

Entropy module, E-ENTROPY

A key measurement for personalized anesthesia



The E-ENTROPY Module is a single-width, plug-in module with the unique Entropy™ algorithm that monitors the state of the brain. It is indicated for use within the hospital for adult and pediatric patients older than two years.

Benefits of Entropy measurement (1,2)

In adults, Entropy measurement

- May be used as an aid in monitoring the effects of certain anesthetic gases
- May help the user titrate anesthetic drugs according to the individual needs
- May be associated with a reduction of anesthetic use and faster emergence from anesthesia

Measurement technology

- Utilizes the intuitive and published Entropy algorithm, a Datex-Ohmeda innovation (3)
- Based on acquisition and processing of EEG and FEMG signals
- Features two Entropy parameters
Response Entropy (RE) - a fast reacting parameter for detecting activation of facial muscles
State Entropy (SE) - a steady and robust parameter for assessing the effect of anesthetic drugs in the brain in adults

Display options

- Entropy information integrated into CARESCAPE™ and S/5 modular anesthesia monitor screens
- Digital display and trending of the Entropy parameters and burst suppression ratio (BSR)
- Entropy EEG waveform display, one channel



Technical specifications

Direct function keys

Entropy	Opens Entropy menu
Check Sensor	Starts impedance measurement of sensor electrodes

Entropy

Measurement method	Entropy monitoring is based on acquisition and processing of raw EEG and FEMG signals using the Entropy algorithm. The signal is measured by placing a disposable sensor on patient's forehead. In adults, Entropy may help the anesthesiologist to assess the effect of certain anesthetics on the patient's brain.
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Amplifier

Amplification	10000
Input dynamic range	$\pm 400 \mu\text{V}$
Input offset	$\pm 300 \text{ mV}$
Frequency range	0.5 - 118 Hz
Noise level	$< 0.5 \mu\text{V}$ @ 0.5 - 118 Hz
Input impedance	1 M Ω @ 10 Hz
CMRR	$> 100 \text{ dB}$
Defibrillation protection	3000 V, 130 J

A/D conversion

Sampling frequency	1600 Hz
Resolution	60 nV

Waveform display (One channel of raw EEG)

Range	800 μV_{pp}
Scales	$\pm 25/50/100/250/400 \mu\text{V}$
Sweep speed	12.5/25/50 mm/s

Numeric display (RE, SE and BSR)

Range	RE 0-100 SE 0-91 BSR 0-100%
Accuracy	± 1 or $\pm 1\%$
Display resolution	1 digit
Display update	1 s

Impedance measurement

Measurement frequency	75 Hz
Current	10 μA
Range	0-30 kW
Resolution	0.1 kW
Accuracy	$\pm 1 \text{ kW}$ or $\pm 10\%$
Measurement time, all leads	5 s
Leads off detection	Continuous
Start of measurement	Manual/automatic

Monitor compatibility

CARESCAPE modular monitors with OR and PACU software

S/5 modular monitors using software L-(C)ANE03(A) or later versions

Environmental specifications

Operating conditions

Temperature	10 to 35°C (50 to 95°F)
Relative humidity	10 to 90% non-condensing

Storage conditions

Temperature	-25 to 50°C (-13 to 122°F)
Relative humidity	10 to 90% non-condensing

Physical specifications

Dimensions (H x W x D)	11.2 x 3.7 x 18.6 cm (4.4 x 1.5 x 7.3 in)
Weight	0.35 kg (0.8 lb)

Warranty

One year

- 1 Aime, I. *et. al.*, Does monitoring Bispectral Index or Spectral Entropy reduce sevoflurane use? *Anesth Analg.* **103(6)**, 1469-77 (Dec 2006).
- 2 Vakkuri, A. *et. al.*, Spectral Entropy monitoring is associated with reduced propofol use and faster emergence in propofol-nitrous oxide-alfentanil anesthesia. *Anesthesiology* **103(2)**, 274-279 (2005).
- 3 Viertiö-Oja, H. *et. al.*, Description of the Entropy algorithm as applied in the Datex-Ohmeda S/5 Entropy Module. *Acta Anaesthesiol Scand* **48(2)**, 154-161 (2004).

For full publication reference list please contact GE Healthcare.

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Our “healthymagination” vision for the future invites the world to join us on our journey as we continuously develop innovations focused on reducing costs, increasing access and improving quality and efficiency around the world.

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