DATA SHEET

Model:ESM-P Series

Patient Monitor

Size and Weight

Size	ESM-P1: 146×99×76mm
	ESM-P12: 323×281×157mm
	ESM-P15: 396×310×198mm
	ESM-P18: 462×334×199mm
	ESM-P22: 530×375×199mm
Weight	ESM-P1: ＜0.9kg
	ESM-P12: ＜5kg
	ESM-P15: ＜6kg
	ESM-P18: ＜7kg
	ESM-P22: ＜8kg
Modular slot	ESM-P12: 4
	ESM-P15/P18/P22: 6

Power

According to IEC 60601-1 and IEC 60601-1-2

Input voltage	AC (100-240) V (±10%)
Frequency	50Hz/60Hz
Input power	ESM-P1: 0.8A-0.5A/80VA
	ESM-P12: 1.5A-0.7A/140VA
	ESM-P15/P18/P22: 2.0A-0.9A/200VA

Display

Type	Color TFT LCD
Size(diagonal)	ESM-P1: 5.5 inch
	ESM-P12: 12.1 inch
	ESM-P15: 15.6 inch
	ESM-P18: 18.5 inch
	ESM-P22: 22 inch
Resolution	ESM-P1: 1280×720 pixels
	ESM-P12: 1280×800 pixels
	ESM-P15/P18/P22: 1920×1080 pixels

Exrernal display

Type	DVI Display
Resolution	Above 1920×1080 pixels

Recorder

Type	BTR50S thermal dot array
Paper width	50 mm±1mm
Recording speed	12.5 mm/s, 25 mm/s, 50 mm/s
Recording waveform	Maximum 3 tracks

Battery

Type	ESM-P1:
	Rechargeable lithium ion battery, 7.4 VDC, 2500mAh
	ESM-P12/P15/P18/P22:
	Rechargeable lithium ion battery, 11.1 VDC, 5000mAh
Operating time	ESM-P1: 240 min single battery, 480 min two batteries
	ESM-P12: ≥4h
	ESM-P15/P18/P22: ≥3h
Charge time	less than 4 hours to 100% (Turn off)
	less than 6 hours to 100% (Turn on)

Connectors

Power	1 AC power inlet with cable retainer
Wired network (standard RJ45)	ESM-P12/P15: 1 ESM-P18/P22: 2 (1 of them is reserved interface)
USB (standard USB 2.0 sockets)	ESM-P12/P15: 4 ESM-P18/P22: 8 (4 of them are reserved interfaces)
DVI connector	ESM-P12/P15: 1 ESM-P18/P22: 2 (1 of them is reserved interface)
Equipotential groudind point	1
Nurse call interface	1
Auxiliary Modules slots connector	1

Environmental requirements

Operating temperature	0℃ to +40℃
Operating humidity	15% to 95%(non condensing)
Operating air pressure	54.0kPa to 107.4lPa
Storage temperature	-20℃ to +60℃
Storage humidity	10% to 95%(non condensing)
Storage air pressure	16.0kPa to 107.4kPa

ECG

Lead	3 lead: I, II, III
	5 lead: I, II, III, aVR, aVL, aVF, Vx
	6 lead: I, II, III, aVR, aVL, aVF, Va, Vb
	12 lead: I, II, III, aVR, aVL, aVF, V1-V6
	Auto: identify leads automatically
Indication of lead-off shall be provided	Every eletrodde
ECG abormal work indications	Every amplification channel shall have an indication of abnormal ECG operation (polarization).
Bandwidth (-3dB)	Diagnostic mode: 0.05 Hz to 150 Hz
	Monitor mode: 0.5 Hz to 40 Hz
	Operation mode: 1 Hz to 25Hz
	ST mode: 0.05 Hz to 40Hz
Input impedance	≥ 5.0 MΩ
ECG signal range	± 10.0 mV
Electrode offset potential	± 500 Mv
System noise	≤ 30 μVpp (RTI)
Breakdown Voltage	4000V 50Hz/60Hz
Baseline recovery	baseline recovery time: 5s (after defibrillation).
Sweep speed	6.25 mm/s,12.5 mm/s, 25 mm/s, 50 mm/s

ST segment

ST Display	12-lead ST segment values at the same time and support ST graphic display
Measurement range	-2.0 mV to +2.0 mV
Accuracy	-0.8 mV to +0.8 mV: ±0.02 mV or ±10%, (whichever is greater)
	Over ±0.8mV: unspecified
Resolution	0.01mV
ST update period	10s

Arrhythmia analysis

Kinds 27 (ASYSTOLE, VENT FIB/TACH, V-TACH, TACHY, VENT BRADY, EXTREME TACHY, EXTREME BRADY, R ON T, BRADY, NONSUSTAINED V-TACH, VENT RHYTHM, PNC, PNP, PAUSE, PVC, PAUSES/MIN HIGH, RUN PVCS, COUPLET, BIGEMINY, TRIGEMINY, FREQUENT PVCS, MISSED BEAT, A-FIB, A-FIB END, ECG NOISE, IRREGULAR RHYTHM, IRREGULAR RHYTHMEND)

Respiration

Source	RA-LA, RA-LL (default)
Measurement range	0 rpm to 150 rpm
Accuracy	±2 rpm or ±2% , whichever is the greater
Sweep speed	6.25mm/s, 12.5mm/s, 25mm/s, 50mm/s
Delay of apnea alarm	10~60s, error ±3s or ±10%,
Bandwith	0.2Hz ~ 2.5Hz (-3db ~ +0.4dB)
Baseline impedance	200 ~ 2500Ω
Measuring impedance	0.3Ω ~ 3Ω

HR

Measurement range	Heart: 10~300bpm Pediatric/Neonatal: 10~350bpm
Resolution	1 bpm
Accuracy	±1% or ±1 bpm, whichever is greater
Detection sensitivity	0.20mVp-p

QT analysis

Measurement range	QT: 200ms~700ms QTc: 200ms~700ms ΔQTc: -500ms~500ms QT-HR: Adult: 15bpm~150bpm Pediatric/neonatal:15bpm~180bpm
Resolution	QT, QTc, ΔQTc: 1ms QT-HR: 1bpm
Accuracy	QT: ±30ms

NIBP

Standard	IEC80601-2-30, ISO 81060-2		
Measurement parameters: SYS, DIA, MAP, PR			
Measurement mode	Manual , Auto, STAT. Sequemce		
STAT mode cycle time	5 min		
Systolic range	Adult	30 to 270 mmHg	
	Pediatric	30 to 235 mmHg	
	Neonatal	30 to 135 mmHg	
Diastolic range	Adult	10 to 220 mmHg	
	Pediatric	10 to 220 mmHg	
	Neonatal	10 to 100 mmHg	
Mean range	Adult	20 to 235 mmHg	
	Pediatric	20 to 235 mmHg	
	Neonatal	20 to 125 mmHg	
Cuff pressure range	0 to 300 mmHg		
Resolution	1 mmHg		
Pressure accuracy	Static： ±3 mmHg		
PR range	40 bpm to 240 bpm		
	Accuracy ±3bpm or ±3%		
Measurement time：	Neonatal:＜90s (MAX)		
	Adult, Pediatric: ＜120s (MAX)		
First overpressure protection	Adult	(297±3) mmHg	
	Pediatric	(252±3) mmHg	
	Neonatal	(147±3) mmHg	

SunTech NIBP (option)

Way of measurement	Oscillometric.		
Measurement range	Adult	SYS	40~260 mmHg
		DIA	20~200 mmHg
		MAP	26~220 mmHg
Child	Pediatric	SYS	40~160 mmHg
		DIA	20~120 mmHg
		MAP	26~133 mmHg
Neonate SYS	Neonatal	SYS	40~130 mmHg
		DIA	20~100 mmHg
		MAP	26~110mmHg
Pressure Accuracy	± 3 mmHg (± 0.4 kPa) or 2 % of the reading		
Pulse rate range	30 ~ 220 bpm		
Pulse Rate Accuracy	2% or 3 bpm, whichever is greater		
Overpressure Protect	Adult	<300 mmHg	
(Hardware & software)	Child	<300 mmHg	
	Neonatal	<150 mmHg	

SpO2

Measurement range	0% ~ 100%	
Resolution	1%	
Accuracy	70% ~ 100%	≤3%
	0% ~ 69%	unspecified

PR

Measurement range	25 bpm to 254 bpm
Resolution	1 bpm
Accuracy	±1% or ±1 bpm, whichever is the greater

PI

Measurement range	At least 0.05 ~ 20.00%2
Resolution	0.01%
Accuracy	±0.1% or ±10% of reading,whichever is the greater

RESP (from pleth)

Measurement range	0 rpm ~ 90rpm
Resolution	1 rpm
Accuracy	±2 rpm

Nellcor SpO2 (option)

Measurement range	0% to 100%
Resolution	1%
Accuracy	70% to 100%: ±2%(adult/pediatric)
	70% to 100%: ±3%(neonate)
	0% to 69%, unspecified

PR

Measurement range	20 bpm to 300 bpm
Accuracy	20 bpm to 250 bpm: ±3 bpm
	251 bpm to 300 bpm: unspecified
Resolution	1 bpm

PI

Measurement range	At least 0.05 ~ 20.00%2
Resolution	0.01%
Accuracy	±0.1% or ±10% of reading,whichever is the greater

Masimo SpO2 (option)

Measurement range	0% to 100%
Resolution	1%
Accuracy	70% to 100% ±2% (adult/pediatric, non-motion)
	70% to 100% ±3% (neonate, non-motion)
	70% to 100% ±3%(motion conditions)
	0% to 69% unspecified

PR

Measurement range	25 bpm to 240 bpm
Accuracy	±3 bpm(non-motion conditions)
	±5 bpm(motion conditions)
Resolution	1 bpm

SpCO

Measurement range	0% to 100%
Accuracy	0% to 40%: ±3%(non-motion conditions) >40%, unspecified

SpMet

Measurement range	0% to 100%
Accuracy	0% to 15% ±1%(non-motion conditions) >15% unspecified

PI

Measurement range	0.05% to 20%

SpHb

Measurement range	0 g/dl to 25 g/dl
Accuracy	8g/dl to 17g/dl: ±1g/dl (non-motion conditions) <8 g/dl or >17 g/dl, unspecified

IBP (option)

Standard	EN 60601-2-34 / IEC 60601-2-34
Nominal sensitivity 5uV/V/ mmHg	
Output impedance 300Ω to 3000Ω	
Static measurement range	-50 mmHg to +360 mmHg
Static measurement accuracy	±0.3kPa (±2mmHg) or ±2% whichever is the greater (without sensor)
Dynamic measurement range	-50 mmHg to +360mmHg
Dynamic measurement accuracy	±0.3kPa (±2mmHg) or ±2% whichever is the greater (without sensor)
Resolution	1 mmHg
Unit	mmHg, kPa, cmH2O
Frequency Response	0 Hz to 10 Hz

PPV

Measurement range	0% ~ 50%
Resolution	1%

PR

Measurement range	30bmp ~ 300bpm
Resolution	1bpm
Resolution	±1% or ±1bpm, whichever is greater

CO_2 (Option)

Standard	ISO 80601-2-55
Measurement parameter: $EtCO_2$, $FiCO_2$ a CO_2 waveform and awRR	
Measurement method	Mainstream, Sidestream/Microflow
Unit	mmHg, Kpa and %
$EtCO_2$/$FiCO_2$ range	0% ~ 19.7% (0mmHg ~ 150mmHg)
Accuracy	±(0.43% + 8% of reading)
Resolution	0.1% or 1mmHg
awRR range	0 ~ 150 bpm
Accuracy	±1 bpm
Resolution	1 bpm
awRR alarm range	0 ~ 150 bpm, high/low limit can be adjusted continuously
Sampling frequency and accuracy of gas (only sidesteam):	
C1	50 ml/min ~ 200ml/min, ±10%, can be adjusted.
Other sidestream CO_2	50 mL/min±10mL/min
Response time	Sidestream CO_2: < 3s Mainstream CO_2: < 1s

AG (option)

Standard	ISO 80601-2-55
Measurement mode	Mainstream, Sidestream
Parameters	Resoiratory end gas fraction (Et), inhaled gas fraction (Fi), airway respiration rate (awRR) of Halothane (Hal), Enflurane (Enf), Isoflurane (Iso), Sevoflurane (Sev), Desflurane (Des), CO_2, N_2O, O_2 (only be applicable for ISA OR+ module)
Resolution	Hal, Enf, Iso, Sev, Des, CO_2: 0.1% N_2O, O_2: 1%
Warm up time	< 20s
Total system response Time: Mainstream: <1s, Sidestream: < 4s	
Sampling rate of sidestream anesthesia gas:	
	50mL/min±10mL/min
Measurement range and accuracy of gas	

Gas	Range (%)	Accuracy
CO2	0 to 15%	± (0.2% + 2% of reading)
N2O	0 to 100%	± (2% + 2% of reading)
ISO, ENF, HAL	0 to 8%	± (0.15% + 5% of reading)
SEV	0 to 10%	± (0.15% + 5% of reading)
DES	0 to 22%	± (0.15% + 5% of reading)
awRR range	0 rpm to 150 rpm	
awRR accuracy	±1 rpm	

ICG (option)

Measurement way	Thoracic electrical bioimpedance
Parameters	C.O., C.I., SV, SI, SVR, SVRI, TFI, TFC, HR
Measurement range	HR: 44 bpm to 185 bpm SV: 5.0 mL to 250.0 mL C.O. : 1.4 L/min to 15.0 L/min
Resolution	HR: ±10% SV: ±15% C.O. : ±15%
Alarm range	C.I.:1.4 L/min/m2 to 15.0 L/min/m2, alarm error is±0.1L/min/m2 TFC: 19 /kΩ to 125 /kΩ, alarm error is ±1/kΩ.

RM (option)

Measure method	Flow sensor

PAW

Range	-20 to 100 cmH_2O
Accuracy	±1 cmH2O or ±3% of reading, whichever is greater
Resolution	0.1 cmH_2O

TVe/TVi

Range	Adult/Pediatric: 150ml to 1600ml Neonate: 15 ml to 300 ml
Accuracy	Adult/Pediatric: ±10% or ±30ml, whichever is greater Neonate: ±10% or ±6 ml, whichever is greater
Resolution	1 ml

MVe/MVi

Range	Adult/Pediatric: 2.00 L/min to 20.00 L/min Neonate: 0.50 L/min to 5.00 L/min
Resolution	0.01 L/min

RR

Range	Adult/Pediatric: 4 bpm to 35 bpm Neonate: 4 bpm to 50 bpm
Resolution	1 bpm

EEG (Option)

Standard	IEC 60601-2-26
Sampling frequency	250 dots/s/ channel
Signal input Range	≥-2mV ~ +2mV
Polarization resistance voltage	±320mV
Input impedance	≥15MΩ@10Hz , can expand to0.25~110Hz
Frequency range	0.5~30Hz(default)
Noise level	≤3.0uVp-p(0.5~30Hz)
CMRR	>89dB (turn off the power frequency filter) >100dB (turn off the power frequency filter)
Measurement range	SEF: 0.5 Hz -30.0 Hz, MDF: 0.5 Hz -30.0 Hz PPF: 0.5 Hz -30.0 Hz, TP: 0.0 Hz -100.0 dB Delta: 0.0%-100.0%, Theta: 0.0%-100.0% Alpha: 0.0%-100.0%, Bata: 0.0%-100.0%

BIS (option)

Measurement Index	Bispectral index (BIS), myoelectric activity (EMG), signal quality index (SQI), suppression ratio (SR), break count (BC), total power (TP), spectral edge frequency (SEF)
Wave shape	Electroencephalo-graph waveform (EEG)

Parameter measurement range

BIS range	0~100
SQI / SR range	0%~100%
SEF range	0.5~30Hz
TP range	40~100dB

EEG measurement specifications

Duration	error ≤±5%
CMRR	> 100dB
Noise(RTI)	< 2uv (0.25~50Hz)

Amplitude frequency characteristics: 6Hz~30Hz (-3dB～+0.4dB) when turn on the filter; at least 0.5Hz~70Hz (-3dB～+0.4dB) when turn off the filter

Polarization resistance voltage: plus ±300mV d.c. bias voltage, EEG waveform amplitude deviation is within ±5%.

NMT (option)

Stimulation Modes	TOF、DB、PTC、SMC, Auto, TWI and TET
Current Range	0mA~80mA, error: ±5% or ±2mA, whichever is greater
Maximum Stimulation Voltage:	≤400V
Stimulus	Monophasic square wave, pulse width was 0.2ms and error is ±5%
Stimulating Frequency	1Hz, 2Hz, 5Hz, 50Hz, 100Hz, error ±5%
Max Load Impedance	5 kΩ, max peak output stimulus current 70mA 4 kΩ, max peak output stimulus current 80mA

Masimo O_3 (option)

Measurement Range	0%-99%
Calibration Range	45%-85%
Calibration Standard	Invasive Co-oximeter
Accuracy	≤3% (RMS, trend) Adult:≤4%; Pediatric: ≤5%
Stimulating Frequency	1Hz, 2Hz, 5Hz, 50Hz, 100Hz, error ±5%
Max Load Impedance	5 kΩ, max peak output stimulus current 70mA 4 kΩ, max peak output stimulus current 80mA
Accuracy	1%

△SpO_2

Measurement range	0%-99%
Resolution	1%

Percentage of rSO2 deviation baseline (△BL)

Measurement range	-100%-890%
Resolution	1%

Area under the curve (AUC)

Measurement range	0min·%～9999min·%
Resolution	1min·%

Temperature

Standard	ISO 80601-2-56
Parameter	T1, T2, TD
Probe	YSI400 series probe
Measurement site	Surface and coelom
Measurement range	0.0℃ to 50.0℃(32℉ to 122℉)
Accuracy	±0.1℃ or ±1℉ (exclusive of probe)
Resolution	0.1℃ or 1℉
Unit	℃ or ℉
Minimum accurate measuring time	Surface <100s; Coelom <80s.

DM (option)

Liquid stop function:	Alarm and stop liquid when drip rate is abnormal Alarm and stop liquid when infusion is completed When the module is powered off, the liquid stop clip is opened without affecting the infusion.
Unit	Drops/min, mL/h
Measurement range	5 Drops/min～200 Drops/min (1mL of conventional tube =20 drops)
Drip accuracy	±2 Drops/min and ±2%, whichever is greater
Resolution	1 Drops/min

Data storage

Trend data	Long trend: 1800h, minimum resolution is 10 min Medium trend: 180h, minimum resolution is 1 min Short trend: 6h, minimum resolution is 5 second
Parameter alarm event	At least 3000 parameter alarm events and associated parameter waveform at the moment
ARR events	3000 ARR events
NIBP result	At least 2400 groups.
Holographic waveform	At least 72 hours

Option Module:

2-IBP module, 2-Temp module, Nellcor SpO2 module, **Masimo Rainbow Module**, Masimo SpO2 Module, RM module, Sidestream CO2 module, MicroFlow CO2 module, Mainstream CO2 module, Mainstream / Sidestream AG module, Suntech NIBP module, ICG module, EEG module, BIS module, NMT module, RsO2 module, DM module, Voice assistant module, BIOLINK module

Other option:

Thermal Printer, Rolling stand, Wall mount, External Display, Wireless Lan (Wifi), Analog Output (ECG or IBP), Auxiliary module slots , Dock station 1, Transport handle

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