Cardiac Output Module and S(c)vO_2 Module, E-COP, E-COPSv

For monitoring the state of the heart

The E-COP module integrates the thermodilution cardiac output (C.O.), right ventricular ejection fraction (REF) and invasive blood pressure (P) measurements onto CARESCAPE™ monitor's screen. The E-COPSv module provides the additional measurement of mixed venous oxygen saturation (SvO_2) and central venous oxygen saturation ($ScvO_2$). The module is IEC 60601-1 3rd edition compliant.

Features

- Modules contain direct keys for starting the C.O. measurement and zeroing invasive pressure channel
- Single and automatic set of C.O. measurement types
- Up to six C.O. measurements can be edited for an averaged C.O.
- Hemodynamic and oxygenation calculation display view
- Provides the following hemodynamic calculations with indexed values: CI, SV, SI, SVR, SVRI, PVR, PVRI, LVSW, LVSWI, LCW, LCWI, RCW, RCWI, RVEDV, RVEDVI, RVSW, RVSWI+RVESV and RVESVI
- Provides the following oxygenation calculations with indexed values: CaO_2, CvO_2, $C(a\text{-}v)O_2$, VO_2, VO_2I, RQ, ATMP, VO_2 calc., VO_2I calc., O_2ER, DO_2, DO_2I, PaO_2, $AaDO_2$, CcO_2, Qs/Qt, CO calc. and CI calc.
- Editing of calculation input data
- Trending and printing of calculations
- Insertion/removal of the module without interrupting other monitoring
- SvO_2, $ScvO_2$, C.O. and REF measurements provided with Edwards Lifesciences Corp. compatible catheters

Technical Data

Direct function keys

Zero P4/P8	Zeros invasive blood pressure P4/P8
Start C.O.	starts C.O. measurement

Cardiac output (C.O.)

Measurement method	C.O. is the amount of blood ejected by the heart to the peripheral circulation every minute. Cardiac output is measured utilizing the thermodilution technique
Measurement range	0.5 to 20 L/min
Display resolution	0.01 L/min (C.O. >10 L/min; resolution 0.1 L/min)
Repeatability	±2% or ±0.02 L/min
Numerical display	Cardiac output, cardiac index, blood and injectate temperatures
Injectate temperature range	0 to 27°C (32 to 80.6°F)
Blood temperature range	17.5 to 43°C (63.5 to 109.4°F)
Injectate temperature accuracy	±0.5°C (0 to 27 °C)/ ±0.9°F (32 to 80.6°F)
Injectate volume	3, 5, or 10 mL
Catheters	Edwards Lifesciences Corp.
Blood temperature accuracy with Edwards Lifesciences Corp. catheters	±0.5°C (17.5 to 30.9°C)/ ±0.9°F (63.5 to 87.6°F) ±0.3°C (31 to 43°C)/ ±0.5°F (87.8 to 109.4°F)

SvO_2 and $ScvO_2$

Measurement method	SvO_2/$ScvO_2$ measurement utilizes a spectrophotometric technique involving the use of light emitting diodes (LEDs) that produce red and infrared light
Measurement range	1 to 98%
Measurement accuracy	±2% SvO_2/$ScvO_2$ equals 1 standard deviation for range of 30 to 95% SvO_2/$ScvO_2$ and 6.7 to 16.7 g/dl Hb when using in vivo calibration
Display resolution	1%
Catheters	Edwards Lifesciences Corp. SvO_2 or $ScvO_2$ catheter and optical module (OM-2E)

Right ventricular ejection fraction (REF)

Measurement method	Ejection fraction is determined using an exponential technique by synchronizing sensed ECG R-waves with points of temperature changes on the time temperature (thermodilution curve). Once ejection fraction, C.O. and heart rate are known, right ventricular volumes may be calculated.
Measurement range	1 to 85%
Repeatability	±2% as measured by electronically generated pulsatile curves for range 10 to 60%
Catheters	Edwards Lifesciences Corp. REF catheter

Invasive blood pressure

Measurement method	Invasive blood pressure is converted to an electrical signal by a pressure transducer. The signal is displayed continuously as a waveform and numeric value. The invasive pressure setup consisting of connecting tubing, pressure transducer, an intravenous bag of normal saline or other flush liquid connected together by stopcocks, is attached to the arterial catheter. The pressure transducer is placed at the same level with the heart and electrically zeroed
Measurement range	-30 to 320 mmHg
Measurement accuracy	±4% or ±4 mmHg
Transducer sensitivity	5 µV/V/mmHg
Pressure filter	0 to 22 Hz (-3 dB) adjustable upper limit 4 to 22 Hz

Waveform display

Range	-30 to 300 mmHg
Scales	Adjustable in 10 mmHg increments

Numerical display

Resolution	1 mmHg
Alarms	Adjustable high and low alarm limits for systolic, diastolic and mean pressures

Pulse rate

PR from ART and FEM

Measurement range	30 to 250 bpm
Display resolution	1 bpm
Accuracy	±5% or ± 5 bpm

Monitor compatibility

CARESCAPE modular monitors

Environmental specifications

Operating conditions

Temperature	10 to 40°C (50 to 104°F)
Relative humidity	10 to 90% non-condensing

Storage conditions

Temperature	-25 to 60°C (-13 to 140°F)
Relative humidity	10 to 90% non-condensing

Physical specifications

Dimensions (H x W x D)	11.2 x 3.7 x 18.7 cm (4.4 x 1.5 x 7.4 in)
Weight	0.35 kg (0.77 lb)

Imagination at work

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