



The ultimate modular solution for bronchial challenge and airway resistance tests

- ▶ Three flowmeter configurations available: digital turbine; single use pneumotach Flowsafe; multi-use pneumotach Flowsafe X9
- ▶ Full Spirometry testing (FVC, SVC and MVV)
- ▶ Integrated dosimeter for accurate and easy bronchial challenge tests (optional)
- ▶ Airways resistance (R<sub>occ</sub>) and integrated SPO<sub>2</sub> monitor (optional)
- ▶ Advanced software for real time management of results



**Quark SPIRO** is a modern laboratory for complete spirometry testing, allowing also more sophisticated applications with integrated dosimeter and airway resistance module. The system is designed in order to allow the choice of modules and options according to the specific user's needs.

The innovative design architecture eliminates the procedure of ordinary maintenance and allows to easily solve any technical problems by replacing a board.

Quark SPIRO ensures great accuracy exceeding ATS and ERS criteria.

The operating software, designed for Windows XP and compatible with VISTA, provides easy operations and functionality. User-friendly interface, intuitive commands and icons are the perfect tools for fast and reliable data collection in any hospital department or doctor office.

## Applications

- ▶ Pulmonary function testing departments
- ▶ Primary care
- ▶ Occupational health
- ▶ Clinical trials

## Accurate and Reliable Flow and Volume measurements

Quark Spiro is available with three different configurations:

- ▶ the bidirectional digital turbine flowmeter (that requires the use of antibacterial filters)
- ▶ the new disposable Flowsafe, a single use differential pressure transducer (that does not require antibacterial filter)
- ▶ the multi-use pneumotach Flowsafe X9, characterised by high accuracy and extremely low thermal capacity (so avoiding condensation during expiration).

All flowmeters comply with the most stringent requirements for accuracy fixed by ATS and ERS.

## High modularity

Thanks to COSMED innovative technology, Quark Spiro can be upgraded with modules and options for any particular need. The system incorporates "plug and play" circuitry for instant upgrades.

### Spirometry Module (standard)

Includes all necessary functions for complete spirometry tests execution (FVC, SVC, MMV and bronchial challenge test).

### Dosimeter Module

Quark Spiro can be integrated with the dosimeter module for a simplified management of bronchial challenge tests and a better analysis of airways reactivity:

- ▶ Use of the "Five breaths dosimeter" ERS protocol"
- ▶ Possible personalised protocols creation for supplied quantities of broncho-stimulants
- ▶ Precise pressure control during aerosol delivery
- ▶ Functioning with compressed air (requires medical air/gas for drug inhalation).

### Airways Resistance

Includes a unit for the airways resistance measurement with the occlusion technique (Roc/Rint). The shutter is closed during 100ms at the begin of the exhalation and is totally imperceptible for the patient. The Roc kit brings accurate airways resistance measurements, highly indicated for paediatric applications.

### Integrated SPO<sub>2</sub> Monitor

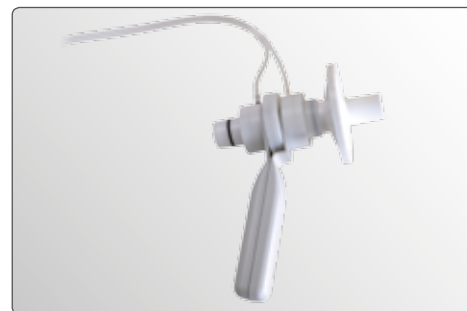
With this module it is possible to use finger, ear and reflectance pulse oximeter for oxygen measurements (SpO<sub>2</sub>) at rest and during exercise.

## PC Software

Quark Spiro comes with a powerful software that allows efficient management of PC data:



Digital turbine



Multiuse Pneumotachograph (X9)



"Flowsafe", single use pneumotach

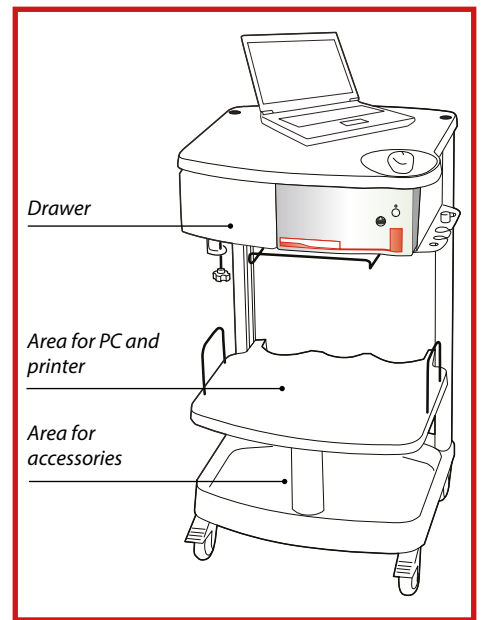


Integrated dosimeter for automatic broncho-challenge tests

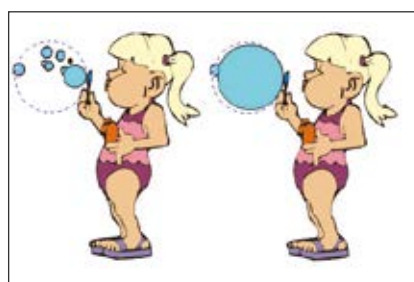
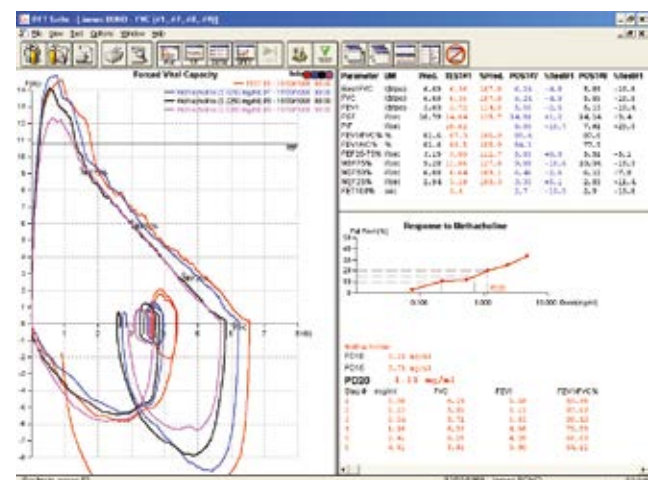
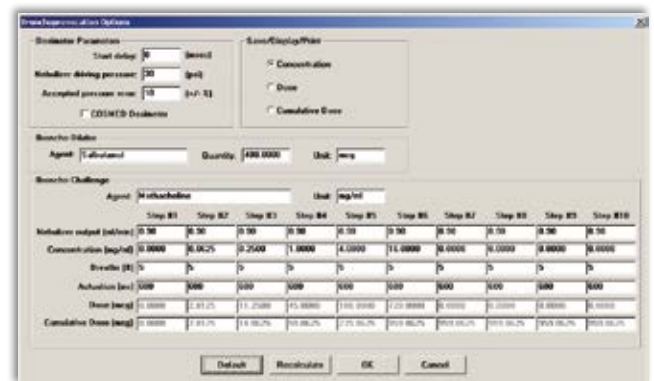
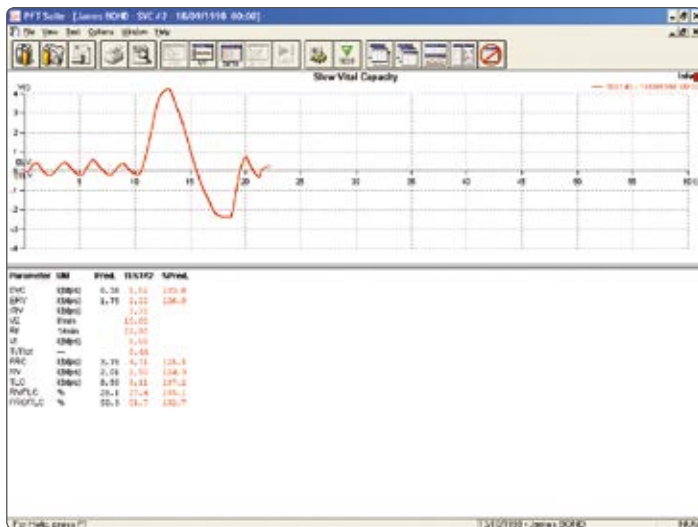


Pulse oximeter for SpO<sub>2</sub> saturation measurements

- ▶ Complete database management for patients, diagnosis, clinical report, bronchial challenge protocols;
- ▶ User defined protocols to easily manage bronchial challenge tests;
- ▶ Detailed printing of F/V, V/t, bronchial challenge response graphics, PD 10, 15 and PD 20 calculation;
- ▶ Pre-Post test with either bronchial dilator or metacholine;
- ▶ Powerful post-analysis elaboration of data with possibility to compare tests performed in different test sessions;
- ▶ Multiple parameters trend analysis;
- ▶ Software encouragement tool for children and non-cooperative patients;
- ▶ Several selectable sets of predicted values;
- ▶ Create custom parameters and user defined set of predicted equations;
- ▶ New NHANES III predicted equations included;
- ▶ Printout report according to the ERS-ATS requirements;
- ▶ Customizable printouts as per user's requirements;
- ▶ Best Test selection and results reproducibility according to ATS 1994 standards;
- ▶ Quality control messages according to the ATS guidelines for spirometry tests.



New medical cart with isolation patient transformer required for medical environments.



Real time graphic and numeric visualization of spirometry tests

# Technical Specification

Flowmeter	Single use Pneumotach	Multi-use Pneumotach	Digital Turbine
Type	Pressure transducer (lilly)	Pressure transducer (lilly)	Bidirectional 28 mm
Flow range	0-14 l/s	0-14 l/s	0-16 l/s
Volume range	12 litres	12 litres	12 litres
Accuracy of reading	±2% or 20 ml/s	±2% or 20 ml/s	±2% or 20 ml/s
Resistance	<1.0 cmH <sub>2</sub> O/l/s @ 14 l/s	<1.0 cmH <sub>2</sub> O/l/s @ 14 l/s	<0.6 cmH <sub>2</sub> O/l/s@14l/s

## Measured Parameters (partial listing)

FVC • IVC • VC • MVV • VT • FEV1 • FEV6 • FEV1/FEV6 • FEV6/FVC • PEF • PIF • FEV1/FVC • FEF 25-75 • FEV1/VC% • %FEV1 • MEF25% • MEF50% • MEF75% • FET 100% • Lung Age • ERV • IRV • VE • Rf • ti • te • ti/t.tot • VT/ti • Best FVC • Best FEV1 • IC • SpO2 • HR • R\_occ • G\_occ

## Predicted values (partial listing)

2012 Global Lung initiative (GLI), ERS 1993 (ECCS 1983), NHANES III, Knudson 83, ECCS 1971, ITS, Zapletal, LAM, Pneumobil, Gutierrez (Chile), Multicèntrico Barcelona, Thai 2000, Austria (Forche), Crapo 1981 user defined predicted calculations.

## Automatic Interpretation

ATS/ERS 2005 (Spirometry), GOLD COPD, ATS/ERS 2005 (Obstruction Reversibility based on FVC Post BD)

## Hardware

Temperature	0-50 °C (32-122 °F)
Pressure	400-800 mmHg
Humidity	0-100%
Dimensions (cm)	33 x 41 x 16
Weight (kg)	6

## Standard Packaging includes

Quark Spiro unit, USB cable, RS232 cable, PC software, user manual. The standard packaging is implemented for each module with a specific kit.

## Available languages

English, Italian, French, German, Spanish, Dutch, Russian, Chinese, Portuguese

## PC configuration required

OS Compatibility	Vista (32/64), Windows 7 (32/64), Windows 8 (32/64)
Processor speed	1.4 GHz or faster
RAM	1 GB or greater
Disk space	500 MB of free disk space plus 100 MB for .NET framework plus 512 MB for SQLServer 2008 R2 SP1 Express
Monitor	Min. screen resolution 1280 x 1024 pixels

## Electrical requirements

Power supply	100/240V±10% 50-60 Hz
Power	100 W
Class	I type BF (IEC60601-1)

## Safety and Quality Standards

Equipment complies with MDD (93/42 EEC) and FDA 510(k) cleared, EN 60601-1 (safety) and EN 60601-1-2 (EMC)  
COSMED is an organisation whose quality management system is certified by CERMET according to UNI EN ISO 9001:2008 and UNI EN ISO 13484:2004



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