

EXPAIR software

The most intuitive, userfriendly and complete software 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 off-line 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 or VPN assist

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

HYPAIR COMPACT+

GENERAL SPECIFICATIONS

Dimensions	Module	Trolley
(H x W x D) cm	14 X 40 X 33	89 x 65 x 67
Weight	+/- 12 Kg	+/- 35 Kg
Power requirements	230/115 VAC	50/60 Hz
Power Consumption	+/- 100 VA (module)	
Warm up Time	20 min. minimum	
Conform to electrical safety req. IEC60601/1 and CE 0029 certified		

AMBIENT CONDITIONS

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

PRESSURE TRANSDUCERS

Piezo resistive sensors protected from overload

Sensitivity	Resolution
Flow	Ocl. P. & flow.
P ₀₋₁ , NEP, Rint	Linearity
MIP/MEP, SNIP	Relative accuracy

GAS ANALYSERS

Helium	Thermal conductivity
Range	0 to 15% He
Relative Accuracy	+/- 0,1%
Response time	10 sec (10-90 % Fs)
Carbon Monoxide	Chemical Fuel Cell
Range	0 to 0,350% CO
Relative Accuracy	+/- 0,1%
Response time	+/- 20 sec. (10-90 % Fs)
Oxygen	Chemical Fuel Cell
Range	0 to 100% O ₂
Relative Accuracy	+/- 0,1%
Response time	<10 sec (10-90% FS)
Oxygen	Paramagnetic (FRC pediatric option)
Range	0-100% O ₂
Relative Accuracy	+/- 0,01%
Response time	+/- 2 sec(10-90% FS)

ANALYSER CIRCUIT

Automatic, rapid and accurate calibration with quality control

CALIBRATION GAS BOTTLE MIXTURE

FRC He	14% He, 25% O ₂ , rem N ₂
FRC N ₂	O ₂ 100%
DLCO He option	0,28% CO, 21% O ₂ , 14% He, rem N ₂
DLCO CH ₄ option	CO and CH ₄ 0,3%, O ₂ 21%, rem N ₂
DLNO option	± 450 ppm NO, rem N ₂
Pressure regulator	0 - 8 Bar / 15 m ³ /h

OPTIONS

- FRC He : adult or paediatric
- FRC N₂
- DLCO He, DLCO NO, DLCO CH₄, DLCO steady state
- MIP/MEP, SNIP, P₀₋₁, NEP, Rint, Ros,
- Static and dynamic Compliance
- Integrated automatic nebulizer, PROVO 4
- Specific configuration: HypAir muscle study, HypAir Macro, ...
- Heating pneumotachograph (STD on CRF He / O₂ Comp.)
- Computer integration trolley with electrical insulation transfo.
- Automatic data backup
- Medisoft Network
- Data transfer & reception (HL7,...)

PATIENT VALVE

Pneumotachograph	Lilly cone
Range	+/- 0,03 to 15 L/sec or 20L/sec
Resistance	0,4 cmH ₂ 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	
Patient valve	Pneumatic (T. of O/C: 30 mSec)
Dead Space	< 60ml / 30ml (paediatric)
Disinfection	Simple Dismantling for cold cleaning
Valve Support Arm	Moveable arm with 3 joints

PRESSURE TRANSDUCERS

Calibration	Mouth P	Water column
0,01 cmH ₂ O	Pneumotachograph	Semi - auto with 1 to 3L syringe with ATS quality control indicator
Error < 0,1%		
Error < 0,01%		

OPTIONAL ANALYSER

Multigas analyser	IR spectrometer (CO, CH ₄ , CO ₂)
Range	0 to 0,350%, CO ₂ : 0 -10%
Relative Accuracy	+/-0,1%
Response time	< 0,1 sec (10 - 90% FS)
Nitric oxide	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
Computer	Pc Pentium, LCD moniteur, A4 colour Deskjet or laser printer
Operating Syst	Windows® XP or 7

ANALYSER CIRCUIT

80 ml analyser circuit included linear motorized pump (no wear) sampling system with flow regulation.
Gas sample dried to room conditions by the Nafion tubing.

MEASURED AND CALCULATED PARAMETERS

- Slow Spirometry : VC, ERV, IRV, IC, EC, ...
- Forced Spirometry : FEV₁, FIV₁, 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., VV vis., (option)
- MIP/MEP, SNIP, P₀₋₁, P₀₋₁ CO₂, PDI ... (option)
- NEP, RNep, Exp. Flow Lim, ... (option)
- R_{int}, R_{os}, ... (option)

HYPAIR COMPACT+[®]

FLOWMETER PULMONARY FUNCTION TESTING STATION



- 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



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HYPAIR COMPACT +

Flowmeter Pulmonary Function Testing Station

► Hyp'Air Compact and Exp'Air combination offer "Gold Standard" measurements

From basic to Full version, 8 optional versions & combinations



4 Way patient valve with sodalime canister for FRC He dilution measurement



STANDARD SPIROMETRY (SLOW AND FORCED)

The Hyp'air Compact® 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 calculated by numerical integration.

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

Additionally, incentive spirometry assists measurements with children. Post visualization and post treatment provide 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 and graphical representation, deletion of poor efforts, ...



FRC HE OR N₂ (option)

The Hyp'air Compact® can be equipped with the functions necessary to the FRC measurement by the helium dilution technique in closed circuit or by the nitrogen washout method by pure O₂ inspiration, in open circuit (single and multi breath method).

These two techniques are fully automated and require only minimal user intervention.

The recording of the ventilation and of the gas concentration (He or N₂) is visualised in real time, during the test, to facilitate the understanding of the measurements.

- Measurement of TLC by FRC He
Standard method by closed circuit He dilution technique with O₂ compensation and CO₂ absorption

- Measurement of TLC by Nitrogen washout.
The Nitrogen washout uses the accumulated volume of oxygen to wash nitrogen from the lungs as the 'true' FRC value.
On screen visualisation guides the user through the full test procedure, making the understanding and quality control of the test a key feature. Importing a VC from a separate effort is possible when the subject may be unable to perform the best effort within the test. The measuring circuit uses O₂ and CO₂ analysers by subtraction to measure the nitrogen; the patient circuit consists of an automatic two-channel valve with automatic delivery of 100% O₂ with a low resistance demand valve.
The closing volume is calculated from N₂ slope during a maximal expiration

As for spirometry, all the software functions needed for the measurement under the best conditions are integrated in this option. Special combined version (paediatrics and adult).



MEASUREMENT OF DIFFUSION CAPACITY DLCO (option)

UNIQUE the only spirometer offering the range of 5 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 benefit greatly 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 subject's 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 allows 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}) and provides a good alternative to the standard screening method.



RINT - ROS (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.

Ros

Measurement of airway resistances by forced oscillation method, generated by a sinusoidal pump turning at approximately 6 to 30 Hz. This method measures the impedance (Z) and the phase (j) to calculate the resistance.



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.
- P_{0.1} : inspiratory occlusion pressure at 0.1 second. Specific version (see datasheet)
- Static and dynamic Compliance and Resistance : measured by intra-oesophageal balloon catheter.
- Muscle strength study : specific version for a full and complete muscle and neural drive study



PROVO II (OPTION)

Equipment for fully automated bronchochallenge tests with automatic 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