

# EucapSys

Eucapnic voluntary hyperpnea

Drug free asthma diagnosis



# OVERVIEW

The eucapnic voluntary hyperpnea (EVH) test is an alternative method to other indirect or direct bronchial challenge tests such as exercise challenge or metacholine challenge test<sup>1</sup>. The huge advantage of EVH is that no medication is needed. Traditionally it has been used for elite athletes<sup>2</sup> and is widely regarded as the Gold Standard for assessing exercise induced bronchoconstriction (EIB) among athletes<sup>3</sup>.

As EVH mimics breathing while exercising, the provocative method is the best tool to diagnose exercise-induced airway narrowing. EucapSys is the first commercially available system that makes EVH applicable to a wide range of users. As the eucapnic gas concentration is mixed by the device, expensive gas mixtures are not required, making the test more affordable and easier to use.



**One step protocol saves time**



**More comfortable for the patient**



**Drug free provocation with dry air**



**Easy to implement stand-alone device**



**High specificity - Fewer false positive results**



**Low operating costs**



**Economical**

The EucapSys reduces gas-related costs by 90%. Gas supply is thus facilitated and guaranteed.



**Operation**

An innovative patented technology helps to produce a hypercapnic air mixture gradually and according to your needs, for up to 200 l/min.



**CO<sub>2</sub>-Content**

Dynamically regulated at 5% in order to be isocapnic, that is equivalent to 40 mmHg of PetCO<sub>2</sub>.

# THE DEVICE

**Integrated spirometer** measures MVV

**Gas sensor** constantly monitoring and regulating the right concentration

**Pressurized CO<sub>2</sub>** supply hose

**The dry air** provokes the reaction in patients (quick connectors)

A **flexible outlet hose**, of 35 mm standard diameter, connects the mask to the device. The fitted mask must have a two-way y-shape non-rebreathing valve.

**Mixing bag** with eucapnic air concentration

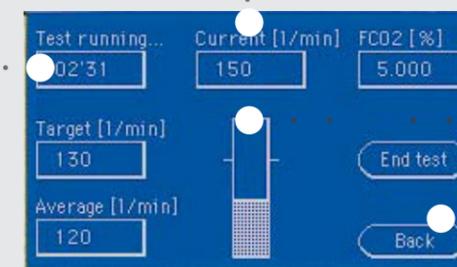
**Headgear** for a perfect fit on the patient's head

**Breathing mask**



**Real-time display**  
Screen size: 8 × 11 cm

- Parameters** at a glance:
- ✓ Test duration
  - ✓ Targeted MVV
  - ✓ Average MVV
  - ✓ Current MVV
  - ✓ CO<sub>2</sub> fraction in %



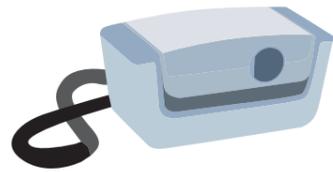
**Control panel**

**Performance visualization**

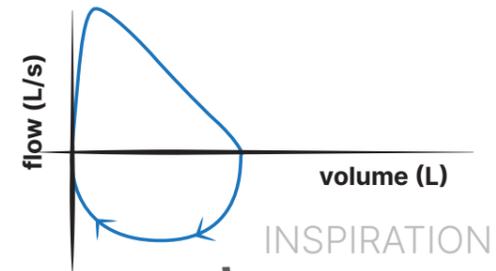
**Guided touch interface**

1 J W Dickinson, McConell, & Whyte; Br J Sports Med; 2011; 45(14) 1126-31  
 2 J W Dickinson et al.; Br J Sports Med; 2006; 40:179-183  
 3 J H Hull et al.; Br J Sports Med; 2016; 46:1083-1093

# MEASUREMENT PRINCIPLE



Before performing the provocation, a forced spirometry test is performed to set the baseline for pre FEV<sub>1</sub>.

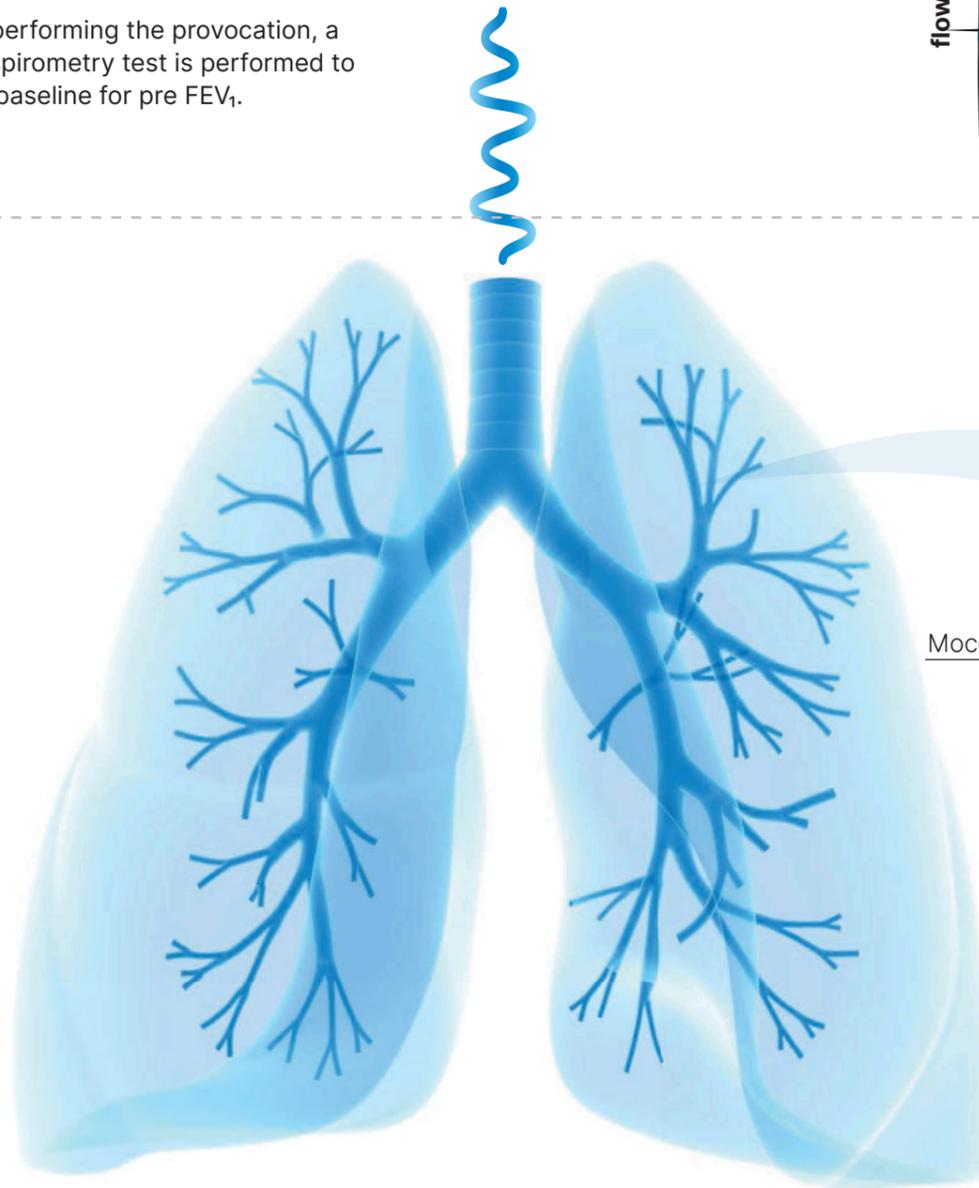


## PRE spirometry test

**A**



A dry gas mixture enriched with 5 % CO<sub>2</sub> is hyperventilated at room temperature by the patient for about 6 minutes through a breathing mask. The patient breathes faster than normal, aiming to reach a precalculated individual target, which is constantly monitored by the EucapSys.



Alveolus

Mocous Membrane

**1** Normal breathing  
40 % – 60 % humidity

## EUCAPSYS test

**B**

Low-risk hyperpnea becomes possible by adding 5 % CO<sub>2</sub> to air

**2**

BF & VT normal

BF & VT increasing ↑

**3** Hyperpnea: 30x/min  
FEV<sub>1</sub>

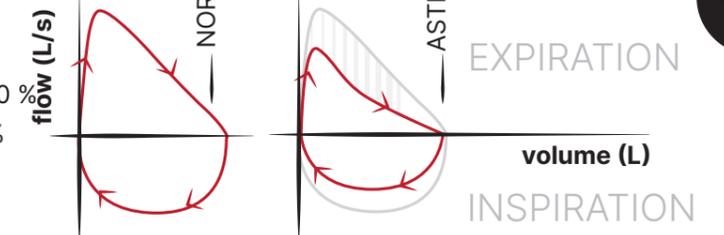
BF & VT normal



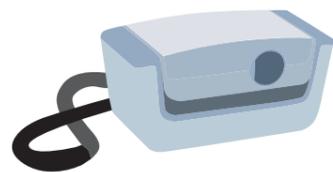
## FEV<sub>1</sub> POST spirometry test

Interval for asthma severity:

mild	>= 10 % to <= do 20 %
moderate	>= 20 % to <= 30 %
severe	> 30 %



**C**



After the provocation phase, spirometry measurements are performed again. If the value falls below 10 % of the baseline FEV<sub>1</sub>, asthma can be diagnosed.



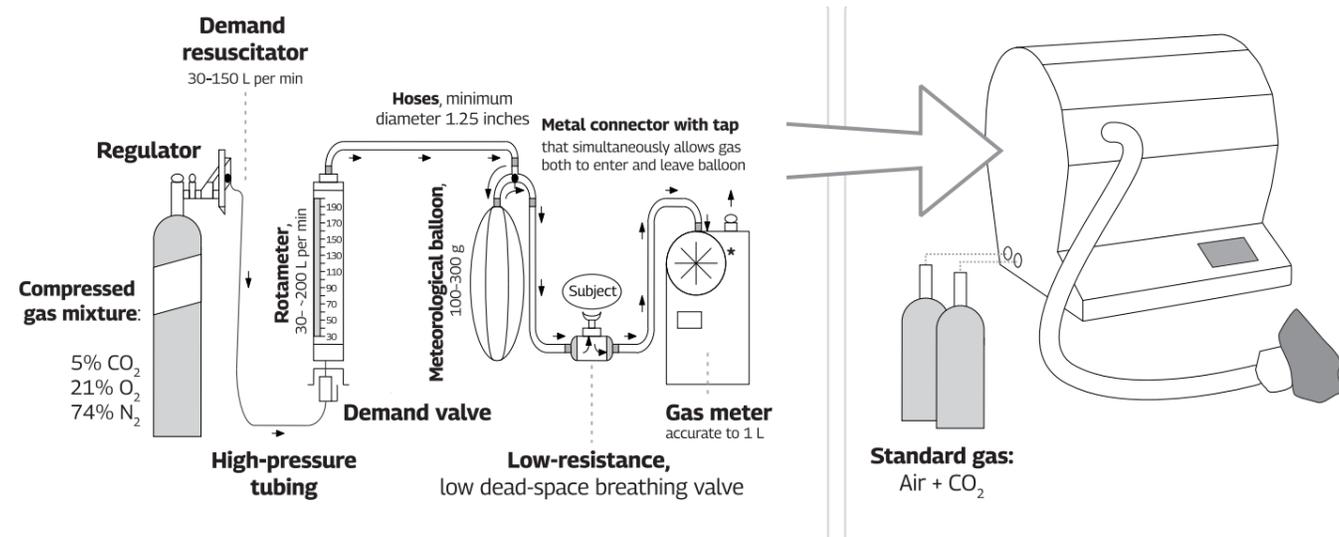
## TECHNICAL DATA

<b>Principle</b>	in situ adjustable mixture of dry air and CO <sub>2</sub>
<b>Display</b>	Instant display of air flow in l/min CO <sub>2</sub> fraction in % test time in min/sec
<b>Regulation</b>	electronic PID-type
<b>Regular CO<sub>2</sub> fraction</b>	5%
<b>Accuracy of CO<sub>2</sub> fraction</b>	0.01%
<b>Production of mixture</b>	as needed, in accordance with consumption
<b>Air flow rate</b>	up to 220 l/min
<b>CO<sub>2</sub> supply</b>	via a CO <sub>2</sub> cylinder
<b>Air flow control</b>	using a syringe
<b>Electrical suppl</b>	110 - 220 Volts
<b>Electrical consumption</b>	50 W peak
<b>PCO<sub>2</sub> monitoring</b>	Thermoconductivity sensor
<b>Control electronics</b>	by microprocessor
<b>Weight</b>	approx. 15 kg
<b>Dimensions</b>	h: 55 cm; l: 50 cm; w: 40 cm
<b>Breathing hose</b>	ultra-flexible, 60 cm - 180 cm long
<b>Mouthpiece or mask</b>	two-way y-shape non-rebreathing valve

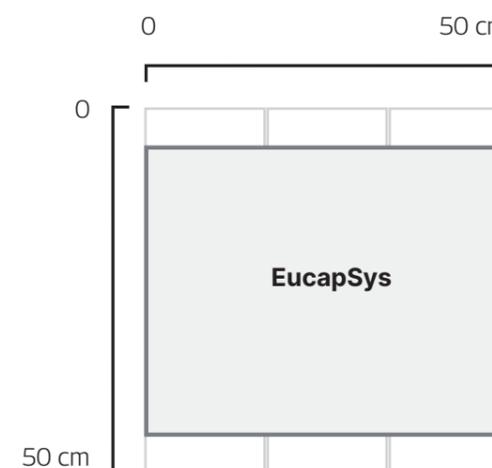
### Comprehensive technology in a compact design

**Conventional** basic equipment used to perform an eucapnic voluntary hyperpnea test

Slim **EucapSys** device with compact and advanced technology



### Dimensions



The device must be placed on a stable support, the upper part has a minimum size of: 50 cm x 50 cm and the surface is not slippery.

Device height: 55 cm

# 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+

Body Plethysmography



## 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



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