iM70

Patient Monitor

Version 1.4

Main Unit Specification

Physical Specifications

Dimension	328 mm (W) × 285 mm (H) × 158 mm (D)
Weight	< 4.5 kg (standard configuration, without battery)

Power Supply

Power Supply	100 V to 240 V~, 50 Hz/60 Hz
Current	1.4 A-0.7 A

Battery

Battery Type	Rechargeable lithium-ion battery	
Capacitance	2500 mAh , 5000 mAh	
Operating Time	2500 mAh	≥4.5 h
	5000 mAh	≥10 h
Charge Time	2500 mAh	≤3.5 h, 100% charge ≤3.15 h, 90% charge
	5000 mAh	≤6.5 h, 100% charge ≤5.85 h, 90% charge

Display

Display screen	12.1 inch color TFT, supporting touch screen
Resolution	800 × 600
Wave	A maximum of 13 waveforms (with 12-lead ECG function)

Recorder

Record Width	48 mm
Paper Speed	12.5 mm/s, 25 mm/s, 50 mm/s
Channels	3
Recording types	Continual real-time recording 8-second real-time recording 20-second real-time recording, Trend graph recording Trend table recording NIBP review recording Arrhythmia review recording Alarm review recording Drug calculation titration recording Hemodynamic Calculation result recording Oxygenation Calculation result recording Ventilation Calculation result recording Renal Function Calculation result recording 12-lead diagnosis recording C.O. measurement recording Frozen waveform recording ST view recording QT view recording

Data Storage

Internal Temporary Memory

A single piece of patient data maximally contains the following information:

Trend Data	3 hour, at 1 s resolution 120 hours, at 1 min resolution
Alarm Events	Up to 200 sets
NIBP Measurement Data	1200 sets
Arrhythmia Events	Up to 200 sets
12-lead Analysis Result	Up to 50 sets
Full disclosure Waveforms	48 hours

Storage capacity for 1G extended space:

Continuous parameter data	720 hours, resolution: 1 min
NIBP data	At least 68000 sets
Physiological alarm event	At least 4500 sets
Arrhythmia event	At least 4500 sets
Full disclosure waveforms	30 hours

Wi-Fi

IEEE	802.11a/b/g/n
Frequency Band	2.4 GHz ISM band & 5 G ISM band

Interfaces and others

Nurse Call / Analog Output/ Defibrillator Synchronization	1
USB Interfaces	2
VGA Interface	1
Wired Network Interface	1
Anti-theft lock interface	1

ECG

Lead Mode	3 Electrodes: I, II, III 5 Electrodes: I, II, III, aVR, aVL, aVF, V 6 Electrodes: I, II, III, aVR, aVL, aVF, Va, Vb. 10 Electrodes: I, II, III, aVR, aVL, aVF, V1-V6
Electrode Standard	AHA, IEC
Gain Selection	×0.125, ×0.25, ×0.5,×1, ×2, ×4, AUTO gain
Sweep	6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
Bandwidth (-3 dB)	Diagnosis: 0.05 Hz to 150 Hz Diagnosis 1: 0.05 Hz to 40 Hz Monitor: 0.5 Hz to 40 Hz Surgery: 1 Hz to 20 Hz Enhanced: 2 Hz ~18 Hz Customized: High-pass Filter and Low-pass Filter

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EDAN

CMRR	Diagnosis: > 95 dB Diagnosis 1: > 105 dB (when Notch is turned on) Monitor: > 105 dB Surgery: > 105 dB Enhanced: > 105 dB Customized: > 105 dB (Low-pass Filter < 40 Hz) > 95 dB (Low-pass Filter > 40 Hz)
Hum Filter	In diagnosis, Diagnosis 1, monitor, surgery, enhanced and customized modes: 50 Hz/60 Hz (Hum Filter can be turned on or off manually)
Recovery Time After Defibrillation	< 5 s (measured without electrodes as IEC60601-2-27:2011, Sect. 201.8.5.5.1 requires.)
ESU Protection	Cut mode: 300 W Coagulation mode: 100 W Restore time: ≤10 s
Pace Pulse Detecting Lead	one among I, II, III, aVR, aVL, aVF, V1- V6

Heart Rate

Range	ADU: 15 bpm to 300 bpm PED/NEO: 15 bpm to 350 bpm
Accuracy	±1% or ±1 bpm, whichever is greater
Resolution	1 bpm

PVC

Range	ADU: (0 to 300) PVCs/ min PED/NEO: (0 to 350) PVCs/ min
Resolution	1 PVCs/min

ST value

Range	-2.0 mV to +2.0 mV
Accuracy	-0.8 mV to +0.8 mV: ±0.02 mV or 10%, whichever is greater. Beyond this range: not specified.
Resolution	0.01 mV

QT measurement

Range	200 ms ~ 800 ms
Resolution	4 ms
Accuracy	± 30 ms

QTc measurement

Range	200 ms ~ 800 ms
Resolution	4 ms
Accuracy	± 30 ms

ΔQTc measurement

Range	-600 ms ~ 600 ms
Resolution	1 ms

Arrhythmia analysis

Asystole, Sustain VT, V-Fib/V-Tach, ExtremeTachy, ExtremeBrady, V-Tach, Vent Brady, Tachy, Brady, Wide QRS Tachy, Non-Sustain VT, Afib, Vent Rhythm, Acc. Vent Rhythm, Pause, Pauses/min High, PVCs High, R on T, PVC Bigeminy, PVC Trigeminy, Pacer not Pacing, Pacer not Capture, Missed Beat, VEB, PVC, Couplet, Run PVCs, IPVC, Irr Rhythm, PAC Bigeminy, Multiform PVCs, PAC Trigeminy, Low Voltage (Limb)

12-Lead ECG Synchronization Analysis

Average parameters of heart beat	PR interval (ms)
Heart rate (bpm)	QRS interval (ms)
Time limit of P wave (ms)	QT/QTC (ms)
P-QRS-T AXIS	

RESP

Method	Impedance between RA-LL, RA-LA
Measurement lead	Options are lead I and II. The default is lead II.
Measuring Range	Adult: 0 rpm to 120 rpm Ped/Neo: 0 rpm to 150 rpm
Resolution	1 rpm
Accuracy	Adult: 6 rpm to 120 rpm: ±2 rpm 0 rpm to 5 rpm: not specified Ped/Neo: 6 rpm to 150 rpm: ±2 rpm 0 rpm to 5 rpm: not specified
Gain Selection	×0.25, ×0.5, ×1, ×2, ×3, ×4, ×5
Sweep	6.25 mm/s, 12.5 mm/s, 25.0 mm/s, 50.0 mm/s
Apnea Alarm Time Setup	10 s, 15 s, 20 s (Default), 25 s, 30 s, 35 s, 40 s

EDAN Module NIBP

Method	Oscillometry
Mode	Manual, Auto, Continuous, Sequence
Measuring Interval in Auto Mode	1/2/2.5/3/4/5/10/15/30/60/90/120/180/240/360/480 min and User Define
Continuous	5 min, interval is 5 s
Measuring Type	SYS, DIA, MAP, PR
Measuring Range	
Adult Mode	SYS: 25 mmHg to 290 mmHg DIA: 10 mmHg to 250 mmHg MAP: 15 mmHg to 260 mmHg
Pediatric Mode	SYS: 25 mmHg to 240 mmHg DIA: 10 mmHg to 200 mmHg MAP: 15 mmHg to 215 mmHg
Neonatal Mode	SYS: 25 mmHg to 140 mmHg DIA: 10 mmHg to 115 mmHg MAP: 15 mmHg to 125 mmHg
Cuff Pressure Measuring Range	0 mmHg to 300 mmHg
Pressure Resolution	1 mmHg
Maximum Mean Error	±5 mmHg
Maximum Standard Deviation	8 mmHg
Maximum Measuring Period	Adult/ Pediatric: 120 s Neonatal : 90 s
Typical Measuring Period	20 s to 35 s (depend on HR/motion disturbance)
Dual Independent Channel Overpressure Protection	Adult : (297±3) mmHg Pediatric: (245±3) mmHg Neonatal : (147±3) mmHg

SunTech Module NIBP

Method	Oscillometric
Mode	Manual, Auto, Continuous, Sequence
Measuring Interval in AUTO Mode	1/2/3/4/5/10/15/30/60/90/120/180/240/360/480 and User Define
Measuring Type	SYS, DIA, MAP, PR
Measuring Range	
Adult Mode	SYS: 40 mmHg to 260 mmHg DIA: 20 mmHg to 200 mmHg MAP: 26 mmHg to 220 mmHg
Pediatric Mode	SYS: 40 mmHg to 230 mmHg DIA: 20 mmHg to 160 mmHg MAP: 26 mmHg to 183 mmHg
Neonatal Mode	SYS: 40 mmHg to 130 mmHg DIA: 20 mmHg to 100 mmHg

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	MAP: 26 mmHg to 110 mmHg
Pressure Resolution	1 mmHg
Maximum Mean Error	±5 mmHg
Maximum standard deviation	8 mmHg
Maximum measuring period	Adult/Pediatric: 130 s Neonate : 75 s
Dual Independent Channel Overpressure Protection	Adult/Pediatric : < 300 mmHg Neonate : < 150 mmHg

EDAN Module SpO_2

Measuring Range	0% to 100%
Resolution	1%
Data update period	1 s
Accuracy	Adult/Pediatric: ±2% (70% to 100% SpO_2) Undefined (0% to 69% SpO_2) Neonate: ±3% (70% to 100% SpO_2) Undefined (0% to 69% SpO_2)

PI (Perfusion Index)

Measuring Range	0.00-20%, invalid PI value is -?-.
Resolution	1% (10% to 20%) 0.1% (1.0% to 9.9%) 0.01% (0.00% to 0.99%)

Nellcor Module SpO_2

Measuring Range	1% to 100%
Resolution	1%
Data Update Period	1 s
Accuracy	
DS-100A, OXI-A/N(Adult) D-YS (Adult and Pediatric) OXI-P/I (Pediatric)	±3% (70% to 100% SpO_2)
MAX-A, MAX-AL, MAX-N, MAX-P, MAX-I, MAX-FAST (Adult and Pediatric)	±2% (70%～100% SpO_2)
MAX-A, MAX-AL, MAX-N, MAX-P, MAX-I, MAX-FAST (Adult and Pediatric)	±3% (60%～80% SpO_2)

PR

PR (SpO_2)

Measuring range	EDAN: 25 bpm to 300 bpm Nellcor: 20 bpm to 300 bpm
Accuracy	EDAN: ±2 bpm Nellcor: ±3 bpm (20 bpm to 250 bpm)
Resolution	EDAN: 1 bpm Nellcor: 1 bpm

PR (NIBP)

Measuring range	EDAN: 40 bpm to 240 bpm SunTech:: 30 bpm to 220 bpm
Accuracy	EDAN: ±3 bpm or 3.5%, whichever is greater SunTech: ±3 bpm or ±2%, whichever is greater
Resolution	EDAN: 1 bpm SunTech: 1 bpm

PR (IBP)

Measuring range	EDAN: 20 bpm to 300 bpm
Accuracy	EDAN: 30 bpm to 300 bpm: ±2 bpm or ±2%, whichever is greater; 20 bpm to 29 bpm: undefined
Resolution	EDAN: 1 bpm

TEMP

Channel	2
Sensor type	YSI-10K and YSI-2.252K
Technique	Thermal resistance
Measure Parameter	T1, T2, TD (the absolute value of T2 minus T1)
Position	Skin, oral cavity, rectum
Unit	°C, °F
Measuring Range	0°C to 50°C (32 °F to 122 °F)
Resolution	0.1°C (0.1 °F)
Accuracy	Accuracy (not including sensor): ±0.1°C Sensor accuracy: ≤ ±0.2°C
Transient Response Time	≤30 s

IBP

Channel	2
Technique	Direct invasive measurement
Measuring range	Art: (0 to +300) mmHg PA/PAWP: (-6 to +120) mmHg CVP/RAP/LAP/ICP: (-10 to +40) mmHg P1/P2: (-50 to +300) mmHg
Resolution	1 mmHg
Accuracy (not including sensor)	±2% or ±1 mmHg, whichever is greater ICP: 0 mmHg to 40 mmHg: ±2 % or ±1 mmHg, whichever is greater; -10 mmHg to -1 mmHg: undefined
Unit	kPa, mmHg, cmH_2O

EDAN G2 Sidestream Module CO_2

Intended patient	Adult, Pediatric, Neonatal
Measure Parameters	$EtCO_2$, $FiCO_2$, AwRR
Unit	mmHg, %, kPa
Measuring Range	$EtCO_2$: 0 mmHg to 150 mmHg (0% to 20%) $FiCO_2$: 0 mmHg to 50 mmHg AwRR: 2 rpm to 150 rpm
Resolution	$EtCO_2$: 1 mmHg $FiCO_2$: 1 mmHg AwRR: 1 rpm
$EtCO_2$ Accuracy	
Typical conditions: Ambient temperature: (25± 3) °C Barometric pressure: (760± 10) mmHg Balance gas: N_2 Sample gas flowrate: 100 ml/min	±2 mmHg, 0 to 40 mmHg ±5% of reading, 41 to 70 mmHg ±8% of reading, 71 to 100 mmHg ±10% of reading, 101 to 150 mmHg
All conditions	±12% of reading or ±4 mmHg, whichever is greater
AwRR Accuracy	±1 rpm
Sample Gas Flowrate	70 ml/min or 100 ml/min, accuracy: ±15 ml/min
Warm-up time	Display waveform within 20 s Reach the design accuracy within 2 minutes.
Response time	< 4 s (with 2 m gas sampling tube, sample gas flowrate: 100 ml/min) < 4 s (with 2 m gas sampling tube, sample gas flowrate: 70 ml/min)
Barometric Pressure Compensation	Automatic (The change of barometric pressure will not add additional errors to the measurement values.)
Zero Calibration	Support
Calibration	Support
Apnea Alarm Delay	10 s, 15 s, 20 s (Default), 25 s, 30 s, 35 s, 40 s

Respironics Sidestream and Mainstream Modules CO_2

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Applicable Patient Type	Adult, pediatric and neonatal
Method	Infra-red Absorption Technique
Measure Parameters	$EtCO_2$, $FiCO_2$, AwRR
Unit	mmHg/ %/ kpa
Measuring Range	$EtCO_2$: 0 mmHg to 150 mmHg
	$FiCO_2$: 3 mmHg to 50 mmHg
	AwRR: 2 rpm to 150 rpm (Sidestream)
	0 rpm to 150 rpm (Mainstream)
Resolution	$EtCO_2$: 1 mmHg
	$FiCO_2$: 1 mmHg
	AwRR : 1 rpm
$EtCO_2$ Accuracy	±2 mmHg, 0 mmHg to 40 mmHg
	±5% of reading, 41 mmHg to 70 mmHg
	±8% of reading, 71 mmHg to 100 mmHg
	±10% of reading, 101 mmHg to 150 mmHg
	±12% of reading, RR is over 80 rpm (Sidestream)
	There will be no degradation in performance due to respiration rate. (Mainstream)
AwRR Accuracy	±1 rpm
Zero Calibration	Support
Apnea Alarm Delay	10 s, 15 s, 20 s (Default), 25 s, 30 s, 35 s, 40 s;
Barometric Pressure Compensation	User setup
CO_2 Rise Time (Mainstream)	< 60 ms
Sensor Response time (Sidestream)	<3 seconds - includes transport time and rise time

Masimo Sidestream Module CO_2

Ambient CO_2	≤ 800 ppm (0.08 vol%)
Sampling Flow Rate	(50 ± 10) sml/min
Respiration Rate	0 to 150 ± 1 breaths/min.
Calibration	No span calibration is required.
Warm-up Time	< 10 seconds
CO_2 Rise Time At 50sml/min Sample Flow	≤ 200 ms
NomoLine ISA CO_2 System Response Time	< 3 seconds
AwRR Range	0 rpm to 150 rpm
AwRR Accuracy	± 1 rpm
CO_2 Accuracy	
Standard Conditions	(0 to 15) vol% ±(0.2 vol% + 2% of reading)
All Conditions	(15 to 25) vol% Unspecified

Masimo Mainstream Module CO_2

Respiration Rate	0 to 150 ± 1 bpm.
Calibration	No span calibration required for the IR bench.
Warm-up Time	< 10 seconds (full accuracy)
Rise Time (@ 10 l/min)	≤ 90 ms
Total System Response Time	< 1 second
AwRR Range	0 rpm to 150 rpm
AwRR Accuracy	± 1 rpm
CO_2 Accuracy	
Standard Conditions	(0 to 15) vol% ±(0.2 vol% + 2% of reading
All Conditions	±(0.3 kPa + 4% of reading)

C.O.

Technique	Thermodilution Technique
Measure Parameters	C.O., TB, TI
Measuring Range	C.O.: 0.1 L/min to 20 L/min
	TB: 23°C to 43°C (73.4ºF to 109.4ºF)
	TI: -1°C to 27°C (30.2ºF to 80.6ºF)
Resolution	C.O.: 0.1 L/min
	TB, TI : 0.1° C (+0.1 ºF)
Accuracy	C.O.: ±5% or ±0.2 l/min, whichever is greater
	TB: ±0.1° C (not including sensor)
	TI : ±0.1° C (not including sensor)

EDAN G7 (Sidestream) AG

Intended Patient	Adult, pediatric, neonatal
Measure Parameters	Halothane (HAL), Isoflurane (ISO), Enflurane (ENF), Sevoflurane (SEV), Desflurane (DES), CO_2, O_2, N_2O, AwRR, and MAC
Unit	HAL, ISO, ENF, SEV, DES, N_2O: %; CO_2, O_2: mmHg, %, kPa, default is %; AwRR: bpm;
Measuring Range	
CO_2	0~15 vol%
N_2O	0~100 vol%
Halothane/ Enflurane/ Isoflurane	0~8 vol%
Sevoflurane	0~10 vol%
Desflurane	0~22 vol%
O_2	0~100%
Resolution	N_2O, O_2: 1%
	CO_2, AG: 0.1%
AwRR	Measurement range : 2 ~ 150 rpm
	Measuring accuracy: ±1 bpm (120 bpm and below), Not specified (120 bpm above)
	Resolution: 1 rpm
Sampling Flow Rate	150 ml/min, accuracy ±15 ml/min
Warm-up Time	Display reading within 20 s; reach to the designed accuracy within 2 minutes
Response Time	< 4 s (with 2 m gas sampling tube, sample gas flowrate: 150 ml/min)

Masimo ISA analyzer AG

Module Type	
ISA AX+	Displaying the concentration of CO_2, N_2O, and two anesthesia agent and identifying the anesthesia agent automatically (built-in module)
ISA OR+	Displaying the concentration of CO_2, O_2, N_2O, and two anesthesia agent and identifying the anesthesia agent automatically (built-in module)
Measurement Parameters	CO_2, N_2O, O_2, Halothane (HAL), Isoflurane (ISO), Enflurane (ENF), Sevoflurane (SEV), Desflurane (DES), AwRR, MAC
Measurement Principle	CO_2, N_2O, Anesthesia Agent: Infra-red absorption characteristic; O_2 : Paramagnetic method
Sampling Flow Rate	(50 ± 10) ml/min
Compensations	Automatic compensation for pressure, temperature and broadening effects on CO_2.
Warm-up Time	< 20 s
Measurement Range	CO_2 : 0 to 25 vol% O_2: 0 to 100 vol% N_2O: 0 to 82 vol% HAL, ENF, ISO, SEV, DES: 0-25 vol% AwRR: 0 rpm to 150 rpm
Resolution	CO_2 : 0.1% HAL, ENF, ISO, SEV, DES: 0.1% N_2O: 1% O_2:1% AwRR: 1 rpm

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Accuracy (Standard Conditions)

CO_2	0 to 15 vol% 15 to 25 vol%	±(0.2 vol% + 2% of reading) Unspecified
N_2O	0 to 82 vol%	±(2 vol% + 2% of reading)
HAL, ENF, ISO	0 to 8 vol % 8 to 25 vol %	±(0.15 vol% + 5% of reading) Unspecified
SEV	0 to 10 vol % 10 to 25 vol %	±(0.15 vol% + 5% of reading) Unspecified
DES	0 to 22 vol % 22 to 25 vol %	±(0.15 vol% + 5% of reading) Unspecified
O_2	0 to 100 vol %	±(1 vol% + 2% of reading)
AwRR Accuracy	±1 rpm	
Apnea Alarm Delay	20 s (Default), 25 s, 30 s, 35 s, 40 s	

Masimo IRMA module (Mainstream) AG

Module Type: IRMA AX+	Displaying the concentration of CO_2, N_2O and two anesthesia agent and identifying two anesthesia agent
Measurement Parameters	CO_2, N_2O, HAL, Isoflurane(ISO), Enflurane (ENF), Sevoflurane (SEV), Desflurane (DES), AwRR, MAC
Measurement Principle	CO_2, N_2O, anesthesia agent: infra-red absorption characteristic
Barometric Pressure Compensation	Automatic
Warm-up Time	< 20 seconds (Concentrations reported, automatic agent identification enabled and full accuracy)
Measurement Range	CO_2 : 0 to 25 vol% N_2O: 0 to vol% HAL, ENF, ISO, SEV, DES: 0-25 vol% AwRR: 0 to 150 rpm
Resolution	CO_2: 0.1% HAL, ENF, ISO, SEV, DES: 0.1% N_2O: 1% AwRR: 1 rpm

Accuracy (Standard Conditions)

CO_2	0 to 15 vol%	±(0.2 vol% + 2% of reading)
N_2O	0 to 82 vol%	±(2 vol% + 2% of reading)
HAL, ISO, ENF	0 to 8 vol%	±(0.15 vol% + 5% of reading)
SEV	0 to 10 vol%	±(0.15 vol% + 5% of reading)
DES	0 to 22 vol%	±(0.15 vol% + 5% of reading)
AwRR Accuracy	±1 rpm	
Apnea Alarm Delay	20 s (Default), 25 s, 30 s, 35 s, 40 s.	

Safety Specifications

Compliant with Standards	IEC 60601-1: 2005+A1 :2012; IEC 60601-1-2: 2014; EN 60601-1: 2006+A1 :2013; EN 60601-1-2: 2015; IEC 80601-2-49: 2018
Anti-electroshock Type	Class I equipment and internal powered equipment
Anti-electroshock Degree	CF: ECG (RESP), TEMP, IBP, C.O. BF: SpO_2, NIBP, CO_2, AG
Ingress Protection	IPX1

Environmental Specifications

Temperature	Working : +0°C to +40°C (32ºF ~ 104ºF) Transport and Storage: -20°C to +55°C (-4ºF ~ 131ºF)
Humidity	Working: 15%RH to 95%RH (non-condensing) Transport and Storage: 15%RH to 95%RH (non-condensing)
Altitude	Working: 86 kPa to 106 kPa Transport and Storage: 70 kPa to 106 kPa

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