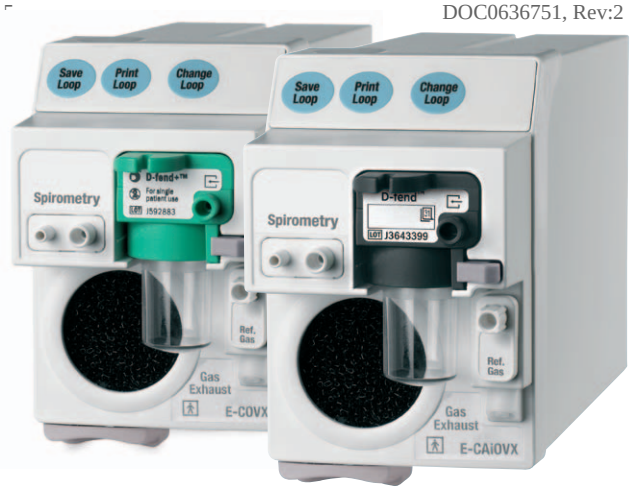
GE Healthcare



Compact Airway Modules E-CAiO(V)(X), E-CO(V)(X)

Comprehensive respiratory monitoring for anesthesia and critical care applications

This family of compact airway modules is designed to support respiratory monitoring in anesthesia and critical care areas. Depending on the module version and clinical application needed they provide measurements of airway gases, anesthetic agents with identification, Patient Spirometry and gas exchange/metabolics.

Features

- Airway gases measured by the sidestream method
- Calculated balance gas values
- 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
- Anesthesia- and critical care-specific water separation systems to support care area workflow
- Numerical and graphical trends of measured data available together with parameters on the monitor's screen to support multiparameter-based clinical decision making
- Detects end inspiratory and end expiratory occlusions automatically and calculates values for Static Plat, Static PEEPi+e and Static Compliance

Clinical measurements

- CO_2 and N_2O – GE infrared technology:
  Inspired and end-tidal values, CO_2 waveform and respiration rate
- Respiration rate – calculated from the CO_2 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 (O_2) 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, print or change loops
- Gas exchange – Direct 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

Sampling rate	200 ±20 ml/min

Automatic compensation for atmospheric pressure variation (500 to 800 mmHg), temperature and CO_2, O_2, N_2O, agent cross effect compensation. Parameter display update interval typically breath-by-breath.

Functional alarms for

- Blocked sample line
- Water trap check
- Water trap replacement
- Low gas sample flow

Letters in the module name stand for

C = CO_2 and N_2O

Ai = Anesthetic agents and agent identification

O = Patient O_2

V = Patient Spirometry

X = Gas exchange

Non-disturbing gases

Ethanol, acetone, methane, nitrogen, nitric oxide, carbon monoxide, water vapor:
Maximum effect of non-disturbing gases on readings:
CO_2 < 0.2 vol%; N_2O, O_2 < 2 vol%;
anesthetic agents < 0.15 vol%

Carbon dioxide (CO_2)

CO_2 waveform

$EtCO_2$	End-tidal CO_2 concentration
$FiCO_2$	Inspired CO_2 concentration
Measurement range	0 to 15 vol% (0 to 15 kPa, 0 to 113 mmHg)
Accuracy	±(0.2 vol% + 2% of reading)

GE infrared sensor

Adjustable low and high alarm limits for $EtCO_2$ or $FiCO_2$

Respiration rate (RR)

Measurement range	4 to 60 breaths/min
Detection criteria	1% variation in CO_2

Adjustable low and high alarm limits for respiration rate; alarm for apnea

Patient oxygen (O_2)

O_2 waveform

FiO_2	Inspired O_2 concentration
EtO_2	End-tidal O_2 concentration
FiO_2-EtO_2	Inspired-expired difference
Measurement range	0 to 100 vol%
Accuracy	±(1 vol% + 2% of reading)

GE differential paramagnetic sensor

Adjustable low and high alarm limits for FiO_2 or EtO_2

Nitrous oxide (N_2O)

FiN_2O	Inspired N_2O concentration
EtN_2O	End-tidal N_2O concentration
Measurement range	0 to 100 vol%
Accuracy	±(2 vol% + 2% of reading) $N_2O \leq 85\%$

Alarm for FiN_2O >82%

Note: N_2O is only displayed with CARESCAPE* ANE and PACU software, and AS/3 and S/5 modular monitors with ANE software.

Anesthetic agent (AA)

Anesthetic agent waveform

FiAA	Inspired anesthetic agent concentration
EtAA	End-tidal anesthetic agent concentration

MAC or MACage value displayed

Agent mixture detection

Measurement range

Sevoflurane	0 to 8 vol%
Desflurane	0 to 20 vol%
Isoflurane, enflurane, halothane	0 to 6 vol%

Accuracy	±(0.15 vol% + 5% of reading)

Agent identification

Identification threshold	0.15 vol%

Adjustable high and low alarm limits for EtAA, FiAA

Patient Spirometry

Pressure-volume loop

Flow-volume loop

Airway pressure and flow waveforms

Adjustable low and high alarm limits for Ppeak, PEEPtot and MVexp

Messages for MVexp << MVinsp and for low volumes

Detection through D-lite or Pedi-lite flow sensor and gas sampler with following specifications:

	D-lite(+)	Pedi-lite(+)
Respiration rate	4 to 35 breaths/min	4 to 50 breaths/min
Tidal volume		
Measurement range	150 to 2000 ml	15 to 300 ml
Accuracy	±6% or 30 ml	±6% or 4 ml
Minute volume		
Measurement range	2 to 20 l/min	0.5 to 5 l/min
Airway pressure		
Measurement range	-20 to +100 cmH_2O	-20 to +100 cmH_2O
Accuracy	±1 cmH_2O	±1 cmH_2O
Display units	cmH_2O, mmHg, kPa, mbar, hPa	
Flow		
Measurement range	-100 to +100 l/min	-25 to +25 l/min
I:E		
Measurement range	1:4.5 to 2:1	1:4.5 to 2:1
Compliance		
Measurement range	4 to 100 ml/cmH_2O	1 to 100 ml/cmH_2O
Airway resistance		
Measurement range	0 to 40 cmH_2O/l/s	0 to 40 cmH_2O/l/s

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
Resistance		
at 30 L/min	0.5 cmH_2O	
at 10 L/min		1.0 cmH_2O

Gas exchange and metabolics

$\dot{V}O_2$	Oxygen consumption
$\dot{V}CO_2$	Carbon dioxide production
Measurement range	20 to 999 ml/min
EE	Energy expenditure
Measurement range	0 to 6000 kcal/d 0 to 24000 kJ/d
RQ	Respiratory Quotient ($\dot{V}CO_2/\dot{V}O_2$)
Measurement range	0.6 to 1.2 in
Accuracy	Valid for respiration rates 4 to 35 breaths/min
$FiO_2 < 65\%$	± 10% or 10 mL
$65\% \leq FiO_2 < 85\%$	± 15% or 15 mL

Detection through D-lite(+) or Pedi-lite(+) flow sensor and gas sampler. (See the measurement ranges and sensor specifications above.)

Adequate $\dot{V}O_2/\dot{V}CO_2$ values cannot be measured with leaking airway, with FiO_2 higher than 85%, or when N_2O or xenon is present in ventilation.

Monitor compatibility

CARESCAPE modular monitors

AS/3, CS/3 and S/5 modular monitors using software S-STD94, S-ARK94, S-ANE97, S-ICU97 or later versions

Displayed data, trends and alarms may vary depending on the host device.

Environmental specifications

Operating conditions

Temperature	10 to 40°C (50 to 104°F)
Relative humidity	10 to 95% non-condensing

Storage conditions

Temperature	-25 to 70°C (-13 to 158°F)
Relative humidity	10 to 95% non-condensing

Physical specifications

Dimensions (H x W x D)	11.2 x 7.5 x 22.8 cm (4.4 x 3.0 x 9.0 in)
Weight	1.6 kg (3.5 lb)

Warranty

One year

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