

CARESCAPE™ Respiratory Modules E-sCO(V), E-sCAiO(V), E-sCOVX, E-sCAiOVX

Monitoring respiratory and ventilatory parameters for adult, pediatric and neonatal patients in anesthesia and critical care applications



This family of compact respiratory modules is designed to support respiratory monitoring in anesthesia and critical care areas. Depending on the module type, host device software version and the clinical application, they provide measurements of airway gases, anesthetic agents with agent identification, Patient Spirometry and Gas Exchange. The modules are compliant with IEC 60601-1 3rd edition.

Features

- Airway gases measured by the sidestream method
- Eight module versions available to meet the needs of various care areas
- All parameter values sampled proximal at the patient's airway with a single gas sampling line, D-lite(+)(++) or Pedi-lite(+) flow sensor, along with an additional Spirometry tube
- Et and Fi values updated breath by breath
- Fast oxygen measurement for accurate EtO₂ and FiO₂ values
- Automatic identification of anesthetic agents
- Detects end inspiratory and end expiratory occlusions automatically and displays values for Statis Plat, Static PEEPi+e and Static Compliance
- Calculated balance gas value for estimating the N₂-concentration
- Very compact size, low weight and low power consumption

Clinical measurements

- CO₂ and N₂O – GE infrared technology: Inspired and end-tidal values, CO₂ waveform and respiration rate

- Respiration rate – calculated from the CO₂ waveform
- Anesthetic agents – GE infrared technology
 - Measures and identifies all five agents and two agent mixtures: halothane, enflurane, isoflurane, sevoflurane and desflurane
 - MAC (Minimum Alveolar Concentration)
 - MACage with age, temperature and ambient pressure compensation
- Patient oxygen – GE paramagnetic oxygen (O₂) technology: Inspired, end-tidal and Fi-Et difference, waveform
- Patient Spirometry – Designed to measure true patient values independent of the ventilator with GE-patented D-lite(+)(++) and Pedi-lite(+) flow sensors and gas samplers at the patient airway
 - Numerical values for airway pressure, minute and tidal volumes, compliance, airway resistance and I:E ratio values, and flow and airway pressure waveforms
 - Continuous measurement of intrinsic, extrinsic and total PEEP
 - Pressure-volume and flow-volume loops
 - Ability to store and print up to six loops
 - Recall saved loops to compare to current loop
 - Module keys to save or change loop view
- Gas exchange - Non-invasive and continuous measurement
 - Oxygen consumption ($\dot{V}O_2$) and carbon dioxide production ($\dot{V}CO_2$)
 - Values for energy expenditure (EE) and respiratory quotient (RQ)

Technical specifications

General

When monitoring neonatal or other patients that have high respiration rate or low tidal volume these modules shall be used within the limits of respiration rates and tidal volumes to ensure specified measurement accuracy.

Sampling flow 120 ±20 ml/min

Size and fit of gas sampling accessories may impact measured gas concentration values at low tidal volumes. Always ensure use of appropriate accessories according to patient and application.

Automatic compensation for atmospheric pressure variation (660-1060 mbar), temperature and CO₂, O₂, N₂O, agent cross effect compensation. Parameter display update interval typically breath-by-breath.

Functional alarms for

- Disconnected water trap
- Partially blocked sample line or water trap
- Low gas sampling flow
- Blocked sample line or water trap
- Blocked sample gas outflow

Letters in the module name stand for

s = Single-width module

C = CO₂ and N₂O

Ai = Anesthetic agents and agent identification

O = Patient O₂

V = Patient Spirometry

X = Gas Exchange metabolics $\dot{V}O_2$, $\dot{V}CO_2$, RQ and EE

Non-disturbing gases

- Ethanol, acetone, isopropanol, methane, nitrogen, nitric oxide, carbon monoxide, water vapor and freon R134A.
- Maximum effect of non-disturbing gases on readings:
O₂ & N₂O <2vol%, CO₂ < 0.2 vol%, AA < 0.15 vol%.

Carbon dioxide (CO₂)

GE infrared absorption sensor technology

CO₂ waveform

EtCO₂ End-tidal CO₂ concentration

FiCO₂ Inspired CO₂ concentration

Measurement range 0 to 15 vol%
(0 to 15 kPa, 0 to 113 mmHg)

Accuracy ±(0.2 vol% + 2% of reading)
Rise time < 260 ms with 2 and 3 m sampling line
< 310 ms with 6 m sampling line
Adjustable low and high alarm limits for EtCO₂ or FiCO₂

Respiration rate (RR)

Measurement range 4 to 100 breaths/min

Detection criteria 1 vol% change in CO₂ level

Accuracy ±1/min in the range
4 to 20 breaths/min
±5% in the range
20 to 100 breaths/min

Alarm note sent to host device if no breath detected in 20 seconds

Patient oxygen (O₂)

GE differential paramagnetic sensor

O₂ waveform

FiO₂ Inspired O₂ concentration

EtO₂ End-tidal O₂ concentration

FiO₂-EtO₂ Inspired-expired difference

Measurement range 0 to 100 vol%

Accuracy ±(1 vol% + 2% of reading)

Rise time < 260 ms with 2 and 3 m sampling line
< 310 ms with 6 m sampling line

Nitrous oxide (N₂O)

GE infrared absorption sensor

FiN₂O Inspired N₂O concentration

EtN₂O End-tidal N₂O concentration

Measurement range 0 to 100 vol%

Accuracy ±(2 vol% + 2% of reading)
N₂O ≤ 85%

Note: N₂O is only displayed with CARESCAPE ANE and PACU software

Anesthetic agent (AA)

GE infrared absorption sensor

Anesthetic agent waveform

FiAA Inspired anesthetic agent concentration

EtAA End-tidal anesthetic agent concentration

MAC or MACage value options for hosts

Agent mixture detection

Measurement range

Sevoflurane 0 to 8 vol%

Desflurane 0 to 20 vol%

Isoflurane, enflurane,
halothane 0 to 6 vol%

Accuracy $\pm(0.15 \text{ vol\%} + 5\% \text{ of reading})$

Agent identification

Identification threshold 0.15 vol%

Detection time <20 sec

Patient Spirometry

Pressure-volume loop, flow-volume loop, airway pressure and flow waveforms updated breath by breath

Adjustable low and high alarm limits for Ppeak, PEEP_{tot} and MV_{exp}

Messages for MV_{exp} << MV_{insp} and for low volumes

Through selection of D-lite or Pedi-lite gas sampling and flow sensor from menu, the following specifications apply:

	D-lite(+)(++)	Pedi-lite(+)
<i>Respiration rate</i>	4 to 35 breaths/min	4 to 70 breaths/min
<i>Tidal volume</i>		
Measurement range	150 to 2000 ml	5 to 300 ml
Accuracy	$\pm 6\%$ or 30 ml	$\pm 6\%$ or 4 ml
<i>Minute volume</i>		
Measurement range	2 to 20 l/min	0.2 to 5 l/min
<i>Airway pressure</i>		
Measurement range	-20 to +100 cmH ₂ O	-20 to +100 cmH ₂ O
Accuracy	$\pm 1 \text{ cmH}_2\text{O}$	$\pm 1 \text{ cmH}_2\text{O}$
Display units	cmH ₂ O, mmHg, kPa, mbar, hPa	
<i>Flow</i>		
Measurement range	-100 to +100 l/min	-25 to +25 l/min
<i>I:E</i>		
Measurement range	1:4.5 to 2:1	1:4.5 to 2:1
<i>Compliance</i>		
Measurement range	4 to 100 ml/cmH ₂ O	1 to 100 ml/cmH ₂ O

Airway resistance

Measurement range	0 to 200 cmH ₂ O/l/s	0 to 200 cmH ₂ O/l/s
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The presence of xenon or helium in the breathing circuit causes incorrect measurement values.

Sensor specifications

	D-lite(+)(++)	Pedi-lite(+)
Dead space	9.5 ml	2.5 ml

Gas Exchange and metabolics[†]

$\dot{V}O_2$	Oxygen consumption
$\dot{V}CO_2$	Carbon dioxide production
Measurement range	20 to 999 ml/min
Respiration Rate range	Adult 4 to 35 breaths/min Pediatric 8 to 35 breaths/min
$\dot{V}CO_2$ and $\dot{V}O_2$ Accuracy	FiO ₂ <65 vol% (and RR $\leq$ 30 breaths/min for D-lite++): $\pm 10\%$ or 10 ml, whichever is greater FiO ₂ 65...85 vol% (or RR > 30 breaths/min for D-lite++): $\pm 15\%$ or 15 ml, whichever is greater

CARESCAPE monitors B850 and B650 calculate and display Energy expenditure (EE) and Respiratory Quotient (RQ).

EE [‡]	Energy expenditure
Display range	0 to 6000 kcal/d or 0 to 25120 kJ/d
RQ [‡]	Respiratory Quotient ($\dot{V}CO_2/\dot{V}O_2$)
Display range	0.6 to 1.3
RQ resolution	0.01

The presence of xenon, N₂O or helium in the breathing circuit causes incorrect measurement values.

[†] Measurement not applicable for neonatal patients

[‡] Calculated by host device. For more information on other host devices, refer to their user documentation.

System compatibility

- CARESCAPE Monitor B850
- CARESCAPE Monitor B650
- CARESCAPE Monitor B450
- B40(i) Patient Monitor
- Aisys CS²
- Avance™ CS²
- Carestation 620/650/650c

Displayed data (including but not limited to TV, MV, RR, Raw and N₂O) trends and alarms may vary depending on the host device. Specifications listed represent the capabilities of the modules. All module measurement options (Ai, V, X) may not be available in all host devices. Always check the host device's User Manual for additional information.



Environmental specifications

Operating conditions

Temperature	10 to 40°C (50 to 104°F)
Relative humidity	10 to 98% RH, non-condensing
Ambient pressure	660 to 1060 mbar

Storage conditions

Temperature	-25 to 60°C (-13 to 140°F)
Relative humidity	10 to 90% RH, non-condensing
Ambient pressure	500 to 1060 mbar

Physical specifications

Dimensions (H x W x D), excluding water trap	112 x 37 x 205 mm (4.4 x 1.5 x 8.1 in)
Weight	0.7 kg (1.5 lb)

Imagination at work

Product may not be available in all countries and regions. Full product technical specification is available upon request. Contact a GE Healthcare Representative for more information. Please visit www.gehealthcare.com/promotional-locations.

Data subject to change.

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