CONTINUOUS NONINVASIVE
BLOOD PRESSURE & HEMODYNAMICS

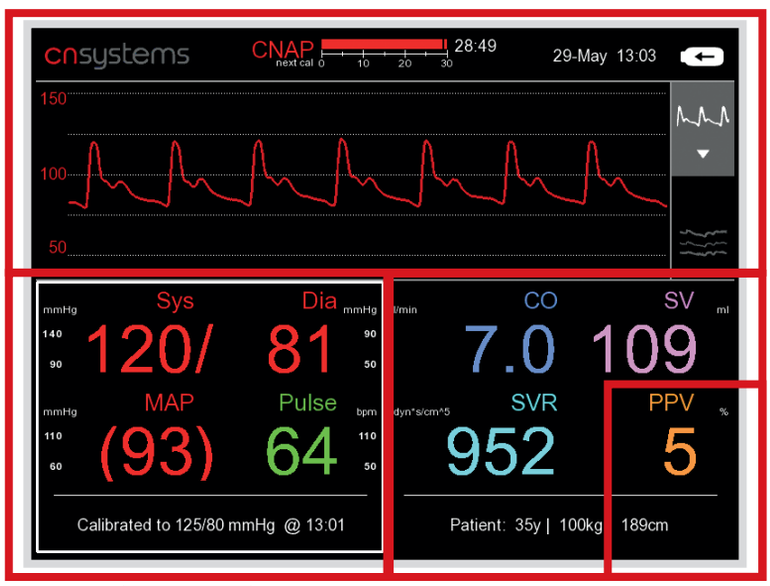
THE NEXT GENERATION OF
NONINVASIVE MONITORING

NEUROSPEC
Research Neurosciences

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[1-11, 21]

> Reliable tracking (e.g. in patients with volatile blood pressure; during Goal Directed Therapy)

> 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

cnap® hemodynamic control

PROVEN ACCURACY IN CLINICAL SETTINGS

> CNAP® measurements are comparable to invasive arterial line measurements in terms of continuity, accuracy and waveform dynamics.[1,2,3]

> CNAP® delivers reliable results for the efficient treatment of ICU and ER patients.[4,5, 6,7]

> CNAP® provides immediate hemodynamic status and detects blood pressure drops during the induction of anesthesia.[8]

> CNAP® shows outstanding performance in monitoring pediatric patients without an arterial catheter.[9,10]

EASY & RELIABLE TOOL FOR RESEARCH [11,12,13, 14]

> Noninvasive measurement

> Easy-to-use: all from *one* sensor

> Reliability clinically validated

FAST & ACCURATE HEMODYNAMIC OVERVIEW [16,17]

> Early recognition[15]

> Fast intervention

> Detection of hemodynamic reactions

> ...without arterial catheter

REDUCING RISK & IMPROVING OUTCOME THROUGH GOAL DIRECTED THERAPY

> Noninvasive CNAP® PPV / SVV is an accurate predictor of fluid responsiveness in anaesthetized patients.[18,19]

> Goal directed therapy with CNAP® HD significantly reduces postoperative infections, organ complications and number of transfusions.[20]

> Noninvasive CO with CNAP® HD performs comparably to invasive CO monitoring.[21]

"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."[1]

"CNAP® can be used as an alternative to intra-arterial pressure" [4]

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

2 Ilies, C., Investigation of the agreement of a continuous non-invasive arterial pressure device in comparison with invasive radial artery measurement. BJA. 108(2):202-10. doi: 10.1093/bja/aer394 (2012).

3 Biais, M. et. al. Continuous non-invasive arterial pressure measurement: Evaluation of CNAP™ device during vascular surgery. Ann Fr Anesth Reanim, doi:10.1016/j. annfar. 2010.05.002 (2010)

4 Jagadeesh, AM., A comparison of a continuuous noninvasive arterial pressure (CNAP™) monitor with an invasive arterial blood pressure monitor in the cardiac surgical ICU. Ann Card Anaesth. Jul-Sep;15(3):180-4. doi: 10.4103/09719784.97973 (2012).

5 Ilies, C. et al. Comparison of a continuous noninvasive arterial pressure device with invasi-ve measurements in cardiovascular postsurgical intensive care patients: A prospective observational study. European Journal of Anaesthesiology, 31, 1–9. doi:10.1097/EJA.0000000000001366 (2014).

6 Wagner, J. Y. et al.Noninvasive continuous versus intermittent arterial pressure monito-ring: evaluation of the vascular unloading technique (CNAP device) in the emergency department. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine, 22(1), 8. doi:10.1186/1757-7241-22-8 (2014).

7 Wagner, J. Y. et al. Continuous noninvasive arterial pressure measurement using the volume clamp method : an evaluation of the CNAP device in intensive care unit patients. J Clin Monit Comput, online. doi:10.1007/s10877-015-9670-2 (2015).

8 Kumar, A., et al. Evaluation of continuous non - invasive arterial pressure monitoring during induction of general anaesthesia in patients undergoing cardiac surgery. Indian J Anaesth, 59(1), 21–25. doi:10.4103/0019-5049.149444 (2015).

9 Kako, H. et al. Accuracy of the CNAP™ monitor, a noninvasive continuous blood pressure device, in providing beat-to-beat blood pressure readings in pediatric patients weighing 20-40 kilograms. Paediatric Anaesthesia, 1–5. doi:10.1111/pan.12173 (2013).

10 Dewhirst, E. et al. Accuracy of the CNAP monitor, a noninvasive continuous blood pressure device, in providing beat-to-beat blood pressure readings in the prone position. Journal of Clinical Anesthesia, 1–4. doi:10.1016/j.jclinane.2013.01.01(2013).

11 Gonzales, J. U. et al. Arterial stiffness is higher in older adults with increased perceived fatigue and fatigability during walking. Experimental Gerontology. doi:10.1016/j.exger.2014.12.005 (2014).

12 Lee JF, et a. The magnitude of heat-stress induced reductions in cerebral perfusion does not predict heat-stress induced reductions in tolerance to a simulated hemorrhage. Journal of Applied Physiology, 114(1), 37–44. (2013).

13 Sng, B. L. et al. Closed-loop double-vasopressor automated system vs manual bolus vasopressor to treat hypotension during spinal anaesthesia for caesarean section: a randomised controlled trial. Anaesthesia, 1–9. doi:10.1111/anae.12460 (2013).

14 Cornick, J. E. et al. Consequences of objective self-awareness during exercise. Health Psychology Open, 2(2), 2055102915598088. doi:10.1177/2055102915598088 (2015).

15 Benes, J., et al. Continuous non-invasive monitoring improves blood pressure stability in up-right position: randomized controlled trial. Journal of Clinical Monitoring and Computing. doi:10.1007/s10877-014-9586-2 (2014).

16 Ilies, C.et al.Detection of hypotension during Caesarean section with continuous non-invasive arterial pressure device or intermittent oscillometric arterial pressure measurement. British Journal of Anaesthesia, 3–9. doi:10.1093/bja/aes224 (2012).

17 Siebig, S. et al. Continuous non-invasive arterial pressure technique improves patient monito-ring during interventional endoscopy. International Journal of Medical Sciences, 6(1), 37–42. Retrieved from http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2631161&tool=pmcentrez&rendertype=abstract (2009).

18 Biais, M. et al., The ability of pulse pressure variations obtained with CNAP™ device to predict fluid responsiveness in the operating room; Anesthesia and analgesia, 523-28 (2011).

19 Monnet, X. et al., Prediction of fluid responsiveness by a continuous non-invasive assess ment of arterial pressure in critically ill patients: comparison with four other dynamic indices. British Journal of Anaesthesia (2012).

20 Benes, J et al. Fluid management guided by a CNAP device is associated with decreased postoperative morbidity after total knee and hip replacement. BMC Anesthesiology, 15(1), 148 (2015).

21 Wagner, J. Y. et al. Continuous noninvasive cardiac output determination using the CNAP system: evaluation of a cardiac output algorithm for the analysis of volume clamp method-derived pulse contour. Journal of Clinical Monitoring and Computing. doi:10.1007/s10877-015-9744-1 (2015).

TECHNICAL SPECIFICATIONS

CNAP® – CONTINUOUS NONINVASIVE ARTERIAL PRESSURE			NBP – OSCILLOMETRIC BLOOD PRESSURE		
Measuring range	Sys: Dia: Mean: Pulse rate:	40 - 250 mmHg 30 - 210 mmHg 35 - 230 mmHg 30 - 200 bpm	Measuring range	Sys: Dia:	Adult 40 - 260 mmHg, Pediatric 40 - 230 mmHg Adult 20 - 200 mmHg, Pediatric 20 - 160 mmHg
Degree of protection	BF	(defibrillation proof)	Degree of protection	BF	(defibrillation proof)
Automatic scaling to brachial pressure (NBP)					

CNAP® HEMODYNAMICS: CO, CI, SV, SVR, SVI, SVRI				
Measuring range	CO	0,0 - 99,9 l/min	CI	0,0 - 99,9 l/min/m^2
	SV	0 - 500 ml	SVI	0 - 500 ml/m^2
	SVR	0 - 9999 dyne*s/cm^5	SVRI	0 - 9999 dyne*s/cm^5/m^2

FLUID RESPONSIVENESS: CNAP® PPV AND SVV		
Measuring range	PPV	0 - 40%
	SVV	0 - 40%

ELECTRICAL			
Nominal voltage	100 - 240 VAC	Battery:	sealed lead-gel, operating time: 2 hours (fully charged battery)
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	> IEC 60601-1-6	> EN 1060-4 (NBP)
Class II b (93/42/EEC)	> IEC 60601-1-2	> IEC 60601-1-8	> ISO 81060-2 (NBP)
Patient applied part type BF	(defibrillation proof)	> IEC 80601-2-30	

INTELLECTUAL PROPERTY			
Patents	> US 6,669,648	> US 8,114,025	> US 2011/0105918
	> EP 1 179 991	> EP 1 675 507	> EU 2493373
	> US 7,390,301	> US 8,343,062	
	> EP 1 608 261	> 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.




cnsystems

NEUROSPEC

Research Neurosciences

NEUROSPEC AG
Stansstaderstrasse 10
CH-6370 Stans
Switzerland

www.neurospec.com
info@neurospec.com
Tel +41 41 371 07 04
Fax +41 41 371 07 03

Version: 04/2016, V3.6.1, EN | www.cnsystems.com