

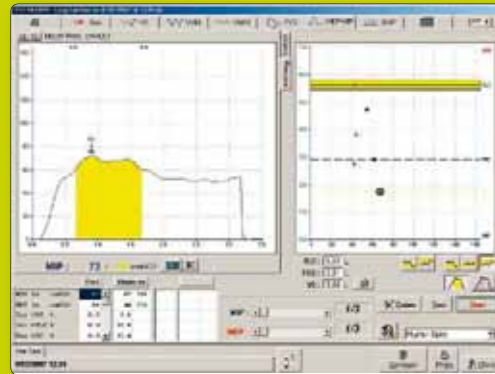
Steady state DLCO measurement



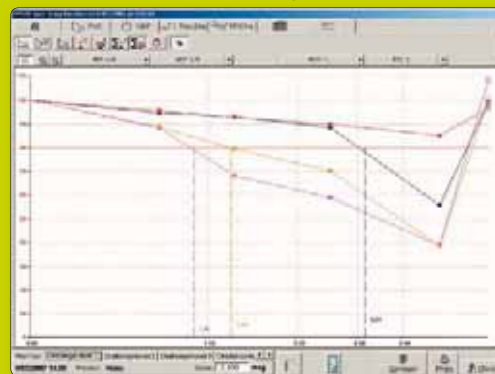
Forced spirometry measurement with incentive screen



Maximum Expiratory and Inspiratory pressures



Effect / Dose curve function (challenge test)



Historic graphic display function



## EXPAIR

The most intuitive, userfriendly and complete basic version

- A sophisticated and powerful data-base function and electronic storage function
- Trends Report (Historic function)
- Interpretation function
- Comment function
- Off Line input and on line data transfer
- Report designer
- Predicted value editor
- Choice of languages
- User defined calculated parameters
- Bronchial test generation
- Blood gases with blood chemistry analysis from manual entry
- Choice of units for the measured parameters
- Measurement sequencing configuration
- Full calculation function : display of calculation points with manual correction capability
- Technical toolbox to enable diagnostic function and full program control
- Inbuilt quality control with calibration markers for performance
- Teleassistance

The MediSoft factory is a state of the art modern facility with clinical research, precision engineering and computer design departments.



## SPIRO AIR®

### GENERAL SPECIFICATIONS

	Module	Trolley
<b>Dimensions</b> (H x W x D) cm	39 X 58 X 37	89 X 65 X 67
<b>Weight</b>	+/- 22 Kg	+/- 35 Kg
<b>Power requirements</b>	230/115 VAC	50/60 Hz
<b>Power Consumption</b>	+/- 100 VA (module)	
<b>Warm up Time</b>	20 min. minimum	

Conform to electrical safety req. IEC60601/1 and CE 0344 certified

### AMBIENT CONDITIONS

Temperature	10 to 40°C
Relative humidity	25 to 90% (non condensed)

### SPIROMETER

Spirometer Construction Material	Stainless steel and Silicon Rubber
Spirometer Volume	13 litres displacement
Resolution	< 8ml
Accuracy	< 0.5 % life time without adjustment
Volume Displacement	Optical Encoder
Flow Range	+/- 15l/s
Resistance	< 1 cmH <sub>2</sub> O
Bandwidth	35 Hz flat response
Volume converted to BTPS	automatic temperature measurement

### PRESSURE TRANSDUCERS

Piezo resistive sensors protected from overload		Calibration	
<b>Sensitivity</b>			
Flow	+/-5,0 cmH <sub>2</sub> O	Ocl. P. & flow.	0,01 cmH <sub>2</sub> O
MIP MEP, SNIP	+/-250,0 cmH <sub>2</sub> O	Linearity	Error < 0,1%
NEP, Rint,	+/-12,5 cmH <sub>2</sub> O	Relative accuracy	Error < 0,01%
		Mouth P.	Water column
		Pneumotachograph	Semi-auto with 1 to 3L syringe
			with ATS quality control indicator

### GAS ANALYSERS

<b>Helium</b>	Thermal conductivity
Range	0 to 15% He
Relative Accuracy	+/- 0,1%
Response time	10 sec (10-90 % FS)
<b>Carbone Monoxide</b>	Chemical Fuel Cell
Range	0 to 0,350% CO
Relative Accuracy	+/- 0,1%
Response time	+/- 20 sec. (10-90 % FS)
<b>Oxygen</b>	Chemical Fuel Cell
Range	0 to 100% O <sub>2</sub>
Relative Accuracy	+/- 0,1%
Response time	<10 sec (10-90% FS)

### ANALYSER CIRCUIT

Automatic, rapid and accurate calibration with quality control.

### CALIBRATION GAS BOTTLE MIXTURE

FRC HE	room air, 100% He, 100% O <sub>2</sub>
DLCO He option	0,28% CO, 21% O <sub>2</sub> , 14% He, O <sub>2</sub> N <sub>2</sub>
DLCO CH <sub>4</sub> option	0,3% CO, 0,3% CH <sub>4</sub> , 21% O <sub>2</sub> , O <sub>2</sub> N <sub>2</sub>
DLNO option	± 450 ppm NO, O <sub>2</sub> N <sub>2</sub>
Pressure regulator	0 - 8 Bar 15m <sup>3</sup> / h

### OPTIONS

- FRC He
- Paediatric version : 8 litre rolling seal
- DLCO He, DLCO CH<sub>4</sub>, DLCO NO, DLCO steady state
- MIP /MEP, SNIP, NEP, Rint
- Static and dynamic compliance
- Integrated automatic nebulizer, PROVO II
- Computer integration trolley with electrical insulation transfo.
- Automatic data backup
- Medisoft Network
- Data transfer & reception (HL7...)

### PATIENT VALVE

<b>Pneumotachograph</b>	Lilly cone
Range	+/- 0.03 à 15 L/sec
Resistance	0.4 cmH <sub>2</sub> O/L/sec
Relative Accuracy	Error < 3%
Volume conv. to BTPS	integrated thermometer (optional barometer)
Automatic zero shift correction	of measuring elements
Software computerised	linearization
<b>Patient valve</b>	Pneumatic (T. of O/C : 30 mSec)
Dead Space	< 60ml / 30 ml (paediatric)
Disinfection	Simple Dismantling for cold cleaning
<b>Valve Support Arm</b>	Moveable arm with 3 joints

### COMPUTER INTERFACE

Type	serial RS 232 or USB
Conversion	12 & 16 bit.
Acq. frequency	100 Hz /channel (multigas 3500 Hz)
Transmission speed	115.200 baud
Isolation	System fully isolated by optical infrared
Computer	Pc Pentium, 17" monitor, A4 colour Deskjet or laser printer
Operating Syst.	Windows® XP Pro or Vista

### MEASURED AND CALCULATED PARAMETERS

<b>Multigas analyser</b>	IR spectrometer (CO, CH <sub>4</sub> , CO <sub>2</sub> )
Range	0 to 0,350%, CO <sub>2</sub> : 0 - 10%
Relative Accuracy	+/- 0,1%
Response time	< 0.1 sec (10 - 90% FS)
<b>Nitric oxide</b>	Chemical Fuel Cell
Range	0 - 450 ppm
Relative Accuracy	+/- 0,1 %
Response time	< 10 sec (10 - 90 % FS)

### COMPUTER INTERFACE

Type	serial RS 232 or USB
Conversion	12 & 16 bit.
Acq. frequency	100 Hz /channel (multigas 3500 Hz)
Transmission speed	115.200 baud
Isolation	System fully isolated by optical infrared
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### MEASURED AND CALCULATED PARAMETERS

• Slow Spirometry :	VC, ERV, IRV, IC, EC, ...
• Forced Spirometry :	FEV1, FV1, FVC, FEV1/FVC, FEV1/VC,
• FEV6, PEF, F25, F50, F75, MEF, MVV, ...	
• FRC, RV, TLC, RV/TLC, ... (option)	
• Bronchodilation and challenge test, dose-response curves, reactivity threshold, ...	
• DLCO : AV, DLCO / AV, DLCO - NO : Dm, Vc, DLCO ss (option)	
• Compliance stat./dyn., RL stat./dyn., CL stat./dyn., (option)	
• EL dyn., W vis. (option)	
• MIP /MEP, SNIP, ... (option)	
• NEP, R <sub>neap</sub> , Exp. Flow Lim, ... (option)	
• Rint, ... (option)	



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Medisoft s.a. reserves the right to change and improve the above specifications without prior notice

CE 0344



ISO 13485 : 2000



CARDIO-RESPIRATORY INSTRUMENTATION

# SPIRO AIR®

## DRY ROLLING SEAL SPIROMETER



Version with trolley FRC He and DLCO He

### The gold-standard measurement

- A fast, accurate "One-stop" test center
- Software guided clinical excellence
- Expansive capability (DLCO, MIP/MEP, ...)
- More than 10 options
- Precision engineering of the highest quality
- Low cost of operation and maintenance
- No high-cost proprietary disposables

# SPIRO AIR®

## Stainless steel rolling seal spirometer, the best technology for measuring

- **Functional Residual Capacity (FRC) by closed circuit helium dilution method with oxygen compensation and CO2 absorption.**
- **DLCO He or DLCO CH4**
- **DLCO NO**
- **MIP/MEP & SNIP**
- **NEP**
- **RINT**
- **Automatic nebulizer (PROVO II)**

## Technical advantages

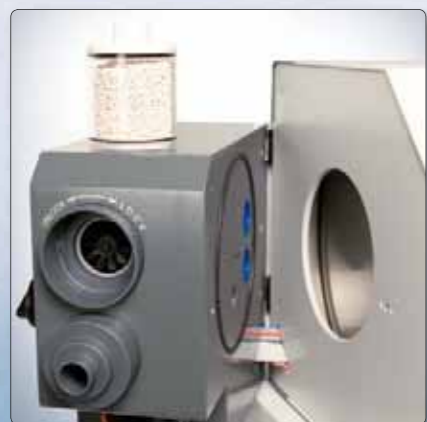
- **Flow or Volume measurement capability**
- **Fully automated procedure**
- **Low maintenance**
- **Rugged construction**
- **Built to exacting construction methods**
- **Totally linear over full volume and flow range**
- **Traceable to world standards**



3 way patient valve (version without DLCO)



Easy dismantling of patient valve



Easy access to rolling seal for cleaning



### STANDARD SPIROMETRY (SLOW AND FORCED)

The Spiro'Air® incorporates all the functions and performances needed to measure slow and forced vital capacity. The flow is measured by the pneumotachograph and the volume is measured by true volume displacement.

Tests under bronchodilator or bronchoconstrictor are simplified by the specifically adapted software functions (comparison table, effect-dose curves, test protocols, ...)

Additionally, incentive spirometry assists the measurements with children. Post visualisation and Post treatment give a convenience of use particularly appreciated: Choice of graphical representation, selection of calculation points, alignment of the flow / volume curves on RV, time evolution of measured parameters by numerical or graphical representation, deletion of poor effort, ...



### FRC HE (OPTION)

The Spiro'Air is fully equipped for FRC measurement by the closed circuit He dilution technique with CO2 absorption and O2 compensation. The latter is required to compensate for burnt up O2 during breathing. This technique is fully automated and requires minimal user intervention.

During the procedure, 2 fast moving fans fill up the Spiro'Air bell with a mixture of room air, 100% He and 100% O2 (2 gas cylinders are needed).

The recording of the ventilation and the gas concentrations is viewed in real time, during the test, to facilitate the understanding of the measurements.

As for spirometry, all the software functions needed for the measurements, under the best conditions, are integrated in this option.



### MEASUREMENT OF DIFFUSION CAPACITY DLCO

UNIQUE the only manufacturer offering the choice of 4 diffusion methods :

#### Single Breath using the helium trace gas He

The well known technique described by J.E. Cotes based on the Jones Meade method. Using a bag collection system the subject can be controlled for inspiratory volume, washout (discard) volume and sample volume. This method has proven repeatability and the method was the same as that used to collect the predicted values we use today.

#### DLCO-NO (TRACE GAS HE) NEW & EXCLUSIVE

Membrane diffusion and capillary blood volume (Dm & Qc) measurement.

Regarded as the 'True' diffusion characteristic and the most useful indicator of membrane thickening, this measurement takes on a new lease of life. The powerful Exp'Air software makes the calculations painless, the combination of NO and CO follows the work of Prof. Guenard of Bordeaux. Simple to perform and rapid results add this test to the list of favourite studies undertaken in routine practice. Additionally, this measurement can be performed in conjunction with NEP, the pulmonary blood flow and its ability to recruit from the capillary reserve can then be evaluated.

#### Single Breath using Methane trace gas (CH4)

Using fast gas analysis, this method collects the exhaled breath directly as a high resolution data array. This has the advantage that post test analysis can be performed aligning the start of sample onto the alveolar plateau after the clearances of all the dead spaces. A sample as low as 50 ml can be used to calculate the diffusion. This can overcome the volume limitation of other systems and methods.

### Intra Breath diffusion

The sample is taken during a slow and constant exhalation in the range of 200 – 500 ml/sec. Applying linear regressions to the data array of the expiratory gas, the alveolar concentrations are calculated. As this method requires no breath holding, it will greatly benefit some subject groups.

### Steady State diffusion Tlco ss NEW & EXCLUSIVE

Medi-soft has taken a new look at this method, using fast gas technology and replacing the older bulky instrumentation this is a "NEW" method for a new age of diffusion measurement. Requiring minimal subject effort, this method is especially helpful for obtaining measurements with children and reluctant subjects. Performed at a steady state breathing condition, the measurement is valid as soon as the subjects ventilation is uniform and stabilized.



### NEP (OPTION) EXCLUSIVE

A new and very sensitive test that is specific and reproducible for determining the degree of expiratory flow limitation both at rest and during exercise, particularly with subject's known to have obstructive lung disease. The test applies a negative pressure to the mouthpiece during the expiratory phase, this permits the comparison of the flow volume loop with the tidal efforts when reviewed as a flow volume loop display.

This method also allows the indirect measurement of the resistance (R Nep) which provides a good alternative to the standard screening method.



### RINT (OPTION)

#### Rint

Measurement of the total pulmonary resistance by the method of airflow interruption (during 80 to 120 ms) at each respiratory cycle.

- Visualization of the mouth pressure in real time with calculation point for each cycle.
- Choice between 3 mouth pressure calculation methods.
- Averaging of the value with rejection by "Gauss's curve" method.
- Automatic functions identical to the spirometry ones for test with bronchodilator and bronchoconstrictor.
- These measurements are taken in passive mode.



### VENTILATION MECHANICS (OPTION)

- **MIP - MEP** : Maximum Inspiratory and Expiratory Pressure as an assessment of respiratory muscle strength, also useful for weaning subjects from ventilators, ...
- **SNIP** : measurement of the maximal nasal inspiratory pressure using a nasal canular. A non-invasive estimate of muscle fatigue.



### PROVO II (OPTION)

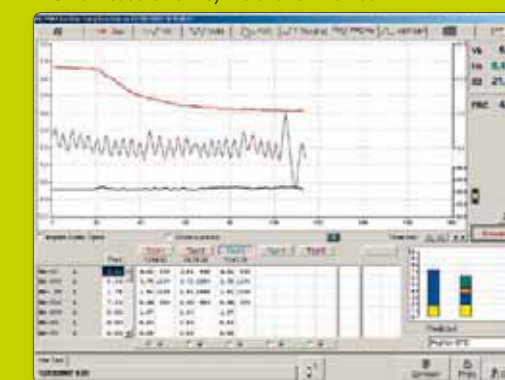
Equipment for fully automated bronchochallenge tests with automated nebulizer. This option provides full control of products and doses used and of test performing criteria for bronchochallenge testing.



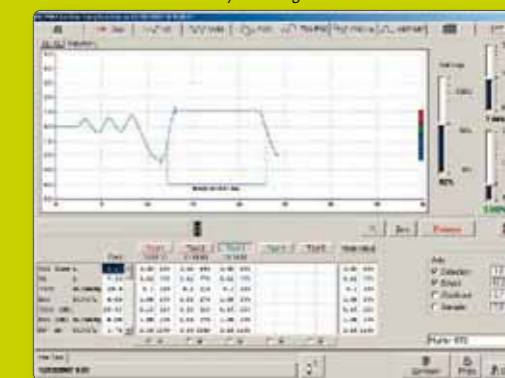
### FENO (OPTION)

External module for the measurement of exhaled endogenous NO by the off-line method

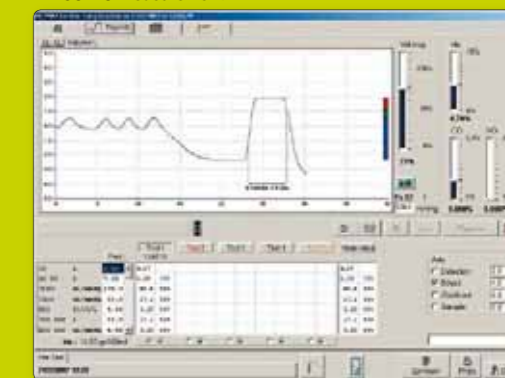
FRC He measurement by the dilution method



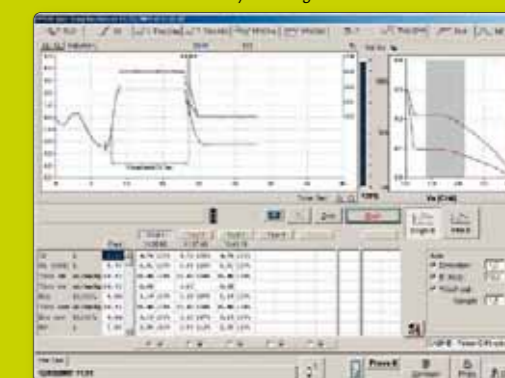
DLCO He measurement by the single breath method



DLCO NO measurement



DLCO CH4 measurement by the single breath method



DLCO CH4 measurement by the simple expiration method

