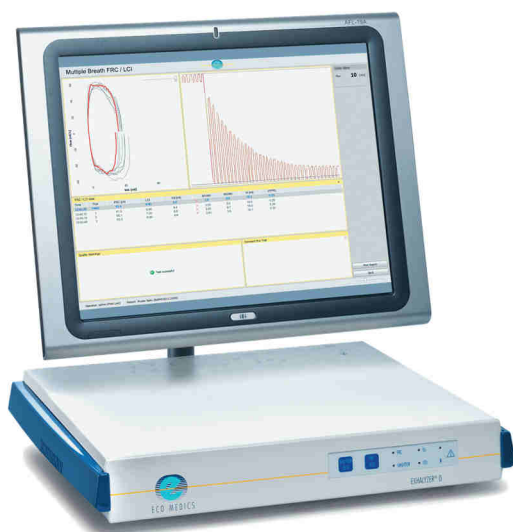# EXHALYZER® D

Pulmonary Function Tests for Infants, Children and Adults

The Ideal Choice for Diagnosis of:
- *Airway Obstructions*
- *Small Airway Disease*
- *Airway Inflammation*
- *Airway Restrictions*
- *Early Lung Disease*

The EXHALYZER® D offers the complete range of modern pulmonary function tests in one single instrument. Together with the SPIROWARE® software, it covers a wide application range and facilitates the full workflow of a clinical or research pulmonology lab, including patient management, measurement evaluation, documentation as well as data storage and export. The EXHALYZER® D is suitable for testing infants, children and adults.

One Instrument for all Pulmonary Function Tests
Having only one instrument for all lung function tests saves valuable space in the test lab and reduces time for training on several different instruments.

Automatic Quality Control
Several parameters are constantly monitored during measurement and evaluation 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.

Upgradable to your needs
The modular setup of the EXHALZER® D allows individual upgrades at any time.

Unmatched Accuracy
State-of-the-art components ensure high precision and accuracy of the instrument. The accuracy of the flow and volume measurement is immune to turbulence, humidity or temperature changes in the respiratory flow.

From infants to adults – adjustable accessories
Exchangeable dead space reducers guarantee optimal conditions for the measurement of infants, children and adults.
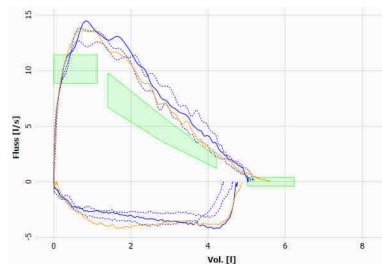
Step-by-step user guidance
Operator and patient are guided with easy to follow instructions through the preparation and execution of a measurement.

Applications:

- **Spirometry**
- **Tidal Breathing Analysis**
- **Inert Gas Washout**
- **Volumetric Capnography**
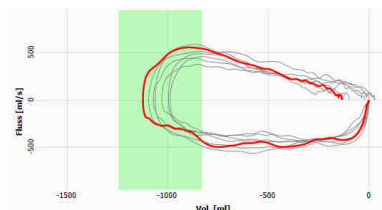- **FeNO Analysis**

Applications EXHALYZER®D

Spirometry

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

Selected Parameters: FVC, FEV-1, FEV-1/FVC, PEF, $FEV_{0.75}$, $FEV_{0.75}$/FVC, $FEV_{0.5}$, $FEV_{0.5}$/FVC, Insp. VC, FET, Time to PEF, FEF_{25-75}, FEF_{25}, FEF_{50}, FEF_{75}

Tidal Breathing Pattern 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, RQ, et CO_2, PIF, PEF, AZV, AF, MV, $TEF_{75\%}$, $TEF_{50\%}$, $TEF_{25\%}$, $TEF_{10\%}$, $TIF_{50\%}$, TEF_{50}/TIF_{50}, TEF_{75}/PEF, TEF_{50}/PEF, TEF_{25}/PEF, TEF_{10}/PEF, O_2 consumed, CO_2 emitted, Vd CO_2 Fowler, Vd CO_2 Langley

Inert Gas Washout (N_2 and SF_6)
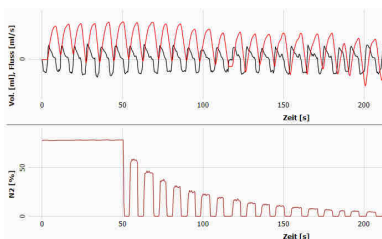
Multiple breath or single breath washouts measure the efficiency of gas mixing in the lung (FRC/LCI) and represent a very sensitive method for diagnosis of small airway disease. Measurements can be carried out with nitrogen or SF6, which is typically used for infants. For nitrogen washouts, the single and multiple breath method can be used.

Selected Parameters: FRC, $LCI_{2.5}$, LCI_5, S_{cond}*VT, S_{acin}*VT, P_{acin}*VT, M1/M0, M2/M0, S_{cond}, S_{acin}, P_{acin}, 1st breath Sn_{III}*VT, 1st breath Sn_{III}, norm. et N_2@TO6, Vd CO_2 Fowler, Vd CO_2 Langley, TBFVL RQ, TBVFL $etCO_2$

Volumetric Capnography (Indirect Calorimetry)
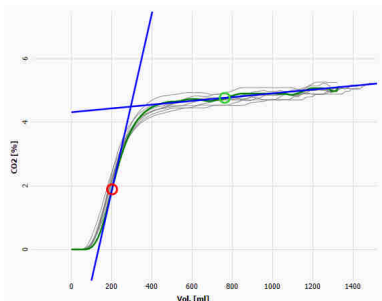
The mainstream measurement of CO_2 allows the calculation of CO_2 production, indicating energy consumption, as well as the determination of dead space VD and the respiratory quotient RQ.

Selected Parameters: $etCO_2$, CO_2 emitted, Reinsp. CO_2 Vol., $VolCO_2Netto$, $V'CO_2$, Mean CO_2 Exp., S_{III}, KPlv, $FACO_2$, VD_{aw}, VD_{Bohr}, VD_{phys}, VD_{alv}

FeNO Analysis
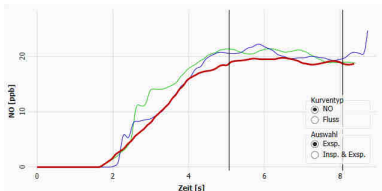
The EXHALYZER D can be extended with the CLD 88 option for fractional exhaled nitric oxide (FeNO) analysis by chemiluminescence detection. FeNO plays an important role in the diagnosis of airway inflammation. Pulmonary, alveolar, nasal and offline NO detection are possible.

Selected Parameters: $FeNO_{50}$, $FeNO_{nasal}$, C_aNO, $C_{aw}NO$, $D_{aw}NO$, $J'_{aw}NO$, FiNO, Exp. Time, Plat. Duration, Plat. Avg. Flow, V'NO