

CritiCool Pro

Technical Specification



CritiCool Pro thermal Regulation System – Technical Specifications

The **CritiCool Pro** system is composed of three elements, the **CritiCool** device, the **CureWrap** and the **Vitalogik 4000** patient monitor.

The **CritiCool** device functions as a control unit constantly monitoring the Patients' core temperature and as a cooling/heating device which brings the circulating water via the curewrap garment, The desired patient temperature is preset by the physician with a possible range of target temperature from mild Hypothermia to Normothermia.

The **Vitalogik 4000** patient monitors enables vital signs monitoring along with controlling the CritiCool and the thermo regulation process.

HARDWARE

Heat Exchangers

- Peltier Technology (TECs)

Water tank

- Sterile/ 0.22 micron filtered tap water usage
- Tank Capacity: 6 liters (1.6 gal.)

Water Temperature

- Water Temperature Accuracy $\pm 0.3^{\circ}\text{C}$ (0.4 $^{\circ}\text{F}$)
- Water Temperature (outflow) 13-40.8 $^{\circ}\text{C}$ (55-105.4 $^{\circ}\text{F}$)

Pump

- Water Circulating Pump
- Pump Rate: 1.2 L/min
- Protected by 263 micron filter

Patient Temperature Channels

- 2 Channels: Core, Surface
- Sensor Temperature Range: 15 $^{\circ}\text{C}$ to 44 $^{\circ}\text{C}$ (59 $^{\circ}\text{F}$ to 111.2 $^{\circ}\text{F}$)
- Sensor Temperature Accuracy $\pm 0.3^{\circ}\text{C}$ (0.4 $^{\circ}\text{F}$)

Temperature and Pressure Sensors

- System Sensors:
 - ◊ 3 Internal Temperature Sensors: Water in, Water out, Thermostat
 - ◊ 2 Pressure Sensors
- Safety measures:
 - ◊ Over pressure protection and alarm
 - ◊ High water temperature protection and alarm

Physical Dimensions

- Mobile Unit with 4 wheels and 2 brakes
- 260 mm W x 625 mm D x 940 mm H / (10.23"W x 24.6"D x 37"H)

Net Weight

- 34 kg / 75 lb

Electricity Input Power

- 230/115 VAC (Switchable) with isolation transformer 50/60Hz
- 100VAC with isolation transformer 50/60Hz

Maximum Current

- 230 VAC 2.5A-3A
- 115 VAC 4.8A-5A
- 100 VAC 6A-6.6A

Environmental Operating Conditions

- Temperature: 5 $^{\circ}\text{C}$ to +40 $^{\circ}\text{C}$ (50 $^{\circ}\text{F}$ to 104 $^{\circ}\text{F}$)
- Humidity: 10 to 93%, non-condensing
- Should not be used in an atmosphere with flammable anesthetic mixtures.

Environmental Storage Conditions

- Ambient temperature range of -15 $^{\circ}\text{C}$ to (+68) $^{\circ}\text{C}$ (5 $^{\circ}\text{F}$ to 154 $^{\circ}\text{F}$)
- Humidity: 10 to 93%, non-condensing
- Maximum storage time without calibration is 52 weeks

External Ports

- 1 X Isolated Serial Port

LCD Display

- Size: 5.5"
- Resolution: 128x240

SOFTWARE

Displayed Information

- Mode of operation
- Set point temperature (Range: 32 $^{\circ}\text{C}$ - 38 $^{\circ}\text{C}$)
- Core Temperature
- Surface temperature
- System status and alarms
- Technician mode display

Operating Modes (continuous)

- Mild Hypothermia (Cooling):
 - ◊ Adult/Neonatal Mode
- Auto Re-Warming
- Normothermia
- Stand-By
- Emptying

Languages

- German
- English
- French
- Finnish
- Turkish
- Italian
- Dutch
- Spanish
- Portuguese
- Swedish
- Norwegian
- Danish
- Russian
- Polish

User Interface (GUI)

- 4 soft push buttons

ACCESSORIES

Temperature Sensors

- YSI 400 Series Probes
- Reusable core (Adult, Infant)
- Reusable surface
- Disposable core (one size)
- Disposable adapter core
- Disposable surface (one size)
- Disposable adapter surface

CureWraps

- Sizes range from 40 cm–196 cm (1'4"–6'5")
- Duration of use: 5 days
- Each garment contains a 33mg AQUATAB purification tablet
- Wrap Storage Span: 5 years
- Storage Conditions:
 - ◊ Temperature: 10 $^{\circ}\text{C}$ to 27 $^{\circ}\text{C}$
 - ◊ Humidity: 10-90%
- Transport Conditions
 - ◊ Temperature: -20 $^{\circ}\text{C}$ to +60 $^{\circ}\text{C}$
 - ◊ Humidity: 20%-95%

External Water Tubes

- Adult—Dual/Triple connector to garment
- Pediatric/Infant—Dual connector to garment

CliniLogger (Optional)

Detailed information on next page

VL 4000 for *CritiCool Pro*

Technical Specification



Hardware and Parameters

VitaLogik 4000* is a compact monitor with a built-in display and battery back-up.

Parameters Included

- 3/5/12 lead ECG
- Respiration
- NIBP
- SpO2 (Masimo®/ Nellcor®)
- 2 Temperatures

Additional Parameters (option)

- 12 Lead ECG (optional)
- 2 x IBP (optional 4 IBP available)
- CO / 2 additional Temperatures
- 4 channels Analog output or Remote control port.
- Microstream or MicroPod EtCO2 (optional)
- Anesthetic Gases supported via UIM Port (optional)

Universal Input Module - "UIM"

- 2 x RS232 ports
- Interface to other vendor devices:
 - ◊ Anesthetic gases: Poet IQ, Andros 4800, Leon Plus, IRMA
 - ◊ Ventilators: EVITA, Monet, Matisse, Saturn Evo, Stephanie, Babylog VN500
 - ◊ Continuous CO: Vigilance, Vigileo, PiCCO2
 - ◊ Other: BISx, CritiCool, Micropod, Radical-7, TOF Watch

Display

| | |
|----------------------------------|--------|
| LCD (1024x768) | 12.1" |
| Waveform display horizontal area | 160 mm |
| Numeric Display | |
| horizontal area | 75 mm |
| vertical area | 20 mm |
| Very Big Numbers | |
| One or Two Lead ECG WF | ✓ |
| HR height | 34 mm |
| Four areas with Waveform height | 13 mm |
| Numeric Vital Signs height | 25 mm |

- Interface to a Remote Display
- Waveform Display - Standard
- 7 sec, grid 5 boxes/sec (25 mm/sec nominal)
- Up to 8 traces and up to 14 traces (during 12 lead ECG)
- Overlapping Pressure Waveforms mode
- Sweep Speed: 6.25, 12.5, 25, 50, 100 mm/sec (nominal)
- Cardio Respiratory Graph (CRG) - up to 4 parameters
- Big Numbers
- Waveform + Trend Format: 2/3 waveforms and 1/3 graphic Trend
- Very Big Numbers mode

CPU Details

- Via X 86 Core Fusion CPU
- Sound Blaster 2W audio power / 8Ω
- Mass storage: 1 GB.
- Operating System: QNX 4.25
- Window manager: Photon
- SW upgrades via network or memory card

Dimensions \ Weight

VitaLogik 4000*

HxWxD: 300x324x180 mm (11.9x12.8x7.1 inches)
Weight: 5.9Kg. (13.00 lb) (for basic configuration with battery)

Power requirement

- 100-120 VAC, 2A, 50/60 Hz
- 230-240 VAC, 1A, 50 Hz

Recorder (Optional)

- Integrated Recorder up to 3 channels

Battery

| Single Battery | |
|------------------------|---------------|
| Lithium Ion | 14.8V / 5.2A |
| Operation Time (Hours) | 3 |
| Charge Time (Hours) | 3 |
| Dual Battery | |
| Lithium Ion | 14.8V / 10.4A |
| Operation Time (Hours) | 6 |
| Charge Time (Hours) | 6 |

Environmental Operating Conditions

- Temperature: +5°C to +40°C (41°F to 104°F)
- Humidity: 10 to 93 percent, non-condensing

Environmental Storage Conditions

- Temperature: -15°C to +68°C (5°F to 154°F)
- Humidity: 10 to 93 percent, non-condensing

Network

- LAN Physical: IEEE 802.3 Ethernet interface 10/100 BaseT
- Protocol: TCP/IP
- Serial Interface RS232 (optional)
- Connectivity to: Ensemble (CNS), Enguard and network printer
- Wireless LAN (optional) **includes:**
 - ◊ Utilizes an industry-standard 802.11b/g IEEE compliant radio card
 - ◊ Dual-diversity dipole antenna
 - ◊ Signal strength indicator
 - ◊ WPA security and encryption

User Controls

- 5 Fixed keys
- Quicknob
- Remote Control Keypad (optional)
- Touch Screen—ELO IT (optional)
- Barcode Reader (optional)

Patient Data storage

- Demographic Data
- Charts - Numerical
- Trend - Graphic
- Full Disclosure - All leads ECG waveform
- Overview - All Waveforms with top ECG
- Event Strips - 20 Seconds of all ECG and Vital signs waveforms

| Storage Type | 8GB | 16GB | 32GB | 64GB |
|---------------------|---------------|---------|---------|---------|
| Charts | 80 days | 80 days | 80 days | 80 days |
| Trends | 80 days | 80 days | 80 days | 80 days |
| Full disclosure | ~5 Days | ~8 Days | ~8 Days | ~8 Days |
| Overview | ~5 Days | ~8 Days | ~8 Days | ~8 Days |
| Event Strips | 75 | 75 | 75 | 75 |
| aEEG data | Not supported | 8 Days | 8 Days | 8 Days |
| aEEG Sections | Not supported | 50 | 50 | 50 |
| Saved Patients | 10 | 10 | 10 | 10 |
| AEAG Saved Patients | Not supported | 3 | 8 | 25 |
| MPM storage time | ~5 HR | ~5 HR | ~5 HR | ~5 HR |
| MPM saved files | 3 | 3 | 3 | 3 |

Calculation

- Medications
- Hemodynamics
- Respiratory Mechanics
- Oxigenation
- Renal Clearance
- Fick Cardiac Output
- Heart Rate Variability (HRV):
 - ◊ Time Domain
 - ◊ Histogram

Default Alarms

- User defined
- Fixed or calculated values
- Alarm levels:
 - ◊ Clinical levels: C1, C2, C3, C4
 - ◊ Technical levels: T1, T2.
- Visual and Audible alarm

Analog Output (Optional)

- ECG II – 1Volt/mV (pin1, 5 Gnd)
- ECG V1 – 1Volt/mV (pin2, 6 Gnd)
- QRS – 5 Volt
- ART – 1Volt/100 mmHg (pin4, 8 Gnd)
- Output to input delay < 20 mSec

Languages

- English, Dutch, Spanish, French, Greek, Italian, Polish, Portuguese, Russian,

3/5 ECG Lead (12 Lead optional)

- Leads: ECG cables for 3/5-lead surface ECG with defibrillation protection in the cable (12 Lead optional).
- Input Dynamic Range: ± 5 mV peak to peak
- Input DC Offset: ± 530 mV
- Baseline Correction: Automatic recovery of waveform within 100 msec
- Notch Filtering: 50Hz or 60Hz
- Frequency Response:
 - ◊ Diagnostic 0.05 to 150Hz
 - ◊ Monitoring 0.5 to 40Hz
 - ◊ ST 0.05 to 40Hz
 - ◊ Exercise 1 to 25Hz
- Sensitivity: 0.25, 0.5, 1.0, 2.0, 4.0, 8.0 mV/cm (nominal)
- Common Mode Rejection: 120 dB minimum
- Noise: 30 μ V
- Input Impedance: 2.5 mega Ω
- Defibrillator Pulse Protection: Yes
- Baseline Recovery: < 8 sec
- Lead Fault Sense: Based on impedance with driven lead: Sense current < 90 nA
- Digital Sample Rate: 640Hz
- Sample Resolution: 24 bit
- Pacemaker Detection and Rejection of Pacer Artifact:
 - ◊ Amplitude: +/- 2 mV to +/- 700 mV
 - ◊ Width: 0.1 ms to 2.0 ms
- Pacer Detection Flag inserted into ECG waveform.
- 3 Detection Modes:
 1. Fixed Threshold 2mV
 2. Adaptive 1 Threshold 1/2mV High Sensitivity
 3. Adaptive 2 Threshold > 2mV High Immunity
- Auto Cable Detection
- Audio Indicator: QRS Beep—Adjustable volume
- QRS Detection Range:
 - ◊ Height: 0.25 or 0.15 mV to 5.0 millivolt
 - ◊ Width: 70 to 120 milliseconds
- Heart Rate Counting:
 - ◊ Range: 0 to 350 BPM
 - ◊ 0-300 Accuracy: ± 2 BPM, 300-350 Accuracy ± 4 BPM
- Heart Rate averaging:
 - 3/4 of last average + 1/4 new beat (about 8 beats between 60 to 120, or 120 to 60)
- **Note:** Values below 20- forced to zero
- Heart Rate Alarm Settings
- High and low rate: 20 - 350 BPM non-overlapping
- Leads analyzed for Heart Rate and Arrhythmia Configuration:
 - ◊ Top two displayed
- ECG Leads:
 - ◊ I, II, III (3 Lead cable)
 - ◊ I, II, III, aVR, aVL, aVF, V (5 Lead cable)
 - ◊ I, II, III, aVR, aVL, aVF, V1-V6 (12 Lead cable)
- ST on all leads:
 - ◊ Automatic or Manual
 - ◊ ST range + 8 mm to - 8 mm
 - ◊ ST Alarm
- Arrhythmia: Detection and alarm on 19 Arrhythmias
- PR and QT measurement and display
- Data Storage: Beat notification, RR Interval, Heart Rate, ST values, Arrhythmia, Alarms, Alarm event markers

Respiration

- Leads: RA-LA or Leads: RA-LL
- Excitation: 65 kHz, < 1 mA
- Input Impedance: >2.5 mega Ω
- Frequency Response: 0.13 to 2.5Hz
- Impedance Range: 100 to 3000 Ω
- Input Sensitivity Range: 0.2 to 5 Ω
- Digital Sample Rate: 640 Hz
- Sample Resolution: 24 bit
- Sweep Speed: ECG speed, 6.25, 12.5 mm/Sec (nominal)
- Gain: Automatic or 1/8 to x 8
- Respiration Rate Counting Range: 0 to 150 breaths/min
- Respiration rate: Accuracy +/- 1 per minute
- Respiration Alarm Settings
 - ◊ Low rate: 0 - 150 BPM
 - ◊ High rate: 0 - 150 BPM
 - ◊ Apnea: User configurable (10, 15, 20, 30, 45, 60, 90 Sec.)
 - ◊ Cardiac coincidence alarm
 - ◊ Modes: Normal / Cardiac
- Data Storage: Respiration rate, Respiration rate Alarms, Apnea alarms
- Alarm event markers

Invasive Blood Pressure

- Site Labels: BPx, ART, PAP, CVP, RAP, LAP, ICP
- Input Sensitivity: 5 μ Volt/Volt/mmHg
- IBP waveform synchronized to ECG
- Dynamic Range
 - ◊ Pressure range: -50 to +350 mmHg
 - ◊ Zero range: ± 150 mmHg
 - ◊ Total dynamic range: -200 to +450 mmHg
 - ◊ Heart rate: 20—350 BPM
- Transducer Excitation Voltage: +5 VDC
Separate excitation driver for each channel
- Zero Accuracy: ± 0.2 mmHg
- Zero Drift:
 - Less than ± 0.2 mmHg in 24 hours, (at constant temperature)
- Blood Pressure Accuracy:
 - ± 2 mmHg or $\pm 2\%$, whichever is greater, exclusive of transducer
- Blood Pressure Linearity: within 1% across entire range
- Waveform Frequency Response: 0 - 40 Hz
- Sampling Rate: 640 Hz
- Sample Resolution: 24 bit
- Fault Detection; Transducer in/out, Cable out
- Data Storage: Systolic, Diastolic and Mean; Alarms

Pulse Oximetry (SpO2)

- Nellcor® Oximax or Masimo® SET Technology
- Plethysmograph waveform
- Saturation Range: 0% to 100% SpO2
- Extreme Alarm Capability
- SpO2 Accuracy: SpO2 % +/-3 digits standard deviation
- Pulse Rate Range: 20 to 250 BPM +/-3 BPM
- Saturation alarm limits: 0% to 100%
- Data Storage: Heart rate and O2 saturation, Alarms

Thermo Dilution Cardiac Output

- Adapter and Compatibility Cables:
 - ◊ CO Set interface cable
 - ◊ Ice Bath YSI-400 cardiac output interface cable
 - ◊ Dual temperature interface cable (YSI-400)
- Temperature Range
 - ◊ Blood temperature: 27°C to 45°C (81°F to 113°F)
 - ◊ Injectate temperature: 0°C to 25°C (32°F to 77°F)
 - ◊ Body temperature: 0°C to 45°C (32°F to 113°F)
- Accuracy $\pm 0.1^\circ$ C over the entire range
- Digital Sample Rate: 160 Hz
- Sample Resolution: 24 bit
- Frequency Response: 0 to 15 Hz
- Cardiac Output Determination Range: 0 to 20 liters per minute
- Injectate Volumes: 1, 3, 5, and 10cc
- Displayed Data: Cardiac Output, Cardiac Index, Stroke Volume, Stroke Volume Index, Blood Temperature, Injectate Temperature, Trial Number
- Data Storage:
 - In Cardiac Output mode:* Cardiac Output, Hemodynamic Calculation results Measuring time
 - In Two Temp mode:* Temperatures and Delta-Temp, Temperature Alarms

Non-Invasive Blood Pressure

- Oscillometric Method
- Displayed Parameters: Systolic, Diastolic, Mean pressure values, Time of last measurement, and next measurement
- Cuff Size: Adult, Pediatric, Infant, Neonatal
- Inflation Rate: Within 5 sec.
- Initial inflation target: 150 mmHg, Adult/Pediatric
- Initial inflation target: 100 mmHg, Neonatal
- Over pressure limit : 290 mmHg, Adult/Pediatric
- Over pressure limit : 145 mmHg, Neonatal
- Cycle Times
Deflation time (typical): 30 sec.; BP time-out: 60 - 180 sec.
- Measurement Ranges, Adult (in mmHg)
Systolic: 30 to 255; Diastolic: 15 to 220; Mean: 20 to 235
- Measurement Ranges, Neonatal (in mmHg)
Systolic: 30 to 135; Diastolic: 15 to 110; Mean: 20-125
- Pressure: Transducer Accuracy ± 3 mmHg or $\pm 2\%$, whichever is greater
- Heart Rate:
 - ◊ Adult/Pediatric: 30 to 240 BPM
 - ◊ Neonatal: 40 to 240 BPM
- Modes: Auto, Manual, STAT
- Automatic intervals 1,2,3,4,5,10,15,20,30,60,120,180,240,360, 480 minutes
- Data Storage: Measurement time markers, S/D/M, Alarm event markers

Temperature

- YSI400 series Probes
- Body temperature: 0°C to 45°C (32°F to 113°F) $\pm 0.1^{\circ}\text{C}$
- Temperature Alarm Range: 25°C to 45°C (77°F to 113°F)
- Data storage: Temperature and Delta temperature, Temperature alarms

Delta Temperature

- Range + / - 45°C
- Delta temp Accuracy: $\pm 0.1^{\circ}\text{C}$

End Tidal CO₂ Microstream (EtCO₂)

- Sidestream method
- Flow rate: 50 ml/min (accuracy: $-7.5\text{ml}/\text{min} + 15\text{ml}/\text{min}$)
- Displayed Data:
 - ◊ Waveform labels and annotations
 - ◊ EtCO₂, in CO₂ and respiration rate values
- CO₂ units : mmHg or kPa or Vol%
- CO₂ Display Range: 0-99 mmHg
- Measurement Resolution:
 - ◊ Waveform resolution 0.1 mmHg
 - ◊ EtCO₂, inCO₂ 1 mmHg
- Accuracy:
 - ◊ pCO₂ at see level
 - ◊ 0-38 mmHg ± 2 mmHg
 - ◊ 39-99 mmHg $\pm (5\%$ of reading $+ 0.08 \times (\text{reading} - 39\text{mmHg}))$
- Accuracy in presence of interfering gases
 - ◊ 0-38 mmHg $\pm (2$ mmHg $+ 4\%$ of reading)
 - ◊ 39-150 mmHg $\pm (9\%$ of reading $+ 0.08 \times (\text{reading} - 39\text{mmHg}))$
- Respiration Rate:
 - ◊ 0 to 70 bpm: ± 1 bpm
 - ◊ 71 to 120 bpm: ± 2 bpm
 - ◊ 121 to 150 bpm: ± 3 bpm
- Rise Time: 190 msec (10% - 90%)
- Delay Time: 2.7 Sec (10% - 90%) typical
- Start-up Time: 30 sec typical
- Ambient Temperature: 0-40°C,
Humidity: 10-95%, non-condensing
- Barometric Pressure: 430-795 mmHg
(-1250 to 15,000 ft. ; -380 to 5200 meter)
- Calibration required: Initially—after 1200 operating hours and then once a year or 4000 operating hours
- CO₂ Alarm Limits: 0 to 100 mmHg; 0 to 10%; 0 to 15 kPa
- Respiration Rate Alarm Limits: Neonatal - 0 to 150 BMP; Adult - 0 to 50 BPM
- Data Storage: EtCO₂, inCO₂ and Respiration Rate values, Alarms, Apnea Alarm
- Exhaust Gas Outlet

BIS Interface

BISx Technology

- Bispectral Index (BIS): 0 to 100
(0 = no brain activity, 100 = fully conscious)
- Electromyographic Strength (EMG):
25 to 100 dB (where $1\mu\text{V} = 40\text{dB}$)
- Signal Quality Index (SQI): 0 to 100%
- Suppression Ratio (SR): 0 to 100%
- Spectral Edge Frequency (SEF): 0.5 to 30.0 Hz
- Total Power (TP): 40 to 100 dB ($1\mu\text{V RMS} = 40\text{dB}$)
- Burst Count (BC): 0 to 30 (with an Extend Sensor only)
- EEG: Two channel, real-time EEG waveform
- Noise (EEG Waveform) $< 0.3 \mu\text{V RMS}$ ($2.0\mu\text{V}$ peak-to-peak)
- BIS Numeric Update Frequency: Once per second
- Band width: 0.25 to 100 Hz (- 3dB)
- Filters:
 - ◊ High Pass: 0.25, 1, 2 Hz
 - ◊ Low Pass: 30, 50, 70 Hz
 - ◊ Notch: 50 or 60 Hz
- Impedance Measurement Range: 0 to 999 kOhm
- Data Storage:
 - ◊ Numeric Chart
 - ◊ Graphic Trend and
 - ◊ EEG waveform full disclosure
 - ◊ CRG trend
- Display features:
 - ◊ EEG waveforms
 - ◊ EEG waveform + Trend of BIS and EMG
 - ◊ BIS value and alarm limit
 - ◊ EMG and SQI at vertical bars
 - ◊ SR, BC, TP numeric display
- Alarms:
 - ◊ High BIS alarm: 0-100
 - ◊ Low BIS alarm: 0-100

Anesthetic Gases Module

- Agent Gas External Module using Poet IQ bench technology
- Automatic 5 Agent Identification .
- Size: (WxDxH) 264 x 208 x 96 mm / 10.4 x 8.2 x 3.8 in.
- Weight 3.4 kg / 7.5 lbs.
- Power: Input Voltage 100 to 240 Vac - 48 to 62 Hz
- Sampling Gas Flow Rate: 100 ml/min.
- Environment:
 - ◊ Temperature: $+15$ to $+35^{\circ}\text{C}$ / $+59$ to 95°F
 - ◊ Humidity: 15 to 95% RH (non-condensing)
 - ◊ Barometric Pressure / Altitude: 525mmHg to 790mmHg
 - ◊ -300m to + 3,000m (-1,000 ft - 10,000 ft)

Gas Specifications

| Gas | Range | Accuracy (1-30 BPM) |
|-----------------------|------------------------------------------|-------------------------------------|
| CO ₂ | 0.0 to 30mmHg 30.1 to 76mmHg | $\pm 1.5\text{mmHg}$ 5% Relative |
| O ₂ - fast | 0.0 to 100.0% | $\pm 2.5\%$ abs. plus 2.5% rel. |
| Breath Rate | 0 to 100bpm | $\pm 2\text{bpm}$ |
| N ₂ O | 0.0 to 100% | $\pm 1.5\%$ abs. plus 5% rel. |
| Isoflurene | 0.00 to 7.5% | $\pm 0.1\%$ abs. plus 4% rel |
| Halothane | 0.00 to 7.5% | $\pm 0.1\%$ abs. plus 4% rel |
| Enflurane | 0.00 to 7.5% | $\pm 0.1\%$ abs. plus 4% rel |
| Sevoflurane | 0.00 to 9% | $\pm 0.1\%$ abs. plus 4% rel |
| Desflurane | 0.00 to 20% | $\pm 0.1\%$ abs. plus 4% rel. |
| MAC | Calculated from N ₂ O + Agent | |

Technical Specification

The CerebraLogik is a dual channel EEG amplifier, with Amplitude Integrated EEG (aEEG) recording and display capability. It is used as a front end EEG amplifier interfaced to VitaLogik Monitors, where EEG and aEEG can be displayed and stored, simultaneously with all patient vital signs monitored on the VitaLogik.

CerebraLogik Module

CerebraLogik interface to VitaLogik with Monitor mass storage:
16GB

Physical

- HxWxD: 140/95/30 mm (5.5/3.7/1.2 inch)
- Weight: 385gr (0.849 lb) (with mounting clip and cable)
- Interface Cable length: 1.2meter (47.2 inch)
- 5 sockets for DIN safety electrodes cables
- Power Consumption: 5V/300 mA
- Mounting Clip

Amplifier

- 2 different amplifiers: Left, Right + Reference.
- Input Range $\pm 400 \mu\text{V}$ p-p full scale
- Input impedance $> 5 \text{ M}\Omega$
- Linearity $\pm 2\%$
- DC input offset: $\pm 2500 \text{ mV}$ maximum
- Common Mode Rejection Ratio 130 dB at 50/60 Hz
- Frequency Response 0.5 Hz to 75 Hz (-3db)
- Noise $< 10\text{nV}/\sqrt{\text{Hz}}$ at 100Hz
- Bias Current: Less than 7nA per input
- Input isolation – Double isolation

A/D

- Sampling rate: 640 Hz per channel
- A/D resolution : 24 bits
- Low filter (High pass) 0.3/0.5/1.5 Hz
- High filter (Low pass) 15/35/50/70 Hz
- Degree of protection: Type BF Applied part

aEEG Monitoring Parameters

- 2 x Differential channel (Left, Right): EEG/aEEG channels
- 1 Cross Channel (Left to Right): EEG/aEEG
- Signal Quality (Resistance) - 0 to 5 (Arbitrary units)
- EEG Gain: 10,20,50,70,100,200 $\mu\text{V}/\text{cm}$;
- aEEG Range: 100, 200 μV
- EEG/aEEG history duration: Up to 7 days recording
- aEEG panel : 3 Hour Display
- EEG sweep speed : 15 or 30 mm/Sec
- Section marking
- Event marking
- Built-in Recorder (Optional)

Data Export

- Data printing on recorder (Optional)
- USB for Data output (viewer on PC)

Environmental Operating Conditions

- Temperature: $+5^{\circ}\text{C}$ to $+40^{\circ}\text{C}$ (41°F to 104°F)
- Humidity: 10 to 93 percent, non-condensing

Environmental Storage Conditions

- Temperature: -15°C to $+68^{\circ}\text{C}$ (5°F to 154°F)
- Humidity: 10 to 93 percent, non-condensing