

Technical data

ProSim 8 Vital Signs Simulator



The 8-in-1 ProSim 8 Vital Signs Simulator offers fast and comprehensive preventative maintenance (PM) testing for your entire patient monitor fleet. Designed to get you in and out of most PM locations in minutes, this multifunction simulator tests ECG (including fetal ECG and arrhythmias), respiration, temperature, IBP, cardiac output, NIBP, SpO₂, and is capable of testing Rainbow multi-wavelength waveforms. Featuring specialized stay-connected ECG posts for secure lead connections, physiologically-synchronized pulses across all parameters, and customizable patient pre-sets and autosequences, the ProSim 8 patient simulator provides unbeatably fast and easy complete monitor testing. Barcode-scanner compatibility and wireless PC interface, direct printing, data transfer and reporting, along with advanced, integrated technologies and works-every-time performance allow top confidence in patient monitor fleet performance and supports passing regulatory audits with ease.

Key features

- All-in-one complete monitor testing 80 % smaller and 17 lbs/ 7.7 kilos lighter than predecessor technology
- 8-in-1 multifunction simulator tests ECG (including fetal ECG and arrhythmias), respiration, temperature, IBP, cardiac output, NIBP, SpO₂, and Rainbow multi-wavelength waveforms
- Stay-connected ECG posts for easy/secure ECG snap and lead connections
- Custom SpO₂ r-curve for accurate testing of the latest and future oximetry technologies
- Static pressure linearity testing
- Repeatable NIBP simulation (+/- 2 mmHg) for dynamic pressure repeatability testing
- Physiologically synchronized pulses across all parameters
- Barcode scanning and direct data capture and printing functionality
- Onboard, customizable patient pre-sets and autosequences for fast/easy testing
- Multi-language user interface offers choice of language selection
- Integrated, easily-replaceable long-life battery
- Optional PC-interface software offers customizable procedures/ checklists to replace bulky service manuals and automated data capture/storage*
- Wireless communication for remote PC control of test device, as well as data transfer and automated regulatory reporting*

*Bipolar leakage testing performed with 200 ohm fixed load.

Specifications

General specifications			
Temperature	Operating	10 °C to 40 °C (50 °F to 104 °F)	
	Weight	-20 °C to +60 °C (-4 °F to 140 °F)	
Humidity	10 % to 90 % non-condensing		
Altitude	3,000 meters (9,843 ft)		
Dimensions (L x W x H)	14.5 cm x 30.2 cm x 8.6 cm (5.7 in x 11.9 in x 3.4 in)		
Display	LCD color display		
Communication	USB device upstream port	Mini-B connector for control by a computer	
	USB host controller port	Type A, 5 V output, 0.5 A max load. Connector for keyboard, barcode reader, and printer	
	Wireless	IEEE 82.15.4 for control by a computer	
Power	Lithium-ion rechargeable battery		
Battery charger	100 V to 240 V input, 15 V/2.0 A output. For best performance, the battery charger should be connected to a properly-grounded ac receptacle		
Battery life	9 hours (minimum), 100 NIBP cycles typical		
Weight	1.87 kg (4.2 lb)		
Safety standards	IEC/EN 61010-1 3rd Edition; Pollution degree 2 CAT None		
Certifications	CE, CSA, C-TICK N10140, RoHS		
Electromagnetic compatibility (EMC)	IEC 61326-1:2006		
Detailed specifications			
Normal-sinus-rhythm waveform			
ECG reference	The ECG amplitudes specified are for Lead II (calibration), from the baseline to the peak of the R wave. All other leads are proportional		
Normal sinus rhythm	12-lead configuration with independent outputs referenced to right leg (RL). Output to 10 universal ECG jacks, color-coded to AHA and IEC standards		
High-level output	0.5 V/mV ± 5 % of the ECG amplitude setting available on a BNC connector		
Amplitude	0.05 mV to 0.5 mV (0.05 mV steps); 0.5 mV to 5.0 mV (0.25 mV steps)		
	Other leads are proportional to Lead II (reference lead) in percentage per:		
	Lead I: 70	Lead V1: 24	Lead V4: 120
	Lead II: 100	Lead V2: 48	Lead V5: 112
	Lead III: 30	Lead V3: 100	Lead V6: 80
Amplitude accuracy	± (2 % of setting + 0.05 mV)		
ECG rate	10 BPM to 360 BPM in 1 BPM steps		
Rate accuracy	± 1 % of setting		
ECG waveform selection	Adult (80 ms) or pediatric (40 ms) QRS duration		
ST-segment elevation	Adult mode only. -0.8 mV to +0.8 mV (0.1 mV steps). Additional steps: + 0.05 mV and - 0.05 mV		
Power-on default	60 BPM, 1.0 mV, adult QRS and ST-segment elevation of 0 mV		



Pacemaker waveform			
Pacer pulse	Amplitude	0 (off), ± 2, ± 4, ± 6, ± 8, ± 10, ± 12, ± 14, ± 16, ± 18, ± 20, ± 50, ± 100, ± 200, ± 500, and ± 700 mV for lead II (reference lead)	
	Accuracy	Reference lead II: ± (5 % setting + 0.2 mV) All other leads: ± (10 % setting + 0.4 mV)	
Pacer pulse width	0.1 ms, 0.2 ms, 0.5 ms, 1 ms, and 2 ms ± 5 %		
Paced arrhythmias	Atrial 80 BPM Asynchronous 75 BPM Demand with frequent sinus beats Demand with occasional sinus beats Atrio-ventricular sequential Noncapture (one time) Nonfunction		
Power-on default	Amplitude 5 mV, width 1 ms, atrial waveform		
Arrhythmia			
Baseline NSR	80 BPM		
PVC focus	Left focus, standard timing (except where specified)		
Supraventricular arrhythmia	Atrial fibrillation (coarse or fine); atrial flutter; sinus arrhythmia; missed beat (one time); atrial tachycardia; paroxysmal atrial tachycardia; nodal rhythm; and supraventricular tachycardia		
Premature arrhythmia	Premature atrial contraction (PAC); premature nodal contraction (PNC); PVC1 left ventricular; PVC1 left ventricular, early; PVC1 left ventricular, R on T; PVC2 right ventricular; PVC2 right ventricular, early; PVC2 right ventricular, R on T; and multifocal PVCs		
Ventricular arrhythmia	PVCs 6, 12, or 24 per minute; frequent multifocal PVCs; bigeminy; trigeminy; multiple PVCs (one-time run of 2, 5, or 11 PVCs); monoventricular tachycardia (120 to 300 BPM in 5 BPM steps); poly-ventricular tachycardia (5 types); ventricular fibrillation (coarse or fine); and asystole		
Conduction defect	First-, second-, or third-degree heart block; and right- or left-bundlebranch block		
Advanced cardiac life support	Shockable pulseless arrest rhythms	Ventricular fibrillation (coarse), ventricular fibrillation (fine), unstable polymorphic ventricular tachycardia	
	Non-shockable pulseless arrest rhythms	Asystole	
	Symptomatic bradycardia	Sinus bradycardia (< 60 BPM) 2nd degree AV block, mobitz type I 2nd degree AV block, mobitz type II Complete/3rd degree AV block Right bundle branch block Left bundle branch block	
		Symptomatic tachycardia: regular narrow-complex tachycardia (QRS < 0.12 seconds)	Sinus tachycardia > 150 BPM Supraventricular Tachycardia
	Symptomatic tachycardia: regular wide-complex tachycardias (QRS ≥ 0.12 seconds)	Sinus tachycardia > 150 BPM Supraventricular tachycardia SVT with aberrancy	
	Irregular tachycardia	Atrial fibrillation (coarse and fine), atrial flutter, unstable monomorphic ventricular tachycardia (120 BPM to 300 BPM), torsade de pointes/polymorphic ventricular tachycardia (long QT interval)	

Invasive blood pressure		
Channels	2, each independently settable with identical parameters and are individually electrically isolated from all other signals	
Input/output impedance	300 Ω \pm 10 %	
Exciter input range	2 to 16 V peak	
Exciter-input frequency range	DC to 5000 Hz	
Transducer sensitivity	5 (default) or 40 μ V/V/mmHg	
Pressure accuracy	\pm (1 % of setting + 1 mmHg) accuracy guaranteed for dc excitation only	
Static pressure	- 10 to + 300 mmHg in 1 mmHg steps	
Pressure units	mmHg or Kpa	
Dynamic waveforms	Types (default pressures	Arterial (120/80) Radial artery (120/80) Left ventricle (120/00) Right ventricle (25/00) Pulmonary artery (25/10) Pulmonary-artery wedge (10/2) Right atrium (central venous or CVP) (15/10)
	Pressure variability	Systolic and diastolic pressures are independently variable in 1 mmHg steps
Swan-Ganz sequence	Right atrium, right ventricle (RV), pulmonary artery (PA), pulmonary artery wedge (PAW)	
Cardiac catheterization	Chambers	Aortic, pulmonary valve, and mitral valve
Respiration artifact	Arterial, radial artery, and left ventricle	5 % to 10 % multiplication
BP output	Circular DIN 5-Pin	
Power-on default	0 mmHg	
Respiration		
Rate	0 (OFF), 10 BrPM to 150 BrPM in 1 BrPM steps	
Waves	Normal or ventilated	
Ratio (inspiration:expiration)	Normal	1:1, 1:2, 1:3, 1:4, 1:5
	Ventilated	1:1
Impedance variations (Δ Ω)	0.00 Ω to 1.00 Ω in 0.05 Ω steps and 1 Ω to 5 Ω in 0.25 Ω steps	
Accuracy delta	\pm (5 % of setting + 0.1 Ω)	
Baseline	500 Ω , 1000 Ω (default), 1500 Ω , 2000 Ω , Leads I, II, III	
Accuracy baseline	\pm 5 %	
Respiration lead	LA or LL (default)	
Apnea selection	12 sec, 22 sec, or 32 seconds (one-time events), or continuous (Apnea ON = respiration OFF)	
Power-on default	20 BrPM, delta 1.0 Ω	

Temperature		
Temperature	30 °C to 42.0 °C in 0.5 °C steps	
Accuracy	± 0.4 °C	
Compatibility	Yellow Springs, Inc. (YSI) Series 400 and 700	
Output	Circular DIN 4-Pin	
Cardiac output		
Catheter type	Baxter Edwards, 93a-131-7f	
Calibration coefficient	0.542 (0 °C injectate), 0.595 (24 °C injectate)	
Blood temperature	36 °C (98.6 °F) to 38 °C (100.4 °F) ± 0.2 °C in 1 °C steps	
Injectate volume	10 cc	
Injectate temperature	0 °C or 24 °C	
Cardiac output	2.5, 5, 10 liters per minute ± 7.5 %	
Faulty-injectate curve	Waveform for simulation available	
Left-to-right-shunt curve	Waveform for simulation available	
Calibrated pulse	1.5 ° for 1 second	
Connector	Circular DIN 7 pin	
Power-on default	5 liters per minute, 0 °C injectate, 37 °C blood temperature	
Non-invasive blood pressure		
Pressure units	mmHg or kPa	
Manometer (pressure meter)	Range	10 mmHg to 400 mmHg
	Resolution	0.1 mmHg
	Accuracy	± (0.5 % reading + 0.5 mmHg)
Pressure source	Target pressure range	20 mmHg to 400 mmHg
	Resolution	1 mmHg
NIBP simulations	Pulse	
	Volume of air moved	
	Simulations (systolic/diastolic [MAP])	Adult: 60/30 (40), 80/50 (60); 100/65 (77); 120/80 (93); 150/100 (117); and 200/150 (167) and 255/195 (215) Neonatal: 35/15 (22); 60/30 (40); 80/50 (60); 100/65 (77); 120/80 (93) and 150/100 Pressure variability: systolic and diastolic pressures are variable by 1 mmHg
	Repeatability	Within ± 2 mmHg (at maximum pulse size independent of device under test)
	Synchronization: normal Sinus heart rates: 30 BPM to 240 BPM	Maximum rate at 1 ml: 240 BPM achievable with pulses up to 1 ml Maximum rate at 1.25 ml: 180 BPM
	Synchronization: arrhythmias	Premature atrial contraction (PAC), premature ventricular contraction (PVC), atrial fibrillation, and missed beat
Leak test	Target pressure	20 mmHg to 400 mmHg
	Elapse time	0:30 min to 5:00 minutes: seconds in 30 second steps
	Leakage rate	0 mmHg/minute to 200 mmHg/minute
Pressure relief test range	100 to 400 mmHg	

Oximeter SpO2 optical emitter and detector (optional)		
% O ₂	Range	30 % to 100 %
	Resolution	1 %
% O ₂ accuracy	With oximeter manufacturer's R-curve	Saturation within UUT specific range: ± (1 count + specified accuracy of the UUT)
		Saturation outside UUT specific range: monotonic with unspecified accuracy
	With Fluke Biomedical R-curves	91 % to 100 % ± (3 counts + specified accuracy of the UUT)
		81 % to 90 % ± (5 counts + specified accuracy of the UUT)
71 % to 80 % ± (7 counts + specified accuracy of the UUT)		
Below 71 % monotonic with unspecified accuracy		
Heart rate	30 BPM to 300 BPM in 1 BPM steps. Oximeter SpO2 optical emitter and detector is synchronized with ECG rate delayed by 150 ms.	
Transmission: ratio of detector current to LED current, expressed in parts per million (ppm)	Range	0 ppm to 300.00 ppm
	Resolution	0.01 ppm
	Accuracy	+ 50 %/- 30 % for compatible monitors, unspecified for others. Selected by finger size and color: dark, thick finger, medium finger, light, thin finger, neonatal foot.
Pulse amplitude	Range	0 % to 20.00 %
	Resolution	0.01 %
Artifact	Respiration	Range: 0 % to 5 % of transmission
		Resolution: 1 %
		Rate: all ProSim respiration simulation settings
	Ambient light	Range: 0 to 5X transmitted light
Resolution: 1X		
Frequency: DC, 50 Hz, 60 Hz, and 1 kHz to 10 kHz in 1 kHz steps		
Masimo Rainbow technology	Masimo Rainbow technology with an optional adapter cable supplied by Masimo that allows the ProSim two wavelength to test the Rainbow multiple wavelength system	
Compatible manufacturer products	With manufacturer R-curve	Nellcor, Masimo, Nonin, and Nihon Kohden
	With Fluke R-curve	Mindray, GE-Ohmeda, Philips/HP, and BCI



Pre-Defined Simulations

- Normal
- Hypertensive
- Hypotensive
- Tachycardic
- Bradycardic
- Ventricular fibrillation
- Asystole

Autosequences (default)

- Monitor testing sequence
- Medical training sequence
- Oximeter testing sequence
- Cardiac failure sequence
- Arrhythmia sequence
- Exercise sequence
- Respiration sequence
- Performance wave test
- IBP testing sequence
- Temperature sequence

Ordering information

Part number	Description
3979409	ProSim 8 Vital Signs Simulator
3985658	ProSim SpO ₂ Test Module
4034609	ProSim Rainbow Test Cable

Standard Accessories

Part number	Description
3980671	ProSim 6/8 Users Manual
3980667	ProSim 6/8 Getting start manual
4021085	ProSim 6/8 Battery Pack
4034393	USB Cable
2392173	IBP Cable, unterminated
4034597	ProSim 6/8 Carrying Case
4308086	ProSim NIBP Mandrel Set
2391882	Set of NIBP Cuff Adapters
2184298	AC/DC Power Supply Power cord (country-specific)



AC Power cords

Part number	Description
2201437	ProSim 8 AC power cord Schuko
2201455	ProSim 8 AC power cord USA
2201428	ProSim 8 AC power cord UK
2201419	ProSim 8 AC power cord Japan
2201443	ProSim 8 AC power cord Australia
3930831	ProSim 8 AC power cord Brazil

Optional Accessories

Part number	Description
2392199	CI-3 Cardiac Output Box
3408564	Mini-DIN to DIN IBP Adapter
4034611	NIBP Rigid Test Chamber 500ML
4034627	Ansur Test Software ProSim 8 Plug-In
3341333	USB Wireless Dongle

Cable kits

Part number	Model	Includes
3984910	ProSim 8 Accessory Kit	DIN to minDin adapter, HP/Philips Intellivue IBP cable, GE Marquette Eagle/Dash/Solar IBP cable, Welch Allyn Propaq/SpaceLabs Ultraview IBP cable, USB wireless dongle, YSI400 series temperature cable, YSI700 series temperature cable, CI-3 Cardiac Output Box, spare battery pack)
3984922	HP/Phillips intellivue Cable Set	HP-3 BP Cable (2198902) two, HPT-2 Tamp/C.O. Injct Cable Assembly (2199257), COA-1 Cable Assembly (2199240), UT-4, Low profile 1/4 inch phone plug, YSI 400 Series Compatible 2 conductor (2523334)
3984968	GE Marquette Eagle/Dash/Solar Cable Set	MQ-3 BP Cable (2199627) two, UT-4 Low profile 1/4 inch phone plug, YSI 400 series Compatible 2 conductor (2523334), UT-2 Tamp Cable 700 series YSI (2199019), PROSIM8- 4402GECO, Din cardiac Output Marq Eagle (4022300)
3984946	ProSim 8 SpaceLabs Ultraview Cable Set	TK-1 BP Cable (2198879) two, UT-4 Low profile 1/4 inch phone plug, YSI 400 series compatible 2 conductor (2523334), UT-2 Tamp Cable 700 Series YSI (2199019)
3984979	Welch Allyn/Propaq Cable Set	TK-1 BP Cable (2198879) two, UT-4 Low profile 1/4 inch phone plug, YSI 400 Series Compatible 2 conductor (2523334), UT-2 Tamp cable 700 series YSI (2199019)
3984993	Drager Infinity Cable Set	SM-1 BP Cable (2198925) two, UT-4, Low profile 1/4 inch phone plug, YSI 400 series compatible 2 conductor (2523334)
3985009	ProSim 8 Nihon Kohden Cable Set	Nihon Kohden-NK-1, BP Cable (5M) (2462263) two, DIN to mindin adapter (3408564), UT-4, Low profile 1/4 inch phone plug, YSI 400 Series Compatible 2 conductor (2523334)

The ProSim 8 does not provide simulation for all types of fetal heart rate tracings and contraction patterns, including the following:

- variable decelerations
- sinusoidal pattern
- reactive tracing
- variations in FHR variability
- tachysystole

Blood pressure cables

Part number	Description
2198879	BCI International TK-1 (6M)
2198879	Criticare Systems Inc. (1100) TK-1 (6M)
2198879	Critikon (Dinamap Plus) TK-1 (6M)
2198887	Datascope DS-1 (6F)
2200955	Datex (AS/3, CS/3, Compact, Cardio Cap II, Critical Care, Light) DX-1 (10F)
2199387	Fakuda Denshi (DS3300 series) FD-2 (12M)
2199682	GE Marquette Medical Corometrics (115, 116, 142, 145, 556) CM-3 (Nicolet round – 12M)
2198893	GE Marquette Medical (PPG/E for M DR) EM-1 (6F)
2198978	GE Marquette Medical (7000 and TRAMAR series only) MQ-2 (8M round)
2199627	GE Marquette Medical (Dash, Eagle, Solar, Tram, and MacLab) MQ-3 (rectangular – 11M)
2198902	Hewlett Packard/Philips (78-300, 78- 500, 78-800, Merlin/Viridia/ Omnicare (HP/Philips M1006B iBP module has a sensitivity of 5 uV/V/ mmHg only. The HP-3 cable should be selected for this application.) HP-3 (12M 5 µV)
2198916	Hewlett Packard/Philips (78-300, 78- 500, 78-800, Merlin/Viridia/Omnicare) HP-4 (12M 40 µV)
2198879	Invivo Research TK-1 (6M)
2198879	Ivy Biomedical (400 and 700 series) TK-1 (6M)
2198940	Medical Data Electronics (Escort series) PC-1 (6M)
2198879	North American Drager (Vitalert 2000) TK-1 (6M)
2198940	Physio Control (VSM series) PC-1(6M)
2198879	Protocol System (Propaq series) TK-1 (6M)
2190955	Puritan Bennett PB 240 DX-1 (10F)
2198925	Siemens (SIRECUST series) [SM- 1 and Siemens Medical Transducer Adapter (3368-383-E530U) used to run a single invasive BP channel on the Siemens Medical SC6000 and SC9000 series monitors] SM-1 (10M)
2198879	SpaceLabs (1050, 1700, PCMS series) (SpaceLabs adapters 700-0028-00 and 0120-0551-00 with TK-1 used when testing the new UltraView Command Module) TK-1 (6M)
2392173	Universal unterminated UU-1 (5-Pin DIN one end only)
2198893	Witt Biomedical EM-1 (6F)
5226108	PS8IUP-8001, Corometrics IUP Simulation Cable
5226113	PS8IUP-8000,HP/AG/PH, 50 & 8040 SER, IUP SIMU CABLE

Temperature cables

Part number	Description
2199019	UT-2 standard 1/4 in phone plug (compatible with YSI 700 series – 3 conductor)
2523334	UT-4 Low profile, 1/4 in phone plug, YSI 400 series compatible, two conductor
2199257	HPT-2 temperature adapter (Hewlett Packard) (2 pin, used with UT-1 for HP monitors)

Cardiac output bath/injectate adapters

Part number	Description
2392199	CI-3 cable assembly
2392158	General purpose connector
2199240	COA-1 Cardiac output adapter (Hewlett Packard) (HPT-2 also required for cardiac output simulation on HP patient-monitoring systems)
2199257	HPT-2 Temperature adapter (Hewlett Packard) (2 pin) (COA-1 also required for cardiac output simulation on HP patient-monitoring systems)
4022300	DIN Cardiac Output MARQ EAGLE

About Fluke Biomedical

Fluke Biomedical is the world's leading manufacturer of quality biomedical test and simulation products. In addition, Fluke Biomedical provides the latest medical imaging and oncology quality-assurance solutions for regulatory compliance. Highly credentialed and equipped with a NVLAP Lab Code 200566-0 accredited laboratory, Fluke Biomedical also offers the best in quality and customer service for all your equipment calibration needs.

Today, biomedical personnel must meet the increasing regulatory pressures, higher quality standards, and rapid technological growth, while performing their work faster and more efficiently than ever. Fluke Biomedical provides a diverse range of software and hardware tools to meet today's challenges.

Fluke Biomedical regulatory commitment

As a medical test device manufacturer, we recognize and follow certain quality standards and certifications when developing our products. We are ISO 9001 and ISO 13485 medical device certified and our products are:

- CE Certified, where required
- NIST Traceable and Calibrated
- UL, CSA, ETL Certified, where required
- NRC Compliant, where required

Fluke Biomedical

We empower our everyday heroes to focus only on protecting lives.

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