The Quark i2m is a forced oscillation technique (FOT) system for the measurement of the mechanical properties of the respiratory system, total respiratory input impedance ($Z_{rs}$), under tidal breathing conditions. FOT employs small-amplitude pressure oscillations superimposed on the normal breathing and, therefore, has the advantage of not requiring the performance of complex respiratory manoeuvres.

The FOT test is simple and fast (8 seconds) and it is performed with the patient breathing normally into the measuring device, making the test ideal in uncooperative patients or those unable to perform forced expiratory manoeuvres, such as children or the elderly. As the FOT is noninvasive, it may be used for routine testing, epidemiological studies, research and monitoring the efficacy of treatment in COPD, asthma and muscoviscidosis. Novel FOT applications include tests during mechanical ventilation and sleep.

Quark i2m superimposes a random signal to the patient’s breath and measure the respiratory apparatus response. This signal is generated by an acoustic source connected to a mouthpiece with a pressure transducer, where the patient breathes at rest. The acoustic pulses are sent to the mouth at high frequency in casual sequence (Pseudo Random Noise - PRN).

Quark i2m measures pressure and flow at the subject’s mouth while an imperceptible, low intense and high frequency (4-48 Hz) pressure signal is applied. Elaborating flow and pressure signals, Quark i2m provides respiratory impedance measurement ($Z_{rs}$) and its two components: resistance ($R$) and reactance ($X$).

Quark i2m can be used either as a standalone system or as a module fully integrated in a COSMED Quark PFT system. A special rack can be added to the Quark PFT medical graded cart, allowing thus the operator to manage, with one single PC program, tests of respiratory mechanics, diffusing lung capacity, static and dynamic lung volumes.

**Forced Oscillations Technique, the reference method for respiratory mechanics in children**
### Validation articles

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

### Technical Specifications

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>REF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quark i2m</td>
<td>Forced Oscillation Technique (FOT) Laboratory</td>
<td>C09010-01-99</td>
</tr>
<tr>
<td>Standard packaging</td>
<td>Quark i2m unit, Quark i2m head, arm support for Quark trolley, calibration unit, antibacterial filters (20 pcs), nose clips (2 pcs), rubber mouthpieces (20 pcs), RS232 serial communication cable (2 pcs), PC software, user manual.</td>
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</tbody>
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#### Standard Tests

**Forced Oscillation Technique**
- Total Respiratory System Impedance (Zrs), Resistance (Rrs) in hPa/(l/s) & Reactance (Xrs) in hPa/(l/s), Resonance frequency, frequency dependency, average Rrs and Xrs, discriminant function

**FOT Technology**
- **Type**: Optimized pseudorandom noise (PRN) between 4Hz and 48Hz
- **Measurement range**: 0.5 - 40 hPa/(L/s)
- **Frequencies**: between 4 and 48Hz (frequency step 2 Hz)
- **Accuracy**: ± 2%
- **Coherence**: 0-1, (Index = 0,95)
- **Processing time**: 8 sec

#### Pressure Transducer
- **Type**: Piezo-resistive
- **Range**: 0-1 psi
- **Dimensions & Weight**: 33 x 20 x 16 cm / 6.5 Kg
- **Electrical requirements**: 100-240V ± 10% 50/60 Hz
- **Environmental conditions**: Temperature 0-50 °C (32 - 122 °F); Barometer 400-800 mmHg; Humidity 0-100%
- **Software**: PFT Suite

- **Available languages**: Italian, English, German, Spanish, French, Portuguese.
- **PC Configuration**: Pentium or faster, Windows XP, VISTA (32 bit), Windows 7 (32 bit), 128 Mb RAM or more, USB or RS 232, CD-Rom reader, 80 Mb on HD space available.

**Optional Module**
- **Pulse Oximetry**: Oximeter (Xpod) requires probe C02600-01-05

**Accessories**
- **Large Medical Cart**: 3 cylinder holder (230 or 120 VAC) C02900-01-04 (230), 02900-02-04 (120)
- **Table arm support**: flexible arm for holding Quark i2m head C02870-01-05
- **Bracket extension**: Special rack to be added to the medical graded cart, allowing thus the operator to fully integrate FOT tests with other Quark PFT tests C03660-01-11

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

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