

# Q-NRG™ +

# Metabolic Monitor



## Introducing The New Generation of Metabolic Monitors for Indirect Calorimetry in Clinical and Critical Care Practice



**COSMED**®  
The Metabolic Company

“*In critically ill mechanically ventilated patients, EE should be determined by using indirect calorimetry*”<sup>1</sup>

## ESPEN Guidelines on Clinical Nutrition in Intensive Care Unit (2018)



**Individual**



**Gold Standard**



**Quick**



**Easy**



**Compact**



**Affordable**



Introduced by COSMED, worldwide leader in the design of metabolic systems for clinical and human performance applications, Q-NRG is the first Indirect Calorimeter specifically intended for the measurement of Resting Energy Expenditure (REE) in patients who are mechanically ventilated or spontaneously breathing and for healthy subjects.

Indirect calorimetry remains the Gold Standard in measuring energy expenditure in clinical settings, proven to have enormous advantages compared to Predictive Equations<sup>2</sup>. In fact, this measuring technology provides an individual and dynamic metabolic assessment based on the actual physical status of the subject rather than estimating it on anthropometric data.

Q-NRG is a unique product, the result of COSMED's collaboration with world-class institutes in the field of nutrition support in intensive care units. Product concept and specifications have been designed together with the ICALIC Trial study group<sup>3</sup>. This collaboration made possible the development of an accurate metabolic system simple to use and at the same time able to solve all typical pitfalls of Indirect Calorimetry technology.

### Individual Metabolic Assessment

Q-NRG uses the Gold Standard Indirect Calorimetry technique to measure metabolic parameters. The technique itself guarantees that the results reflect the metabolic alterations during illness and repeated measurements may correspond with disease progression or resolution<sup>4</sup>. QNRG is the ultimate tool to develop individual nutrition support plans and optimize them to prevent over/under-feeding, to reduce length of stay and, ultimately, to decrease costs in ICU.

### Indirect Calorimetry, a Gold Standard

Q-NRG is the result of more than 30 years of experience in the design of metabolic systems. The new calorimeter has been validated in-vitro by international multicentre study showing the greatest accuracy with excellent agreement vs. mass spectrometer measurements<sup>5,6</sup>.

### Quick to operate, clean and maintain

Q-NRG has been designed to reduce operations and measurement time<sup>7</sup>. System does not require warm-up time nor user-assisted calibrations, all operations can be performed with a few taps on the screen and cleaning procedures are simplified thanks to rounded surfaces and single-use accessories.

### Designed for Clinical Practice

Q-NRG usability has been designed according to best clinical practice. An intuitive workflow supports the user through all operations with main instructions prompted along the procedures and test information always accessible. Designed to be portable, the device can be easily transported between rooms.

### Latest Technologies in a Compact Device

Q-NRG is a compact, lightweight, battery operating device. The 10" inches LCD touch-screen simplify access to all operations. Bluetooth, USB, RS-232 and LAN interfaces allow to connect the system to any hub (PC, printers, etc.).

### Affordable

Q-NRG has been designed to compete with conventional metabolic system, at a fraction of the cost.

## One tool for many applications

Q-NRG provides flexibility in a variety of clinical settings, assessing different patient's conditions (mechanically ventilated for spontaneous breathing) and with different techniques (Canopy Hood and/or Face Mask), from pediatric to adult.



**Ventilator Mode.** Q-NRG can measure REE in mechanically ventilated patients (FiO<sub>2</sub> up to 75%). A single-use flowmeter is placed in series in the patient circuit to measure ventilatory parameters. Two sampling lines are connected to patient circuit and ventilator outlet for the measurement of inspired/expired gases.



**Canopy Mode.** Indirect Calorimetry through Canopy Hood is the "Gold Standard" technique to measure REE in spontaneously breathing subjects. Exhaled gases are diluted within a "Canopy Hood" (small or large size). Measurement of dilution flow and O<sub>2</sub>/CO<sub>2</sub> concentrations allow the calculation of VO<sub>2</sub> and VCO<sub>2</sub>.



**Face Mask Mode.** REE measurements can be performed using an oronasal face mask on spontaneously breathing subjects whenever Canopy Hood cannot be used (special subjects, claustrophobic, etc.). A flowmeter and a sampling line are connected to the mask (5 sizes) for VO<sub>2</sub> and VCO<sub>2</sub> measurement



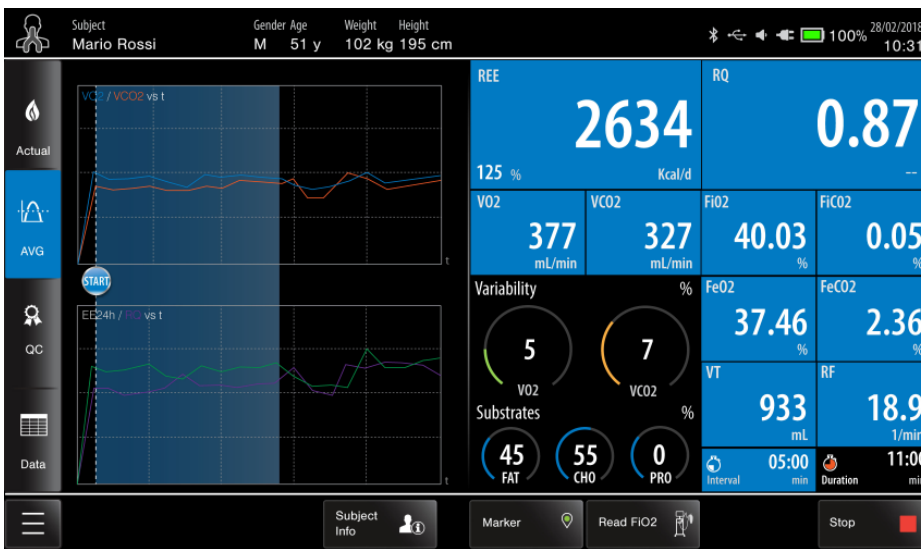
The Ventilator patient circuit requires the use of a single-use flowmeter and HME or standard filter



Canopy Hood (small or large size) utilizes a single-use veil to avoid cross contamination



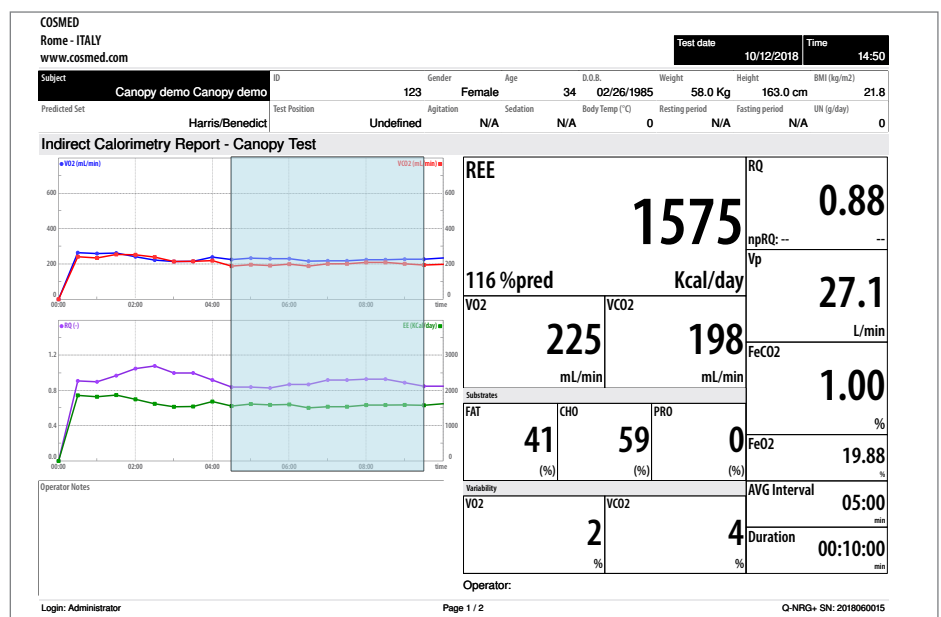
COSMED single-use pneumotach flowmeter (Flow-REE)



Real Time dashboard of Ventilator test shows metabolic and ventilatory data as well as widgets to verify Quality Control and understand whenever test is completed.

## Accessories & Options

- **Canopy Hood kit.** Available in two sizes (large or small), includes hood w/ adapter and corrugated tube.
- **Face Mask kit.** Includes two oronasal masks in silicone (S/M sizes), 1 head cap, and external flowmeter.
- **Gas Calibration kit.** Required for the monthly gas calibration. It includes a 3,6 Liter cylinder with certified gas mix (16% O<sub>2</sub>, 5% CO<sub>2</sub>, N<sub>2</sub> bal) and pressure regulator.
- **Flow/Volume Calibration kit.** Required for the monthly calibration, includes a 3L certified calibration syringe and adapters.
- **Cart.** Compact Cart with medical grade wheels, includes gas cylinder holder and accessory basket, perfect for moving the system between beds or hospital departments.
- **Clamp.** Pole/rail clamp with 100 mm VESA mounting plate to be used for securing Q-NRG on any Pole or Rail setting within an hospital setting.



PDF printout of Ventilator test shows test results in a comprehensive format to facilitate metabolic assessment. Tabular data may also be included.





Q-NRG can be mounted either on the optional cart (with cylinder holder and accessory basket) or on any hospital rail with the optional clamp

## Bibliography

- 1 ESPEN guidelines on clinical nutrition in the intensive care unit. Singer P, et al. Clin Nutr. 2018
- 2 Resting energy expenditure in malnourished older patients at hospital admission and three months after discharge: predictive equations versus measurements. Neelemaat F, van Bokhorst-de van der Schueren MA, Thijs A, Seidell JC, Weijts PJ. Clin Nutr. 2012
- 3 Indirect calorimetry in nutritional therapy. A position paper by the ICALIC study group. Oshima T, et al. Clin Nutr. 2017
- 4 Indirect calorimetry as point of care testing. Singer P, Rattanachaiwong S. Clin Nutr. 2019
- 5 In vitro validation of indirect calorimetry device developed for the ICALIC project against mass spectrometry. Oshima T, et al. Clin Nutr ESPEN 2019
- 6 Evaluation of the accuracy and precision of a new generation indirect calorimeter in canopy dilution mode. Delsoglio M, et al. Clin Nutr 2020
- 7 The clinical evaluation of the new indirect calorimeter developed by the ICALIC project. Oshima T, et al. Clin Nutr 2020

More scientific studies on [www.cosmed.com/bibliography](http://www.cosmed.com/bibliography)



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## Technical Specifications

<b>Product</b>		
Part Number	C09092-02-99	
Intended use	Resting Energy Expenditure (REE) measurement on mechanically ventilated and spontaneously breathing subjects*	
Standard packaging	Q-NRG+ unit, USB cable, power cable, fuses, Q-NRG + cover, User Manual	
Test kit (Single-use)	Flow-REE, FiO <sub>2</sub> and FeO <sub>2</sub> /CO <sub>2</sub> sampling lines, FiO <sub>2</sub> Vent Adapter, HME or standard filter	
<b>Measurement Modes</b>		
Ventilator	Standard	
Canopy Hood	Option	
Face Mask	Option	
<b>Main Parameters</b>		
	<b>Range</b>	<b>Accuracy</b>
VO <sub>2</sub>	10-1000 mL/min	±3% or 5mL/min
VCO <sub>2</sub>	10-1000 mL/min	±3% or 5mL/min
RQ	0-2.00	±5% or 0.04
REE	0-7200 kcal/day	±3% or 36 kcal/day
<b>Flowmeter</b>		
	<b>Ventilator</b>	<b>Canopy/Mask</b>
Type	Disposable Pneumotach (Flow-REE)	Bidirectional digital turbine
Flow Range	0.01 – 1.6 L/s	0.05 – 2 L/s
Accuracy	≤2% or 100mL/min @1-25 L/min	≤ 2% or 100mL/min @1-25 L/min
Resistance	2.3 cmH <sub>2</sub> O s/L @ 1 L/s	<0.45 cmH <sub>2</sub> O s/L @ 1 L/s
Calibration	Automatic via Internal Blower	With 3L calibration syringe (monthly)
<b>Gas Sensors</b>		
	<b>O<sub>2</sub></b>	<b>CO<sub>2</sub></b>
Gas exchange sampling	Micro Dynamic Mixing Chamber (patented)	
Type	Galvanic Fuel Cell (GFC)	Digital NDIR
Range	0-75%	0-10%
Accuracy	<0.05% Vol	<0.05% Vol
Resolution	0.01% Vol	0.01% Vol
Calibration	Automatic via gas cylinder (monthly)	
<b>Report</b>		
Export modes	USB, Bluetooth®	
Export formats	PDF, CSV, XML	
<b>Hardware</b>		
Display	10.1" Transmissive TFT LCD, 1024x600, 65k colors, capacitive touch screen	
Power	Battery: Li-Ion "smart" (3 hours autonomy) Mains: 100V-240V ±10%; 50/60Hz, 100-130 VA	
Wireless Connectivity	Bluetooth (2.1 + EDR Class II - Range 10 m line-of-sight)	
Wired Connectivity	1 USB-device (5 kV galvanic insulated), 2 x USB Host, RS-232 (5 kV galvanic insulated), LAN (5 kV galvanic insulated)	
Weight & Dimensions	4.65 kg (10.3lb), 31x21x27cm (12.2x8.3x10.6in)	
Environmental ranges (operating)	Temp. +10°C to +35°C. Humidity: 5-93% (non condensing). Atmospheric pressure: up to 3011m	
<b>Embedded Software</b>		
Languages	Italian, English, Spanish, French, German, Portuguese, Dutch, Polish	
<b>PC Software (optional) OMNIA</b>		
Languages	Italian, English, Spanish, French, German, Portuguese, Greek, Dutch, Turkish, Russian, Chinese (Traditional & Simplified), Korean, Romanian, Polish, Czech, Norwegian, Hebrew (interpretation only)	
OS Requirements	Windows 7, 8, 10	
<b>Security &amp; Quality Standards</b>		
MDD (93/42/EEC Class IIa), FDA 510(k), Safety (IEC 60601-1 Class I), EMC (IEC 60601-1-2), Telemetry (ETSI EN 301 489-1, ETSI EN 301 489-17), FCC, IC		

\* This device is indicated for the measurement of REE with some limitations in accordance with labeling, within the following population:  
Ventilator: ventilated subjects > age 10 and 10Kg (22lb)  
Canopy: spontaneously breathing subjects > 15Kg (33lb)  
Mask: spontaneously breathing subjects > age 6 and 10Kg (22lb)

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To know more:

