



Forced Oscillations (FOT), the easiest way to measure respiratory resistance

- ▶ Forced Oscillation Technique
- ▶ Pseudo Random Noise Signal
- ▶ Total Respiratory Impedance: Resistance and Reactance
- ▶ No patient collaboration required, ideal for pediatric use
- ▶ Fast and easy assessment (8 sec processing time)



Application Fields

The Forced Oscillation Technique (FOT) is particularly useful for the assessment of the mechanical properties of the respiratory system in uncooperative patients or patients 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 mucoviscidosis.

[...] The main advantages of the forced oscillation technique are that minimal cooperation of the patient and no respiratory manoeuvres are needed; therefore, the measurement of respiratory impedance should be considered whenever spirometry cannot be performed or appears to be unreliable [...]" (Bibliography Ref.1).

I2m, a Clinical Routine Test

A simple and fast (8-second) manoeuvre performed while the patient is breathing normally throughout a measuring device. This allows the Quark i2m to measure pressure and flow at the subject's mouth while an imperceptible, low intense and high frequency (4-48 Hz) pressure signal is applied. The Fourier analysis allows for the determination of the total subject respiratory impedance and its two components: resistance (R) and reactance (X).

State-of-the-art pseudo random noise signal...

The Quark i2m randomizes the pressure output frequency as recommended by the governing organizations. The pseudorandom noise signal does not influence the subject's spontaneous breathing and allows for better measurement of respiratory impedance.

High Reproducibility!!!

The data are extremely accurate and reproducible. The simple technology design provides reliable data time and time again. The system doesn't require any particular maintenance except the common disinfection recommendations. COSMED recommends the use of anti-bacterial filters to prevent cross-contamination.



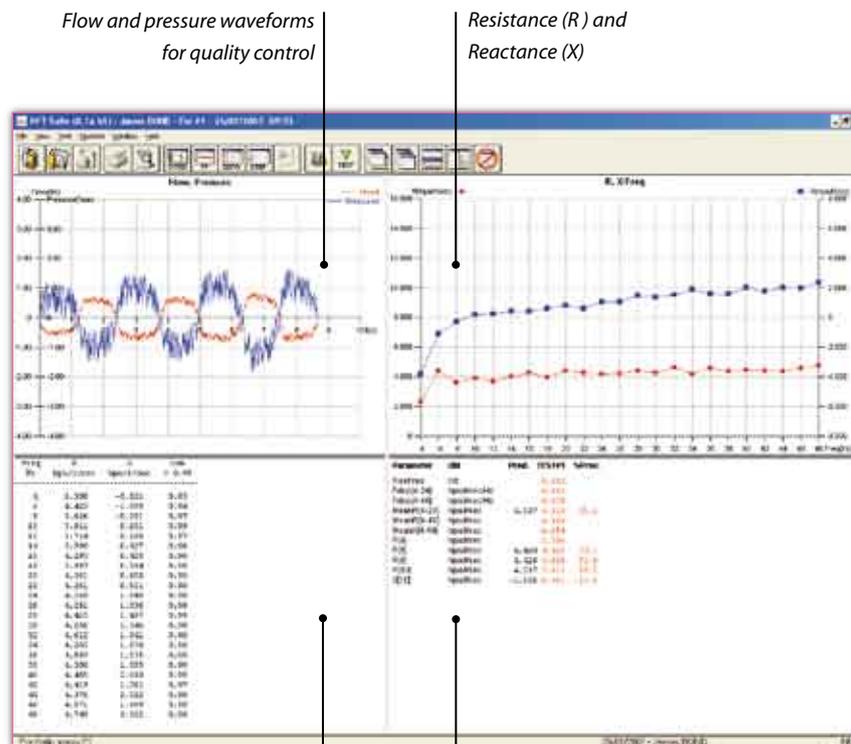
Performing FOT is easy and fast, subject has to breath normally without any manoeuvre

Ultimate Software features

The Quark i2m comes with MSWindows™ software designed according to the latest guidelines concerning user interface and ease of use. The software provides full patient database management and calibration tools.

- ▶ "User friendly" interface
- ▶ Pre-Post display of bronchodilator/ bronchoconstrictor test
- ▶ User-defined protocols for an easy management of bronchochallenge test
- ▶ Set of predicted values for Pre-school children
- ▶ Built-in set of predicted values for easy diagnosis

- ▶ Comprehensive printout report
- ▶ Easy test quality control by the analysis of the breathing pattern and of the quality index displayed for all the frequencies (4-48 Hz)
- ▶ Possibility to export tests to MS Excel for further data analysis
- ▶ Full compatibility with COSMED antibacterial filters
- ▶ Full compatibility with COSMED Quark PFT line.



Mean values and resonance frequency against predicted values for accurate diagnosis

Features

Integration

Quark i2m can be fully integrated in a COSMED Quark PFT system. The plug and play technology will enable operator to manage, with one single PC program, test of respiratory mechanics, diffusing lung capacity, static and dynamic lung volumes measurement

Ultimate protection

Quark i2m is supplied with disposable antibacterial filters, a barrier to viral contamination with 99.9999% filtrance efficiency. Each filter is factory calibrated and ensures a total resistance (flowmeter + filter) inferior that what recommended by ATS/ERS

Automatic Calibration

in just few seconds by means of a calibrator tool with a known resistance included in the package

Arm support

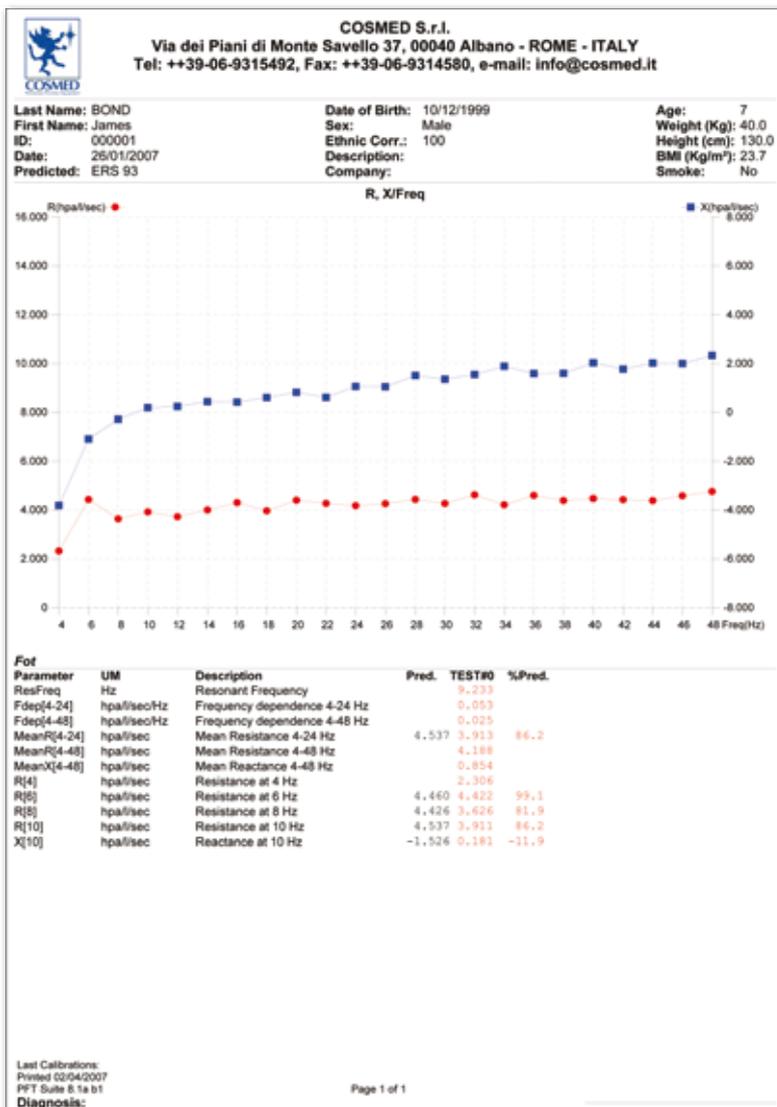
An adjustable arm support clips on to any surface, holds the flowmeter and makes the test accessible for both adults and children.



Antibacterial filter is strongly recommended for the prevention of cross contamination



Fast and easy automatic calibration



Quark i2m is the ideal instrument for testing children.

Bibliography

1. The forced oscillation technique in clinical practice: methodology, recommendations and future developments. E. Oostveen, D. MacLeod, H. Lorino, R. Farrez, Z. Hantos, K. Desager, F. Marchal, on behalf of the ERS Task Force on Respiratory Impedance Measurements *Eur Respir J* 2003; 22: 1026-1041 (Ref1)
2. Evaluation of impulse oscillation system: comparison with forced oscillation technique and body plethysmography. J. Helleinckx, M. Cauberghe, K. De Boeck, M. Demedts. *Eur Respir J* 2001; 18: 564-570.

The standard printout documents graphical a numerical values of respiratory resistance and reactance in the entire frequency sampling range (4-48 Hz).



Technical Specifications

Forced Oscillations

Type	optimized pseudorandom noise (PRN) between 4Hz and 48Hz
Measurement range	0.5 - 40 hPa/(L/s)
Accuracy	± 2%
Resistance	(Rrs) in hPa/(L/s)
Reactance	(Xrs) in hPa/(L/s)
Coherence	0-1, (Index = 0,95)
Measurements	Resonance frequency, frequency dependency, average Rrs and Xrs, discriminant function
Monitoring	on line of both breathing signal and PRN
Processing time	8 sec
Data	between 4 and 48Hz (frequency step 2 Hz)

Pressure sensors

Type	Piezo-resistive
Range	0-1 psi

Hardware

Dimensions	33 x 20 x 16 cm (12,9 x 7,8 x 6,2 inc)
Weight	6,5 Kg (13,2 lb)

Standard Packaging Includes

Quark i2m unit, calibration unit, antibacterial filters, PC software, serial communication cable, user manual

Electrical requirements

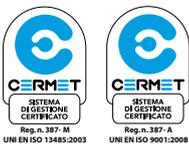
Power supply unit	90-264Vac
Power consumption	100W Max @ 230 VAC

PC configuration required

Pentium or faster, Windows XP, 2000, 128 Mb RAM or more, Serial port RS-232 available, CD-Rom reader, 80 Mb on HD space available.

Safety

Quark i2m complies with MDD (93/42 EEC). EN 60601-1. EN 60601-1-2



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