

FLUKE®

Biomedical



Fluke Biomedical Product catalog

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 **RaySafe™**

LANDAUER®

Trusted for the measurements that matter.

Fluke Biomedical leads the world in the design and manufacture of biomedical test and simulation products. Reliability, accuracy and quality are the foundation of our company and products. Empowering you to focus on protecting lives is our goal.

1 Innovative design from customer feedback

At Fluke Biomedical, we strive to lead our market segments through creative solutions and ongoing improvement of current offerings. Our multi-functional product development teams are comprised of experts in mechanics, electronics, software, systems, engineering, service and manufacturing technology. This expertise, coupled with intensive customer research, called “voice of customer” helps us develop the devices that address your current and future testing needs. In addition to our VOC research, we actively participate in a wide range of industry associations, conferences and speaking events. We pay careful attention to evolving trends in the industry, applications and what is being asked of you.

2 Customer satisfaction demanded

When you invest in the best products, you deserve the best support. We have several world-class service centers, including the world’s largest commercial medical testing device laboratory. Our service centers are extremely versatile and can service over 1,000 different models. With extensive experience in full-asset management, our highly-accredited program is equipped to give you OEM firmware and product updates that can’t be found elsewhere; NIST-traceable calibration, 90-day warranty on repairs and fast turnaround from their state-of-the-art facilities.

3 High standards for quality assurance

Our employees are committed to maintaining the high quality of our products and services. We solicit customer input on quality and product features and then design, validate, manufacture and service these to requirements. We show an ongoing commitment to quality through the continuous improvement process required by our internationally recognized ISO 9001 and ISO 13485 Quality System registration.

About Fluke Corporation

Fluke Biomedical is a division of Fluke Corporation. Fluke Corporation is the world leader in the manufacture, distribution, and service of electronic test tools and software and is a wholly owned subsidiary of Fortive Corporation (*NYSE: FTV)



ProSim vital signs simulator family

Comparison guide

							
Functions	ProSim 8 + SPOT	ProSim 8	ProSim 4, ProSim 3, SPOT Light	ProSim 4	ProSim 3	ProSim 2	SPOT Light
ECG simulation	●	●	●	●	●	●	
Arrhythmia waveform selection	50+	50+	43	43	43	43	
Respiration simulation	●	●	●	●	●	●	
IBP simulation (channels)	2	2	4	1	4	2	
Temperature	●	●	●		●	●	
NIBP simulation	●	●	●	●			
Manometer (pressure meter)	●	●	●	●			
Leak test	●	●	●	●			
Pressure relief test	●	●	●	●			
Fetal ECG/IUP simulation	●	●			●		
Cardiac output	●	●	●		●		
Rainbow SET (Masimo) test	●						
Optical SpO ₂	●		●				●
Features							
Multi-parameter simulation	●	●	●	●	●	●	
Presets, auto sequences	●	●					
Multi-language	●	●	●	●			●
PC control software(Ansur)	●	●					
Direct data saving and printing	●	●					
Barcode scanning	●	●					
Wireless control	●	●					
Remote operation	●	●			●	●	
Communication	USB, wireless	USB, wireless	USB	USB	USB	USB	USB
Display	LCD color	LCD color	Touchscreen	Touchscreen	LCD gray	LCD gray	LCD gray
Battery life	9 hours	9 hours	4 hours	4 hours	8 hours	8 hours	10 hours

ProSim 8

Vital Signs Simulator



The 8-in-1 ProSim 8 Vital Signs Simulator offers fast and comprehensive preventive 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/ cardiac catheterization, NIBP, SpO₂, and is the premier SpO₂ simulator to test Rainbow multi-wavelength waveforms (with optional ProSim SpO₂ Test Module). Featuring specialized stay-connected ECG posts for secure lead connections, physiologically-synchronized pulses across all parameters, and customizable patient pre-sets and auto-sequences, the ProSim 8 provides unbeatably fast and easy complete monitor testing.

ProSim SpO₂ Test Module is an optional accessory

Specifications

Normal-sinus-rhythm waveform		
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 mV (0.25 mV steps)	
ECG rate	10 BPM to 360 BPM in 1 BPM steps	
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	
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)
Pacer pulse width	0.1ms, 0.2 ms, 0.5 ms, 1ms, 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	
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); mono-ventricular tachycardia (120 to 300 BPM in 5 BPM steps); poly-ventricular tachycardia (5 types); ventricular fibrillation (coarse or fine); and asystole	

Key features

- All-in-one complete monitor testing
- Stay-connected ECG posts for easy/secure ECG snap and lead connections
- Custom SpO₂ r-curve for accurate testing of the latest oximetry technologies
- Static pressure linearity testing
- Repeatable NIBP simulation (± 2 mm Hg) for dynamic pressure repeatability testing
- Physiologically synchronized pulses across all parameters
- Barcode scanning and direct data capture, printing functionality
- Onboard, customizable patient pre-sets and auto sequences
- Multi-language user interface
- Integrated, easily replaceable, long-life battery
- Wireless communication for remote PC control of test device, as well as data transfer and automated regulatory reporting*

*You must have Ansur Test Executive version 2.9.6 or greater on your PC to communicate with the product.

Optional accessories

- 2392199 CI-3 Cardiac Output Box
- 3408564 Mini-DIN to DIN IBP Adapter
- 3890640 NIBP Test Chamber 500 ML
- 4034627 Ansur Test Software ProSim 8 Plug-In
- Cable kits
- 3984910 ProSim 8 Accessory Kit
- 3984922 HP/Philips Intellivue Cable Set
- 3984968 GE Marquette Eagle/Dash/Solar Cable Set
- 3984946 ProSim 8 SpaceLabs Ultraview Cable set
- 3984979 Welch Allyn/Propaq Cable Set
- 3984993 Drager Infinity Cable Set
- 3985009 ProSim 8 Nihon Kohden Cable Set

Arrhythmia continued		
Conduction defect	First-, second-, or third-degree heart block; and right- or left-bundle-branch 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/poly-morphic ventricular tachycardia (long QT interval)	
ECG performance testing		
Amplitude	0.05 mV to 0.5 mV (0.05 mV steps)	
	0.5 mV to 5 mV (0.25 mV steps)	
Pulse wave	30 BPM, 60 BPM, with 60 ms pulse width	
Square wave	0.125 Hz, 2 Hz, 2.5 Hz	
Triangle wave	0.125 Hz, 2 Hz, 2.5 Hz	
Sine wave	0.05 Hz, 0.5 Hz, 1 Hz, 2 Hz, 5 Hz, 10 Hz, 25 Hz, 30 Hz, 40 Hz, 50 Hz, 60 Hz, 100 Hz, and 150 Hz	
R-wave detection	Waveform	Triangular pulse
	Rate	30 BPM, 60 BPM, 80 BPM, 120 BPM, 200 BPM, and 250 BPM
QRS detection	Rate	30 BPM, 60 BPM, 80 BPM, 120 BPM, 200 BPM, and 250 BPM
Tall T-wave rejection	Waveform	QT Interval 350 ms
		T-Wave width 180 ms
		T-Wave shape ½ sinewave
	Rate	80 BPM
ECG artifact		
Type	50 Hz, 60 Hz, muscular, baseline wander, respiration	
Size	25%, 50%, 100% of the normal sinus R-Wave for each lead	
Lead select	All, RA, LL, LA, V1, V2, V3, V4, V5, V6	
Fetal/maternal ECG		
Fetal heart rate (fixed)	60 BPM to 240 BPM in 1 BPM steps	
Fetal heart rate (IUP)	140 BPM at beginning, then varies with pressure	
Intrauterine-pressure waveforms	Early deceleration, late deceleration and acceleration	
Wave duration	90 seconds, bell-shaped pressure curve, from 0 mmHg to 90 mmHg and returning to 0	
Invasive blood pressure		
Channels	2, each independently settable with identical parameters and are individually electrically isolated from all other signals	
Transducer sensitivity	5 (default) or 40 μV/V/mmHg	
Static pressure	-10 to +300 mmHg in 1 mmHg steps	
Pressure units	mmHg or Kpa	
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
	Other	5 mmHg or 10 mmHg
BP output	Circular DIN 5-Pin	

ProSim 4 with SPOT Light

Vital Signs Simulator and SpO₂ Functional Tester

The ProSim 4 Vital Signs Simulator offers quick and simple one-tap testing for patient monitor performance checks and troubleshooting. Designed to get you in and out of most locations in 60 seconds, this quick-check device offers 12-lead ECG simulation, respiration, IBP and NIBP testing in the palm of your hand. Featuring specialized stay-connected ECG posts to ensure secure lead connections and no-hassle testing, the ProSim 4 is the perfect patient simulator for first-call patient monitor quality assurance and safety professionals.

The ProSim SPOT Light SpO₂ Tester is the first comprehensive SpO₂ tester to come in a handheld and easy-to-use device. It's lightweight and flexible with three custom presets specially designed to make it the fastest and easiest to use device on the market for pulse oximeter functional testing.



Key features

ProSim4

- ProSim 4 is a multi-function tester offering 12-lead ECG, respiration, IBP and NIBP simulation
- Touchscreen interface
- One-tap testing for most performance tests and checks
- Easy quick-check patient monitor testing

SPOT Light

- SPOT Light preset programs test any combination of saturation, heart rate, perfusion, transmission, artifact noise, and r-curve in 15 seconds or less
- Small, portable and lightweight
- Rechargeable battery lasts 10 hours minimum
- Signal strength indicator
- SpO₂ saturation: 80 %, 85 %, 90 %, 95 %, 97 %, 98 %, 99 % and 100 %
- Heart rate: 30, 40, 60, 80, 90, 100, 120, 150, and 240 BPM
- Perfusion: 0.2 %, 2 % and 10 %
- Transmission: dark/thick, normal and light/thin
- Artifacts: respiration and ambient light
- R-curves: Nonin, Masimo, Nellcor, Nihon Kohden, Mindray, GE, Philips, BCI

Specifications

Standard compliance	CE, CSA, C-Tick, RoHs
ECG rate	30 BPM, 60 BPM, 80 BPM, 90 BPM, 120 BPM, 150 BPM, 180 BPM, 210 BPM, 240 BPM, 270 BPM, 300 BPM, and 320 BPM
ECG accuracy	± 1 % of setting
Arrhythmia	11 waveforms
Respiration rate	0 (OFF), 10 BrPM to 100 BrPM in 10 BrPM steps
Accuracy baseline	± 5 %
Manometer (Pressure meter)	10 mmHg to 400 mmHg
Manometer resolution	0.1 mmHg (for display purposes)
Manometer accuracy	± (1% of reading + 1 mmHg)
Invasive blood pressure	One channel
Pressure accuracy	± (1% of setting + 1mmHg), dc excitation only
Temperature	0 °C (32 °F), 24 °C (75.2 °F), 37 °C (98.6 °F), 40 °C (104 °F)

Optional accessories

3984878 ProSim 4 Accessory Kit, includes: Unterminated IBP cable, HP-3 IBP cable, MQ-3 IBP cable, TK-1 IBP cable, Adult cuff Mandrel spacer block (3), Adult cuff Mandrel end block (2), Neonatal Mandrel, USB cable, Spare Battery pack, ECG Snap/banana adapter

2392328 Neonatal Cuff Mandrel

2392370 Adult Cuff Mandrel End Blocks (2 needed)

2392381 Adult Cuff Mandrel Spacer Blocks (3 needed)

4026551 ECG Snap Adapter 4 mm and 3.2 mm ECG Banana Adapter Converter Modules (international only)

ProSim 2 and ProSim 3

Vital Signs Simulator



Don't need a comprehensive patient monitor tester? The ProSim 3 and ProSim 2 Vital Signs Simulators are clear choices for biomedical engineers and field service technicians that need a quality, portable device. Choose one of these modern vital signs simulators for preventive maintenance, troubleshooting and repair.

The ProSim 3 and 2 feature the perfect amount of features for testing in the field. We like to call it the just-right feature set, and it includes:

- ECG
- Pacemaker
- Arrhythmia and performance testing
- Respiration
- Invasive blood pressure
- Temperature
- Cardiac output (ProSim 3 only)
- Fetal/maternal (ProSim 3 only)

Specifications

Standard compliance	CE, CSA, C-tick, WEEE and RoHS
ECG rate	30 BPM, 40 BPM, 45 BPM, 60 BPM, 80 BPM, 90 BPM, 100 BPM, 120 BPM, 140 BPM, 160 BPM, 180 BPM, 200 BPM, 220 BPM, 240 BPM, 260 BPM, 280 BPM and 300 BPM
ECG accuracy	± 1% of setting
Arrhythmia	43 waveforms
Respiration rate	0 (OFF), 15 BPM, 20 BPM, 30 BPM, 40 BPM, 60 BPM, 80 BPM, 100 BPM, 120 BPM
Accuracy baseline	± 5%
Blood pressure	4 channels
Pressure accuracy	± (2% of setting + 2 mmHg), dc excitation only
Temperature	0 °C (32 °F), 24 °C (75.2 °F), 37 °C (98.6 °F), 40 °C (104 °F)
Temperature accuracy	± 0.1 °C
Cardiac output	2.5, 5, 10 liters per minute ± 5%
Fetal/maternal	Fetal HR: 60 BPM, 90 BPM, 120 BPM, 140 BPM, 150 BPM, 210 BPM and 240 BPM Fetal HR (IUP): 140 BPM, then varies

Key features

- Portable, multi-parameter patient simulators for evaluating the performance of patient monitors
- Just-right feature set includes: ECG, pacemaker, arrhythmia and performance testing, respiration, invasive blood pressure, temperature, cardiac output (ProSim 3 only), fetal/maternal (ProSim 3 only)
- 43 high-quality waveforms
- With four IBP channels, ProSim 3 can test even the highest accuracy scenarios
- Stay connected ECG posts for secure lead connections
- Improved user interface and online Advantage Training demos
- Upgraded DIN connectors ensure consistency with the ProSim family; minimize cable compatibility issues
- Field upgradeable, and easily paired with other devices for comprehensive testing

Included accessories

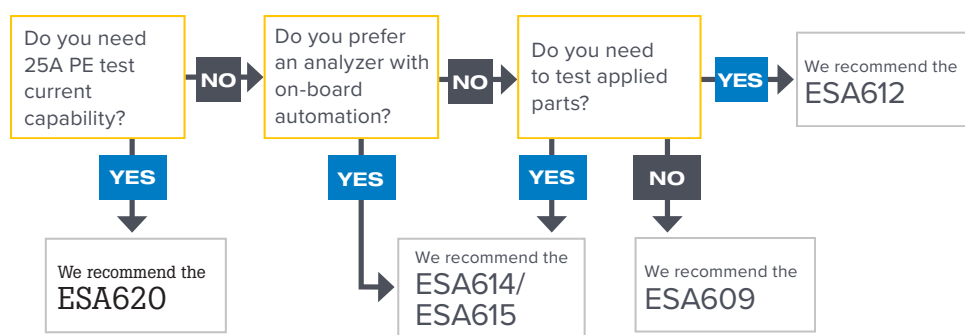
- ProSim 2/3 Instruction Sheet (Multilingual)
- 4253822 ProSim 2/3 Users Manual CD
- 614487 Two 9-volt alkaline batteries (minimum eight hours continuous use)
- 2392173 IBP Cable, unterminated
- 2392199 3010-0289FG, CI-3 Cable Assembly (Cardiac Output Box; ProSim 3 only)
- 1671807 USB cable
- 2248623 ProSim 2/3 Carrying Case

Optional accessories

- 2523334 YSI 400 Series (UT-4)
- 2199019 YSI 700 Series (UT-2)
- 4022300 Cardiac output switch for GE

Electrical safety analyzers

Comparison guide



	ESA615	ESA614	ESA612	ESA620	ESA609
Basic overview					
Preferred analyzer for which standard?	IEC62353 and NFPA-99	ANSI/AAMI and NFPA-9	ANSI/AAMI and NFPA-99	IEC60601-1 2nd, 3rd edition	ANSI/AAMI and NFPA-99
Automation inside	•	•			
Ansur compatible	•	•	•	•	
Onboard memory	•	•	•		
ECG simulation	•	•	•	•	
Handheld	•	•	•		•
GFCI protection	•	•	•	•	•
DUT load current	•	•	•	•	•
25 A test capability				•	
Detailed comparison					
Test modes	Automated Manual if preferred	Automated Manual if preferred	Manual Ansur-automatable	Manual Ansur-automatable	Manual
Test loads	AAMI, IEC60601-1	AAMI, IEC60601-1	AAMI, IEC60601-1	AAMI, IEC60601-1, IEC61010	AAMI, IEC60601-1
Mains voltage measurement	All lines	All lines	All lines	All lines	All lines
PE test current	200 mA ac	200 mA ac	200 mA ac	200 mA ac, 25 A ac	>200 mA dc
Leakage range	0 µA to 10,000 µA 0 µA to 20 mA (differential only)	0 µA to 10,000 µA 0 µA to 20 mA (differential only)	0 µA to 10,000 µA 0 µA to 20 mA (differential only)	0 µA to 10,000 µA 0 µA to 20 mA (differential or 61010 only)	0.0 µA to 1999.9 µA
Patient auxiliary leakage lead selections	Any 1 to all	Any 1 to all	Any 1 to all	Any 1 to all RA-LL-LL-LA RA-LA	-
MAP test voltage	100% of mains	100% of mains	100% of mains	110% Or 100%	-
Power supply (V ac)	120 or 230	120 or 230	120 or 230	120 or 230	90 to 264
Applied parts connections	5 banana safety jacks, Bj2ECG adapter, 1-to-10 Expander	5 banana safety jacks, Bj2ECG adapter, 1-to-10 Expander	5 banana safety jacks, Bj2ECG adapter, 1-to-10 Expander	10 insulated posts	-
Communication options	Wireless and Wired	Wireless and Wired	Wired	Wired	-
Data entry options	Onboard keypad USB compatible keyboard, Barcode scanner	Onboard keypad USB compatible keyboard, Barcode scanner	Onboard keypad	-	-
Printer port	Available via Ansur	Available via Ansur	Available via Ansur	Available via Ansur	-
Dual lead testing	µA/mV, V and Ω	µA/mV, V and Ω	µA/mV, V and Ω	µA/mV, V and Ω	µA/mV, V and Ω
Connectivity	USB	USB	USB	USB	-
Power cord	Removable	Removable	Removable	Removable	Removable

ESA615

Electrical Safety Analyzer

The automated ESA615 Electrical Safety Analyzer brings fast and simple testing to a portable analyzer perfect for use in the field and in facilities. Whether it is simple testing or comprehensive analysis, the ESA615 can do it all. The multifaceted device performs all primary electrical safety tests including line (mains) voltage, ground wire (protective earth) resistance, insulation resistance, device current and lead (patient) leakage tests.



Key features

- On-board automation with automated test sequences for easy compliance to key global electrical safety standards (ANSI/AAMI ES-1 (NFPA-99), IEC62353 (VDE751), IEC60601-1 2nd and 3rd editions, and AS/NZS 3551)
- Portable, ergonomic design with an integrated handle and tilt stand
- Human-factors-designed user interface for streamlined testing
- ECG waveform tests and dual-lead measurements
- Five applied parts jacks and easy ECG snap connection; optional expander box for up to 12-lead ECG testing
- Easy data entry through barcode, external keyboard or on-board keypad
- Wireless communication plus removable memory card
- Replaceable mains fuses
- Custom language selections include: English, French, German, Spanish, Italian and Portuguese

Specifications

Voltage	
Range (mains voltage)	90.0 V ac rms to 132.0 V ac rms, 180.0 V ac rms to 264.0 V ac rms
Range (point-to-point voltage)	0.0 V ac rms to 300.0 V ac rms
Accuracy	± (2 % of reading + 0.2 V)
Voltage tests	Mains and point to point
Earth resistance	
Mode	Two wire
Test current	> 200 mA ac
Range	0.000 Ω to 2.000 Ω
Accuracy	± (2 % of reading + 0.015 Ω)
Resistance tests	Earth resistance and point to point
Equipment current	
Mode	AC rms
Range	0 A to 20 A
Accuracy	± 5 % of reading + (2 counts or 0.2 A, whichever is greater)
Duty cycle	15 A to 20 A, 5 min on/5 min off 10 A to 15 A, 7 min on/3 min off 0 A to 10 A continuous
Leakage current	
Modes*	ac + dc (true-rms) ac only dc only
*Modes are available in all leakage tests with the exception of MAP leakages that are available only in true-rms.	
Patient load selection (input impedance)	AAMI ES1-1993 Fig. 1, IEC 60601: Fig 15
Crest factor	≤ 3
Ranges	0.0 μA to 199.9 μA 200 μA to 1999 μA 2.00 mA to 10.00 mA

Included accessories

- CD-ROM Users Manual (multilingual)
- MANUAL Getting Started Guide (hard copy, multilingual)
- Ansur Plug-in CD with demo version
- Data Transfer Cable
- USA Accessory Kit: Test Lead Set, TP1 Test Probe Set, AC285 Alligator Clip Set (ESA T/L KIT USA)

Optional accessories

- 4316223 50' Test Lead
- 4794643 75' Test Lead
- 4165219 Ansur ESA 615 Plug-in License
- 2392639 Ground Adapter
- 2392639 Ground Adapter

ESA612

Electrical Safety Analyzer

Portable, lightweight and designed for operation in tight spaces, the ESA612 Electrical Safety Analyzer offers the functionality of a simulator, multimeter and analyzer in a single test tool. The versatility of the multifaceted ESA612 is further expanded with optional automation software, which speeds and simplifies testing and provides high-end productivity at software-level investment.



Key features

- Large, easy-to-read display with adjustable contrast
- Human-factors-designed user interface
- Tilt stand design for stand-up testing in field environments
- Five applied parts jacks and easy ECG snap connection with optional expander box
- ECG waveform tests and dual-lead measurements
- Replaceable mains fuses
- Internal memory for 100 test records
- USB connection for use with Ansur and Data Viewer software (for memory download to PC)
- Built-in handle

Specifications

Voltage	
Range (mains voltage)	90.0 V ac to 132.0 V ac rms, 180.0 V ac to 264.0 V ac rms
Range (point-to-point voltage)	0.0 V ac to 300.0 V ac rms
Accuracy	± (2 % of reading + 0.2 V)
Voltage tests	Mains and point-to-point
Earth resistance	
Mode	Two terminal
Test current	> 200 mA ac
Range	0.000 Ω to 2.000 Ω
Accuracy	± (2 % of reading + 0.015 Ω)
Resistance tests	Earth resistance and point-to-point
Equipment current	
Mode	AC rms
Range	0.0 A to 20.0 A
Accuracy	± 5 % of reading + (2 counts or 0.2 A, whichever is greater)
Duty cycle	15 A to 20 A, 5 min on/5 min off 10 A to 15 A, 7 min on/3 min off 0 A to 10 A continuous
Leakage current	
Modes*	ac + dc (true-rms) ac only dc only
*Modes are available in all leakage tests with the exception of MAP leakages that are available only in true-rms	
Crest factor	≤ 3
Ranges	0.0 μA to 199.9 μA 200 μA to 1999 μA 2.00 mA to 10.00 mA

Included accessories

- CD-ROM Users Manual (multilingual)
- Manual Getting-Started Guide (hard copy, multilingual)
- Cable Assembly Data Transfer Cable
- ESA612 Accessory Kit (country specific)
- Null Post Adapter
- 5-to-5 Banana Jack to ECG (BJ2ECG) Adapter
- Carry Case Detachable Power Cord (country specific)

Included accessories for ESA612 with test automation

- All of the above, plus:
- ANSUR ESA612 Ansur Test-Automation Software ESA612 plug-in

Optional accessories

- 1903307 Retractable Test Leads
- 2242165 Ground Pin Adapter (US receptacle testing ground lug)
- 3392119 1210 Adapter Box Assembly
- 3454829 Ansur ESA612 Plug-In License Key
- 4316223 50' Test Lead
- 4794643 75' Test Lead

ESA620

Electrical Safety Analyzer



The multifaceted ESA620 Electrical Safety Analyzer performs all primary safety tests including mains voltage, protective earth resistance, insulation resistance, device current, earth, chassis, and patient leakages as well as several additional leakage tests to comply with standards of choice.

Equipped with ten safety-enhanced ECG posts, the ESA620 offers simulation of ECG and performance waveforms so both electrical safety and basic tests on patient monitors can be performed with a single connection. When used with the optional Ansur computer-based software plug-in, the ESA620 becomes automated. This allows for standardization of test procedures, capturing and storage of results, comparison to standard limits, and printing of reports thus enabling the sophisticated performance of the high-end electrical safety analyzers.

Specifications

Voltage	
Range (mains voltage)	120.0 V model: 90.0 V ac to 132.0 V ac rms 230.0 V model: 180.0 V ac to 264.0V ac rms
Accuracy	± (2 % of reading + 1 V)
Range (point-to-point voltage)	0 V ac to 300 V ac rms
Accuracy	± (2 % of reading + 2 LSD)
Voltage tests	Mains, Accessible, and Point to Point
Earth resistance	
Modes	Two terminal or four terminal
Test current	> 200 mA ac or 10 A ac to 25 A ac
Ranges	0.000 Ω to 2.000 Ω
Accuracy	± (2 % of reading 0.015 Ω)
Equipment current	
Mode	ac rms
Range	0.0 A to 20.0 A
Accuracy	± 5 % of reading ± (2 counts or 0.2 A, whichever is greater)
Leakage current	
Patient load selection (input impedance)	AAMI ES1-1993 Fig 1 IEC 60601: Fig 15 IEC 61010: Fig A-1
Crest factor	≤ 3
Ranges	0.0 µA to 199.9 µA 200 µA to 1999 µA 2.00 µA to 10.00 mA
Frequency response	DC to 1 kHz 1 kHz to 100 kHz 100 kHz to 1 MHz
Accuracy	± (1 % of reading + 1 µA or 1 LSD, whichever is greater) ± (2 % of reading + 1 µA or 1 LSD, whichever is greater) ± (5 % of reading + 1 µA or 1 LSD, whichever is greater)

Key features

- Superior compliance with multiple standards: IEC60601-1(partial), IEC62353, VDE 751, ANSI/AAMI ES1:1993, NFPA-99, AN/NZS 3551, IEC61010
- Expanded leakage ranges through 10,000 µA
- Dual-lead resistance, leakage and voltage tests
- AC only, dc only and true-rms leakage readings
- 100 % and 110 % mains voltage for mains on applied parts (lead isolation) test
- DSP filter technology
- More applied parts selections
- ECG and performance waveforms
- Intuitive user interface
- Easy-to-use applied parts (ECG) connections
- Insulation posts on applied parts connections
- Five different insulation tests
- Varying insulation test voltage 500 V dc and 250 V dc
- Two or (optional) four-wire ground wire resistance
- Optional Ansur plug-in software
- USB connection
- CE, C-TICK and CSA for USA and Canada
- RoHS compliance

Included accessories

CD-ROM Users Manual
Manual Multilingual Getting Started Guide
ESA620 Accessory Kit (country specific)

Soft Case Carry case Detachable Power Cord (country specific)

ESA620 with test automation

Comes with all of the above plus:
ANSUR ESA620 Ansur Test-Automation Software ESA620 plug-in

Cable Assembly Data Transfer Cable

Optional accessories

2392639 Ground Adapter
4316223 50' Test Lead
4794643 75' Test Lead

ESA609

Electrical Safety Analyzer



The ESA609 Electrical Safety Analyzer is a rugged, portable and easy-to-use analyzer designed for general electrical safety testing. Engineered for on-the-go technicians, the ESA609 requires no training to use and has a protective, rubberized case. Its functional strap and featherweight design make it one of the most portable electrical safety analyzers in its class. Heavy-duty switches allow users to effortlessly change polarity and configuration of the neutral connection between open and closed, while push-button operation ensures fast transition between tests for complete basic testing. The ESA609 integrates all functions needed to test medical devices when patient lead testing is not required, including: line (mains) voltage, ground wire (protective earth) resistance, equipment current, leakage current and point-to point tests. Versatile to global electrical safety standards of choice, the ESA609 tests to ANSI/AAMI ES1, NFPA-99, and parts of IEC62353 and IEC60601-1.

Specifications

Mains voltage measurement	
Range	90.0 V to 264.0 V ac rms
Accuracy	± (2 % of reading + 0.2 V)
Earth resistance	
Modes	Two wire
Test current	> 200 mA dc
Range	0.000 Ω to 20.000 Ω
Accuracy	± (1 % of reading + 0.010 Ω)
Resistance tests	Earth resistance and point to point
Equipment current	
Mode	ac rms
Range	0.0 A to 20.0 A
Accuracy	± 5 % of reading + (2 counts or 0.2 A, whichever is greater)
Duty cycle	15 A to 20 A, 5 min. on/5 min. off 10 A to 15 A, 7 min. on/3 min. off 0 A to 10 A, continuous
Leakage current	
Modes	True-rms
Patient load selection	AAMI ES1-1993 Fig. 1 IEC 60601: Fig. 15
Crest factor	Less than or equal to 3
Ranges	0.0 μA to 1999.9 μA accuracy
DC to 1 kHz	± 1 % of reading + (1 μA, whichever is greater)
1 kHz to 100 kHz	± 2.5 % of reading + (1 μA, whichever is greater)
100 kHz to 1 MHz	± 5 % of reading + (1 μA, whichever is greater)
Leakage tests	Ground wire (earth) Chassis (enclosure) Direct equipment Point to point

Key features

- Standards compliance include: ANSI/AAMI ES1, NFPA-99, and parts of IEC62353 and IEC60601-1
- Test current consumption up to 20 A for a diverse set of medical devices
- All parameters needed for basic electrical safety testing: line (mains) voltage, ground wire (or protective earth) resistance, equipment current, ground wire (earth) leakage, chassis (enclosure) leakage, direct equipment leakage, and point to point leakage and resistance
- Global use: the ESA609 will operate at 120 V and 230 V
- Rugged: Rubberized case and Ingress Protection rating of IP30 help prevent damage when dropped
- User-friendly: Quick push-button operation for rapid testing
- Portable: Featherweight (1.5 lb) design, functional strap, and tilt stand make it easy for transportation and operation on-the-go (onsite or offsite)
- Rigorously tested for safety and reliability, with CE, CSA and Australia RCM in addition to Fluke quality

Included accessories

- 4370089 Operator's manual (Multilingual CD-ROM)
- 4370092 Safety sheet
- 3111008 USA/AUS/ISR Accessory Kit: test lead set, TP1 test probe set, AC285 alligator clip set (ESA T/L kit, USA)
- 2248650 Carrying case
- 2242165 Ground Adapter
- Line cord Country-specific power cord
- 3111024 EUR Accessory Kit: test lead set, TP74 test probe set, AC285 alligator clip set (ESA T/L kit, EUR)

Optional accessories

- 2195732 15 A to 20 A adapter

Gas flow analyzers

Comparison guide



VT900A

VT650

	VT900A	VT650
Features and functions		
Single flow full-range channel (± 300 lpm)	•	•
Oxygen accuracy	1 %	2 %
7-in (17.8 cm) color touch screen	•	•
Airway temperature / humidity / oxygen measurement	•	•
Test profile customization	•	•
Real-time measurements and graphical display	•	•
Onboard memory and automatic test report creation	•	•
Global user interface	•	•
Ultra-low flow channel (± 750 ml/min)	•	
Ultra-low pressure range (0 – 10 mbar)	•	
External trigger input	•	
Anesthesia gas concentration measurements	with VAPOR	

The VT900A has all the features and specifications of the VT650 and more. VT900A has a higher oxygen accuracy, ultra-low flow and ultra-low pressure ports, and an external TTL breath trigger input.

VT650

Gas Flow Analyzer

Designed for accuracy and portability, the VT650 Gas Flow Analyzer is a high quality, all-in-one, basic needs gas flow analyzer that also tests ventilators.

The VT650 Gas Flow Analyzer offers high accuracy and reliability for gas flow and respiratory medical equipment, including neonatal, mechanical and high-frequency ventilators. The single, full range ± 300 lpm air flow channel offers built-in oxygen, temperature and humidity measurements to streamline your testing procedure. Designed and tested to world renown Molbloc-L calibration specifications ensures traceability to global regulatory standards with measurements you can rely on.



Key features

- More uptime with increased oxygen sensor accuracy and life
- Avoid confusion and ensure accuracy with one-channel full range air flow functionality
- Streamline your testing procedure reduce errors and quicken your test time with the ability to create customized test profiles
- Easily transport and store the lightweight (3.64 lb/1.6 kg) all-in-one device—no extra modules for different tests
- Quickly access menu options interpret results and see measurements at a distance up to 6' (1.8 m) with the large easy-to-read 7 (17.8 cm) color touch screen
- Operate on-the-go all day with 8 hours of battery life
- The on-board memory allows you to record and save data
- Have confidence that your measurements comply to global regulatory standards and adhere to SI units of measurement with the Molbloc-L calibration system.
- More control over your testing by selecting your own trigger point with the external trigger input

Optional accessories

- 2387318 ACCU LUNG Test Lung
- 4281291 ACCU LUNG II Test Lung
- 4969657 Vesa Mounting System/ Test Arm

VT900A

Gas Flow Analyzer

The VT900A Gas Flow Analyzer provides high accuracy for testing gas flow and respiratory medical equipment. It's accurate, easy-to-use, reliable and portable.

Designed to accurately and reliably test all types of gas flow equipment especially those requiring high accuracy in ultra-low flow and ultra-low pressure measurements, this compact and lightweight analyzer is extremely portable, and also saves space on your benchtop.



The VT900A features an external trigger input and special ultra-low flow and ultra-low pressure ports. These ultra-low flow and ultra-low pressure ports allow high accuracy for devices requiring crucial low volume and pressure testing such as anesthesia machines and flow meters. Designed and tested to world renown Molbloc-L calibration specifications ensures traceability to global regulatory standards with reliable measurements you can count on.

VAPOR Anesthesia Tester

VAPOR seamlessly integrates with the VT900A Gas Flow Analyzer, allowing you to quickly and easily transition from ventilator to vaporizer testing. Complete your whole anesthesia machine PM with this one solution. All five agents are automatically detected and two are displayed simultaneously to detect all vaporizer failure modes.



Key features

- Detects all 5 anesthetic agents (SEV, ISO, HAL, ENF, DES)
- Reduce risk of error with automatic agent ID and color matching
- Portable – fits in one case with VT900A

Impulse 7000DP

Defibrillator Tester/External Pacemaker Analyzer



Key features

- IEC 60601-2-4 compliance
- Lown, Edmark, trapezoidal, biphasic and pulsed-biphasic defibrillation technology compatibility
- AED compatibility
- 12-lead ECG simulation
- Ability to test external transcutaneous pacemakers (Impulse 7000 DP only)
- Internal pacer brand selections
- Flexible heart-rate settings (1 BPM step)
- DSP-based measurements for firmware and waveform upgrade
- Waveform capture, store and replay
- First-in-class accuracy $\pm 1\%$ of reading + 0.1J
- Long lasting, rechargeable battery

The Impulse 7000DP is a combination Defibrillator/Transcutaneous Pacemaker Analyzer that is portable, rugged, and easy-to-carry. It measures any defibrillator energy waveform, properly tests all defibrillator and AED devices (including Shock Advisory), ensures proper loads used for pacer testing, and delivers superior performance with accuracy measurements $\pm 1\%$ of reading + .01 J.



Impulse 7010 Selectable Load Accessory

The 7010 Selectable Load Box replicates selectable impedance values and simulates user-selectable impedances as high as 200 ohms accurately, ensuring IEC 60601-2-4 compliance. The 7010 Load Box and Impulse 7000DP work together as a system to replicate all possible human variations and ensure patient safety.

Included accessories

- 1626219 USB Computer Communication Cable
- 3028681 User Manual CD
- 3028662 Getting-Started Guide
- Battery Eliminator Country specific
- 2814980 Carrying Case
- 3156262 Defib Paddle Contact Plates

Optional accessories

- 3091370 Ansur Impulse 6000D/7000DP
- Impulse 7010 Defibrillator Selectable Load Accessory provides multiple loads of 25 Ω , 50 Ω , 75 Ω , 100 Ω , 125 Ω , 150 Ω , 175 Ω , and 200 Ω to comply with IEC 60601-2-4 standard*

*Compatible only with Impulse 7000DP

Specifications

Defibrillator Analyzer

Safety standards	CE: IEC/EN61010-1 2nd Edition; Pollution degree 2, CAN/CSA-C22.2 No 61010-1; UL61010-1, C-Tick: Australian EMC
Autoranged measurement	0.1 J to 600 J
Accuracy	0.1 J to 360 J: $\pm 1\%$ of reading +0.1 J 360 J to 600 J: $\pm 1\%$ of reading +0.1 J, typical Note: For pulsed bi-phasic defibrillator, specified accuracy is $\pm (1.5\%$ of reading + 0.3 J) on both ranges
Load resistance	Resistance: 50 Ω
Accuracy	1%, non-inductive (< 2 μ H)
Charge time measurement	Range: 0.1 s to 100 s Accuracy: ± 0.05 s, typical
Synchronization test (cardioversion)	Delay time measurement <ul style="list-style-type: none"> • Timing window: ECG R-wave peak to the defib pulse peak • Range: -120 ms to 380 ms; measures timing from 120 ms prior to the R-wave peak to up to 380 ms following the R-wave peak
	Automated defibrillator test ECG waves <ul style="list-style-type: none"> • Normal sinus: 10 BPM to 300 BPM in 1 BPM steps • Ventricular fibrillation: Coarse and fine • Monomorphic ventricular tachycardia: 120 BPM to 300 BPM in 1 BPM steps • Polymorphic ventricular tachycardia: Five types • Asystole

Impulse 6000D

Defibrillator Analyzer



Key features

- Portable, rugged, easy to carry
- Intuitive user interface and backlight, easy-to-read display
- 10 independent ECG outputs that provide 12 lead combinations for standardized clinical signals
- Unique integrated posts for secure connections
- Optional Ansur test automation software to standardize testing procedures, capture waveforms and test results, and print and document test results
- Two-year extended warranty (no-cost extended warranty available after first-year calibration at any Fluke Biomedical authorized service center)

If you don't require a pacemaker analyzer, the Impulse 6000D is your device. It is the quintessential defibrillator analyzer featuring the exact functionality of the 7000DP, but without pacemaker testing. It will deliver any energy or waveform (monophasic, biphasic, pulsed-biphasic) while properly testing all defibrillator and AED devices including Shock Advisory.

Defibrillator analyzer

Comparison guide



Functions	Impulse 7000DP	Impulse 6000D
Accuracy (Energy measurement)	± 1 %	± 1 %
Default patient test load	50 Ω	50 Ω
External pacer tests	●	
Mono-, bi- and pulsed bi-phasic energy measurement	●	●
Non-inductive resistor	● (<2 μH)	● (<2 μH)
Protection of pacer input against accidental defibrillation	●	No; Unable to test pacers
Test variable patient loads	● (with 7010 Load Box)	
Selectable measurement algorithms, test loads for external transcutaneous pacemakers	●	
Capable of testing ECG	● (10-lead)	● (10-lead)
Ansur automatic testing compatibility	●	●

Included accessories

- 1626219 USB Computer Communication Cable
- 3028681 User Manual CD
- 3028662 Getting-Started Guide
- Battery Eliminator Country specific
- 2814980 Carrying Case
- 3156262 Defib Paddle Contact Plates

Optional accessories

- 3091370 Ansur Impulse 6000D/7000DP

Infusion device analyzers

Comparison guide



Features	IDA-1S	IDA-5 4Ch
Number of channels	1	Up to 4
Volume of measurement	0.06–999 ml	0–9999 ml
Dual flow measurement		•
Onboard graphic of pressure and flow		•
Flow rate change	0.5 to 1000 ml/hr	0.05–1500 ml/hr
Battery powered	Yes	No
Weight	2.7 lbs	11 lbs



HydroGraph™ Graphics Software

Use the moving-color visual advantage of HydroGraph to troubleshoot up to four infusion pumps at once. Data is taken directly from the transducer and transmitted to HydroGraph. The flowing graphs provide an electronic means to display, store and recall flow patterns for comparison at a later date. Each test window can display instantaneous and average flow rates, cumulative, and bolus volumes, and occlusion pressure.

IDA-1S

Infusion Device Analyzer

A unique mix of speed and technical precision, the IDA-1S is the ideal analyzer for quick reliable one-channel measurements while on-the-go.

It's a portable, battery-operated instrument that allows for speedy verification of infusion device performance.

The IDA-1S measures the flow rate and volume delivered, and the pressure generated in occlusions or blockages of the fluid line. The IDA-1S is based on sophisticated measurement technology trusted by biomedical professionals around the world.

It is easy to set up and requires little or no training to use. The IDA-1S can be used to test a wide variety of infusion pumps and an auto-start feature simplifies syringe pump testing and other tests that have long startup times.



Key features

- Integrated carrying handle and lightweight (2.7 lb) for easy portability
- Battery powered with up to 10 hours of continuous operation for on-the-go operation
- LCD touch screen for ease of use
- Average and instantaneous flow measurement
- Occlusion pressure measurements to 45 psi
- Maximize accuracy with Autostart mode enabling unit to begin testing only when fluid is detected
- Compatible with a wide variety of infusion pumps
- Based on technology that is proven and trusted worldwide
- On-board memory allows test results storage instantly
- Hydrograph graphical software to control unit, display results and print results via PC
- Global sales, service and support

Specifications

Flow rate measurement	
Range	0.5 ml/h to 1000 ml/h
Accuracy	1 % of reading \pm 1 LSD for flows of 16 ml/h to 200 ml/h for volumes over 20 ml; otherwise 2 % of reading \pm 1 LSD for volumes over 10 ml under laboratory conditions
Max test duration	10 hours on battery
Volume measurement	
Range	0.06 ml to 999 ml
Accuracy	1 % of reading \pm 1 LSD for flow rates of 16 ml/h to 200 ml/h for volumes over 20 ml; otherwise 2 % of reading \pm 1 LSD for volumes over 10 ml under laboratory conditions
Max test duration	10 hours on battery
Pressure measurement	
Range	0 psi to 45 psi and equivalent in mmHg, Bar and kPa
Accuracy	1 % of full scale \pm 1 LSD under laboratory conditions
Max test duration	10 hours on battery

Included accessories

- 4418071 Hydrograph Software and Users Manual
- 4497350 20 ml syringe
- 4480978 3-way Luerlock
- 4478942 Drain tube (1 m)
- 4541948 Micro-90 solution (225 ml)
- 1740487 USB data transfer cable
- 2461300 Country-specific adapters
- 4329971 Power Supply
- 4481150 NiMH replacement battery

IDA-5

Infusion Device Analyzer

Representing 20 years of experience in infusion pump testing, the IDA-5 Infusion Device Analyzer can digitally verify a pump is administering flow, volume and boluses accurately, and the pump is alarming upon occlusion as expected. The IDA-5 has built-in automation allowing users to create custom test templates for quick, standardized testing with minimal user intervention. This automation bundle includes Ansur software for comprehensive testing.



Key features

- Tests up to four infusion pumps at the same time
- Customizable test templates for quick and standardized testing
- On-board and PC-based automation to fully test to IEC60601-2-24 testing requirements for quick standardized testing
- Compatible with virtually any type of infusion device
- Real time snap shots of flow and pressure for immediate issue recognition
- Instantaneous and average flow measurement of up to 1500 ml/hr
- Occlusion pressure measurements to 45 psi
- Single-flow, dual-flow (piggy-back) and PCA testing
- Auto-start mode enables unit to begin testing only when fluid is detected to maximize accuracy
- Ability to automatically end flow measurement based on user-defined time, volume or both
- Convenient and easy data entry with plug-n-play, USB compatible, keyboard or barcode scanner
- Built-in memory to save test results for printing or downloading to computer

Specifications

Flow rate measurement	
Range	0.1 ml/h to 1500 ml/h (2600 ml/h is shown)
Accuracy	1 % of reading ± 1 LSD for flows of 16 to 200 ml/h for volumes over 20 ml; otherwise 2 % of reading ± 1 LSD for volumes over 10 ml under laboratory conditions.
Volume measurement	
Range	0.06 ml to 9999 ml
PCA bolus/dual flow measurement	
Minimum bolus volume	0.5 ml
Resolution	60 ul increments
Pressure measurement	
Range	0 psi to 45 psi and equivalents in mmHg and kPa
Accuracy	1 % of full scale ± 1 LSD under laboratory conditions

Included accessories

- 4418071 Hydrograph Software and User Manual
- 4354014 20 ml syringe
- 4354038 3-way Luerlock
- 4354429 5-ft Plastic Drain Line
- 4354452 USB A-B Cable 2M

Optional accessories

- 4354490 Optional Miniature Keyboard
- 4354503 Ansur Test Software, IDA-5 Plug-In License
- 4354532 One Channel Upgrade Option

QA-ES III

Electrosurgical Analyzer



Key features

- Test ESU functions with precise power, current, frequency, crest factor, and load resistance ranges
- Connect wirelessly via Bluetooth for easy record retrieval without interference or limitation by cables and wires*
- All hardware and software necessary to complete preventive maintenance and troubleshooting is built in to the unit
- User-friendly interface: large buttons and LCD screen guide the user through test sequences
- Memory storage of up to 5,000 test records
- Complies to global standards, including ANSI/ AAMI and IEC

The QA-ES III is the easiest way to test all critical ESU functions and wirelessly* download results to a PC. Its user-friendly interface guides you through tests, making it quick to collect all measurements, including vessel sealing, contact quality monitor (CQM), high frequency (HF) leakage, and output power distribution (single or continuous mode).

Specifications

Modes of operation	
Continuous operation	Continuous measurement of power, current, peak-to-peak voltage (closed load only), and crest factor
Single operation	Single measurement after the set delay time of the ESU output of power, current, peak-to-peak voltage (closed load only), and crest factor
Power distribution	Tests impedance-sensing circuitry in "power guarantee functions in new-generation ESU. Applicable parameters—power, current, peak-to-peak voltage (closed load only) and crest factor—can easily be observed during the automatic, sequential output energy measurements.
RF leakage current	Provides connections and load configurations to measure HF leakage from both grounded and isolated equipment
CQM	Test the "return electrode control quality monitoring" using the QA-ES internal loads

Generator output	
Load resistance	Variable: 0 Ω, 10 Ω, 20 Ω, 25 Ω to 2500 Ω (by 25 Ω), 2500 Ω to 5200 Ω (by 100 Ω); DC Accuracy: ± 2.5 %
Power (0 W to 9.9 W ± 5 % + 1W), 10 W to 500 W ± 5 %	At 25 % duty cycle (10 seconds on, 30 seconds off): 10 Ω: 300 W, 20 Ω to 2900 Ω: 400 W, 3000 Ω to 5200 Ω: 200 W At 10 % duty cycle (5 seconds on, 45 seconds off): 10 Ω: 300 W, 20 Ω to 2400 Ω: 500 W, 2425 Ω to 2900 Ω: 400 W, 3000 Ω to 5200 Ω: 200 W
Current	RMS: 0 mA to 5,500 mA; Accuracy: ± (2.5 % of reading + 1 mA)
Voltage	Peak: 10 kV peak to peak; Accuracy: ± (10 % of reading + 50 V); Crest factor: 1.4 to 16.0 defined as the ratio of peak voltage to rms voltage (Vpk /Vrms), using the larger of the 2 peaks (positive or negative)
Vessel sealing measurement	Loop current, rms: 0 mA to 5500 mA; Accuracy: ± (2.5 % of reading + 1mA)
HF leakage current	Fixed load: 200 Ω V; V accuracy: ± 2.5 % Power rating: 400 W; Additional fixed load: 200 Ω; Current, RMS: 0 mA to 5500 mA; Accuracy: ± (2.5 % of reading + 1 mA)
CQM test (contact quality monitor)	Resistances: 0 Ω to 475 Ω (by 1 Ω); Accuracy: 0 Ω to 10 Ω ± 0.5 Ω, 11 Ω and above ± 5 %; Power rating: 0.5 W; Auto time interval: 1 to 5 seconds
Oscilloscope output	1 V per ampere of input current, typical
Footswitch simulations	Cut and coag
Communications	USB device port: Micro B connector, full speed; Wireless port: 802.15, Speed: 115,200 baud
Memory	Test records: 5,000; Non-volatile: retained through power cycling

General information	
Display	Monochrome 240 pixels x 64 pixels, 8 lines x 40 characters, white LED backlight
Power	100 V ac, 115 V ac, 230 V ac, 50 Hz / 60 Hz, universal input, 100 V/115 V: 20 VA, 230 V: 30 VA
Dimensions (LxWxH)	14.5 cm x 35 cm x 47 cm (5.75 in x 13.75 in x 18.5 in)
Weight	7.5 kg (16.5 lbs)

*Wireless capabilities not available in all countries. Ask your sales representative for more details.

Optional accessories

- 4635248 International dispersive lead (1/4 inch phono plug)
- 1909216 Test probe set—0.080 brass tip
- 4704312 Ansur Plug-in

Portable and intuitive-to-use, the INCU II Wireless* Incubator/Radiant Warmer Analyzer simplifies testing and verifying the performance of baby incubators, transport incubators, and radiant warmers. Compliant with global IEC standards (IEC 60601-2-19, IEC 60601-2-20 and IEC 60601-2-21), the INCU II simultaneously measures temperature in six independent points, sound, humidity, and airflow.

* Wireless capabilities not available in all countries. Ask your distributor for more details.



Key features

- Displays pass/fail indicators and real-time test results on a large LCD screen
- Portable and compact design, weighs less than 3 lbs (1.4 kg), or 9 lbs (3.9 kg) including radiant warmer pucks
- Creates personalized test sequences for automatic test completion in compliance with standards
- General Test enables flexibility in testing procedures and simplifies troubleshooting
- Simplifies test set-up with color-coded temperature probes that match color of input ports
- Wireless* functionality supports fast and convenient downloading of test results and data
- Able to choose from 10 different language interfaces

Specifications

Measurement and test	
Air conduction peripheral temperature sensors for incubator (T1-T5)	5 sensors; Range: 0 °C to 50 °C; Accuracy: ± 0.05 °C; Display resolution: 0.01 °C
Air convection temperature sensors for radiant warmers, sensors in pucks (black discs)	5 pucks; Range: 0 °C to 50 °C; Accuracy: ± 0.2 °C; Display resolution: 0.01 °C
Relative humidity	Range: 0% to 100%; Accuracy: ± 3% RH (0% to 100%, non-condensing); Display Resolution: 0.1% RH
Airflow	Range: 0.2 m/sec to 2.0 m/sec at 35 °C, 50% RH; Accuracy: ±0.1 m/sec; Display Resolution: 0.01 m/sec
Sound pressure	30 dB(A) to 100 dB(A); Accuracy: ± 5 dB(A); Display resolution: 0.1 dB(A); IEC-61672-1 Class 2 from 31.5Hz to 8kHz
Surface temperature	Range: 5 °C to 60 °C; Accuracy: ± 0.5 °C; Display Resolution: 0.05 °C
Skin temperature probe with reference thermometer	Range: 0 °C to 50 °C; Accuracy: ± 0.05 °C; Display Resolution: 0.01 °C
Environmental	
Operating temperature	10 °C to 40 °C
Storage temperature	-20 °C to 60 °C
Humidity	10% to 90% non-condensing
Altitude	2000 m
Ingress protection rating	IP -20
General Information	
Display	LCD Color Display, 480 pixels x 272 pixels, 4." (10.9 cm), white LED backlight
Power adapter—universal voltage	Input: 100 V to 240 V with adaptors 50 Hz/60 Hz; Output: 15V dc, 1.3 A maximum
Rechargeable lithium-ion battery, internal	7.4 V, 7800 Ah, 58 Wh; 24 hour battery life with 30 second sample rate
Dimensions (LxWxH)	23 cm x 21 cm x 6 cm (9.0 in x 8.5 in x 2.5 in)
Total weight	3.9 kg (8.5 lb)

Optional Accessories

4721175 Skin Temperature Heater Assembly

*Wireless not available in all countries. Please talk to your local Fluke representative for information about wireless availability in your country.

Neonatal test equipment

NICU test solutions

DALE40

Phototherapy Radiometer

The DALE40 measures light radiation in medical devices used to treat hyperbilirubinemia in newborns. It can accurately capture measurement across the blue color spectrum from 400-480 nanometers.



Key features

DALE40 Phototherapy Radiometer

- Intuitive to use with LCD screen
- Accurate to $\pm 5\%$ of full spectral range of 429-472 nanometers
- Measurement range of 0-1999 $\mu\text{W}/\text{cm}^2$ with 1 $\mu\text{W}/\text{cm}^2$
- Probe lens matches the cosine receiving function of human skin
- Portable, weighing less than 9 ounces with a 9 V battery
- Verifies output power and provides continuous measurement of irradiation
- Saves costs by eliminating premature replacement of lamps



Max O2 PLUS AE

Oxygen Analyzer

The Max O2 PLUS AE Oxygen Analyzer measures the oxygen concentration in infant incubators, ventilators, anesthesia systems, or oxygen tanks. Portable and straightforward to use, it can capture measurements from 0 % to 100 % with $\pm 3\%$ accuracy (actual oxygen level overfull operating range).

Max O2 PLUS AE Oxygen Analyzer

- One-touch calibration with reminder
- Long battery life, approximately 5,000 hours
- Impact resistant and drip-proof
- External Max-250E Oxygen Sensor

PS320 Fetal Simulator

- Mechanical heart for ultrasound simulation
- TOCO simulation, external or IUP
- Ultrasound simulation, including twins
- Maternal ECG simulation
- Fetal ECG, tracks ultrasound #1
- Internal (DECG) and external fetal ECG
- Uterine-activity selections
- Fetal beat-to-beat variability
- Periodic and non-periodic fetal ECG changes
- Arrhythmia selections
- Compact, lightweight, pocket-size plastic housing
- Battery operated with status indications
- Special kits available with all required accessories and cables to test fetal monitors for specified manufacturers

PS320

Fetal Simulator

At week 5, a fetus' heart starts beating, increasing to 155 to 195 beats per minute prior to birth. The strength and number of beats can be measured by a fetal electronic monitor is used to determine whether a fetus is in distress.

The PS320 Fetal Simulator mimics fetal and maternal heartbeats (ECG), along with uterine activity during labor to accurately test and troubleshoot fetal electronic monitors.



Digital pressure meters

DPM2Plus

Universal Pressure Meter

The DPM2Plus Universal Pressure Meter is designed to measure the positive and negative pressures of medical devices in either liquid or gaseous form to assist in repair and quality control.



DPM1B

Pneumatic Transducer Tester

The DPM1B Pneumatic Transducer Tester is designed to measure the positive and negative pressures of medical devices in either liquid or gaseous form, and to generate pressure within the ± 300 mmHg range to assist in repair and quality control.



DPM4

Parameter Tester—Model 1 and 2

DPM4 Parameter Tester is a highly accurate meter for testing a wide range of medical devices. Key features include its lightweight, compact size and battery operation. DPM4 is ideal for the testing done as part of preventive maintenance or repair processes whenever measurement of pressure, flow, or relative humidity is required.



Key features

DPM2Plus

- Low-priced pressure meter
- Great for all medical pressure device testing
- Optional cable for viewing pressure waveform on an oscilloscope (0.1 V/psi on all ranges except 100 psi, which is 0.01 V/psi)
- Voltage output accuracy: 5 % of range
- Can be used with optional DALE22 Parabolic Flow Adapter Set

DPM1B

- Low-priced pressure-generator
- Great for all pressure transducers, not just IBP

DPM4

- Mid-priced pressure and temperature tester
- Great for all medical device testing where low-pressure, temperature and low-flow measurements are required
- RS232 for computer control

	DPM1B	DPM2 Plus	DPM4 Model 1	DPM4 Model 2
Pressure generator (positive pressure and vacuum)	•			
Pressure measurement ± 300 mmHg	•	•	•	•
5 Selectable pressure ranges standard		•		
2 Optional pressure ranges (select at time of purchase) G range: -700 to +5000 mmHg H range: 380 to 900 mmHg			•	•
Temperature measurement (-200 to 750 degrees C range)			•	•
Gas flow measurement (± 750 ml range)				•
Gas flow measurement (requires DALE22 Parabolic Flow Adapter set) 10 to 250 l/min (interpretive chart) 10 to 75 l/min (interpretive chart) 5% of reading accuracy		•		

190M

Medical ScopeMeter® Portable Oscilloscope

Taking the guesswork out of troubleshooting

The 190M Medical ScopeMeter Portable Oscilloscope is a high-performance test tool built upon the legacy of Fluke and Fluke Biomedical oscilloscopes in partnership with real customers like you. The 190M is available with choice of two or four channels and offers an unprecedented level of performance, ruggedness and portability.

With the combined power of a high-performance oscilloscope, meter and paperless recorder in an easy-to-use test tool, the 190M is the one test tool you can rely on to tackle just about any troubleshooting task in the field. To minimize downtime and repair costs, you need to get to the root cause of problems as quickly as possible. The 190M offers a number of unique features to help you quickly set up the 'scope and diagnose difficult problems like intermittent events, signal fluctuations or drift. Extend your arsenal of troubleshooting capabilities with the new Fluke Biomedical 190M Medical ScopeMeter Portable Oscilloscope, designed to meet the demands of field service professionals.



Key features

- Two or four electrically-isolated inputs
- Fast sampling rate, up to 2.5 GS/s on two channels simultaneously with up to 400 ps resolution
- Deep memory: 10,000 samples per channel waveform capture so you can zoom in on the details
- Dedicated 5,000 count digital multimeter in two-channel model
- Quad meter measurements via scope BNC inputs in four channel model
- Connect-and-View™ trigger for intelligent, automatic triggering on fast, slow and even complex signals
- Frequency spectrum using FFT-analysis
- High-resolution, non-interlaced video
- Smart averaging
- ScopeRecord™ roll mode gives 30,000 points per input channel and capture waveform sample data for up to 48 hours
- TrendPlot™ trend measurement readings for up to 22 days
- Advanced automatic measurements, power (Vpwm, VA, W, PF) and time (mAs, V/s, w/s)
- Two USB ports make it easy to transfer data to a PC and store unlimited waveforms, screen captures and instrument setups on USB memory devices
- New high-performance Li-ion battery technology delivers the longest battery life on the market
- Charge spare battery door for quick swaps in the field
- Security slot locks down oscilloscope with Kensington lock while unattended
- Environmentally tested to meet IP-51 and withstand a 3 g vibration or 30 g shock

Included accessories

- VPS410-R Voltage probe set, 10:1, 300 MHz, one set red
- VPS410-G Voltage probe set, 10:1, 300 MHz, one set gray
- VPS410-B Voltage probe set, 10:1, 300 MHz, one set blue
- VPS410-V Voltage probe set, 10:1, 300 MHz, one set green
- EBC290 External battery charger for BP290 and BP291
- SW90W FlukeView Software for Windows (full version)
- C290 Hard shell protective carrying case for 190 Series II
- BP291 Li-Ion battery pack, 4800 mAh
- MA190 Medical Accessory Kit

Optional accessories

- VPS410-R Voltage probe set, 10:1, 300 MHz, one set red
- VPS410-B Voltage probe set, 10:1, 300 MHz, one set blue
- TL175 TwistGuard™ safety-designed test leads set (1 red, 1 black)
- EBC290 External battery charger for BP290 and BP291
- SW90W FlukeView Software for Windows (full version)
- C290 Hard shell protective carrying case for 190 Series II
- BP290 Li-Ion battery pack, 2400 mAh
- MA190 Medical Accessory Kit

