A new approach to human performance assessment through VO\textsubscript{2}max and resting metabolism

"Assess, Measure, Improve my Performance"
The Fitmate PRO is a desktop metabolic monitor designed to break the mould of traditional Cardio Pulmonary Exercise Testing and proposes a new approach for the measurement of oxygen consumption during exercise testing or at rest. Fitmate PRO measures VO_{2,max}, either directly or through a sub-maximal protocol, and provides additional features like the calculation of the Anaerobic Threshold (AT) and the definition of heart rate training zones.

Fitmate PRO is a compact desktop device with internal rechargeable battery, a large LCD screen and in-built printer that allow testing without a computer or mains power lead. Fitmate PRO processes test results and stores all information inside its internal memory, ready for upload to PC software (included).

Fitmate PRO has been validated for measuring VO_{2,max} and for predicting maximal oxygen consumption with a sub-maximal protocol.

Cardio Respiratory Fitness (VO_{2,max})

The Fitmate technology allows to execute the VO_{2,max} and sub max test with most of cyclerometers and treadmills available in the market (h/p/cosmos, Ergoline, Trackmaster, Technogym, Monark etc.).

- VO_{2} ventilation, heart rate and related parameters with a 15 seconds sampling rate
- Pre-defined VO_{2,max} and Sub-max exercise protocols and user defined protocols
- Pre-defined or custom exercise protocols (Bruce, cycle, ramp etc.)
- Automatic and adjustable Anaerobic Threshold detection
- Automatic RQ compensation during resting and graded exercise
- Automatic (protocol) or manual ergometer control
- Heart rate measurement with wireless belt (included) or TTL from ECG (optional)
- Calculation of Training Zones based on relationship between VO_{2} and HR (both sub max and VO_{2,max} testing)
- Warnings and quality control messages (mask leaks, breathing pattern etc.) are displayed during test.

Nutritional assessment (REE, RMR)

Fitness assessment and risk analysis

Body composition & comprehensive weight management

Colour LCD display and embedded high speed thermal printer

Software for data management, exercise prescription and HR-VO_{2} training zones

Accurate, affordable and easy-to-use

Nutritional Assessment

- Fitmate measures accurate oxygen consumption at rest (REE, RMR), comparable with conventional metabolic carts. Tests can be executed either with face masks (multi-use), with mouthpiece and antibacterial filter or, optionally, with an integrated canopy hood
- Individual weight management programs based on Energy Balance equation
- Weekly Dietary plan and software (w/ USDA Database);
- Complete Lifestyle and Physical activity monitoring up to 60 days (with optional monitor, Lifecorder)

Subject data & Test Information

The Graph shows VO2/Kg, Heart Rate

Gas Exchange Data (VO2, VE, HR etc.) at peak, average, or each 15 secs interval

Individual HR Training Zones based on calculated Anaerobic Threshold

Software provides complete information and results of current open session or previously closed sessions. Ability to review serial test data.
Technical Specifications

**Product** | **Description** | **REF**
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Fitmate PRO | Desktop metabolic monitor | C0066-02-99

**Standard packaging**
- Unit, Carrying Case, PC Software, Battery Charger, USB Cable, Oxygen Sensor, Roll of thermal paper, Measuring Tape, RMR Flowmeter ID18, VO₂ Flowmeter ID28, Reusable V2 mask (Medium size), HR probe and belt, Head cap for V2 mask, Antibacterial filters (15 pcs).

**Standard Tests**
- **Cardio Pulmonary Exercise Test (CPET)**
  - VO₂max, Sub-max VO₂, Thresholds (AT, RCP), Heart Rate with HR belt
- **Nutritional Assessment**
  - Resting Energy Expenditure (REE, RMR), Indirect Calorimetry (w/ Face Mask or w/ mouthpieces-antibacterial filter), Weight Management Program (Energy Balance), Diet Planner, Standardized Measurements (WHR, BP, RHR, etc), Body composition by Skinfold
- **Fitness Assessment**
  - Muscular Endurance/Strength/Flexibility, Standardized Measurements (WHR, BP, RHR, etc), Body composition by Skinfold
- **Exercise Prescription**
  - ACSM Exercise Prescription, VO₂/HR Training Zones (based on AT)
  - Flowmeter VO₂max (Turbine Ø-28mm) RMR/REE (Turbine Ø-18mm)

**Type**
- Bidirectional Digital Turbine

**Flow Range**
- 0-16 l/s
- 0-8 l/s

**Accuracy**
- ± 2% or 20 ml/s (flow) ± 2% or 200 ml/min (ventil.)
- ± 2% or 20 ml/s (flow) ± 2% or 100 ml/min (ventil.)

**Resistance**
- <0.6 cmH₂O /l/s @ 14l/s
- <0.7 cmH₂O/l/s @ 3l/s

**Ventilation range**
- 0-300 l/min
- 0-50 l/min

**Gas Analyzers**
- O₂
  - Type: GFC
  - Range: 0-25%
  - Accuracy: ±2% (REE) ±0.02% (O₂)

**Warm-up time**
- 10 seconds

**Hardware**
- Dimensions & Weight: 24 x 20 x 8 cm / 1.5kg
- Interface ports: USB A-B, RS-232, HR-TTL, Flowmeter
- Display: Colour LCD 320 x 240 pixel
- Printer: High speed thermal printer 12 cm
- Battery: Rechargeable Li-ion batteries (autonomy 6h; charging time 2h10)

**Electrical Requirements**
- 220V ± 10 %; 50/60Hz
- 110V ± 10%; 50/60Hz

**Firmware**
- Available languages: Italian, English, Spanish, French, German, Portuguese, Greek, Dutch, Turkish, Chinese, Korean, Japanese, Finnish, Polish, Russian, Slovenian

**Software**
- Fitmate Suite
  - Available languages: Italian, English, Spanish, French, German, Portuguese, Greek, Dutch, Chinese, Finnish, Russian, Slovakian

**PC Configuration**
- Pentium or faster, Windows XP, VISTA (32/64 bit), Windows 7 (32/64 bit) 128 Mb RAM or more, USB, CD-Rom reader, 80 Mb on HD space available.

**Accessories & Options**
- REE with Canopy Hood Kit including transparent canopy hood and blower for “gold standard” indirect calorimetry measurements at rest C03950-01-11
- Fitmate cart C02950-01-11
- Calibration syringe C00600-01-11
- O₂ sensor replacement kit C02748-01-11
- Activity Monitor Fitmate Lifeecorder PLUS C03580-01-04
- Flexibility tester Sit & Reach box A-662-160-001

**Safety & Quality Standards**
- MDD (93/42 EEC); FDA 510(k); EN 60601-1 (safety) / EN 60601-1-2 (EMC)

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