CONTINUOUS NONINVASIVE BLOOD PRESSURE & HEMODYNAMICS

THE NEXT GENERATION OF NONINVASIVE MONITORING

CNAP® Monitor 500 HD
Sold as NIBP100D-HD

BIOPAC Systems, Inc.
Registered to ISO 9001:2008
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\(^{1,11,21}\)
- 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
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
> 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

“Given the fact that CNAP® is a reliable device to assess the arterial AP continuously, [...] its noninvasiveness facilitates its use for any operation with a need to assess, document, and maintain hemodynamic stability.”8

“CNAP® can be used as an alternative to intra-arterial pressure.”11


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

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
> Psychophysiology
> Autonomic Function
> Cardiology
> Neurology
> Psychology
> Sports / Exercise Physiology
> 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 5 V 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

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

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

1 Measor, C. et al. Precision and accuracy of a new device (CNAP®) for continuous noninvasive arterial blood pressure monitoring: assessment during general anaesthesia. BJA. 2010;105(3):264-272

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## 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>
<tr>
<td>Degree of protection BF (defibrillation proof)</td>
<td>Degree of protection BF (defibrillation proof)</td>
</tr>
<tr>
<td>Automatic scaling to brachial pressure (NBP)</td>
<td></td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO 0,0 - 99,9 l/min</td>
<td>CI 0,0 - 99,9 l/min/m²</td>
</tr>
<tr>
<td>SV 0 - 500 ml</td>
<td>SVI 0 - 500 ml/m²</td>
</tr>
<tr>
<td>SVR 0 - 9999 dyne*s/cm²</td>
<td>SVRI 0 - 9999 dyne*s/cm²/m²</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>
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</tbody>
</table>

### ELECTRICAL

Nominal voltage 100 - 240 VAC
Supply frequency ~50/60 Hz

### 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) storage: 0°C - 40°C (32°F - 104°F)
Humidity operation: 15% - 85% non condensing storage: 15% - 95%, non condensing, wrapped
Altitude operation: 647 - 1060 hPa 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 (defibrillation proof) > IEC 80601-2-30

### INTELLECTUAL PROPERTY

Patents > US 6,669,648
> EP 1 179 991
> US 7,390,301
> EP 1 608 261
> US 8,114,025
> EP 1 675 507
> US 8,343,062
> EU 2493370

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

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