# STERNMED®

Macs 50
Modular patient monitor

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Modular patient monitors

Macs 50 is an all-in-one modular patient monitor with battery. The large 17" touchscreen color display makes viewing patient data easy. The Macs 50 offers a flexible solution for the varying needs of patients in ICU.

FEATURES

• All-in-one module with display and battery

• 17″ anti-glare color TFT display

• Powerful measurement, ergonomic and flexible design

• Can connect independent large display when multi-display is required

• Fan-less cooling system, keep the monitor working quietly

• Multi-screen, multi-interface display

• Each screen can display user defined parameters, to assure real-time monitoring entire data
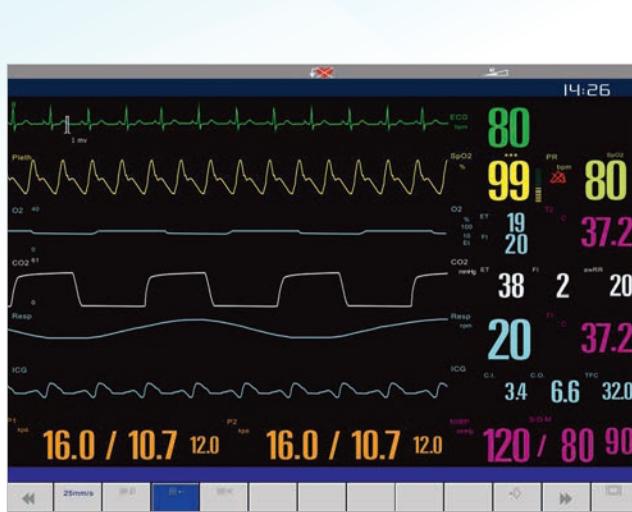
ADVANCE MODULAR MONITORING

ICG

• Non-invasive method to measure patient's Cardio Output and Hemodynamic status and safe easy operate.


AG

• Anesthesia Gas module, measure concentration of Et and Fi CO_2, O_2, N_2O and ISO, ENF, DES, SEV, HAL
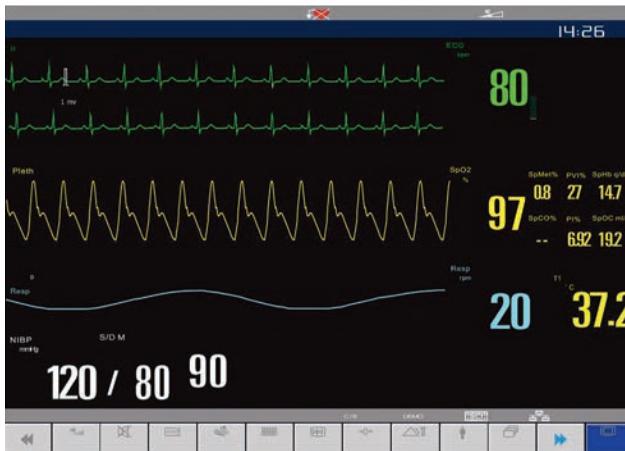
SpO$_2$

- Nellcor SpO$_2$
- High capacity against interference of ESU, motion & low perfusion
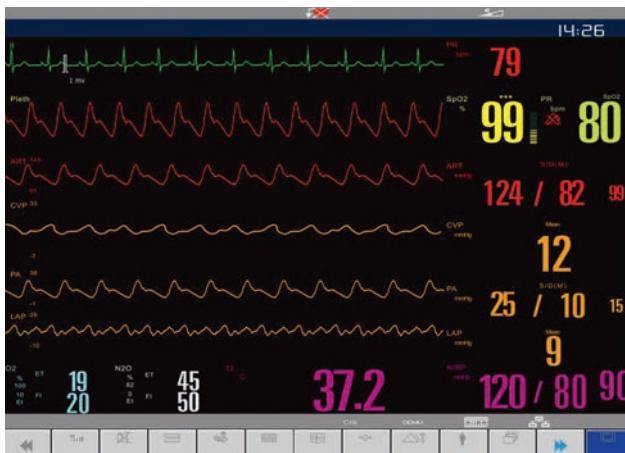
2IBP

- Max, 8 IBP measurement with waveform, Systolic, Diastolic, Mean Pressure on ART, CVP, ICP, PA, LAP, etc to fulfill different positions invasive blood pressure measuring demands
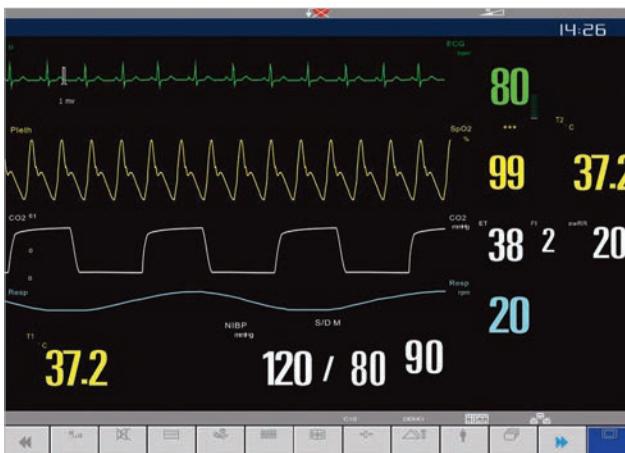
CO$_2$

- Side stream / Mainstream / Micro stream / EtCO$_2$ is optional
- Various option can be suitable for intubated patient, ventilation relied patient, non-intubated patient

E-MODULE – EMERGENCY MODULE

Size and Weight
- Size: 160 mm x 99 mm x 71 mm
- Weight: < 0.6 kg

Display
- 3.5" Color TFT display, Resolution: 320 x 240 pixels
- Waveform: Up to 12 tracks

Battery
- Type: 3.7 V/1800 mAh Rechargeable lithium ion battery
- Operating time: 60 minutes
- Charging time: Standby state: < 6h
- Turn off delay: 5 to 10 minutes after the low battery alarm first occurs
- Standard and Interface: HR, SpO_2, NIBP, RESP, TEMP, and waveform of ECG, SpO_2, RESP. (ECG waveform available for concatenation)
- Big font Interface: HR, SpO_2, NIBP, 1 channel ECG waveform
- User defined interface: 3 basic parameter + 1 Blood Pressure parameter, 1-3 channel waveform

- Arrhythmia analysis and ST analysis.

- Simultaneous display of 12 lead ECG in one screen

- Independent physiological alarm light and technical alarm light

- Seamless transport solution fully meet the clinic demand.

- Providing fast and convenient monitoring during the patient transfer with display, battery, alarm and storage capability.

- Patient's data transferring automatically when connect to main Unit

- Extremely compact design, convenient to carry, allowing patient to roam freely

- 400 NIBP groups

- Power off storage of 8 hours trend

E-MODULE OPTIONS

- Support for Mouse Key board operation.
- Available for multi-language interface.
- Independent Physiological & Technical Alarm.
- Detachable rechargeable lithium battery

Optional Patient Monitor Parameters:
- EtCO2
- IBP
- Dual IBP
- AG
- CO
- CSM
- EEG
- BIS

Drug dose calculation
Hemodynamic calculation
OXYCRG
- Display 16 minutes trend of HR, SPO2, RESP

Short trend
- Maximum 168 hour graphic and tabular trends

Other bed
- Display other bedside monitor's all parameter and one waveform, support user defined parameter display

Big font
- User can select 5 parameters (related waveform will display of available)
- Clear observation in a long distance, especially suitable for ICU, CCU room checking and monitoring during night

SIZE AND WEIGHT	
Size	434 x 389 x 206 mm
Weight	< 11 kg
Standard module slot	4
Additional module rack Slot	1
POWER SUPPLY	
Power voltage	AC 100 - 240 V 50/60 Hz
Input Current	0.8 - 1.7 A
Safety class	Category 1
DISPLAY	
Resolution	17'' color Anti-glare TFT display 1280 x 1024 pixels
BATTERY	
Type	Rechargeable Lithium battery, 11.1 VDC, 4000 mAh Operating time: with 2 batteries up to 4h backup
RECORDER (OPTION)	
Method	Thermal dot array
Paper width	50 mm (1.97 in)
Paper length	15 m
Paper Speed	12.5 / 25 / 50 (mm/sec)
Traces	Maximum 3 tracks
Recording way	Real-time recording, Periodic recording, Alarm recording
ALARM	
Level	Low, medium and high
Indication	Auditory and visual
Patient Physiological Alarm Light color	Yellow & Red
Equipment: Technical Alarm Light color	Blue, Supports Pitch tone and multi-level volume, Supports custom arrhythmia
INPUT DEVICE	
Touch button	standard configuration, support operation of shortcut menu
Knob	Standard configuration
Mouse Input	Support
Keyboard Input	Support
SYSTEM OUTPUT & EXTENSIBLE INTERFACES	
Ethernet Network	2 Standard RJ45 socket
Defibrillation Output	1RJ11 socket
Nurse Call	1 BNC socket
Video Output	1 DVI port, 1 VGA port
USB 1.1 port	6
Auxiliary Module Rack connector	1
SD memory card	Yes, optional
Analog Output (ECG or IBP)	Option
TREND & REVIEWING	
Trend	168 hours
NIBP measurement reviewing	1000 groups
ARR event	128 groups of ARR event and the associated parameter
waveform	at the alarm moment
Holographic waveform	The storage time depends on the stored waveforms and the quantity of them.
ENVIRONMENT	
Operating temperature	5 °C to +40 °C
Storage temperature	-20 °C to +50 °C
Operating humidity	15 % to 85 % (non condensing)
Storage humidity	10 % to 93 % (non condensing)
Operating atmospheric pressure	700 hPa to 1060 hPa
Storage atmospheric pressure	500 hPa to 1060 hPa
SAFETY	
	IEC60601-1 Approved, CE marking according to MDD93/42/EEC

PERFORMANCE		
ECG	Lead Mode	3-leads ECG input 5-leads ECG input 12-leads ECG input
	Lead selection	I, II, III I, II, III, aVR, aVL, aVF, Vx I, II, III aVR, aVL, aVF, V1-V6 (option)
	Gain	2.5 mm/mV (x0.25), 5 mm/mV (x0.5), 10 mm/mV(x1), 2.0 mm/mV (x2), 40 mm.mV (x4), Auto
	CMRR	Monitor mode > 105 dB	Surgery mode > 105 dB	Diagnostic mode 0.05 - 150 Hz
	Input impedance	> 5.0 Mohm
	ECG signal range	+10.0 mV
	Patient Leakage Current	< 10 uA
	Standardizing signal	1 mV+5 %
	Baseline recovery	5 s after Defibrillation. (Mon or Surg mode)
	Indication of electrode separation	Every electrode (exclusive of RL)
	Protection	Breakdown Voltage 4000 VAC 50/60 Hz; defibrillator proof
	Wave speed	6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
HR	Range	Adult 10 - 300 bpm	Pediatric & Neonate: 10 - 350 bpm
	Heart rate averaging	< 50 bpm Per 2 pulses	50 - 120 bpm Per 4 pulses	> 120 bpm Per 6 pulses
	Resolution	1 bpm
	Accuracy	+1 % or + bpm, whichever is greater

ST SEGMENT	
Measurement range	-2.0 mV - 2.0 mV
Accuracy	-0.8 V - 0.8 mV: +1 bpm, whichever is greater Over + 0.8 mV: unspecified
Resolution	0.01 mV

RESP	
Method	Thoracic impedance
Lead Selected from	I (RA-LA) or II (RA-LL): Default: II
Gain	x0.25, x1, x2, x4
Bandwidth	0.25 Hz to 2.0 Hz (-3 db)
Sweep speed	6.25 mm/s, 12.5 mm/s, 25 mm/s
Measurement Range	0 - 150 rpm
Resolution	1 rpm
Accuracy	+2 rpm or 2 % whichever is greater
Delay of Apnea Alarm	10 s, 15 s, 25 s, 30 s, 35 s, 40 s, 45 s, 50 s, 55 s, 60 s

NIBP		
Way of measurement		Thoracic impedance
Range of measurement	Adult	SYS 30 - 270 mmHg
		DIA 10 - 220 mmHg
		MAP 20 - 235 mmHg
	Child	SYS 30 - 235 mmHg
		DIA 10 - 220 mmHg
		MAP 20 - 225 mmHg
	Neonate	SYS 30 - 135 mmHg
		DIA 10 - 100 mmHg
		MAP 20 - 125 mmHg
Cuff pressure range		0 - 300 mmHg
Resolution		1 mmHg
Pressure Accuracy	Static	± 2% or ± 3 mmHg, whichever is greater
	Clinical	+5 mmHg average error
	Standard deviation	< 8 mmHg
Unit		mmHg, kPa
Measurement mode		Manual, Auto, STAT
Intervals for AUTO measurement time		1, 2, 3, 4, 5, 10, 15, 30, 60, 90 minutes; 2, 4, 8, 12 hours
STAT mode cycle time		Keep 5 minutes, at 5 seconds Interval
Overpressure Protection		Hardware and software double protections
Pulse rate range		40 - 240 bpm

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STD-SPO2 (DIGITAL TECHNIC)		
Measurement Range		0 - 100 %
Resolution		1 %
Accuracy		At 40 - 69 %, ± 3 %
PR	Measurement Range	25 - 254 bpm
	Accuracy	+1 % or +1 bpm, whichever is greater
	Resolution	1 bpm

MASIMO SPO2		
Measurement range		0 % to 100 %
Resolution		1 %
Accuracy		70 % to 100 %: +2 % (adult/pediatric, non-motion conditions)
		70 % to 100 %: +3 % (neonate, non-motion conditions)
		70 % to 100 %: +3 % (motion conditions)
Averange time		2 - 4 s, 4 - 6 s, 8 s, 10 s, 12 s, 14 s, 16 s
	Measurement Range	25 bpm to 240 bpm
	Accuracy	+3 bpm (non-motion conditions)
		+5 bpm (motion conditions)
	Resolution	1 bpm

TEMP		
Measurement way		Thermal resistance way
Measurement Range		0.0°C - 50.0°C (32°F - 122°F)
Accuracy		+0.1°C or 1°F
Unit		Celsius (°C), Fahrenheit (°F)

IBP		
Max Channel		8
Measurement way		Directly invasive pressure measurement
Sensitivity of transducer		5 µV/V/mmHg
Impedance of tranducer		300 to 3000 Ω
Measurement Range		+50 - +350 mmHg
Resolution		1 mmHg
Unit		mmHg, kPa, cmH2O
Accuracy	Static	+ 1 mmHg or +2 %, whichever is greater (excluding the transducer)
		+ 4 mmHg or +4 %, whichever is greater (including the transducer)
	Dynamic	+ 4 mmHg or 4 %, whichever is greater
	Transducer sites	Arterial Pressure (ART)
		Pulmonary Artery Pressure (PA)
		Left Atrium Pressure (LAP)
		Right Atrium Pressure (RAP)
		Central Venous Pressure (CVP)
		Intracranial Pressure (ICP)
		P1/P2
Alarm range		ART: 0 - +350 mmHg
		PA: +10 - +120 mmHg
		CVP/RAP/LAP/ICP: -10 - +40 mmHg
		P1/P2: +50 ~ +350 mmHg

EtCO$_2$ (Side-stream)	
Measure method	Infrared spectrum
Measurement Range	0.0 - 13.1 % (0 - 99.6 mmHg)
Resolution	1 mmHg
Unit	% mmHg, kPa
Accuracy	0 % to 4.9 %, +0.3 % (+2.0 mmHg)
	5.0 % to 13.1 %, < +10 % of the reading
Measurement range of awRR	3 - 150 rpm
Calibration	Offset calibration: auto, manual, Gain calibration

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ETCO2 (MAIN-STREAM)	
Measure method	Infrared spectrum
Warm up time	Capnogram displayed in less than 15 seconds, At an ambient Temperature of 25 °C, full specifications within 2 minutes.
Measurement Range	0.0 - 19.7 % (0 - 150 mmHg)
Resolution	1 mmHg
Rise time (10 l/min)	< 60 ms
Unit	%, mmHg, kPa
CO2 Accuracy	0 - 40 mmHg. + 2 mmHg
	41 - 70 mmHg. + 5 % of reading
	71 - 100 mmHg, + 8 % of reading
	101 - 150 mmHg, + 10 % of reading
	(at 760 mmHg, ambient temperature of 35 °C)
awRR measurement range	0 - 150 rpm
awRR measurement Accuracy	+1 rpm

ETCO2 (MICROSTREAM)	
Measure method	Infrared spectrum
Warm up time	Capnogram displayed in less than 20 seconds, At an ambient temperature of 25 °C, full specifications within 2 minutes.
Measurement range	0 - 19.7 % (0 - 150 mmHg)
Resolution	1 mmHg
Unit	%, mmHg, kPa
CO_2 Accuracy	0 - 40 mmHg, + 2 mmHg
	41 - 70 mmHg, + 5 % of reading
	71 - 100 mmHg, + 8 % of reading
	101 - 150 mmHg, + 10 % of reading
	(at 760 mmHg, ambient temperature of 25 °C)
	(when RR > 80 rpm, all the range is +12 % of reading)
CO_2 response time	< 3 s
awRR measurement range	2 - 150 bpm
awRR measurement Accuracy	+ 1 rpm
Sample Flow Rate	50 ml/min + 10 ml/min

ANESTHETIC GAS			
Measure method	Infrared spectrum		
Fi and Et values	CO_2, N_2O, O_2, AG (HAL, ISO, ENF, SEV, DES)		
Resolution	1 %		
Unit	1 %		
Calibration	Room air calibration performed automatically when changing airway adapter (< 5 sec)		
Warm-up time	< 10 s, full accuracy within 1 min		
Measurement and alarm range of AG	**Gas**	**Range**	**Accuracy**
	CO_2	0 - 10 %	+ (0.3 % ABS +4 % REL)
	N_2O	0 - 100 %	+ (2 % ABS +5 % REL)
	O_2	0 - 100 %	+ (2 % ABS +2 % REL)
	HAL, ISO, ENF	0 - 5 %	+ (0.2 % ABS +10 % REL)
	SEV	0 - 8 %	+ (0.2 % ABS +10 % REL)
	DES	0 - 18 %	+ (0.2 % ABS +10 % REL)
awRR measurement range	0 - 150 rpm		
awRR measurement Accuracy	+ 1 rpm		
Rise time (flowing speed 10 l/min)	CO_2 < 90 ms		
	O_2 < 300 ms		
	N_2O < 300 ms		
	Hal, Iso, Enf, Sev, Des < 300 ms		
Total system response time	< 1 second		

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NONINVASIVE CARDIO OUTPUT (ICG)	
Method	Measurement of thoracic electrical bio-impedance
Measurement Range	HR: 40 - 250 bpm
	SV: 5 - 250 ml
	SI: 5 - 125 ml/m²
	C.O.: 1.4 - 15 l/min
	TFC: 15 - 143 KΩ
Accuracy	HR + 2 bpm
Alarm range	C.I.: 0.0 l/min/m² to 15.0 l/min/m² continuous I adjustable.
	TFC: 10 /kΩ continuously adjustable

STANDARD CONFIGURATION OF MACS 50	
Main unit	17" anti-glare TFT display, 4 Standard module slot, 1 Additional module rack Slot for EMS all-in-one module) , 2RJ45 Ethernet socket, 1 Defibrillation Output, 1 Nurse Call Socket, 1 DVI port, 1 VGA port, 6 USB 1.1 port, 1 Auxiliary Module Rack connector, 1 Lithium rechargeable battery

OPTIONS	
EMS Module with 3.5" Color TFT display	6 different options
MPS module	4 different options
Option Module	Side-stream CO_2 module, Micro-stream CO_2 module, Main-stream CO_2 module, AG module, ICG module, IBP module, Temp module, SpO_2
Module Rack	Auxiliary Module Rack
Navigating	USB compatible mouse and keyboard and touch
Printing	3 channel thermal recorder
Mounting	Rolling stand, wall mount
Battery	11.1 V/4.0 AH Rechargeable Lithium Battery (max 2 pcs.)
Other options	External Display, Wireless LAN, Extensive Memory card, Analog Output (ECG or IBP)

STERNMED®

SternMed GmbH
Schubertstrasse 31
88214 Ravensburg - Germany

Tel: +49 751 35 978 0
Fax: +49 751 35 978 105

email@sternmed.de

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