart rate, and breathing heart wave amplitude.

SET 6: PCO₂ - HRV Spectrum

- **PCO₂ - HRV Spectrum:** This screen consists of two graphs, one graph of the PCO₂ waveform along with beat-to-beat calculated heart rate (the breathing heart wave, BHW) and a live 3-D display of the heart rate variability (HRV) spectrum, based on a FFT spectral analysis of the PPG signal.
- **Mechanics Spectrum:** This screen is identical to the PCO₂ - HRV screen described above but where the PCO₂ waveform is replaced with chest/diaphragmatic breathing (strain gage).

SET 7: Feedback Signals: Each of the four feedback signals, used in learning new breathing habits, are displayed on separate graphs: PCO₂, beat-to-beat HR, EMG, and chest/diaphragmatic breathing.

SET 8: Signal Histories: The running histories of five signals are shown in real time: PetCO₂, breaths/minute, EMGrms, heart rate, and BHW (the HF breathing-regulated HRV bandwidth).

SET 9: HRV Bandwidths: This screen consists of three separate graphs, including high, low, and very low HRV frequency feedback signals.

SET 10: Raw Signals: This screen consists of five graphs: (1) raw EMG, (2) EMGrms, (3) raw PPG (blood volume pulse), (4) beat-to-beat heart rate, and (5) chest/diaphragmatic breathing (strain gage).

 109 East 17th Street
Cheyenne, Wyoming 82001 USA
Tel 1.307.773.0888. Fax 1.303.773.0887
instruments@betterphysiology.com
www.betterphysiology.com

CapnoPlus-2™

Accessory Instrument for the CapnoTrainer

Attention: Read QUICK START first.

The **Better Breathing Learning System** is comprised of the combination of the **CapnoTrainer** and the **CapnoPlus-2** which together include somatic (EMG, airflow, chest breathing), autonomic (HR, HRV), and respiratory (PetCO₂) physiology useful for learning and teaching new breathing habits.

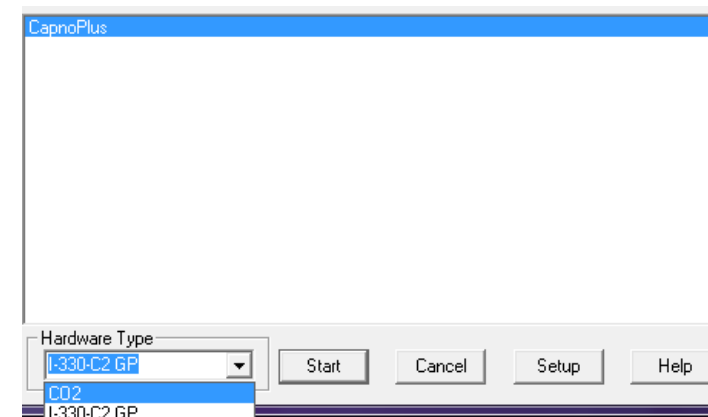
The CapnoPlus-2 provides additional physiology: Raw EMG, EMGrms, Beat-to-Beat calculated Heart Rate, HRV Bandwidth (very low, low, and high) signal display, and Respiratory Strain Gage feedback. It operates together with the CapnoTrainer as a single instrument to provide a combination of the above-described signals with End-tidal CO₂ (PetCO₂), breaths per minute, and the raw PCO₂ signal (airflow: aborted exhale, breath holding, gasping).

The CapnoPlus-2 instrument is an accessory instrument to be used exclusively with the CapnoTrainer. While the CapnoTrainer works independently of the CapnoPlus-2, the **CapnoPlus-2 does not function without running it simultaneously with the CapnoTrainer**. It plugs into a second USB port.

SOFTWARE PREPARATION

Operating the software and its features are described on the QUICK START CARD. Here are considerations specific to the use of your CapnoPlus-2 with the CapnoTrainer:

- Click on **RUN** (located on the Main Menu) for the dialog box shown below.
- **IMPORTANT:** If using 220/230 50 Hz power source, click on **SETUP** and change 60 Hz to 50 Hz.
- Go to **HARDWARE TYPE** in the lower left corner of the dialog box shown below
- Click on the **DROP DOWN ARROW** to the immediate right of the hardware type listed.
- Select the **I-330-C2 GP** if you plan to run the CapnoTrainer **together with** the CapnoPlus-2.
- Select the **CO2** option, if you plan to use the CapnoTrainer **without** the CapnoPlus-2.
- Highlight the **Application** you wish to run listed in the upper left corner of the dialog box.
- Click **START**, or double click the Application name (CapnoPlus-2 in this case).



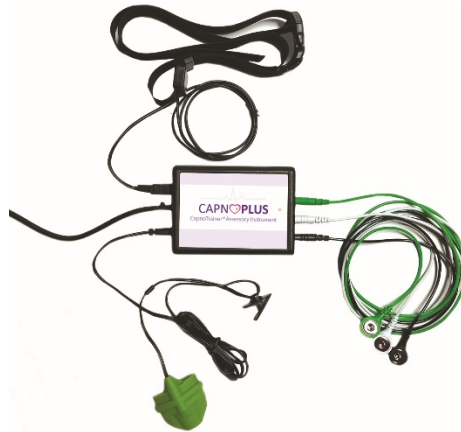
THE CapnoPlus-2 HARDWARE

Accessories and Supplies include:

- EMG Leads (1 pack of 3)
- Dry Electrodes (2 packs of 3)
- Wristbands (2)
- Carry Pouch (1)
- Disposable Electrodes (2 packs of 50)
- PPG Sensor (HRV)
- Respiratory Strain Gage

Setting up the CapnoPlus-2:

- Plug the CapnoTrainer into a second USB port (required).
- Look at the back of the instrument and read the labels for cable positioning.
- Insert the PPG (green) sensor (see label on instrument).
- Insert the respiratory strain gage (see label on instrument).
- Insert the EMG electrode leads (see labels: green is the reference lead).



PPG (Photoplethysmography):

Insert one of the three middle fingers on either hand into the green finger sensor. Be sure that the bead located in the bottom of the sensor (which can be felt upon inserting the finger) is located on the pad of the most distal portion of the selected finger. Do not try to place the sensor further down on the finger or over a joint location. **MAKE THE PLACEMENT BEFORE ACTIVATING THE SOFTWARE.**

EMG (Electromyography):

You may make any kind of specific EMG placement you wish using standard gelled electrodes, e.g., frontalis placement, OR make a wrist-to-wrist placement using the dry electrodes with the wrist bands for monitoring over all upper body muscle activity (chest and back).

Disposable electrode placements:

- Identify the muscle or body area that you wish to monitor/record.
- Determine where you wish to place the green reference electrode (e.g., nearby bony area).
- Clean the skin with an alcohol pad, abrading the skin slightly, in the selected electrode locations.
- Snap on a disposable electrode to the green lead and then place it accordingly.
- Snap electrodes onto the black and white leads and place them as desired, either on a specific muscle (electrode on each end) or spread apart for monitoring an area (e.g., a bilateral trapezius placement).

Wrist-to-wrist placement:

- Put on the wristbands. Attach the dry (brown-colored) electrodes to each of the leads.
- Clean the skin with an alcohol pad. Be sure the skin is wet when you make the placements.
- Place the black lead electrode on the bottom side of the **LEFT wrist**, by sliding it under the wristband.
- Place the white lead electrode under the wristband on the bottom side of the **opposite wrist**.
- Place the green reference lead electrode **on the top of left wrist**, by sliding it under the wristband.

Respiratory Strain Gage:

- Unsnap the plastic buckle for easy placement around either the chest or abdominal area of the body.
- Buckle the strain gage so that it is not too loose or too tight for both good recording and comfort.

SOFTWARE SCREEN OPTIONS

SET 1: PCO₂ Learning

- **PCO₂ Learning:** This screen consists of three graph displays. The top graph displays the live PCO₂ waveform for observation of breath-to-breath changes in PetCO₂, airflow, gasping, breath holding, and aborted exhalation. It includes an adjustable threshold line set at 35 mmHg, the recommended minimum level of PetCO₂. The bottom two graphs provide ongoing history of PetCO₂ and breaths/minute.

- **End-Tidal (PetCO₂) Learning:** This screen consists of three graph displays. The top graph displays live End-tidal CO₂ (PetCO₂) values from breath to breath. Because PetCO₂ values are updated each second, the graph reads the same value continuously until the next breath occurs. The bottom two graphs provide ongoing history of PetCO₂ and breaths/minute. These three graphs will not begin to display signal values for at least two minutes.

- **PetCO₂ & Breathing mechanics:** This screen consists of three graph displays. The top graph displays live End-tidal CO₂ (PetCO₂) values from breath to breath, along with either chest or abdominal breathing (respiratory strain gage). When recording abdominal breathing be sure that you place the strain gage at least one inch (2.5 cm) below the rib cage. The bottom two graphs provide ongoing history of PetCO₂ and breaths/minute but will not begin to display signal values for at least two minutes.

SET 2: PCO₂ & EMG Learning

- **PCO₂ & EMG Learning:** This screen consists of four graphs. The top graph displays the live PCO₂ waveform in combination with EMG, for observing how specific breathing habits may be affecting respiratory and somatic physiology. It includes a threshold lines set at 35 mmHg for PetCO₂ and 5.0 μ v for EMG, both of which may be changed by clicking on the threshold icon. The lower three graphs provide ongoing history of PetCO₂, EMG, and breaths/minute.

- **EMG Somatic:** This screen consists of four graphs. The top graph displays the live EMG signal in combination with chest or abdominal breathing (strain gage feedback). When recording abdominal breathing be sure that you place the strain gage at least one inch (2.5 cm) below the rib cage. The lower three graphs provide ongoing history of PetCO₂, EMG, and breaths/minute.

SET 3: PCO₂ Breathing Template

- **PCO₂ Breathing Template:** This screen consists of two graphs. The top graph displays a breathing pattern template for exploring the mechanics of breathing, including rate, inhalation, exhalation, and pauses between breaths. Click on "Adjust Rate" to change the speed of the moving ball, that is, the breathing rate. The bottom graph provides for simultaneous tracking the PCO₂ waveform.

- **CO₂ - EMG Breathing Template:** This screen consists of three graphs. The upper graph displays the PCO₂ waveform, the middle graph the breathing template display described above, and the bottom graph the live EMG signal.

- **Somatic Breathing Template:** This screen is identical to the PCO₂ Breathing Template screen described above but includes chest/diaphragmatic breathing (strain gage) with the PCO₂ waveform.

- **HRV Breathing Template:** This screen is identical to the CO₂ - EMG Breathing Template screen except that the bottom EMG display is replaced with a beat-to-beat heart rate display.