

# Innocor<sup>®</sup> CO



“Non-empirical  
and accurate even  
during exercise”

Non-Invasive Measurement Of Cardiac Output  
By Inert Gas Rebreathing



**COSMED**  
The Metabolic Company

“Distinguish between ventilatory, central circulatory or peripheral causes of exercise intolerance”

- | Quick measurement (~30 seconds)
- | Suitable in children and adults at rest and during exercise
- | Compact and portable design
- | Optional metabolic gas exchange ( $\text{VO}_2$ ,  $\text{VCO}_2$ , ...) and lung function testing
- | Daily calibration not required
- | Validated over multiple testing conditions
- | FDA 510(k) Cleared Available For US Market only



Cardiac Output (CO) is an important parameter for the assessment of hemodynamic and cardiovascular impairment.

Innocor® CO allows for non-invasive measurement of CO by employing the analytical principle of Inert Gas Rebreathing (IGR).

During a rebreathing test the subject rebreathes an oxygen enriched mixture delivered by the integrated gas cylinder into a closed rebreathing system in the first breathing stage.

The mixture contains very small amounts of two physiologically inert gases - one blood soluble ( $\text{N}_2\text{O}$ ) and one insoluble ( $\text{SF}_6$ ) tracer gas.

The test lasts about 5-6 breaths (or 15-30 seconds).

During this time the blood soluble gas is dissolved in the blood perfusing the ventilated parts of the lungs.

Innocor® CO measures the concentration curve of the blood soluble gas and calculates the wash-out rate, which is proportional to the cardiac output. In patients with a significant intra-pulmonary shunt, the shunt flow is calculated by using the well proven Fick principle for oxygen.

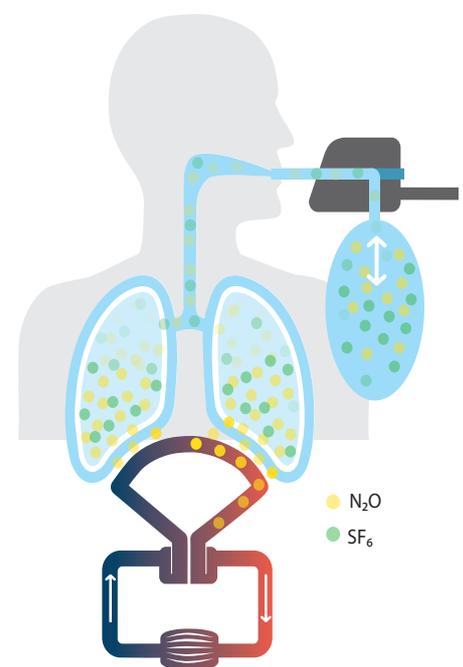
The blood insoluble gas is measured to determine the lung volume and to account for other factors that affect the distribution of the blood soluble gas.

The simplicity of the test manoeuvre together with the specifically designed patient and software interface makes the test suitable for both adults and children at rest and during exercise. Cardiac output and metabolic measurements can be combined during cardiopulmonary exercise test thanks to the optional breath-by-breath gas exchange analysis module.

The validity of Innocor® CO is documented in an impressive number of peer reviewed scientific papers.

This documentation applies to diverse conditions in both health and disease, children and adults, and is conclusively far better than for any other non-invasive method.

As opposed to other non-invasive techniques, Innocor® CO can be used equally well in patients at rest and during exercise.



## Innocor® CO Key Features

- Quick measurement (~30 seconds)**  
 The test is rapid as it takes less than 30 seconds, the time for a subject to breathe normally for about 5-6 breaths.
- Suitable in children and adults at rest and during exercise**  
 The simplicity of the test manoeuvre together with the intuitive software interface makes the test suitable for both adults and children at rest and during exercise.
- Compact and portable design**  
 The reduced dimensions and the integration of the miniature gas cylinder allow to easily move Innocor® CO in between departments.
- Optional metabolic gas exchange (VO<sub>2</sub>, VCO<sub>2</sub>, ...) and lung function testing**  
 Cardiac output and metabolic measurements can be combined during cardiopulmonary exercise test thanks to the optional breath-by-breath gas exchange analysis module.

- Daily calibration not required**  
 Innocor® CO utilizes a fast-responding photoacoustic infrared gas analyser with unmatched sensitivity, accuracy and stability which only requires a yearly calibration check.
- Validated over multiple testing conditions**  
 Innocor® CO is validated in an impressive number of papers covering diverse conditions in health and disease, children and adults, rest and exercise.

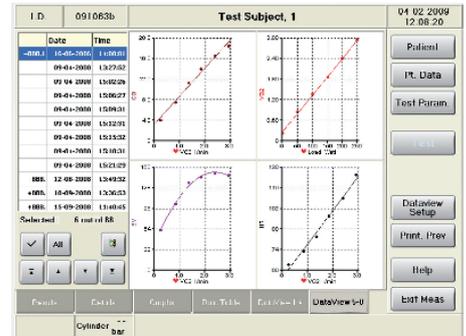
## Innocor® CO Technologies

Innocor® CO utilizes COSMED's proprietary gas analyser technology for measuring nitrous oxide (N<sub>2</sub>O), sulphur hexafluoride (SF<sub>6</sub>) and CO<sub>2</sub> continuously and simultaneously.

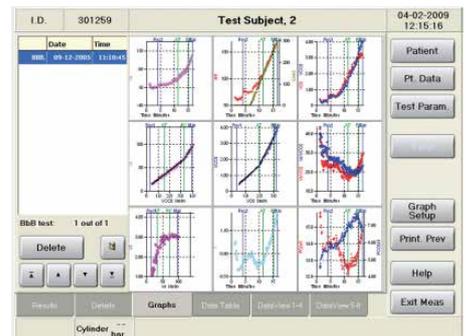
The advanced analyser is a photoacoustic infrared type which combines a fast response with unmatched sensitivity, accuracy and inherent stability. No daily calibration is required – only a yearly calibration check.

The oxygen sensor uses laser diode absorption spectroscopy, meaning no limited life parts. Room air is used for calibration.

A Nafion sampling tube ensures optimal humidity removal.



Hemodynamic (cardiac output and stroke volume) response to graded exercise.



9-plots Wasserman screen from breath-by-breath test to maximum exertion.



Patient interfaces for rest and exercise testing (children and adults)



Intuitive Windows Software for effortless operations.



Space efficient and portable with integrated lifting slot.

Miniature gas cylinder with self-dispensing valve for rebreathing gas mixture.

Test capacity is expanded typically tenfold by automatic dilution with air, thereby avoiding a bulky external cylinder.

PC interface

Quick connector panel for rebreathing valve and SpO<sub>2</sub> sensor.



Pneumatic rebreathing valve with replaceable insert for maximum hygiene.



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