

GROUP INSTRUCTIONAL SYSTEMS

Capno-8 and Capno-4

An EDUCATIONAL CAPNOMETRY instrumentation system
for simultaneous carbon dioxide (CO₂) monitoring of up to 8 learners at a time

- **Educational capnography** is about using carbon dioxide (CO₂) monitoring instrumentation for learning breathing behavior *that results in good respiration*.
- **CapnoLearning™** is about *evaluating, training, and learning* breathing behavior for good respiration *based on carbon dioxide (CO₂) self-regulation*.
- **The CapnoTrainer®** is a combination hardware-software instrumentation system for “live” displaying and recording of exhaled partial pressure carbon dioxide (PCO₂) and heart rate variability (HRV) data for evaluating and teaching breathing behavior.
- **The Group Instructional Systems** include up to eight CapnoTrainers® for simultaneously teaching and learning CO₂ self-regulation with up to 8 people at a time.

Breathing for Good Respiration

- **Carbon dioxide is precious, not poisonous.** It regulates basic body chemistry including: acid-base physiology (pH), electrolyte balance, hemoglobin chemistry, blood flow, brain biochemistry, muscle activity, cardiac function, and kidney physiology.
- **Proper CO₂ allocation is vital** to health and performance, physical and mental. At rest, only **about 15 percent** of the CO₂ passing through the lungs need be excreted. The other 85 percent is essential to proper moment to moment regulation of body chemistry.
- **Hypocapnia is a CO₂ deficit** which, as a result of learned **overbreathing**, can trigger, exacerbate, perpetuate, or cause a wide variety of emotional (anxiety, anger), cognitive (attention, learning), behavioral (public speaking, test taking), and physical (pain, asthma) changes that may seriously impact health and performance.
- **Learned overbreathing behavior results in hypocapnia.** Hypocapnia is either the result of (1) chemical considerations, i.e., bicarbonate deficits arising from metabolic acidosis (e.g., lactic acid), or (2) learned overbreathing behavior motivated and reinforced by life experiences, such as fear reduction and emotional dissociation.
- **Behavioral hypocapnia**, resulting from learned overbreathing, is subject to the same principles of learning as any other behavior, including motivation, emotion, attention, perception, and memory. Ten to 25 percent of the US population suffers with the serious but unrecognized effects of learned hypocapnia.
- **Debilitating symptoms and deficits** triggered by overbreathing are rarely addressed, typically go “unexplained,” are mistakenly attributed to other causes, and are often managed with prescriptive medications. Sixty percent of ambulance runs are a direct consequence of symptoms precipitated by behavioral hypocapnia.
- **Most breathing programs fail to address respiration** and are rooted in misinformation, misconceptions, pseudoscience prescriptions, and ignorance about the physiology and psychology of breathing. Breathing mechanics may look letter-perfect, but respiration and acid-base regulation poorly or not addressed at all.

- **CapnoLearning® is based on textbook science**, pulmonary and acid-base physiology. It is the application of the principles of behavioral analysis, behavior modification, awareness training, biofeedback, and cognitive learning to breathing behavior. CapnoLearning® is “client-centered” behavioral solution rather than a “therapist-centered” treatment of misunderstood breathing mediated symptoms and deficits.
- **Practical solutions include:** (1) determining whether or not behavioral hypocapnia is present, (2) identifying the symptoms and deficits triggered by hypocapnia, (3) discovering specific learning factors that regulate breathing behavior resulting in hypocapnia (overbreathing), and (4) finding and implementing behavioral (learning) solutions to dysfunctional breathing.

Diverse Applications

- rehabilitation (e.g., physical therapy, pain management)
- traditional healthcare (e.g., asthma)
- education, learning, attention (e.g., attention deficit)
- fitness/sports (e.g., endurance, muscle fatigue, attention, anxiety)
- performance training (e.g., public speaking, test anxiety, aviation)
- corporate coaching and consulting (e.g., stress management)
- meditation and yoga (e.g., breathing practices)
- anger, anxiety, panic (e.g., mental health)
- relationships and communications (e.g., couples counseling)
- patient education (e.g., hypertension and migraine)
- pregnancy (Most pregnant women, in fact, overbreathe.)
- peak performance (e.g., golf)

Basic Instrument: The CapnoTrainer®

An educational instrument for learning optimal breathing

The display signals include: the PCO₂ “raw waveform” (continuous measurement throughout the breathing cycle), End Tidal PCO₂ (ETCO₂, peak values on the exhale), breathing rate, heart rate, heart rate variability (HRV), and historical averages for each of these. The raw data of all types of signals can be saved, session by session, for subsequent review in assorted formats. The **hardware components** are illustrated below:



Group Instructional Systems

Group training systems for learning optimal breathing

The Capno-8 System™

The Capno-4 System™

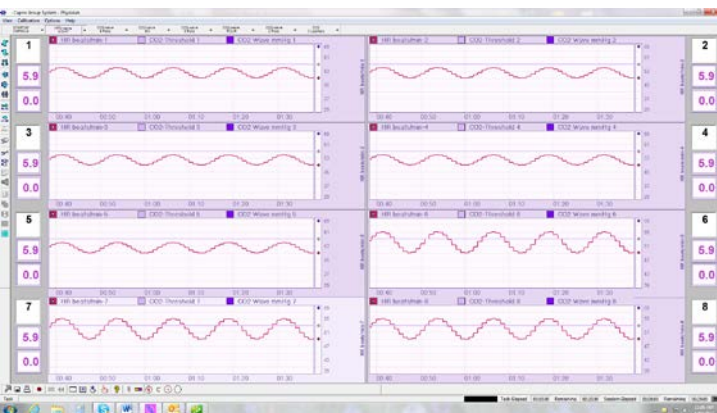


Using the Capno-4™ (four learners)

The Capno-8™ and Capno-4™ consist of up to eight CapnoTrainers, a two-year warranty that includes damage and misuse, software that displays and records physiology in real time for up to eight clients simultaneously, and software for individual work. The CapnoPlus cannot be used in group work.

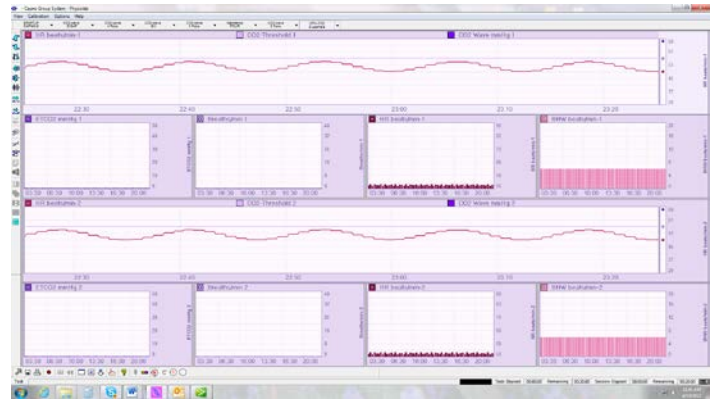
Hubs (wired or wireless) link together up to 8 CapnoTrainers that transmit their data to a single computer, which projects the physiology of up to 8 learners on to a single large screen for all to see with an overhead projector. Hubs are purchased separately.

Display screens present physiology for 2, 4, 6, and 8 learners at a time. There are screens for individual work and for clients working in pairs (e.g., couples). Recorded data may also be observed and printed out for each client separately.

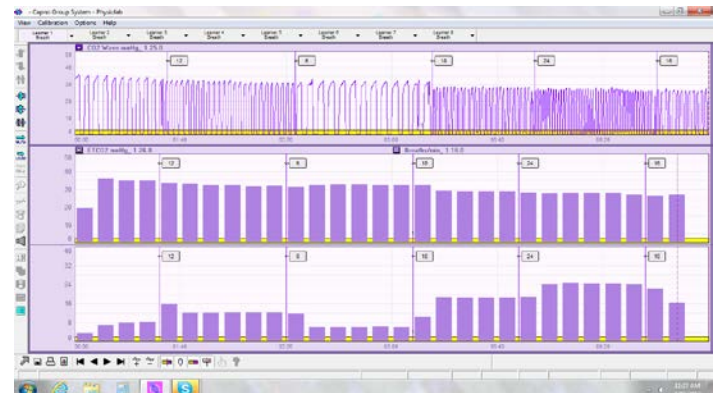


Sample Live Display: 8 clients, PCO₂ waveforms

Group systems with just two or three CapnoTrainers may also be purchased, but the group software must be purchased separately.



Sample Live Display: 2 clients, PCO₂ with history graphs, including breathing rate, and ETCO₂.



Sample Data Display: a single client of 8 records, including original waveform, ETCO₂, breathing rate.

Entrepreneurial practitioners know that efficacious and relevant client services must go hand-in-hand with good business economics. The Capno-8 meets these criteria: (1) evidence-based applications (2) relevancy to teaching large audiences, and (3) a conservative financial model for both individual and corporate clients.

Capno-8™ Group Instructional System: \$31,000.00.
Leasing available.

Capno-4™ Group Instructional System: \$15,500.00.
Leasing available.

Group Software: \$600.00
For customers purchasing less than four instruments

CapnoTrainer®: \$3,900.00
With Starter Kit and Extended Warranty Program

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