

PULMONARY FUNCTION TESTING

EXHALYZER[®]D

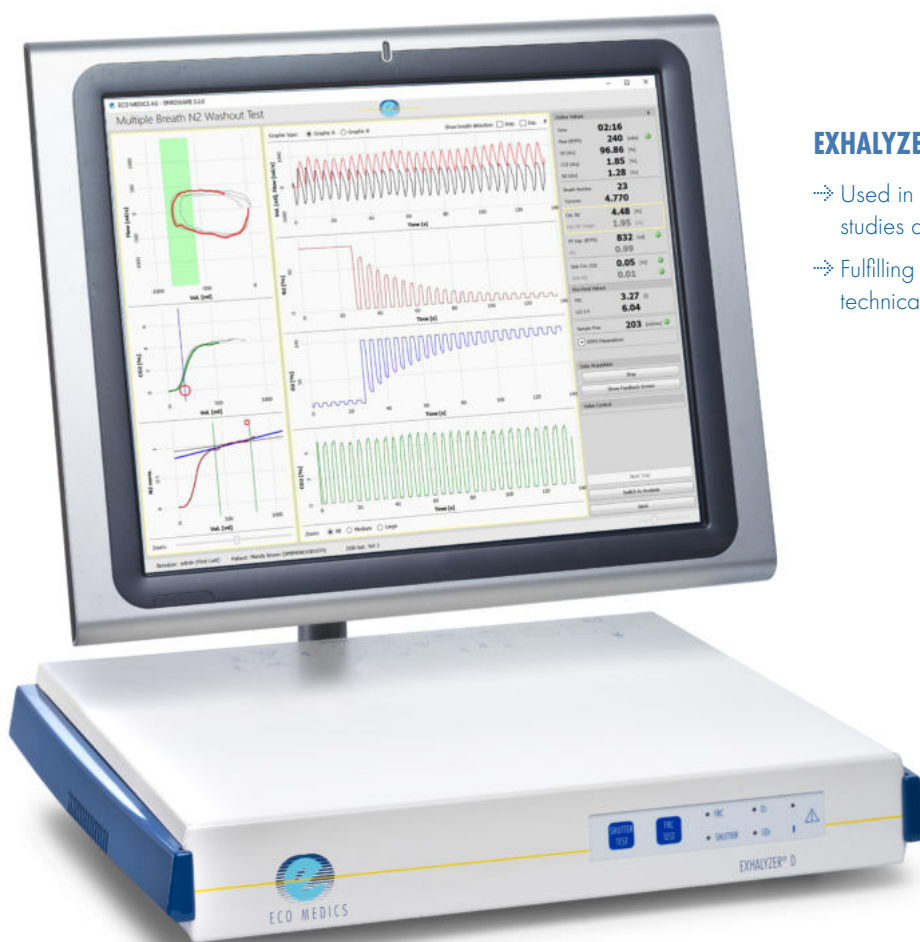


ECO MEDICS

COMPREHENSIVE PULMONARY FUNCTION TESTING

Early detection of small airway disease such as asthma, chronic obstructive pulmonary disease (COPD) and cystic fibrosis (CF) is of great importance for further disease progression. The **EXHALYZER®D** offers comprehensive possibilities for effective pulmonary function testing, including the

most widely applied spirometry and more sensitive multiple breath washout, revealing detailed information on the small airways. Controlled by **SPIROWARE®** software, it is easy to use and meets highest standards of functionality.



EXHALYZER®D

- Used in research studies and clinical studies around the world
- Fulfilling the latest ATS/ERS standards, technical and consensus statements

References:

1. Robinson, P. D. et al. Consensus statement for inert gas washout measurement using multiple- and single-breath tests. *Eur Respir J* 41, 507–522 (2013).
2. Robinson, P. D. et al. Preschool Multiple-Breath Washout Testing. An Official American Thoracic Society Technical Statement. *Am J Respir Crit Care Med* 197, e1–e19 (2018).
3. Bates, J. H. et al. Tidal breath analysis for infant pulmonary function testing. ERS/ATS Task Force on Standards for Infant Respiratory Function Testing. *European Respiratory Society/American Thoracic Society. Eur Respir J* 16, 1180–1192 (2000).
4. Graham, B. L. et al. Standardization of Spirometry 2019 Update. An Official American Thoracic Society and European Respiratory Society Technical Statement. *Am J Respir Crit Care Med* 200, e70–e88 (2019).

WIDE RANGE OF PULMONARY FUNCTION TESTS

From tidal breathing analysis to inert gas washouts, from volumetric capnography to spirometry, the **EXHALYZER® D** offers various tests to assess lung function.

→ **MULTIPLE BREATH WASHOUT (MBW)**

is the most sensitive method to detect early lung disease. It can be carried out using the tracer gas SF₆, typically applied on infants or 100% oxygen to washout the nitrogen in the lung (N₂MBW).^{1,2}

→ **LUNG CLEARANCE INDEX (LCI)**

is the main outcome of the multiple breath washout. It describes the overall gas mixing efficiency of the lung. Further parameters can distinguish the location of ventilation inhomogeneity.

→ **SINGLE BREATH WASHOUT (SBW)**

presents a quick alternative to assess ventilation inhomogeneity.¹

→ **TIDAL BREATHING ANALYSIS**

is a simple and noninvasive tool, in particular for infants and children, requiring only minimal patient cooperation.³

→ **SPIROMETRY**

is widely used to assess and monitor overall lung function.⁴

→ **VOLUMETRIC CAPNOGRAPHY**

allows the determination of further physiological information based on CO₂ dynamics.

AUTOMATIC QUALITY CONTROL

Several parameters such as etCO₂, VD and VT are constantly monitored and displayed during measurement in order to meet defined quality criteria.

ATS/ERS COMPLIANCE

All lung function tests are performed and evaluated according to the current recommendations of the ATS and ERS.^{1,2,3}

UNMATCHED ACCURACY

State-of-the-art components ensure high precision and accuracy of the instrument. The accuracy of ultra-sonic flow and volume measurement is not influenced by turbulence, humidity or temperature changes in the respiratory flow.

SUITABLE FOR INFANTS, CHILDREN AND ADULTS

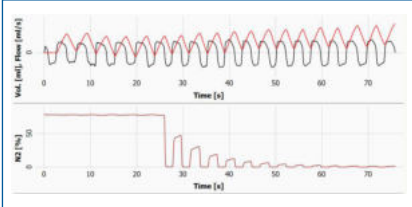
Exchangeable accessories guarantee optimal conditions for the measurement of different age groups.

STEP-BY-STEP USER GUIDANCE

Operator and patient are guided with easy to follow instructions through the preparation and execution of a measurement.

EXHALYZER®D APPLICATIONS

INERT GAS WASHOUT (N₂ AND SF₆)

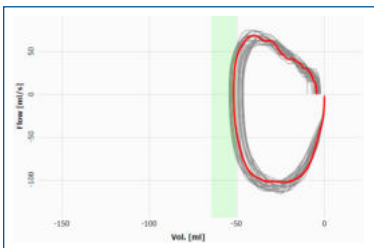


Multiple breath or single breath washouts measure the efficiency of gas mixing in the lung (FRC/LCI) and represent a very sensitive method for diagnosis of small airway disease. Nitrogen washouts as well as SF₆ washouts are possible. For nitrogen washouts, the single and multiple breath technique can be applied.

SELECTED PARAMETERS

- FRC
- LCI_{2.5}
- LCI₅
- Scond*VT
- Sacin*VT
- Pacin*VT
- M1/MO
- M2/MO
- Scond
- Sacin
- Pacin
- 1st breath SnIII*VT
- 1st breath SnIII
- norm. et N₂@TO₆
- Vd CO₂ Fowler
- Vd CO₂ Langley
- TBVFL RQ
- TBVFL etCO₂

TIDAL BREATHING ANALYSIS

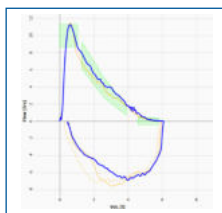


The analysis of tidal flow and volume is a simple, yet very valuable method to study lung function even in non-cooperating infants and children.

SELECTED PARAMETERS

- VT
- RR
- PIF
- PEF
- MV
- TEF 75%
- TEF 50%
- TEF 25%
- TEF 10%
- TIF 50%
- TEF₅₀/TIF₅₀
- TEF₇₅/PEF
- TEF₅₀/PEF
- TEF₂₅/PEF
- TEF₁₀/PEF
- O₂ consumed
- CO₂ emitted
- Vd CO₂ Fowler
- Vd CO₂ Langley

SPIROMETRY

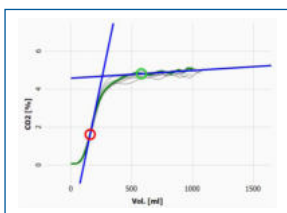


Spirometry is the most common pulmonary function test and measures the volume and flow of the inhaled and exhaled air.

SELECTED PARAMETERS

- FVC
- FEV₁
- FEV₁/FVC
- PEF
- FEV_{0.75}
- FEV_{0.75}/FVC
- FEV_{0.5}
- FEV_{0.5}/FVC
- Insp. VC
- FET
- Time to PEF
- FEF₂₅₋₇₅
- FEF₂₅
- FEF₅₀
- FEF₇₅

VOLUMETRIC CAPNOGRAPHY (INDIRECT CALORIMETRY)



Volumetric Capnography reveals physiological information about metabolic production, circulatory transport and CO₂ elimination within the lungs, as well as the determination of dead.

SELECTED PARAMETERS

- etCO₂
- CO₂ emitted
- Reinsp. CO₂ Vol.
- VolCO₂Netto
- V'CO₂
- Mean CO₂ Exp.
- SIII
- KPIv
- FACO₂
- VDaw
- VDBohr
- VDphys
- VDalv

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