CONTINUOUS NONINVASIVE BLOOD PRESSURE & HEMODYNAMICS

THE NEXT GENERATION OF NONINVASIVE MONITORING

CNAP® Monitor 500 HD
Sold as NIBP100D-HD

CNAP®

BIOPAC Systems, Inc.
Registered to ISO 9001:2008

Cnap®

hemodynamic control
CONTINUOUS NONINVASIVE HEMODYNAMIC CONTROL

FULL HEMODYNAMIC PICTURE

Hemodynamics
- Continuous noninvasive blood pressure waveform / trendview
- Cardiac Output
  CO, CI, Sv, SI
- Vascular Resistance
  SVR, SVRI

Dynamic Fluid Management
- PPV, SVV

> Continuous Blood Pressure: Sys, Dia, MAP, Pulse and Upper arm NBP: Sys, Dia

CONVENIENT CNAP® FINGER SENSOR

NONINVASIVE

EASY-TO-USE AND QUICK
- Quick set-up and error-free application
- Blood pressure waveform and values immediately available

ACCURATE AND RELIABLE
- Comparable with invasive clinical standards
- Reliable tracking (e.g. in subjects with volatile blood pressure)
- Noninvasive hemodynamic monitoring can be used as an addition to arterial line

COST EFFECTIVE
- Up to 77% cost savings through reusable CNAP® double finger sensor
**EASY-TO-USE QUICK START UP COST EFFECTIVE**

**FAST & ACCURATE HEMODYNAMIC OVERVIEW**
1, 2

- Early recognition
- Detection of hemodynamic reactions
- ...without arterial catheter

**EASY & RELIABLE TOOL FOR RESEARCH** 4, 5, 6, 7

- Noninvasive measurement
- Easy-to-use: all from one sensor
- Reliability clinically validated

**CLINICALLY VALIDATED AGAINST INVASIVE STANDARDS**

- CNAP® measurements are comparable to invasive arterial line measurements in terms of continuity, accuracy and waveform dynamics. 8, 9, 10
- CNAP® delivers reliable results for the efficient treatment of ICU and ER patients. 11, 12, 13, 14
- CNAP® shows outstanding performance in monitoring pediatric subjects without an arterial catheter. 15, 16
- Noninvasive CO with CNAP® HD® performs comparably to invasive CO monitoring. 17

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*The CNAP® Monitor HD is CE approved. FDA clearance is pending.*
CNAP® HD IN RESEARCH

reliable & accurate continuous noninvasive hemodynamics
for scientific purposes

KEY FEATURES

NBP Cuff
> Automated scaling to brachial pressure (gold standard) at start of measurement and user programmable
> Variety of sizes to fit pediatric thru large adult

Double finger sensors
> Quick and error-free application
> System includes 3 cuff sizes (small/medium/large)
> Long-term recording (24 hrs per hand)
> User selectable rotation interval up to 60 min. per finger

Continuous waveform & hemodynamics
> Continuous tracing of hemodynamic changes without interruptions to recalibrate
> Beat-to-beat systolic, diastolic, mean BP values
> Cardiac Output and further essential hemodynamic parameters

Connectivity, data storage, export and analysis
> Plug & play integration into all common data acquisition systems
> Easy data storage via USB interface
> Data format (*.csv) for import into all common data analysis software packages (e.g. AcqKnowledge, Matlab, MS Excel, SPSS, etc.)

Accuracy
> validated against clinical invasive standards (IBP, thermodilution) 1,2

APPLICATIONS IN RESEARCH

> Physiology > Neurology
> Psychophysiology > Psychology
> Autonomic Function > Sports / Exercise Physiology
> Cardiology > Pharmacology

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Sample rate</th>
<th>100 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage data format</td>
<td>*.csv (BP waveform; beat values, NBP)</td>
</tr>
<tr>
<td>Interfaces</td>
<td>AUX (non isolated): -5V to 5V</td>
</tr>
<tr>
<td></td>
<td>BP Wave Out (isolated): 5µV/V/mmHg</td>
</tr>
<tr>
<td>Adult &amp; Pediatric</td>
<td>~ 4 years (&gt; 20 kg)</td>
</tr>
<tr>
<td>Language Options</td>
<td>multilingual display</td>
</tr>
</tbody>
</table>
RESEARCHERS COUNT ON CNAP® HD TECHNOLOGY TO...

...study the different cardiovascular reactions during hypercapnia in different human races.³

...study the correlation between stroke severity and autonomic dysfunction.⁴

...study the effects of mainstream media on women’s physiological and psychological functioning.⁵

...study the detection of deception by use of continuous blood pressure.⁶

...develop an automated closed-loop double-vasopressor system to treat hypotension during spinal anesthesia for cesarean section.⁷

...study the relationship between cerebral perfusion during heat stress and the tolerance to a stimulated hemorrhage.⁸

...study the reactions of human body to challenge and threat - positive and negative stress.⁹,¹⁰,¹¹

...quantify emotional response and anxiety.¹²,¹³

...study the effects of sports and exercise on cardiovascular response.¹¹,¹⁴

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BENEFITS FOR RESEARCH

> Full hemodynamics from a simple fingersensor
> Reliable & accurate noninvasive beat-to-beat measurements
> Good for short & long-term monitoring
> Gets running quickly: fast setup & calibration
> Consistent results due to reliable system design
> Easy connection to 3rd party data acquisition systems
> Reusable CNAP® double finger sensors


“Hemo”- dynamize your research work with CNAP® HD*!
**TECHNICAL SPECIFICATIONS**

**CNAP® – CONTINUOUS NONINVASIVE ARTERIAL PRESSURE**

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>NBP – OSCILLOMETRIC BLOOD PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sys: 40 - 250 mmHg</td>
<td>Sys: Adult 40 - 260 mmHg, Pediatric 40 - 230 mmHg</td>
</tr>
<tr>
<td>Dia: 30 - 210 mmHg</td>
<td>Dia: Adult 20 - 200 mmHg, Pediatric 20 - 160 mmHg</td>
</tr>
<tr>
<td>Mean: 35 - 230 mmHg</td>
<td></td>
</tr>
<tr>
<td>Pulse rate: 30 - 200 bpm</td>
<td></td>
</tr>
</tbody>
</table>

**Degree of protection**

| BF (defibrillation proof) | BF (defibrillation proof) |

**Automatic scaling to brachial pressure (NBP)**

**CNAP® HEMODYNAMICS: CO, CI, SV, SVR, SVI, SVRI**

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>CO 0.0 - 99.9 l/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>SV 0 - 500 ml</td>
<td>SVR 0 - 9999 dyne*s/cm²</td>
</tr>
<tr>
<td>SVI 0 - 500 ml/m²</td>
<td></td>
</tr>
</tbody>
</table>

**FLUID RESPONSIVENESS: CNAP® PPV AND SVV**

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>PPV 0 - 40%</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVV 0 - 40%</td>
<td></td>
</tr>
</tbody>
</table>

**ELECTRICAL**

<table>
<thead>
<tr>
<th>Nominal voltage</th>
<th>100 - 240 VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply frequency</td>
<td>~50/60 Hz</td>
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**PHYSICAL**

| Weight | 7.5 kg (16.6 lbs) including accessories and cables |
| Height | 280 x 270 x 250 mm (11 x 10.6 x 9.8 inch) |

**ENVIRONMENTAL**

| Temperature operation | 10°C - 40°C (50°F - 104°F) |
| Humidity operation | 15% - 85% non condensing |
| Altitude operation | 647 - 1060 hPa |
| Temperature storage | 0°C - 40°C (32°F - 104°F) |
| Humidity storage | 15% - 95%, non condensing, wrapped |
| Altitude storage | 500 - 1060 hPa |

**SCREEN**

| Type | TFT-LCD, 800 x 600 pixel |
| Size | 8.4 inch diagonally |

**USER INTERFACE**

| Controls | click-wheel control, fast access keys |
| Indicators | visual and audible alarm indication, battery status, printer status, power LED |
| Trend Display | customized configuration: numeric, graphic, alarm history |

**ADJUSTABLE ALARMING SYSTEM**

| Alarms | physiological: med priority; technical: low priority |

**CONNECTIVITY**

| BP Wave Out | easy integration in all standard patient monitoring systems (2 - 10 VDC supply voltage) |
| AUX Analog Out | analog output of calibrated continuous blood pressure waveform (-5V to 5V) |

**USB PORT**

| Version | USB 1.1 (bandwidth 12 MBits/s) |

**PRINTER**

| Type | integrated thermal printer, 58 mm |

**COMPLIANCE AND APPROVALS**

| Safety class II (IEC 60601) | > IEC 60601-1 |
| Class II b (93/42/EEC) | > IEC 60601-1-2 |
| Patient applied part type BF | > IEC 60601-1-6 (defibrillation proof) |
| > IEC 60601-1-8 |
| > IEC 80601-2-30 |
| > EN 1060-4 (NBP) |
| > ISO 81060-2 (NBP) |
| Patents | > US 6,669,648 |
| > EP 1 179 991 |
| > US 7,390,301 |
| > EP 1 608 261 |
| >EP 1 675 507 |
| >US 8,343,062 |
| >EU 2493370 |
| INTELLECTUAL PROPERTY | > US 8,114,025 |

The CNAP® Monitor is CE approved. All parameters in section “CNAP® hemodynamics” and “fluid responsiveness” currently have no FDA clearance.

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CNAP® – Setting new standards for continuous and noninvasive hemodynamic monitoring.

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