

GANSHORN
powered by **THORASYS**



tremoflo®

Airwave Oscillometry

Pulmonary function test with
minimal patient effort

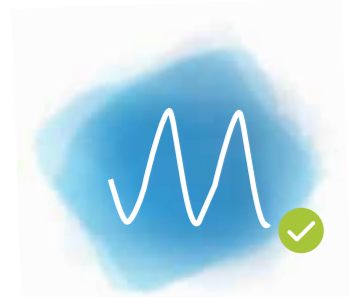
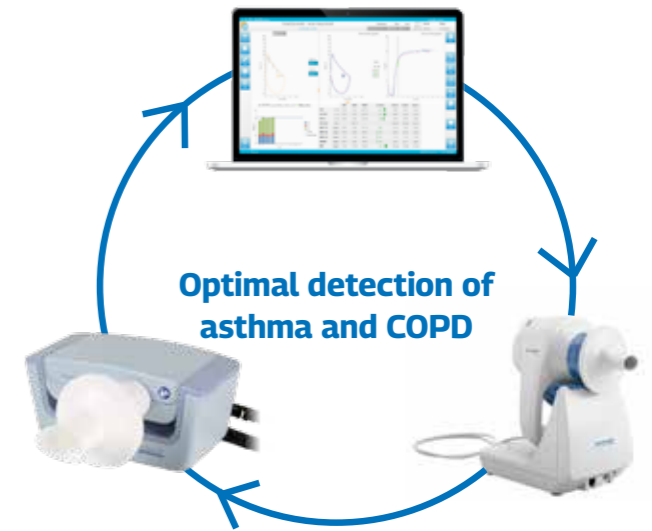
AIRWAVE OSCILLOMETRY

The tremoflo® Airwave Oscillometry System (AOS) is a portable medical device intended to monitor lung function and assess human respiratory diseases such as asthma and COPD in adults and children. The device produces measures of airway resistance, reactance and other lung function parameters to assist physicians in diagnosis, treatment selection

and evaluation of treatment efficacy. The principle technology of the AOS is based on a compact implementation of the Forced Oscillation Technique (FOT), a non-invasive technique that assesses lung function by superimposing a multi-frequency airway on top of the patient's spontaneous breathing.

Recent studies: combination of spirometry and oscillometry are superior

As the study⁶ by the Scottish Centre for Respiratory Research shows, it is best to combine the advantages of spirometry and oscillometry measurements. This combination allows a complete characterization of airflow limitation in moderate to severe asthma. GANSHORN offers these advantages exclusively. Its unique product portfolio allows the combination of ultrasound spirometry with SpiroScout, oscillometry with tremoflo® and to show results in one software and one report. Thanks to its network interfaces LFX also offers the possibility of sending all results from the devices easily via GDT or HL7. The usability of the software makes reportings and data export quick and easy.



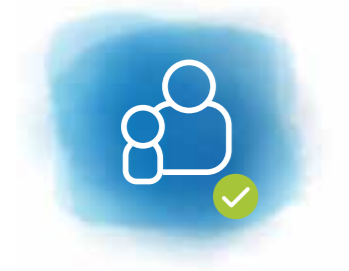
No specific manoeuvre needed - just tidal breathing



Easy to use and very fast



Reversibility and provocation testing



Suitable for geriatric and pediatric use



Semi-automatic calibration in less than 30 sec



Compact and portable



Advantages for children and elderly

Anecdotal evidence from numerous clinicians reveals that even for COPD patients for whom spirometry is not explicitly contraindicated, the test is stressful and exhausting. A typical geriatric spirometry test can last 30 minutes. Moreover, there is a risk of false positives due to a change in underlying bronchomotor tone after repeated forced expirations.

Early detection of peripheral airway impairment

Obstructive pulmonary diseases including asthma and COPD are increasingly recognized to originate in the "small airways" (i.e., those airways with a diameter of less than 2 mm). Early obstructions in these peripheral airways are often not measurable only by spirometry and therefore risk going

undetected. Oscillometry has been shown to be sensitive to changes in the small airways. Consequently, oscillometry provides unique and valuable information regarding peripheral lung function over and above spirometry, which translates into better patient outcomes.

Successful spirometry depends on patient cooperation and maximal effort, the success of a test is severely jeopardized in patients who have difficulty in understanding and following instructions, including young children, and those with language barriers or mental impairments.

As oscillometry is performed in tidal breathing, neither skilled operator nor patient effort is required to obtain a successful test.



⁶Chan, Rory; Lipworth, Brian: Journal of Allergy and Clinical Immunology: In Practice, 2022-07-01, year 10/7, p. 1910-1912.e1, Copyright © 2022.

AIRWAVE OSCILLOMETRY

The importance of small airways

The tremoflo® C-100 provides information related to small airway function.

» *The small airways are frequently involved early in the course of [asthma and COPD] diseases, with significant pathology demonstrable often before the onset of symptoms or changes in spirometry and imaging.*«

McNulty and Usmani, ECRJ 2014

» *Peripheral airway impairment may be clinically relevant at all levels of asthma severity and control.*«

Galant et al., AAAAI 2017

tremoflo® measurements are fast and easy. The patient just breathes quietly.

To assess respiratory function, the tremoflo® adds a gentle oscillatory wave to the patient's regular, quiet breathing. A short measurement duration of only 20 seconds allows three manoeuvres within a couple of minutes, even in patients who have difficulty performing spirometry.

Summary of clinician interpretations per published studies ¹⁻⁵

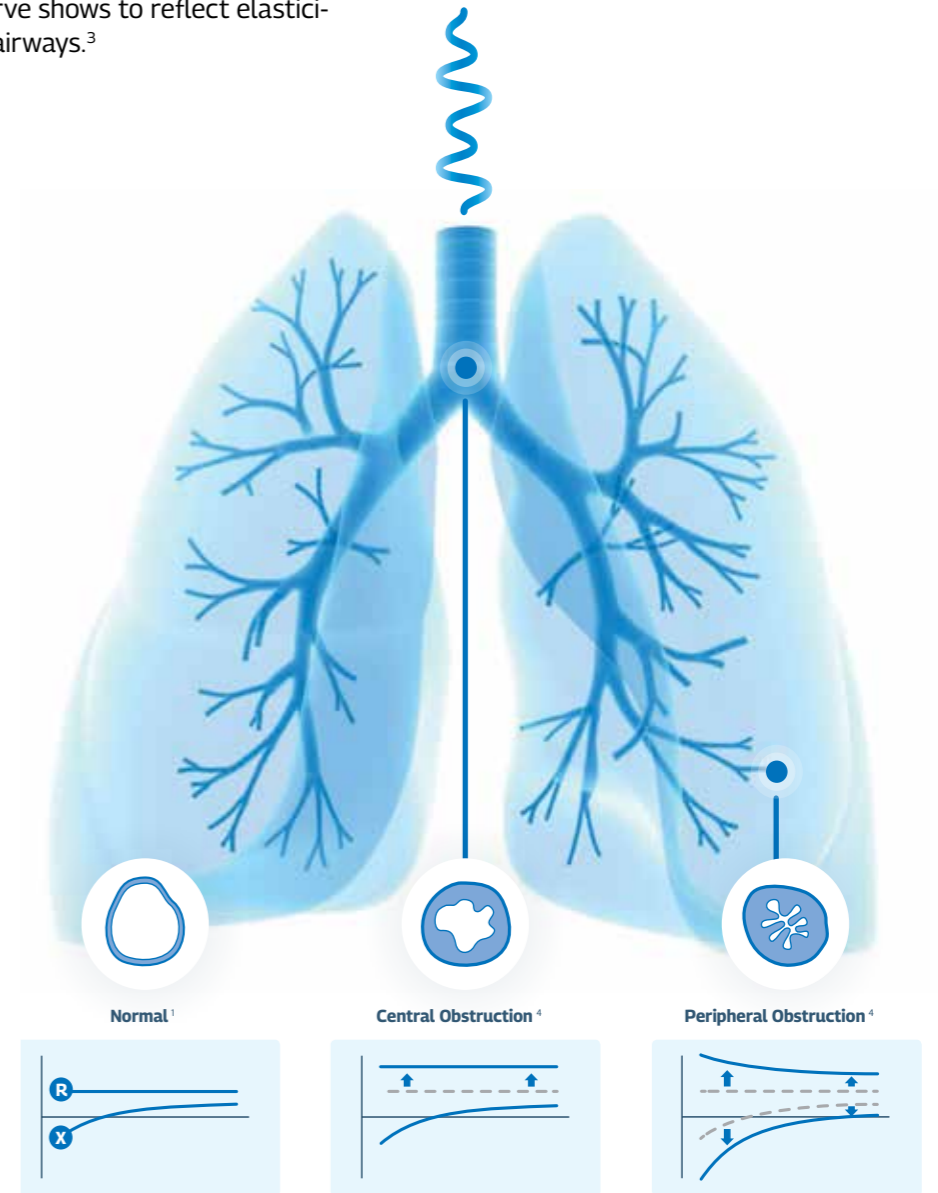
A pair of two curves calculated from the raw data reflects the mechanical properties of the respiratory system in characteristic patterns. Several key outcome parameters are then derived from these curves.



FUNDAMENTALS

Characteristic patterns

- R** The **resistance** curve shows to reflect central and peripheral airways. ²
- X** The **reactance** curve shows to reflect elasticity and peripheral airways. ³



Key outcomes

Resistance at 5 Hz¹	Normal	↑	↑
Resist. change: 5 to 20 Hz¹	Close to zero	Close to zero	↑
Reactance area¹	Normal	Normal	↑

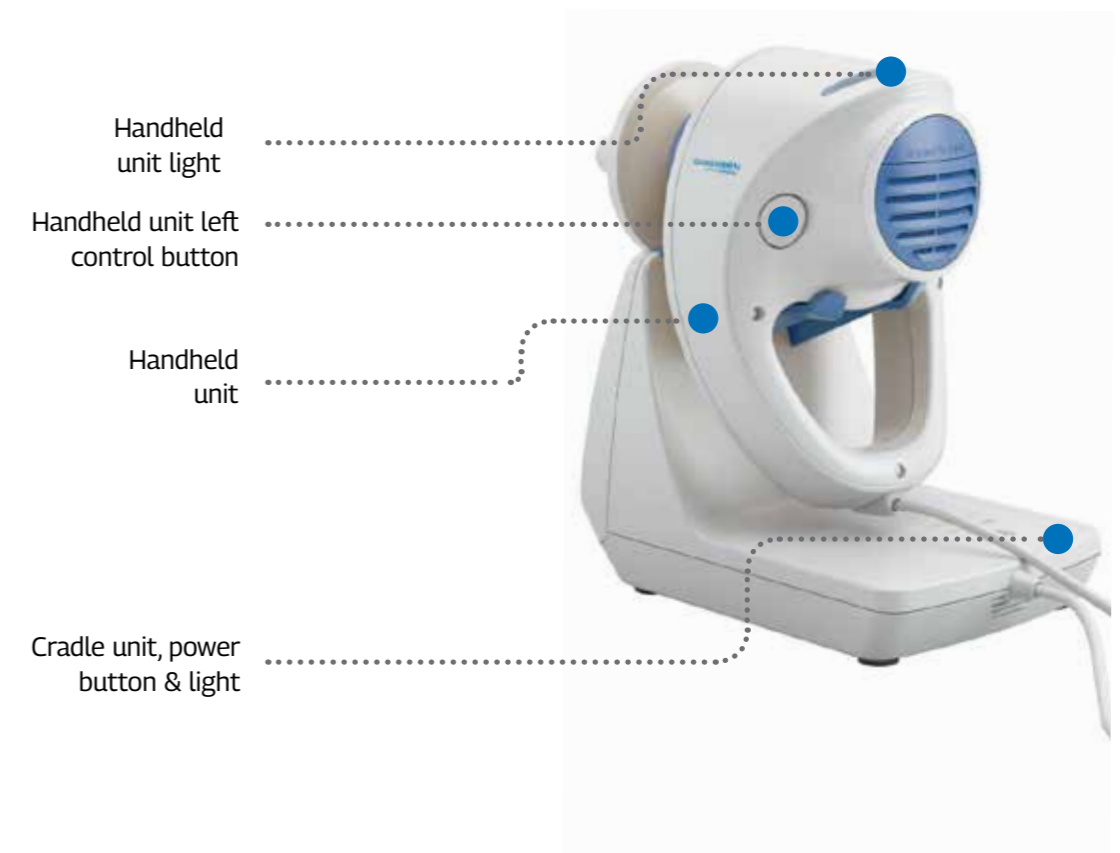
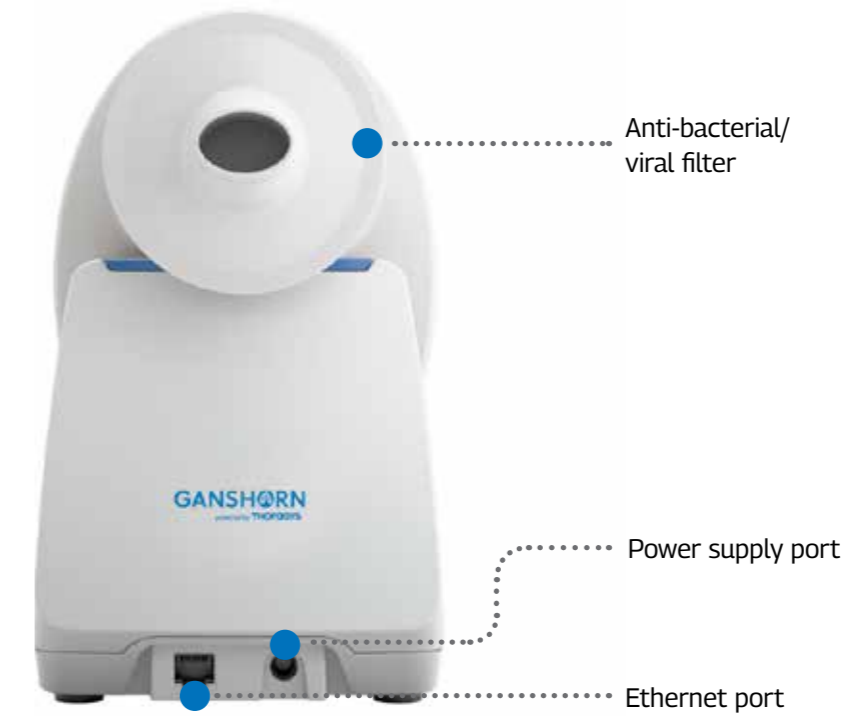
¹ Hirsh et al., AAAAI 2011
² Usmani et al., RESPIRATORY MEDICINE 2016
³ Al-Alwan et al., AJRCCM 2014
⁴ Galant et al., AAAAI 2017
⁵ Johnson et al., THORAX 2007

TECHNICAL DATA

Legal manufacturer	THORASYS Thoracic Medical Systems Inc.
Oscillator Technology	Breathe-through vibrating mesh (Patented)
Measurement Modes	AOS: Pseudo-random noise
Measurement Duration	20 sec, user adjustable 3 repetitions (as per guideline)
Patient Interface	Bacterial/viral filter with integrated mouthpiece
Dimensions & weight	7.5 x 5.1 x 5.5 in, 1.5 lb (handheld only) 8.3 x 5.5 x 9.4 in, 3.7 lb (handheld & cradle)
Performance	Meets and exceeds ERJ 2003, 22: 1026-1041
Marks & Licenses	Health Canada, CE Marked, ARTG
Measurement Principle	Oscillometry (Forced Oscillation Technique, FOT)



CONNECTORS, CONTROLS, INDICATORS



WHY GANSHORN?

For 40 years GANSHORN has been manufacturing a complete state-of-the-art portfolio of pulmonary function testing systems for spirometry, bodyplethysmography, diffusion, bronchial provocation and cardiopulmonary stress testing. With its technological innovations, the company has been a leader in the diagnostics market since 1982. Many of these are now perceived

as gold standards. In order to meet our high quality standards, it is important to us that all key components are made in Germany. Our devices are created in modern processes in Bavaria, from the initial idea to distribution. In the meantime GANSHORN is represented worldwide, with strong markets in Europe, Asia, North and South America.



PowerCube Body+

Bodyplethysmography



SpiroScout

Spirometry



PowerCube Diffusion+

Diffusion measurement



Provo.X

Provocation testing



PowerCube Ergo

Cardiopulmonary exercise testing (CPET)



Vivatmo pro

FeNO monitoring



tremoflo®

Airwave oscillometry



EucapSys

EVH provocation



AltiTrainer

Hypoxic challenge testing, hypoxia training



GANSHORN Medizin Electronic GmbH

Industriestr. 6-8 | 97618 Niederlauer, Germany

✉ sales@ganshorn.de

☎ +49 9771 6222 0

🌐 www.ganshorn.de

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Art. Nr. **019950159** | Rev. **1.0**

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