

# TASK FORCE® MONITOR >> the non-invasive system



## RECORDING CHANNELS

Beat-to-beat BP (vascular unloading)	measuring range: 5-250 mmHg, accuracy: +/- 1 mmHg (absolute values: +/- 5 mmHg)
Beat-to-beat stroke volume & cardiac output	temporal derivative of the impedance dZ/dt: +/-10Ω/s patient measuring current: <400μA eff., 40kHz
6-channel ECG display	accuracy: +/-5μV; sampling frequency: 1000 Hz
Oscillometric BP	measuring range: 50-250 mmHg; accuracy: +/- 5 mmHg
2 external channels (optional)	±5V, maximum sampling frequency: 1000 Hz
Pulse oximetry (optional)	

## DATA FORMATS

FEF (file exchange format)  
ASCII (text format)  
CSV (comma separated value)  
MS-Excel® format

## SAFETY STANDARDS

Safety class I according to IEC 60601, class IIa  
according to MDD, type CF (ECG, ICG),  
type BF (blood pressure)  
automatic calibration of all sensors  
precedes each recording

CE-Certificate (ID-No. 0408, TÜV – Vienna, Austria)  
FDA-Certificate (510 (k) No. K014063)  
EN-ISO 9001:2000  
EN-ISO 46001:1996  
EN-ISO 13485:2000

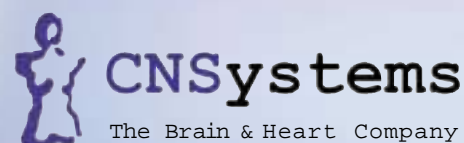
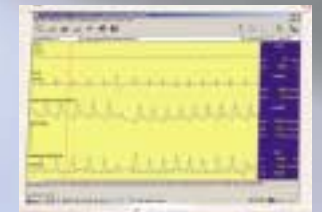
## TECHNICAL SPECIFICATION

Dimension: 402/104/290 mm (w x h x d)  
Weight: 6,1 kg excl. PC  
Trolley: 30 kg  
Computer: High Quality PC + Flatscreen

Nominal voltage: 100-230 V, 50/60 Hz  
Power consumption, typ.: 120mA/240mA, 25W  
Ambient temperature: +10 up to +40 °C  
Relative humidity: 30% up to 75% (non-condensing)  
Storage temperature: 0 up to +40°C  
Relative humidity: 20% up to 95% (non-condensing)

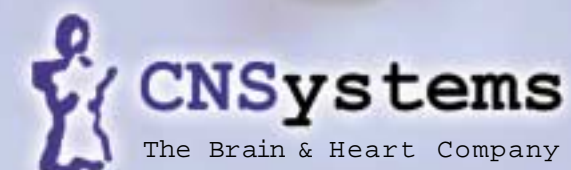


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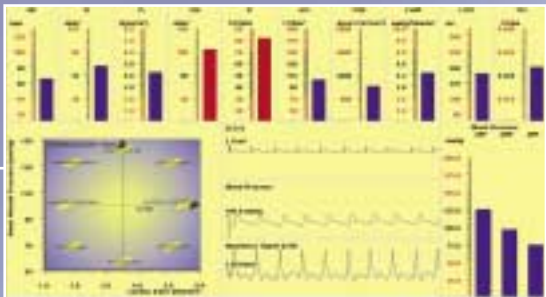
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BEAT-TO-BEAT & ONLINE

- Blood pressure
- Stroke volume and cardiac output
- Peripheral resistance
- Heart rate and blood pressure variability
- Spontaneous baroreflex sensitivity
- Positive cardiac inotropy



METHODS

Beat-to-beat blood pressure is recorded by the vascular unloading technique (fingerplethysmography) by means of a two-finger cuff and is corrected automatically to oscillometric blood pressure (a. brachialis). During the measurement no interruption for calibration is neces-

sary. Impedance cardiography for stroke volume measurement (3 newly developed band-electrodes) and ECG is recorded electrodes through placed on thorax and neck. All signals (beat-to-beat blood pressure, ICG and ECG) are displayed in synchroni-

sed form, analysis is performed beat-to-beat and online (hemodynamic parameters). Autonomic nervous function: HRV and BPV are assessed through online spectral analysis, while baroreflex sensitivity is analysed by applying the sequence method.

HEMODYNAMIC PARAMETERS

PARAMETER	UNIT	SIGNAL
Systolic blood pressure	mmHg	BP
Diastolic blood pressure	mmHg	BP
Mean blood pressure	mmHg	BP
Stroke volume	ml	ICG
Cardiac output	L/min	ECG, ICG
Heart rate	bpm	ECG
RR-interval	ms	ECG
Total peripheral resistance	dyne*s/cm <sup>5</sup>	ECG, ICG, BP
Heart rate variability	ms <sup>2</sup> /Hz	ECG
Blood pressure variability	mmHg <sup>2</sup> /Hz	BP
Baroreflex sensitivity	ms/mmHg	ECG, BP
Left ventricular work index	mmHg*L/(min*m <sup>2</sup> )	BP, ECG, ICG
Left ventricular ejection time	ms	ICG
Index of contractility	1000/s	ICG
Acceleration index	100/s <sup>2</sup>	ICG
Thoracic fluid content	1/Ohm	ICG
Heather index*	1/s <sup>2</sup>	ECG, ICG
Pulse pressure*	mmHg	BP
Pre ejection period*	ms	ECG, ICG
Systolic time ratio*	%	ECG, ICG
Ejection rate*	%	EKG, ICG
Mean systolic ejection rate*	ml/s	ICG
Rapid ejection period*	ms	ICG
R-dZmax time*	ms	ECG, ICG
Total arterial compliance*	ml/mmHg	BP, ICG

\*optional



APPLICATIONS

- SYNCOPE: assessment according to guidelines (ESC, ACC, etc.)
- NEUROPATHY: early diagnosis and assessment
- PACEMAKER: adjustment and therapeutic observation
- VASOACTIVE DRUGS: evaluation of response
- CONGESTIVE HEART FAILURE: risk stratification according to guidelines (ESC, ACC, etc.)
- HYPERTENSION: establishment of underlying cause and observation of therapy
- OCCUPATIONAL MEDICINE: assessment of fitness
- DIALYSIS: hemodynamic monitoring
- DRUG RESEARCH: evaluation of hemodynamic effects
- SPORTS MEDICINE: stress testing and training condition



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## AUTONOMIC FUNCTION TESTING

ACCORDING TO GUIDE LINES<sup>1,2,3,4</sup>

- Tilt table test
- Valsalva manoeuvre
- Carotid sinus massage
- Mental stress  
(e.g. stroop test, mental arithmetics)
- Handgrip & cold pressor
- Ewing battery & Schellong test

## BEAT-TO-BEAT & ONLINE

- Blood pressure
- 6 channel ECG display
- Stroke volume & cardiac output
- Peripheral resistance
- Heart rate and blood pressure variability  
(spectral analysis)
- Baroreflex sensitivity (sequence method)
- Positive cardiac inotropy

## ADVANTAGES

### NON-INVASIVE

- Beat-to-beat BP & CO: „all in one“
- No discomfort or risk of infection for the patient
- Short investigation time through non-invasive procedure

### QUALITY SECURING

- Test according to guidelines<sup>1,2,3,4</sup>
- Highest quality standards (CE, FDA, ISO)
- Excellent correlation to invasive gold standard
- High reproducibility
- Local after sales service

### USER-FRIENDLY

- Easy handling
- Automatic print report
- MS-Excel<sup>®</sup> export of all beat-to-beat parameters
- Individual setting of intervention markers
- Retrospective offline analysis

### COST-EFFECTIVE

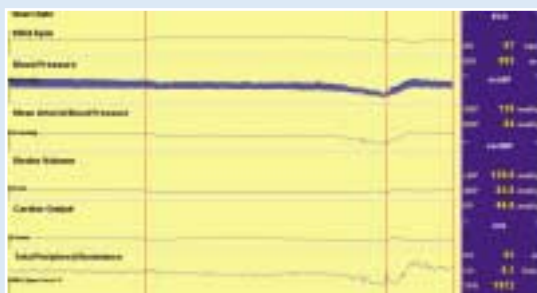
- Low operating and maintenance costs
- No consequential costs due to non-invasive procedure
- Early diagnosis
- Time saving through clear, detailed report
- Cost saving through observation of therapeutic effects



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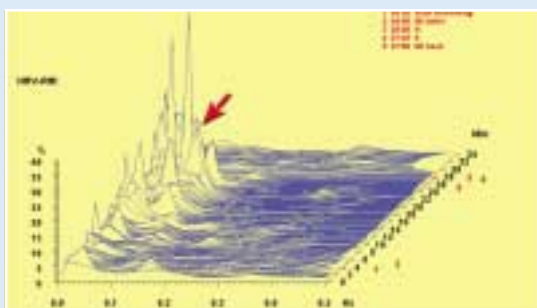


# TASK FORCE<sup>®</sup> MONITOR: Setting a new standard in syncope assessment



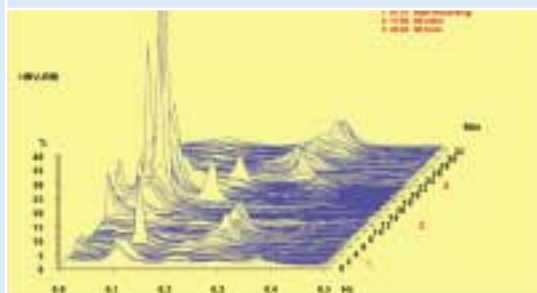
## TREND RECORDING

A case of dysautonomic (vasovagal) syncope: There is a slow but progressive fall in blood pressure and pulse pressure which begins immediately after tilting and continues until the onset of vasovagal reaction. Compared with the supine position heart rate increases during this phase by a variable amount and does not fall more than 10% from its peak at the time of syncope. The vasovagal reaction occurs when a critical value of blood pressure is reached.

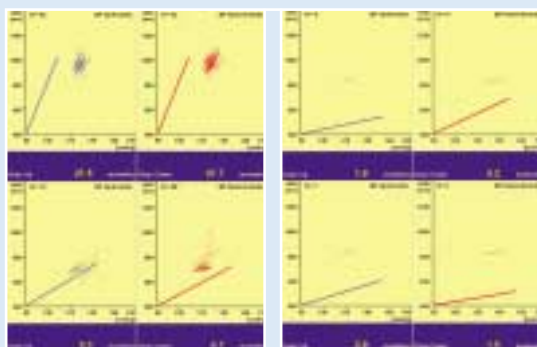


## SPECTRAL ANALYSIS OF HRV

Online heart rate variability reflects the reaction of the autonomic nervous system to head-up tilt testing. In the case of vasovagal syncope the onset of the syncopal phase can be appreciated by an immediate withdrawal of sympathetic tone (red arrow). Thus, as a reaction, vascular resistance drops significantly.



In contrast to neurally-mediated effects, a healthy subject shows a fair amount of vagal activity in supine position during controlled breathing, with an immediate increase in sympathetic drive at the onset of tilting. Hence, sympatho-vagal balance is increased.



## BAROREFLEX SENSITIVITY

Beat-to-beat BP enables online assessment of baroreflex sensitivity (BRS) from the spontaneously occurring BP rises and falls which are accompanied by counter-regulatory HR interval changes. On the left a healthy subject with high BRS during supine and good modulation with decreased BRS induced by head-up tilt. In contrast, on the right, a patient with low BRS without modulation after head-up tilt is shown. This points either to stiff, sclerotic blood vessels or to autonomic dysfunction.

## Literature

- 1.) Task Force on Syncope, European Society of Cardiology: Task Force Report – Guidelines on management (diagnosis and treatment) of syncope, European Heart Journal 22:1256-1306 (2001)
- 2.) American College of Cardiology (Benditt DG et al.): ACC Expert Consensus Document – Tilt table testing for assessing syncope, JACC 28, 1:263-275 (1996)
- 3.) Brignole M et al.: New classification of haemodynamics of vasovagal syncope: beyond the VASIS classification; Analysis of the presyncopal phase of the tilt test without and with nitroglycerin challenge, Europace 2, 1-11 (2000)
- 4.) Kenny RA et al.: The Newcastle protocol for head-up tilt table testing in the diagnosis of vasovagal syncope, carotid sinus hypersensitivity and related disorders, Heart 83, 5:564-569 (2000)



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