

Pulmonary & Cardiovascular Function Analyzer

ars-Pulfan

Ergospirometer



- ventilation mechanics
- gas exchange
- cardiovascular function
- cell metabolism

Integrated 12 lead resting & stress ECG: ars-Efor



Breath-by-breath study of ventilation and gas exchange at rest and during exercise.
Using the Pitot tube as a flowrate sensor guarantees reliable measurements at all ventilation ranges without patient discomfort.



Integrated 12-lead electrocardiograph for resting and stress test ECGs.
Performance that matches the best references in the field. Real-time Viewing, Measurement, Interpretation, and Processing of data from 12 leads.



Alveolar membrane permeability (DICO) measurement.
Two fast analyzers (CO and CH₄ and a light, compact, mobile, two-channel valve permit resting and non-resting single-breath DICO measurements with or without apnea.



With a special option, the Pulfan can become a complete, highly advanced system.
Slow and forced spirometry (pre-, post-, and pharmacodynamic tests). Study of ventilation and pulmonary hyperinflation during exercise.



Occlusion pressure (MIP, MEP, P01).
These optional parameters can also be measured by including the necessary hardware in the basic module at a particularly low cost.



NEP: a new method for measuring restricted expiratory flow at rest and during exercise.
This new method consists of applying negative pressure to the patients mouth during the expiratory phase and comparing the resulting flow-volume loop with the preceding tidal flow recording.



Pressure cuff measurement of systolic and diastolic pressures and SaO₂ measurement.
Non-invasive blood pressure : This optional external module is integrated into the chain of measurements.
Pulse oximeter : A line of sensors for exercise tests ensures reliable measurements throughout the testing period.



Non-invasive measurement of cardiac output.
These two totally automated methods guarantee reliable measurements at rest and during exercise (Qt, Qc).
1. CO₂ equilibrium measured by re-breathing method.
2. Single-breath measurement by means of the C₂H₂ (acetylene) uptake method.



The PC is perfectly integrated into the unit and easily accessible for every need, such as backups, updates etc.
The software comes with numerous configurations giving the variability to satisfy your needs regarding the choice of calculated, displayed and printed parameters and graphs.

MEASURED AND CALCULATED PARAMETERS

Elapsed time	VCO2	RQ	actual VD/VT
Load (velocity-grade)	EQ O2	HR	P(A) O2,C2
VE	EQ CO2	HRR	P(a-A) O2,CO2
VO2	FE O2, FI O2	MET	TRUE O2, TRUE CO2
VO2/kg	FE CO2, FI CO2	RR,VT	Vent. Res.
Reference VO2	P _{et} O2	TI, Ttot, VT/TI	energy expenditure
VO2/HR	P _{et} t CO2	Estimated VD/VT	I eff., I int

- **Cardiac output module** : Qt, Qc, Sv, predicted Qt, Pa CO2, PV CO2 Feq CO2
- **DLCO module** : DLCO, DLCO CORR, DLCO/AV, Dm, Vc
- **Electrocardiography, spirometry and TLC (nitrogen flushing), NEP options, study of ventilation and pulmonary hyperinflation during exercise:** Consult the specific data sheets.
- **Off-line Parameters** : P.sys, P.dia, gazometry, Sao2, HR, FRC (RV), ...
- **Glossary** for comments and test cut-off criteria.

TECHNICAL SPECIFICATIONS:

►Pneumotachograph incorporated directly in the mask or mouthpiece accessory:

Pitot tube principle.
16-bit dependent differential triple-sensor measuring chain
Range: 0,5 to 15 l/s, Dead space: 13 ml
Passing band: 0-35 Hz, Error: <3%
Volume converted to BTPS (incorporated thermometer and optional barometer)
Linearization calculated by the software
Semi-automatic calibration by a 2- or 3- liter syringe.
Automatic zero shift correction of measuring elements

►O₂ analyzer:

Type: paramagnetic with differential pressure measurement
Range: 10-25% or 0-100% for **hyperoxic** measurement
Response time: 130 ms (for 90% fsd at 150 ml/min)
Accuracy: 0.01% (0-25%), Resolution: 0.01 %, Stability: 0.015%/hr
Software correction of response dynamics.

►CO₂ analyzer:

Type: Infrared Response time: 120 ms (for 90% fsd at 200-ml/min)
Sampling cell; 34 µl
Range: 0-10% (15% as an option)
Accuracy: 0.01% (0-10%), Resolution: 0.005%, Stability: 0.015%/hr
Software correction of response dynamics

►Sampling technique:

Linear motorized pump (no wear) sampling system with flow and pressure regulation
Gas sample dried by the Permapure technique.

►Heart rate measurement:

Synchronization signals detected and measured by impulses or analog ramp generated by an external module.
POLARD heart rate meter interface.

►External connections:

Two analog inputs and two serial (RS 232) connections available for external units:

Ergometer and treadmill control:

Ergometer: Analog (from 0 to 10 volts) (12-bit resolution); Serial interface (RS232): Numerous drivers available.

MD treadmill: Grade and velocity controlled by RS 232 (other makes of treadmill optional)

►Ambient conditions:

Working temperature: 10 to 40 °C
Relative humidity of air: 25 to 95 % (not condensed)

►Digitations and communication :

12 bits 100 Hz / channel (ECG: 500 Hz)
Serial communication: 115,200 bauds with infrared optical insulation

►Computer hardware and peripherals:

Software for Windows 98 or Windows 2000.
PC with Pentium processor (latest technology)
15 or 17" SVGA color screen, ink-jet color printer

►General characteristics:

Dimensions Module: 36/27/19 cm Weight; approx. 8 kg
Trolley: 54/56/89 cm - Weight; approx. 35 kg .(excluding computer)
Power requirements ; 220AC 50Hz (±10%) other power requirements available on request.
Consumption: approx .250 VA
Warm-up time: ± 20 minutes

►Calibration:

Accurate, rapid calibration
Quality verification of calibration factors
Calibration gas bottle mixture: approx. 16 % O₂, and 5 % CO₂, balance N₂
0-5 L/ min combined flow/pressure regulator

►Options:

- ECG Rest & Stress
- System of electrodes with suction cups
- Two LCD monitor version
- Spirometry for study of ventilation and pulmonary hyperinflation during exercise
- DICO (external module)
- Cardiac output (external module)
- NEP
- Right catheterization module
- NIBP
- Pulse Oximetry
- MIP - MEP
- PO 1 (respiration control)
- Calorimetry software
- On-line maintenance by modem
- Automatic backup system
- Windows® NT network extension
- Data export



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