

# Quark CPET

Cardio Pulmonary Exercise Testing

## Research grade Metabolic cart for Cardio Pulmonary Exercise Testing in clinical and sport applications

“ Assess, Measure,  
Improve my  
Performance ”



**COSMED**  
The Metabolic Company

“

*Designed for any kind of cardio pulmonary exercise testing including exercise physiology, sports science and clinical exercise testing*

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- **Breath by breath gas exchange analysis ( $VO_2$ ,  $VCO_2$ )**
- **Fully integrated with 12-lead Stress Testing ECG (option)**
- **Automatic CPET Clinical Interpretation**
- **Resting Energy Expenditure with mask or canopy hood (option)**
- **Mixing chamber for sport science and research applications (option)**
- **Independently validated**



The Quark CPET is a state-of-the-art metabolic cart for gas exchange analysis ( $VO_2$ ,  $VCO_2$ ) either during exercise testing or resting protocols. Its high quality components and super-fast analyzers assure unsurpassed accuracy, reliability, and real breath-by-breath analysis of pulmonary gas exchange, even at high intensity exercises.

The Quark CPET is a stationary system with both breath-by-breath and, optionally, mixing chamber sampling technology. The system has been scientifically validated for both techniques and in a wide range of exercise intensities.

The Quark CPET can be integrated with additional modules including fully integrated 12-lead ECG Stress testing, canopy hood for REE measurements, pulseoximetry and more.

## Design & Main Features

- **Unsurpassed accuracy.** With fast-response stable and durable paramagnetic technology (Oxygen), and NDIR for the  $CO_2$ . Both analyzers can assure long periods of accurate measurements without the need of periodical replacement.
- **Breath by Breath & Mixing Chamber.** Quark CPET provides both technologies either during exercise or at rest conditions.
- **CPET made easy.** Thanks to **OMNIA**, the new generation of COSMED software designed for the entire COSMED product's portfolio. The intuitive, beautiful, and innovative user interface has brought the complex CPET procedure to a new stage.
- **Low running costs and easy maintenance.** The design architecture has been made to eliminate the procedure of ordinary maintenance and to easily and rapidly solve any technical problem by replacing a board.
- **Independently validated.** Quark CPET is the only Metabolic cart in the market that has been validated both on different gas exchange methods (Breath by Breath and Mixing Chamber), and on the entire human physiological range (from resting to a wide range of exercise intensities).
- **Integrated diagnostic quality 12-lead Stress ECG** (available either in wireless or patient cable configuration) with full disclosure and scroll back during the test. High resolution ECG processing produces an exceptionally clear on-screen display and allows detailed, reliable analysis of ST segments and subtle arrhythmia changes. Available with Resting and Exercise ECG interpretation.

- Wide selection of **ergometers**, available from COSMED, including treadmills, cyclergometers, armergometers and recumbent bikes, suitable for any clinical and research application.



*During exercise, Quark CPET can perform pulmonary gas exchange measurements with integrated ECG data*



*COSMED stress ECGs (wireless or patient cable)*



## Data Management & Software

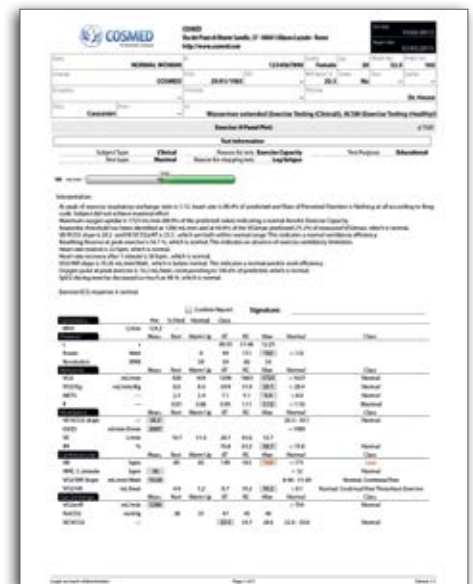
Quark CPET is provided with the **OMNIA Metabolic** Modules, the new software designed by COSMED for CPET and REE testing and data management. Compatible with the entire COSMED product range OMNIA allows users to operate complex testing procedures with just a few training.

- Easy-to-use beautifully designed touch-screen (native) graphic user interface with intuitive workflow and hierarchy.
- Display data and charts through standards (9 panel plot, etc.) or user defined Dashboards.
- Built-in Exercise Protocol editor to design and save any type of protocol.
- Easy, quick and fully assisted calibration for high accuracy measurements either for flowmeters (calibration and linearity check), or gas sensors (zero, gain and delay).
- Powerful post-test editing phase for custom change on filtering, calculation of thresholds (AT, RCP),  $VO_2$  max, VE/ $VO_2$  slope and other parameters requested for interpretation.
- Comprehensive interpretation tool automatically elaborates CPET tests and provides interpretation including text strings and numerical results based on latest scientific guidelines<sup>1</sup>.
- Export data in .pdf, .xml, and xls formats. Import data in .xml format.

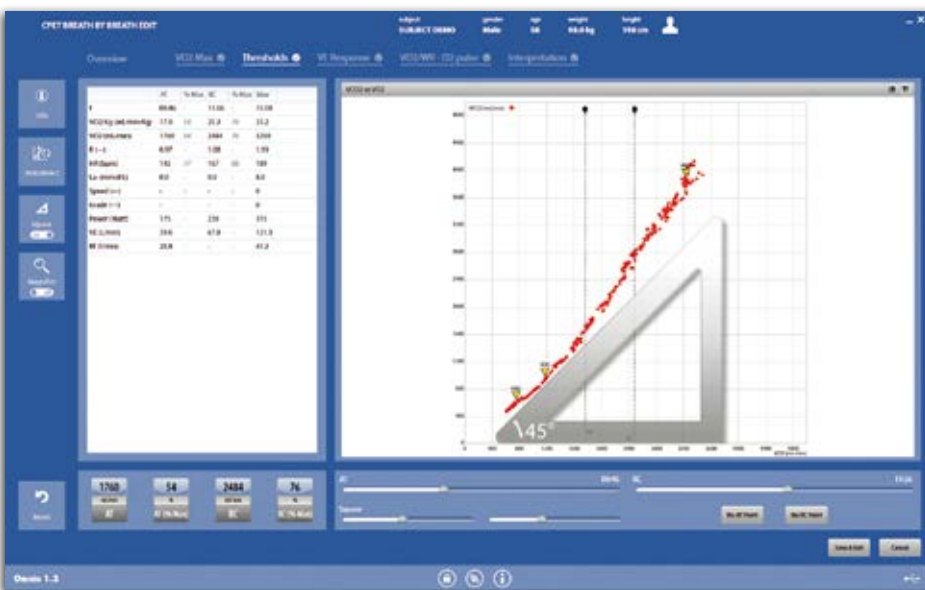


Possibility to manage/display in real time data and plots via dashboards (default and user defined)

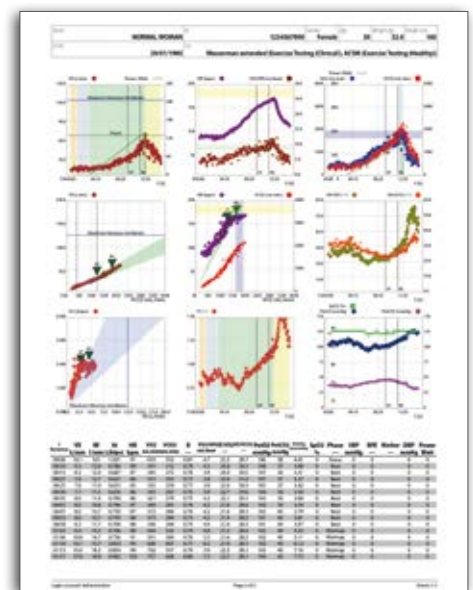
- Custom user rights management (Principal Investigator, Physician, Technician, Administrator...)
- Compatible with Win 8 PRO (32/64), Win 7 (32/64), Win Vista (32/64). Mac OS compatibility when installed in Virtual PC OS (Parallels, VMware).
- Network version with full Client-Server architecture.



<sup>1</sup> ATS/ACCP 2001, ESC 2009, EACPR/AHA 2012, AHA 2010



Powerful post editing for calculation and reviewing of main parameters (edit Thresholds, VE/ $VO_2$ , etc.) up to 4 plots on screen



Custom printout reporting with pictograms, comprehensive interpretation statements, editable charts and tabular data

## Bibliography

- Ashcraft C.M. et al. "A Test of Validity of a New Open-Circuit Indirect Calorimeter." *J Parenter Enteral Nutr.* 2014 Mar 10
- Gullstrand L., et al. *Validation of the Quark CPET Respiratory gas analyser in the BBB mode.* 2013; *Elite Sport Centre, Bosön*
- Gullstrand L., et al. *Validation of the Quark CPET Respiratory gas analyser (Mixing Chamber).* 2013; *Elite Sport Centre, Bosön*
- Nieman DC, et al. *Validity of COSMED's Quark CPET mixing chamber system in evaluating energy metabolism during aerobic exercise in healthy male adults.* *Res Sports Med.* 2013;21(2):136-45
- Blond E. et al. "A new indirect calorimeter is accurate and reliable for measuring basal energy expenditure, thermic effect of food and substrate oxidation in obese and health" *e-SPEN e-Journal of Clinical Nutrition and Metabolism* 6 (2011) e7ee15
- more scientific studies on [www.cosmed.com/bibliography](http://www.cosmed.com/bibliography)

## Technical Specifications

Product	Description	REF
Quark CPET	Metabolic cart	C09073-02-99
Standard packaging	Quark CPET unit, VO <sub>2</sub> max flowmeter (2 pcs), RMR flowmeter, HR Belt (Ant+), Face Masks (3 pcs XS, S, M), Head caps (1 adult, 1 pediatric), Calibration Syringe (3 Liters), antibacterial filters (10 pcs), nose clips (2 pcs), adult paper mouthpieces (50 pcs), pediatric paper mouthpieces (50 pcs), OMNIA PC software, cables, probes and user manual	
<b>Standard Tests</b>		
Cardio Pulmonary Exercise Test (CPET)	Pulmonary Gas Exchange (VO <sub>2</sub> , VCO <sub>2</sub> ), VO <sub>2</sub> max, Sub-max VO <sub>2</sub> , Thresholds (AT, RCP), Heart Rate	
Indirect Calorimetry	Resting Energy Expenditure (REE, RMR), w/ face masks, mouthpieces or (optional) canopy hood. Respiratory Quotient (RQ) & Substrates Analysis	
<b>Optional Tests</b>		
Spirometry	Forced Vital Capacity (FVC) Pre/Post, Slow Vital Capacity (SVC) Pre/Post, Maximum Voluntary Ventilation (MVV), Bronchochallenge - Bronchial Dilator/Constrictor test	
Gas Analyzers	Oxygen (O <sub>2</sub> )	Carbon Dioxide (CO <sub>2</sub> )
Type	Paramagnetic	NDIR
Range	0-100% (user selectable)	0-10%
Response time t90	100 ms	100 ms
Accuracy	±0.02%	±0.02%
Warm-up time	5 min	10 min
Flowmeter	VO <sub>2</sub> max	RMR/REE
Type	Digital Turbine (Ø 28 mm)	Digital Turbine (Ø 18 mm)
Flow Range	0-16 l/s	0-8 l/s
Accuracy	± 2% or 20 ml/s (flow) ± 2% or 200 ml/min (vent.)	± 2% or 20 ml/s (flow) ± 2% or 100 ml/min (vent.)
Resistance	<0.6 cmH <sub>2</sub> O /l/s @ 14l/s	<0.7 cmH <sub>2</sub> O l/s @ 3l/s
Ventilation range	0-300 l/min	0-50 l/min
<b>Hardware</b>		
Dimensions & Weight	17 x 30 x 45 cm / 6 Kg	
Interface ports	USB A-B, RS-232, HR-TTL, SpO <sub>2</sub>	
Software	OMNIA	
Languages	Italian, English, Spanish, French, German, Portuguese, Greek, Dutch, Turkish, Russian, Chinese (Traditional), Chinese (Simplified), Korean, Romanian, Czech, Norwegian	
PC Requirements	I3 or higher processor speed. Compatible with Vista (32/64), Windows 7 (32/64), Windows 8 (32/64). RAM 4GB (8GB recommended). 500 MB of free disk space (plus tools)	
Options	Description	REF
Mixing Chamber	7 liters Mixing Chamber (physical)	C03261-01-11
REE with Canopy Hood	Kit including transparent canopy hood with blower for "gold standard" indirect calorimetry measurements at rest	C03253-01-11
Quark C12x with TTL	Diagnostic quality 12 lead stress test ECG with patient cable	C09080-01-99
Quark T12x with TTL	Diagnostic quality wireless 12 lead stress test ECG	C09081-01-99
High/Low FiO <sub>2</sub> Kit	Kit for hypoxic and hyperoxic gas mixtures	C03471-01-11
Oximeter (Xpod)	Nonin Oximeter integrated in the cable and attachable to different sensors (finger, earlobe and forehead)	C02600-01-05
Oximeter (ipod)	Nonin Oximeter with integrated finger probe	C02390-01-05
Accessories	Description	REF
Gas Calibration Kit	Gas cylinder 16% O <sub>2</sub> , 5% CO <sub>2</sub> , N <sub>2</sub> bal and pressure regulator	A-860-000-004 (Gas) A-870-150-005 (Reg)
Ethanol Burning Kit	Kit consists of a glass ampoule for the verification of RQ	C03471-01-11
Medical Grade Cart	1 cylinder holder (either 120V or 240V)	C03550-0*-04
Medical Grade Cart	3 cylinder holder with drawer (either 120V or 240V)	C02900-0*-04
<b>Safety &amp; Quality Standards</b>		
MDD (93/42 EEC); FDA 510(k); EN 60601-1 (safety) / EN 60601-1-2 (EMC)		



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