K4 b²

Cardio Pulmonary Exercise Testing

Why limit your studies to the length of the cable?

- Pulmonary Gas Exchange (VO_2, VCO_2)
- Breath by Breath Technology
- Telemetry Data Transmission up to 1000m
- Indirect Calorimetry
- Integrated GPS System
- Integrated Oxygen Saturation (SpO_2)
- Integrated 12-lead Stress Testing ECG
- Powerful Windows™ Software for advanced data analysis

COSMED
The Metabolic Company

The K4 b² is the first portable system for cardiopulmonary gas exchange analysis on true breath-by-breath basis. Its technology and dimensions allow the measurement of physiological response to exercise in the field without limitations.

With almost 30 years of experience in mobile metabolic testing, COSMED has designed the K4 b² to be accurate and reliable in any conditions with fast O_2 and CO_2 analyzers and continuous monitoring of temperature, sampling flow and pressure.

K4 b² has been validated, used and mentioned in more than 600 publications worldwide in the most important scientific journals.

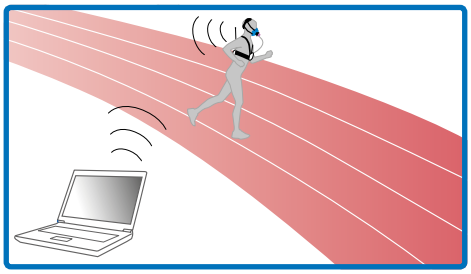
1 - Holter Data Recorder

The unit stores breath by breath data (memory of up to 16.000 breaths). After the test, all data may be downloaded to the PC for analysis and presentation. Tests can be run in the field without the need of a PC or laptop.

Holter data recorder

2 - Telemetry Transmission

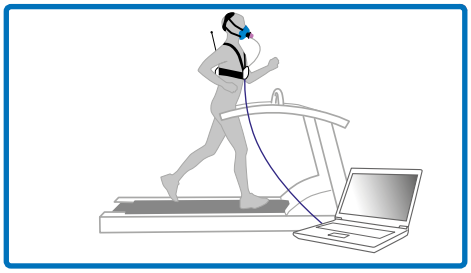
Digital telemetry transmission is used to send breath by breath data to the PC located away from the subject (up to 1000 meters). During transmission, K4 b² stores all data in its memory to avoid data loss.



Telemetry Transmission

3 - Laboratory Station

Connect the RS-232 cable to a PC and turn your mobile K4 b² into a conventional Metabolic Cart with same features of the best standalone labs (accuracy, easy to use, ergometer control etc.).



Laboratory Station

Applications

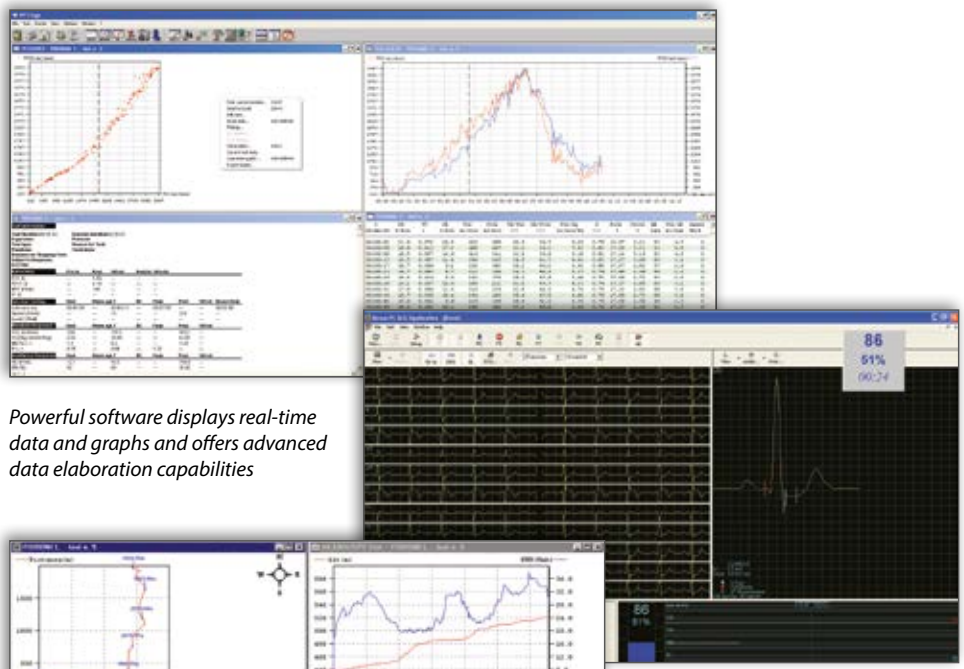
K4 b² is ideal for any application that requires the measurement of the cardio-respiratory response either in the field or in the lab. In particular:

- Sports Medicine
- Research in Human Performance
- Gait Lab
- Occupational health
- Cardiology
- Cardiac Rehabilitation
- Clinical Nutrition

True Mobility

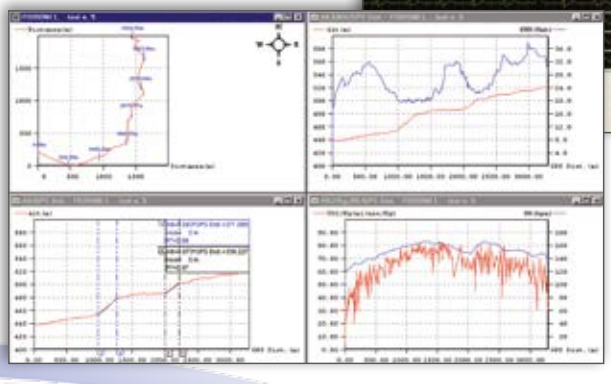
The K4 b² is provided with all necessary hardware for field testing:

- Light weight (only 800 grams) and ergonomic harness
- Integrated LCD for calibrating and showing data during field testing without the need of a PC
- Powerful rechargeable batteries that can be exchanged during the test
- A barometer along with a temperature and pressure sensor allow instantaneous correction for any change in environmental conditions
- A GPS module measures speed, distance, altitude and geographical position of a subject running in an open field together with gas exchange data.



Powerful software displays real-time data and graphs and offers advanced data elaboration capabilities

Real time display of both gas exchange and ECG when integrating K4 b² with COSMED wireless or patient cable ECG

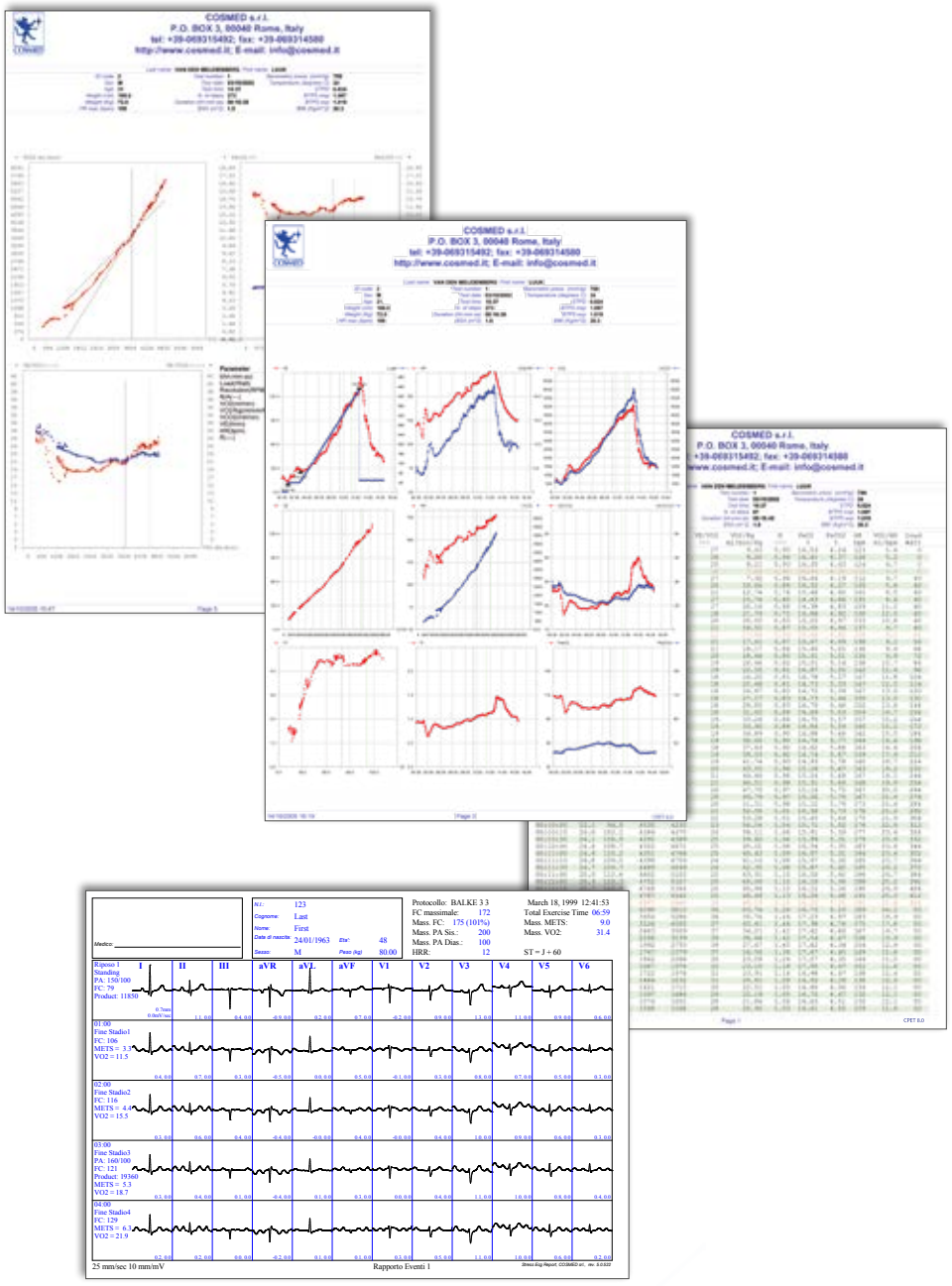


Graphs showing the geographical data obtained from GPS and user selected gas exchange data (VO_2kg, Ventilation, HR etc.)

Complete Data Management

- Patient database management.
- Selection of parameters and graphs for custom data presentation.
- Automatic and manual detection of anaerobic and RC threshold according to the modified V-slope method or user defined plots.
- Control of any ergometer provided with a RS-232 interface.
- Real time visualization of the O_2 and CO_2 waveforms during the test.
- File export in different formats (MS Excel, Lotus, ASCII).
- Advanced data elaboration (filtering, smoothing. averaging etc.).
- O_2 Kinetics tool (O_2 deficit, O_2 debt, time constant, etc.).
- Exercise Flow-Volume loops.
- Custom parameters and predicted equations.
- Custom graphical analysis (linear and exponential).
- "Send to Excel" feature for easy data export to MS Excel.
- Speed and distance marking for easy calculation of O_2 cost of locomotion (Gait Lab applications).
- Non-invasive Cardiac Output during breath by breath analysis.

K4 b² used with Olympic level ice skater (Foto: InnoSportNL)



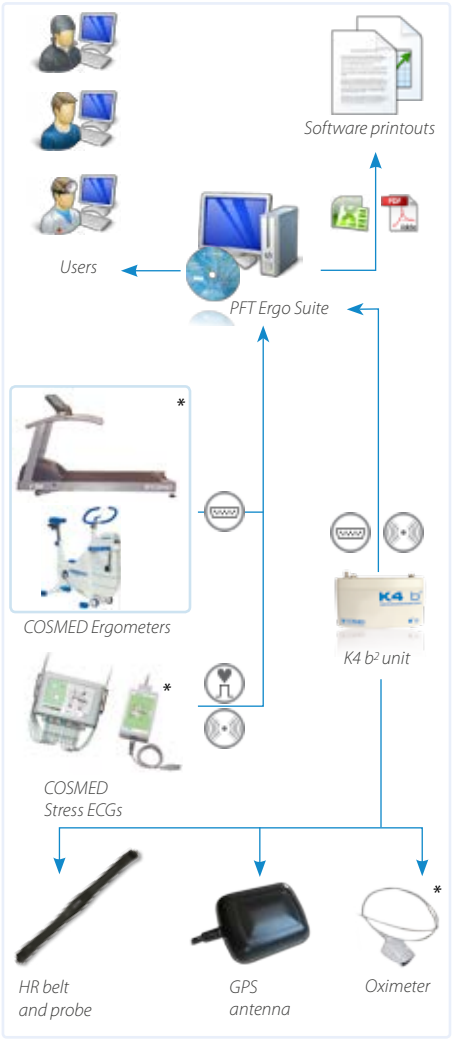
Explicative colour printout reports in different formats deliver clear information to user including: graphical test display, numerical data compared to predicted values and automatic interpretation of test results.

When needed, K4 b² unit can be placed on the back by a simple adjustment of the harness

Anatomical silicone masks (available in 5 different sizes) with easy-to-mount headcap

Possibility to measure gas exchange on swimmers in their environment (swimming pool or flume) with the optional snorkel Aquatrainer

Easy transport of K4 b² and its accessories is facilitated by a practical suitcase



Technical Specifications

Flowmeter — Bidirectional digital turbine Ø 28 mm

Flow range	*0.08-20 l/s*
Ventilation Range	*0-300 l/min*
Accuracy	*±2 %*
Flow Resistance	*<0.7 cmH_2O/l/s @ 14 l/s*
Resolution	*8 ml*

Gas Analyzer

	Oxygen (O_2)	Carbon Dioxide (CO_2)
Type	*GFC*	*NDIR*
Range	*7-24% O_2*	*0-8% CO_2*
Response time	*120 ms per 90% FS*	*120 ms per 90% FS*
Accuracy	*± 0.02% O_2*	*± 0.01% CO_2*

Gas Exchange Measurement

Type	*Breath by Breath*
Expired gas drying	*Nafion® tube*

Hardware

	Transmitter Unit	Receiver Unit
Memory	*16,000 breaths*	
Display	*LCD - 2 lines x 16 characters*	
Keyboard	*6 keys*	
Heart Rate Monitor	*Wireless double electrode (Polar®)*	
Serial port	*RS 232*	
Thermometers (range)	*0-50°C*	
Barometers (range)	*53-106 Kpa*	
Battery type	*Ni-MH*	*4 x 1.5V AA*
Battery autonomy	*~ 6 hours*	
Dimensions (mm/in)	*170 x 55 x 100 / 6.7 x 2.2 x 3.9*	*170 x 48 x 90 /6.7 x 1.9 x 3.5*
Weight (g/lb)	*475 / 1.04*	*330 / 0.72*
Transmission distance	*1000 m (US version only: FCC rules limit transmission up to 300 yards max)*	
GPS Module (g/lb)	*80 / 0.17*	

Standard Packaging Includes

K4 b² TX Module, K4 b² RX Module, GPS Module, three (3) Rechargeable Batteries, Charge unit, two (2) flowmeters, Polar HR belt, three (3) faces masks (Adult S, M, L), Adult headcap, Adult Harness, Gas Calibration unit, PC software, Aluminium Carrying case, RS-232 cable, antenna, extra cabling for connections.

Available languages

English, Italian, Spanish, French, German

Electrical requirements

Power supply	*100/240V, 50-60 Hz*
Power consumption	*60 VA*
Class	*I type B*

PC configuration required

Pentium or faster, Windows XP, VISTA (32 bit), Windows 7 (32 bit), 128 Mb RAM or more, CD-Rom reader, 80 Mb on HD space available.

Safety & Quality Standards

Equipment complies with MDD (93/42 EEC) and FDA 510(k) cleared.
COSMED is an organisation whose quality management system is certified by CERMET according to UNI EN ISO 9001:2008 and UNI EN ISO 13484:2004

CE 0476

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