FLUKE®

Biomedical

Biomedical Test

Product Catalog

2009/2010

Fluke Biomedical.
Better products. More choices. One company.

ESA620 Electrical
Safety Analyzer

ESA612 Electrical
Safety Analyzer

Impulse 7000DP Defibrillator/
Transcutaneous Pacemaker Analyzer

VT MOBILE
Gas Flow Analyzer

Biomedical Test Product Catalog

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Providing solutions, not just products

Today, biomeds, physicists, RSO's, other medical personnel must meet 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.

Service

Fluke Biomedical is dedicated to providing the best service within the healthcare industry. Equipped with the best-credentialed facilities, onsite experts, and full asset-management capabilities, Fluke Biomedical's service team is always on call to take care of its customers. Fluke Biomedical's world-class staff leads the industry in post- and pre-sale support, including helping customers choose the best products and accessories for their needs, technical support, product calibration, and repairs.

Regulatory compliance

Fluke Biomedical's benchmark quality operates to the most rigorous standards in the industry, including compliance with ISO 9001:2000, ISO 13485:2003, FDA/QSR as applicable, and NRC/Part 50, Appendix B/Part 21 and adheres to ISO 17025:2005, ANSI Z540, Mammography MQSA and CNSC. Many of the Fluke Biomedical products are CE-marked and CSA-certified. In addition, the Global Calibration Laboratory holds its NVLAP Lab Code 200566-0 certification and is traceable to both the NIST & PTB.

Legacy

You may be familiar with some of our legacy brand names, including:

- Victoreen®
- Nuclear Associates
- Keithley
- Metron
- DNI Nevada
- Bio-Tek Instruments

Fluke Biomedical has taken the best elements and products of these former brands and has incorporated them into the Fluke Biomedical culture and product line available today.

Our newest catalog

Our Biomedical Test catalog emphasizes the complete line of biomedical test and simulation products for Biomedical/Clinical Engineers and Technicians. The catalog contains information about Fluke Biomedical's test and simulation products, including standalone electrical safety testers, patient simulators, and performance analyzers, as well as fully integrated and automated performance-testing and documentation systems.

If you are interested in receiving catalogs or information about any of Fluke Biomedical's other product-lines, please visit www.flukebiomedical.com/catalogs.

Catalogs are also available for the following product lines:

- Radiation Safety
- Radiation Oncology QA
- Diagnostic Imaging QA
- Service

About Fluke Biomedical

Fluke Biomedical leads the world in the manufacture of biomedical test and simulation products, including standalone electrical safety testers to fully integrated and automated performance testing and documentation systems. Fluke Biomedical also provides some of the most trusted and accurate radiation safety, medical imaging, and oncology quality-assurance solutions for regulatory compliance.

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 Danaher Corporation (NYSE:DHR).

Biomedical Test Product Catalog

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Impulse 6000D/7000DP

Defibrillator/Transcutaneous Pacemaker Analyzer

FLUKE® Biomedical

The Impulse 6000D Defibrillator Analyzer and Impulse 7000DP Defibrillator/Transcutaneous Pacemaker Analyzer Test Systems are rugged, portable precision test instruments that ensure proper operation and ultimate performance of critical life-support cardiac-resuscitation equipment. The Impulse 6000D and Impulse 7000DP test capabilities encompass the spectrum of worldwide-established pulse shapes, showcase breakthrough AED technology compatibility, and outperform in accuracy and standards. Additionally, the Impulse 7000DP incorporates the tests and the extensive range of test loads and measurement algorithms needed to test external transcutaneous pacemakers.

In conjuntion with an Impulse 7000DP, the 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 for defibrillator performance testing. A standard USB interface enables computer control and data transfer, and optional Ansur PC-based automation software increases productivity by outfitting users with an easy-to-use method to standardize testing procedures and capture, print and document data.

N10140

test automation software Ansur plug-in

Key features

- 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 (optional)
- Lown, Edmark, trapezoidal, biphasic and pulsed biphasic defibrillation technology compatibility
- AED technology compatibility
- First-class measurement accuracy: ± 1 % of reading 0.1 J
- Intuitive user interface and backlight, easy-to-ready display
- Portable, rugged, easy to carry
- Long-lasting, rechargeable battery
- Internal pacer brand selections
- Pacer input protected against defibrillator output (7000DP only)
- 10 isolated ECG electrodes that provide 12 combinations for standardized clinical signals
- Flexible heart-rate settings (1 BPM step) facilitate rate meter accuracy and alarm testing
- DSP-based measurements enable future firmware and waveforms upgrade
- Unique integrated posts for secure connections
- Optional Ansur test automation software to standardize testing procedures, capture waveforms, and print and document test result

Product comparison chart

Model	QED 6	Impulse 6000D	Impulse 7000DP
Monophasic and dc biphasic energy capability	Yes	Yes	Yes
Pulsed biphasic engery capability	No	Yes	Yes
Defibrillator tests	Output energy	Output energy	Output energy
	Cardioversion	Cardioversion	Cardioversion
	Peak measurements	Max energy/charge-time overshoot	Max energy/charge-time overshoot
	–	Peak and average current	Peak and average current
	–	Voltage measurement	Voltage measurement
Normal ECG/performance waves	No	Yes	Yes
Transcutaneous pacer tests	No	No	Yes

Impulse 6000D/7000DP

Defibrillator/Transcutaneous Pacemaker Analyzer

FLUKE® Biomedical

Specifications

Defibrillator Analyzer

Energy output measurement	Compatible defibrillator waveshapes: Lown, Edmark, trapezoidal, dc bi-phasic, and ac pulsed bi-phasic
Autoranged measurement	0.1 J to 600 J
Accuracy	0.1 J to 360 J: ± 1 % of reading +0.1 J 360 J to 600 J: ± 1 % of reading +0.1 J, typical Note: For pulsed bi-phasic defibrillator, specified accuracy is ± (1.5 % of reading + 0.3 J) on both ranges
Load resistance	Resistence: 50 Ω
Accuracy	1 %, non-inductive (< 2 µH)
Charge time measurement	Range: 0.1 s to 100 s
	Accuracy: ± 0.05 s, typical
Synchronization test (cardioversion)	**Delay time measurement**
	• 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
	• Normal sinus: 10 BPM to 300 BPM in 1 BPM steps • Ventricular fibrilation: Coarse and fine • Monomorphic ventricular tachycardia: 120 BPM to 300 BPM in 1 BPM steps • Polymorphic ventricular tachycardia: 5 types • Asystole
ECG waves	
ECG general	Lead configuration: 12-lead simulation; RA, LL, LA, RL, V1-6 with independent outputs
Lead to lead impedance	1000 Ω
Rate accuracy	± 1 % nominal
ECG amplitudes	Reference lead: Lead II (default) or Lead I
	Settings: 0.05 mV to 0.45 mV by 0.05 mV and 0.5 mV to 5 mV by 0.05 mV
	Accuracy: ± 2 % of setting (Lead II), ± 5 % for all other leads and defib paddles
ECG normal sinus	Rates: 10 BPM to 360 BPM in 1 BPM steps
ECG on defibrillator input load	Same as the Lead II amplitude but limited to ± 4 mV
ECG performance waves	Square wave: 2 Hz and 0.125 Hz
	Triangular wave: 2 Hz and 2.5 Hz
	Sine waves: 0.05 Hz, 0.5 Hz, 5 Hz, 10 Hz, 40 Hz, 50 Hz, 60 Hz, 100 Hz, 150 Hz, and 200 Hz
	Pulse: 30 BPM and 60 BPM, 60 ms pulse width
R-wave detection	Waveform: Haver-triangle
	Rate: 30 BPM, 60 BPM, 80 BPM, 120 BPM, 200 BPM, and 250 BPM
	Widths: 8 ms, 10 ms, 12 ms, and 20 ms to 200 ms in 10 ms steps
	Accuracy: ± 1 % setting 0.2 mV
Noise immunity	Wave sine
	Line frequency: 50 Hz or 60 Hz (± 0.5 Hz)
	Amplitude: 0 mV to 10 mV (by 0.5 mV ± 5 %)
Arrhythmia selections	Pacer interactive (Impulse 7000DP only) Supraventricular Premature Ventricular Conduction Transveneous paced with selectable pacer spike amplitudes and widths

Impulse 6000D/7000DP

Defibrillator/Transcutaneous Pacemaker Analyzer

FLUKE® Biomedical

Specifications

Transcutaneous Pacemaker Analyzer (Impulse 7000DP only)

Defibrillator input	Fixed load: 50 Ω Accuracy: ± 1 %, non-inductive (< 2 µH)
Pacemaker input	Variable load: 50 Ω to 1500 Ω by 50 Ω Accuracy: ± 1 %, non-inductive (< 2 µH)
Manufacturer specific algorithms	• Medtronic/Physio Control LIFEPAK • Philips/Agilent/HP • ZOLL Medical • GE Responder (1500 and 1700) • MRL/Welch Allyn • Schiller Medical • MDE300 (Medical Data Electronics), plus a general purpose default algorithm selection
Current	Range: 4 mA to 250 mA Accuracy: ± 1 % of reading +0.02 mA
Pulse rate	Range: 5 PPM to 800 PPM Accuracy: ± 0.5 % of reading +0.1 PPM
Pulse width	Range: 1 ms to 100 ms Accuracy: ± 0.5 % of reading +0.01 ms
Demand and asynchronous mode test	Underdrive rate: 10 BPM minimum Overdrive rate: 300 BPM maximum
Sensitivity test	**Automatic interactive threshold detection**
	Compatible pacer rates: 30 PPM to 120 PPM
	ECG R wave
	Waveforms: Square, triangle, sine
	Widths: 1 ms to 19 ms (by 1 ms), 20 ms to 95 ms (by 5 ms), 100 ms to 300 ms (by 25 ms)
	Accuracy: ± 5 % of setting
	Amplitude: 0.05 mV to 0.95 mV (by 0.05 mV), 1 mV to 5 mV (by 0.5 mV)
	Accuracy: ± 5 % of setting
Refractory period tests	Paced refractory period 20 ms to 500 ms Sensed refractory period 15 ms to 500 ms Accuracy: ± 1 ms

General information	
Dimensions (LxWxH)	32 cm x 24 cm x 13 cm (13 in x 9.5 in x 5 in)
Weight	3.02 kg (6.6 lb)

Standards	
Safety standards	CE: IEC/EN61010-1 2nd Edition; Pollution degree 2; CSA: CAN/CSA-C22.2 NO,61010-1, UL61010-1; C-Tick: Australian EMC

Optional accessories

3091370 Ansur Impulse 6000D/7000DP Plug-In

3065489 MedtronicERS/Physio-Control (FAST PATCH) (set of two): 4 mm defibrillator adapters

3065450 Kimberly Clark/R2 Darox MRL/MDE/NK: 4 mm defibrillator adapters

3065438 Internal discharge paddle contacts (set of two)

3065477 Medtronic ERS/Physio-Control (QUIK PACE) (set of two): 4 mm pacer adapters

3065527 Zoll Medical NTP/PD1400: 4 mm pacer adapters

3065461 Medtronic ERS/Physio-Control (QUIK COMBO): 4 mm defib/pacer adapters

3065492 Philips/Agilent/HP (CODEMASTER Series-Round): 4 mm defib/pacer adapters

3065509 Philips/Agilent HEARTSTART FR2/MRX: 4 mm defib/pacer adapters

3065511 Zoll PD-2200 Multi-Function PD-Series, M-Series, M-Series CCT, AED PRO® and AED Plus™ defib/pacer adapters

3065423 GE Marquette (RESPONDER 1500/1700 Series) (set of two): 4 mm defib/pacer adapters

3158544 Impulse 7010 Defibrillator Selectable Load Accessory

Impulse 6000D/7000DP

Defibrillator/Transcutaneous Pacemaker Analyzer

FLUKE® Biomedical

Specifications

Impulse 7010 Defibrillator Selectable Load Accessory

Maximum voltage	5000 V
Maximum continuous power	12 W, equivalent to 10 defib pulses of 360 J every 5 minutes
Inductance	< 2 µH, @25 Ω < 3 µH, @50 Ω < 4 µH, @75 Ω and 100 Ω < 5 µH, @125 Ω < 6 µH, @150 Ω < 7 µH, @175 Ω < 8 µH, @200 Ω
Temperature	Operating: 10 °C to 40 °C (50 °F to 104 °F) Storage: –20 °C to 60 °C (–4 °F to 140 °F)
Humidity	10 % to 90 % non-condensing
Dimensions (WxDxH)	154 mm x 272 mm x 138.7 mm (6.07 in x 10.71 in x 5.46 in)
Weight (net)	1.54 kg (3 lb 6.2 oz)
Safety class	Complies with EN61010-1 2nd Edition, Class II product
Safety standards	CE: IEC/EN61010-1 2nd Edition; Pollution degree 2; CSA: CAN/CSA-C22.2 NO,61010-1, UL61010-1; C-Tick: Australian EMC
Warranty	Two-year extended warranty (no-cost extended warranty available after first-year calibration at any Fluke Biomedical authorized service center)
Calibration interval	One-year
Electrical specifications (for load accessory and analyzer together)	
Load settings	25 Ω, 50 Ω, 75 Ω, 100 Ω, 125 Ω, 150 Ω, 175 Ω, and 200 Ω ± 1 %
Accuracy	Energy (all except pulsed biphasic): 2 % of reading + 0.1 J with 25 Ω, 75 Ω though 200 Ω loads, 1 % of reading + 0.1 J with 50 Ω load
	Energy (pulsed biphasic): 2.5 % of reading + 0.3 J with 25 Ω, 75 Ω though 200 Ω loads, 1.5 % of reading + 0.3 J with 50 Ω load
	Voltage: 1 % of reading + 2 V with 25 Ω and 50 Ω loads, 2 % of reading + 2 V with 75 Ω through 200 Ω loads
	Current: 2 % of reading + 0.1 A with 25 Ω load, 1 % of reading + 0.1 A with 50 Ω through 200 Ω loads

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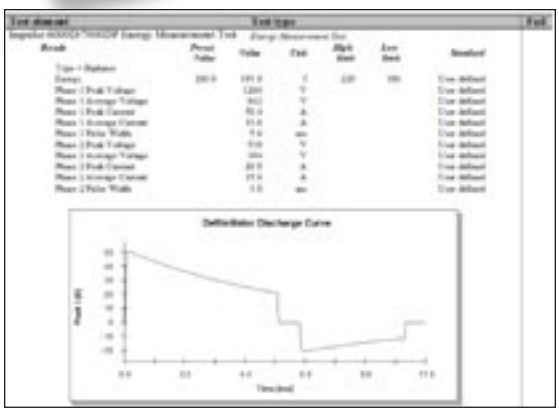
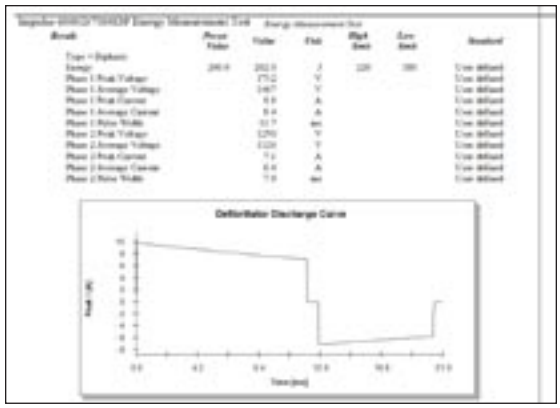


Discharge curve at 25 Ohms using Ansur and the 7010 load box.



Discharge curve at 175 Ohms using Ansur and the 7010 load box. Note the differences in the shape, the peak currents and the time of the discharges.

Included accessories

3028681 Users Manual CD
3028662 Getting Started Guide
XXXXXXX Battery Eliminator (country specific)
2814980 Carrying Case
2795773 Defibrillator Paddle Contact Plates
1626219 USB Computer Communication Cable

Ordering information

Impulse 6000D Defibrillator Analyzer
2811928 United States, 120 V
3077031 Schuko
3077046 United Kingdom
3077054 Japan
3085270 Australia
3085281 India

Impulse 7000DP Defibrillator/Transcutaneous Pacemaker Analyzer
2811919 United States, 120 V
3077005 Schuko
3077010 United Kingdom
3077022 Japan
3085296 Australia
3085308 India

Impulse 7000DP Defibrillator/ Transcutaneous Pacemaker Analyzer with test automation
3326874 United States, 120 V
3326888 Schuko
3326895 United Kingdom
3326901 Japan
3326912 Australia
3326920 India

QED 6

Defibrillator Analyzer

FLUKE® Biomedical

The QED 6 provides a scalable solution to accurately test defibrillators. Lightweight and portable, the QED 6 measures a wide range of defibrillator energy output parameters.

An RS-232 serial port supports remote computer control and test documentation.

Key features

- Defibrillator analyzer
- Monophasic and biphasic dc energy measurement
- Energy and cardioversion measurement
- Peak voltage, peak current, and overshoot measurement
- 2-line x 24-character display
- Bidirectional RS-232 port for computer control
- Storage and playback of output waveform so results can be viewed in greater detail
- Optional Ansur test automation software to standardize testing procedures, capture waveforms and test results, and print and document test results

Specifications

Output energy test	
Load	50 ± 1 %, with inductance < 70 µ h
Resolution	High-range: 1 J Low-range: 0.1 J
Low-range	0 J to 100 J
High-range	0 J to 1000 J
Pulse width	1 ms to 50 ms
Maximum current	Low: 35 A High: 110 A
Maximum voltage	Low: 1750 V High: 5500 V
Minimum voltage	Low: 20 V High: 66 V
Accuracy	1000 J range: ± 2 % of reading 100 J to 1000 J: ± 2 J 100 J Range: ± 2 % of reading, ± 0.1 J
Waveform storage	Discharge viewable via ECG output, paddles, and scope output
Time expansion lead II amplitude	High = 3000 V / mV Low = 900 V / mV
Peak/overshoot	
Voltage accuracy	1000 J range: ± 10 V 100 J Range: ± 25 V
	Current accuracy: ± 1 A
Cardioversion synchronization test	Measurement from peak or base of simulated R-wave: 0 ms to 199.9 ms
	Accuracy: 1 % of full scale or ± 2 ms, whichever is greater

QED 6

Defibrillator Analyzer

FLUKE® Biomedical

Defib waveform playback	
Time base expansion	100:1 @ 25 mm/s paper speed, each division equals 40 ms
Amplitude scaling	Lead II (RA-LL) 1000 J range:1 mV = 3000 V 100 J range:1 mV = 900 V
ECG output	1000 J range: 0.5 V = 3000 V 100 J range: 0.5 V = 900 V
Scope outputs	
ECG hi-level	Fixed at 1 V
Accuracy	± 2 %
Defib output	Real time
Waveform output	5 ECG lead adapters, front-panel paddles, and high-level scope output
Calibration screen	
Load	50 ± 1% (Apex-Sternum)
Amplitude scaling	Apex (+) to sternum (-)
Zero voltage input	0 ± 2 counts
RS-232 output/computer control	Computer control allows the user to operate the QED 6 remotely via a serial RS-232 interface. It requires an RS-232 cable and a bidirectional D-9 connector.
Selectable communications parameters	
Baud rate	300, 600, 1200, 2400, and 9600
Parity	None, even, odd
Stop bits	1 or 2
Data bits	7 or 8
Environmental requirements	
Storage temperature	-25 ˚C to 50 ˚C (-13 ˚F to 122 ˚F)
Operating temperature	0 ˚C to 40 ˚C (32 ˚F to 104 ˚F)
Maximum humidity	90 % relative humidity
General information	
Display	2-line x 24-character super twist LCD
Power	One 9 V alkaline battery or 9 V battery eliminator; 12 hours continuous operation; low-battery indication; 120/240 V battery eliminator input
Dimensions (WxDxH)	24.13 cm x 26.67 cm x 10.16 cm (9.5 in x 10.5 in x 4 in)
Weight	2.06 kg (4.54 lb)

Optional accessories

2817226 Ansur QED 6 Plug-in
2204282 Carrying Case
2204472 RS-232/Printer Cable
2248899 Serial/Parallel Printer
2720054 9 V dc Adapter

Included accessories

2204510 Operator's Manual
2204198 Internal Paddle Adapters

Ordering information

2251457 QED 6 Defibrillator Analyzer

SigmaPace™ 1000

External Pacemaker Analyzer

FLUKE®
Biomedical

Fluke Biomedical's premier SigmaPace 1000 analyzes both transvenous and transcutaneous external pacemakers and comes loaded with features to save time and money. This powerful hand-held tool conducts the full suite of tests specified by major pace-maker manufacturers in less than half the time it would take using originally prescribed testing methods.

Output data is displayed on three selectable screens for easy viewing, including an AV delay time readout providing a performance snapshot for both pacer channels.

With capability for long-term trend testing, the SigmaPace 1000 can interrogate a pacer for up to 11 days, capturing data pulse by pulse to detect intermittent and hard-to-find problems.

For maximum efficiency, the SigmaPace 1000 doubles as a training tool. Interactive ECG simulation lets users test patient monitoring equipment as well as teach nurses how to operate the pacemaker.

Key features

- Transcutaneous and transvenous external pacemaker tests
- Pulse-output tests (rate, current, volts, energy, pulse width, and AV interval)
- Amplitude sensitivity and refractory tests
- Demand and asynchronous-mode tests
- DC load current test
- Output-leakage tests
- Line-frequency noise-rejection tests
- Wide range of test loads, from 50 Ω to 1500 Ω, specified by manufacturer for transcutaneous pacers
- Full range of IEC specified test loads for transvenous pacers 200 Ω, 500 Ω, and 1000 Ω
- Pacer output displayed on three different screens
- AV readout showing both pacer channels on one screen
- Long-term trend test to detect intermittent errors and hard-to-find problems
- Interactive ECG pacer simulation with 5-lead output for patient monitor evaluation and pacer operation training
- 8-line x 21-character display

Specifications

ECG disposable snap electrode adapters	3.2 mm and 4 mm
Modes of operation	Manual, remote
Transcutaneous pacer tests	**Pulse output test** Current: 4 mA to 250 mA Rate: 5 PPM to 300 PPM Width: 1 ms to 99.9 ms Energy: 1 µJ to 1.99J
	Demand model test
	Async mode test
	Amplitude sensitivity test
	Noise immunity test
	Paced refractory period test
	Sensed refractory period test
	Internal test loads: 31 selections: 50 Ω to 1550 Ω

SigmaPace 1000 standard accessories

SigmaPace™ 1000

External Pacemaker Analyzer

FLUKE® Biomedical

Specifications

Transvenous pacer tests	**Pulse output test** Display output test: (3) single (A or V) and dual (A+V) Current: 0.05 mA to 30 mA Rate: 10 PPM to 999 PPM Width: 0.02 ms to 9.99 ms Voltage: 0.05 V peak to 30 V peak Energy: 1 nJ to 999 µJ
	Demand model test
	Async mode test
	Amplitude sensitivity test
	Noise immunity test
	Paced refractory period test
	Sensed refractory period test
	AV delay time test
	DC leakage current test
	Measurement of dc offset on the pacemaker output
	Test types: Static/continuous and dynamic/sync'd with output
	Inputs/test loads: (3) 500 Ω
	DC current range: 0.1 mA to 99.9 mA
	Battery load current test Load current drawn by the pacemaker: 99.9 mA max
Transvenous measurement algorithm	Default: Derived from device manufacturer(s)
Available internal test loads	Ventricular and atrial channels: 200 Ω, 500 Ω, and 1000 Ω
	Default selection: 500 Ω (both A and V channels)
Long-term trend test	Tests the fundamental stability of the pacer output Total pulse count: 999,999 (max) Elapsed time: 999:59:59 (max) Maximum error count: 200 pulses Test limits: Selectable rate and output percentages
Interactive pacer ECG simulation	Simulates dynamic patient ECG activity in response to pacer output: Interactive NSR heart rate: 0 BPM to 25 BPM NSR PR interval: 0.05 s to 0.399 s Transvenous threshold: 1 mA to 25 mA Transcutaneous threshold: 10 mA to 250 mA
Serial port	Type: RS-232 Baud rate: 2400, 9600, and 192000
Power	Internal lithium ion battery pack (rechargeable) Battery operation: 20 hours (minute) Universal/external ac-to-dc power supply
Dimensions (WxDxH)	10.1 cm 20.3 cm x 5 cm (4 in x 8 in x 2 in)
Weight	0.9 kg (2 lb)

Optional accessories

2245006 Electrode adapters (including the brand/model-specific interface connector and a pair of 4 mm "safety-type banana plugs)

2201109 Aligent (HP) CodeMaster Series

2201111 GE Marquette Medical

2201127 Medical Data Electronics (MDE); Medical Research Laboratories (MRL)

2201095 Medtronic Physio-Control Quick Combo

2201088 Medtronic Physio-Control Quick Pace

2201323 Philips/Agilent Codemaster Series

2201130 Zoll Medical NTP Series

2201148 Zoll Medical PD Series and M Series

2200102 Interface Cable (RS-232; female DB9 to female DB25; medTester to SigmaPace™ 1000/PC/Index 2XL/IDA 4 Plus; Impulse 4000 to PC)

2201419 Detachable cord set—Japan (IEC 320 C6 type 3-pin inlet)

2201437 Detachable cord set—Schuko—Euro (IEC 320 C6 type 3-pin inlet)

2201428 Detachable cord set—UKI (IEC 320 C6 type 3-pin inlet)

2201455 Detachable cord set—USA (IEC 320 C6 type 3-pin inlet)

2201443 Detachable cord set—Australia (IEC 320 C6 type 3-pin inlet)

Included accessories

2243306 Users Manual

2392906 Soft-sided Vinyl Carrying Case

2201166 Transvenous Pacer Test Leads (2 sets, red)

2201153 Transvenous Pacer Test Leads (2 sets, black)

2392272 SigmaPace 9 V dc Load Test Cable

2392260 Serial PC Interface Cable

2184298 Universal-input Battery Charger

2198724 Power cord set USA 120 V ac

Ordering information

SigmaPace 1000 External Pacemaker Analyzer

2247700 United States, 120 V

2394548 Japan, 100 V

2394553 Schuko, 250 V

2394566 United Kingdom, 250 V

QA-ES Series II

Electrosurgery Analyzer

FLUKE® Biomedical

Key features

- Automatic power distribution measurement, including power, current, peak-to-peak voltage (closed load only), and crest factor
- Oscilloscope output
- High-frequency leakage measurements with accuracy of ± 2 % of reading
- 128 internal user-selectable test loads from 10 Ω to 5200 Ω
- Foot-switch output for triggering the ESU under test
- Ansur QA-ES software plug-in for automated test protocols
- Large display
- RS-232 and Centronic-Printer interface

QA-ES Series II analyzes electrosurgical units quickly and accurately.

A wide load-resistance range provides 128 user-selectable loads, including very low loads for testing many of today's ESUs.

An accuracy of ± 2 % of reading down to 20 mA guarantees reliable high-frequency leakage results. With capability to run an automatic-power-distribution test in as little as 1 minute, the QA-ES works fast so technicians save time.

An Ansur QA-ES software plug-in allows users to create and automatically run tests, capture data, and produce easy-to-read reports with a PC.

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	Automatic measurement of power, current, peak-to-peak voltage (closed load only), and crest factor through a user-selectable load range
RF leakage current	Provides connections and load configurations to measure HF leakage from both grounded and isolated equipment
RECQM	Test the "return electrode control quality monitoring using the QA-ES internal loads
Manual/remote	via Ansur test automation software

QA-ES Series II

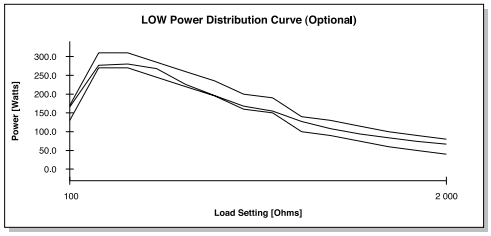
Electrosurgery Analyzer

FLUKE® Biomedical

Specifications

Generator output	
Load resistance (128 loads)	10 Ω to 2500 Ω in step of 25 Ω 2500 Ω to 5200 Ω in step of 100 Ω
Measurement	True-rms value of applied waveform
RMS bandwidth	30 Hz to 10 MHz (-3 dB) for instrumentation only 30 Hz to 2.5 MHz (-3 dB) with loads
Low frequency filter	100 Hz filter to avoid low-frequency disturbance or interference
Current	20 mA to 2200 mA
Current accuracy	± 2 % of reading
Additional fixed load	200 Ω 400 W for 30 s; max 15 % duty cycle
Crest factor	The higher of the two peak voltage measurements is used for computation Range: 1.4 to 16 (V peak/V rms).
Foot-switch output	The foot switch output can be used to trigger the electrosurgical unit.
Peak-to-peak voltage	0 kV to 10 kV (closed load only) accuracy: ± 10 % **Note**: Measurement is taken between the active and dispersive electrodes with closed load only.
Oscilloscope output	5 V/A uncalibrated, 100 mA RF current minimum input
Ansur QA-ES plug-In remote control	All functions and tests in QA-ES may be performed from the PC
	User-programmable test sequences
	Allows unlimited numbers of test sequences with user-programmable templates and test limits. These tests include power distribution test, output test, HF leakage, and RECQM verification.
Storage and recall	Protocol formats and data may be stored, recalled, printed out, or transferred.
General information	
Display	LCD graphic display Alphanumeric format 8 lines x 40 characters Graphic mode 240 x 64 pixel matrix
Display control	Five f-keys, enter, cancel, control knob, and an encoder
Data input/outputs	Parallel printer port and bidirectional RS-232
Power	115/230 V ac; 48 Hz to 66 Hz, 35 VA
Housing	Metal case
Dimensions (LxWxH)	39.5 cm x 34.2 cm x 13.2 cm (15.6 in x 13.5 in x 5.2 in)
Weight	9.8 kg (21.6 lb)

Test element			Test type				Fail
LOW Power Distribution Curve (Optional)			*Power distribution test*				
Test Conditions		*Results*					
Power	*Load*	*Low Limit*	*Power*	*High Limit*	*CF*	*Current*	*Vp-p*
150 W	100 Ohms	130	166.0W	170	1.6	1276.0mA	395.0V
290 W	200 Ohms	270	277.0W	310	1.6	1164.0mA	713.0V
290 W	300 Ohms	270	280.0W	310	1.6	960.0mA	880.0V
265 W	400 Ohms	245	268.0W	285	1.5	821.0mA	977.0V
240 W	500 Ohms	220	226.0W	260	1.6	673.0mA	1022.0V
215 W	600 Ohms	195	196.0W	235	1.6	572.0mA	1063.0V
180 W	700 Ohms	160	168.0W	200	1.6	490.0mA	1065.0V
170 W	800 Ohms	150	155.0W	190	1.6	444.0mA	1102.0V
120 W	1000 Ohms	100	127.0W	140	1.6	359.0mA	1135.0V
110 W	1200 Ohms	90	108.0W	130	1.6	302.0mA	1165.0V
95 W	1400 Ohms	75	94.0W	115	1.6	260.0mA	1149.0V
80 W	1600 Ohms	60	84.0W	100	1.6	227.0mA	1206.0V
70 W	1800 Ohms	50	74.0W	90	1.6	201.0mA	1172.0V
60 W	2000 Ohms	40	67.0W	80	1.6	182.0mA	1218.0V



Example of a power distribution curve created in 30 seconds with the Ansur QA-ES plug-in.

Optional accessories

2461794 Carrying Case
2461802 Ansur Test Software, QA-ES plug-in license
2461993 Data Transfer Cable, RS-232
2716059 QA-ES II Calibration Manual
2523266 Clamp, crocodile style, grip C, black
2523275 Clamp, crocodile style, grip C, red

Included accessories

2716044 QA-ES Series II Users Manual (electronic, CD)
2716032 QA-ES Series II Users Manual (printed)
2772171 ESU-Dispersive Safety Lead
2772180 ESU-CQM Safety Lead
2772209 ESU-Jumper Safety Lead
2826194 Test Lead with stackable plugs
1903307 Test Lead Set with retractable sheaths
1610159 Sure-Grip Large Alligator Clip Set
XXXXXXX Power Cord (country specific)

Ordering information

QA-ES Series II Electrosurgery Analyzer
2649769 United States, 115 V
2651725 Schuko, 230 V
2770445 United Kingdom, 230 V
2770450 Australia, 230 V
3096390 Japan, 100 V
3319736 QA-ES, US 115V w/Test Automation
3319749 QA-ES, SHK 230V w/ Test Automation
3319751 QA-ES, UK 230V w/ Test Automation
3319760 QA-ES, AUS 230V w/ Test Automation
3319772 QA-ES, JPN 100V w/ Test Automation

RF303RS

Electrosurgery Analyzer

FLUKE® Biomedical

RF303RS Electrosurgery Analyzer provides enough user-selectable test loads to do routine maintenance checks on most electrosurgery units on the market today. Compact and portable, the device is so simple to use that technicians can become proficient with the RF303RS within minutes.

The unit measures ESU output and high-frequency leakage, allows for verification tests on the return electrode contact quality monitors, and has an oscilloscope output for waveform viewing. Instantaneous output or selectable sample times provide extra versatility. The instantaneous mode is sufficient for most units, but if output readings are variable and require stabilizing, the signal-averaging mode allows users to manually select two additional, slower sampling times to produce an accurate average reading.

Key features

- Easy to use simple configuration
- Oscilloscope output, high-frequency leakage, and return electrode contact quality monitor tests
- Instantaneous and signal-averaging measurement mode
- Ability to connect with Fluke Biomedical's medTester 5000C for automated solution
- RS-232 port for computer control
- Battery powered
- 4-digit numeric LCD with backlight and power-save mode

Specifications

Modes of operation	Line powered, battery powered, offline (battery maintenance charge)
Test parameters	Power (W), HF current (mA), test load (Ω)
Tests performed generator output	HF leakage (performs to IEC 601 2-2, 1289-2, ANSI/AAMI standards)
	Type BF test 1: Earth-referenced monopolar output
	Type BF test 2: Earth-referenced monopolar output
	Type CF/bipolar: Isolated monopolar or bipolar output
Current measurement (leakage)	Range: 30 mA to 2500 mA rms Resolution: 1 mA Accuracy: ± 2.5 % of reading or ± 15 mA (whichever is greater)
Power measurement (output)	Range: 1 W to 400 W Resolution: 0.1 W Accuracy: ± 5 % of reading or ± 3 W (whichever is greater)
Bandwidth of rms converter circuit (1 % accuracy)	Flat response: 10 kHz to 10 MHz -3 dB points: 1 kHz to 20 MHz
Frequency response	System response: -3 dB points, 1 kHz to 10 MHz at 300 Ω
RECQM test	50 Ω to 750 Ω, 50 Ω steps
Test load section	Number of selections: 15
	Range: 50 Ω to 750 Ω
	Step size: 50 Ω
	Accuracy (dc to 500 KHz): ± 4 % of selected value measured at calibration to ± 1 % (across the entire operating temperature range)
	Duty cycle: 50 % @ 400 W (max 30 sec ON during any 1 minute period)
	Resonance impedance variation: ± 0.5 dB max (< 10 MHz)
Auxiliary leakage test load	Fixed: 200 Ω Accuracy: ± 4 % Power rating: 225 W
Input capacitance (nominal)	Active to dispersive: 30 pF Active or dispersive to earth ground: 40 pF
Oscilloscope output	Transformer coupled output, uncalibrated Connector type: BNC

RF303RS

Electrosurgery Analyzer

FLUKE® Biomedical

Specifications

Battery	Type: Sealed lead-acid
	Time between recharge: Two hours (continuous use)
	Time to full charge: Eight hours
	Number of cycles: 200
	Capacity: 2.2 A H
	Field serviceable: No
	Recharging: Internal, automatic charger; power cord required
Front-panel controls/push buttons	Measurement select (1)
	Load select: Increment test load (+) one step; decrement test load (-) one step
Top-panel input connections	**Designations:** • Generator output-active (1) • Generator output-dispersive (2) • Signal earth/ground reference (2) • Auxiliary HF leakage load (2)
	Connector type: 4 mm (0.16 in) diameter safety sockets
	Input voltage limit: 10,000 V peak
	Input current limit: 3 A rms
	Installation category: II
Side input connection	Designation: Signal reference
Power requirements	Universal input switching supply (12 V dc output)
	Operating voltages: • Specified: 115 V ac/230 V ac • Max Range: 83 V ac to 264 V ac
	Operating frequencies: • Specified: 50 Hz/60 Hz • Max range: 47 Hz to 63 Hz
Ventilation	Internal fan with variable speed control; over-temperature detector; magnetic tachometer sensor to detect blocked fan rotor
Display	LCD, 7-segment, 4 full digits, 2 in x 0.75 in
Case construction	High-impact plastic, UL94-V0
Dimensions (WxDxH)	33.7 cm x 29.2 cm x 15.2 cm (13.25 in x 11.5 in x 6 in)
Weight	5.6 kg (14.2 lb)

Product comparison chart

Model	RF303RS	QA-ES Series II
Test loads	50 Ω to 750 Ω in step of 50 Ω 15 loads	10 Ω to 2500 Ω in step of 25 Ω, 2500 Ω to 5200 Ω in step of 100 Ω 128 loads
Displayed-result parameters	W, mA, Ω	W, mA, Vpp, CF, Ω
High-frequency current	30 mA to 2500 mA RMS	20 mA to 2200 mA ± 2 % of reading
	Accuracy: ± 2.5 % or reading or ± 15 mA, whichever is greater	20 mA to 2200 mA ± 2 % of reading
Automation capabilities	medTester 5000C	Ansur
Additional benefits	Battery operated	Foot-switch output for triggering the ESU under test

Optional accessories

2248587 Multipurpose Hard-Sided, Watertight Carrying Case

2204472 Serial Cable for D9F-D9F

2238659 Interface Cable, medTester to RF303RS (RS-232; male DB9 to female DB9; adapter required, p/n 2391789)

2391789 Adapter for Interface Cable, medTester to RF303RS (male DB9 to female DB25; used with interface cable, p/n 2238659)

Included accessories

2202027 Users Manual

2202009 Accessory Kit

Accessory kit includes the following:

2200904 Active Safety Lead

2200872 ESU Dispersive Safety Lead

2200860 ESU CQM Safety Lead

2200885 ESU Case Safety Lead

2200897 ESU Jumper Safety Leads (2)

2196071 Active Safety Clip, yellow

2196080 Case Safety Clip, green

2183792 Fuses (2) 5X20 F3.15A 250V CE

2242165 Ground Pin Adapter

XXXXXXX Detachable Power Cord (country specific)

Ordering information

RF-303RS
Electrosurgery Analyzer

2251504 United States, 120 V

2394461 Australia, 250 V

2394477 Denmark, 250 V

2394489 Schuko, 250 V

2394492 Israel, 250 V

2394509 Italy, 250 V

2394511 India, 250 V

2394527 Switzerland, 250 V

2394530 United Kingdom, 250 V

FLUKE®
Biomedical

IDA 4 Plus

Multi-Channel Infusion Device Analyzer

IDA 4 Plus Multi-Channel Infusion Device Analyzer maximizes productivity with multiple, independent channels for testing upto four infusion pumps at once.

The device measures instantaneous flow, average flow, occlusion pressure, and analyzes patient-control analgesia (PCA) units. An optional PCA trigger box provides automated PCA pump control, allowing technicians to set up tests and walk away.

An autostart feature simplifies syringe pump testing or other tests that have long startup times.

With built-in memory, the IDA 4 Plus records test results internally and provides easy-to-read test-result graphs right on the analyzer's screen. The display is so large numbers can be read from across the room

Additionally, the IDA 4 Plus comes with Hydrograph PC software for creating full-color graphs and reports. For automated testing, the IDA 4 Plus is compatible with Fluke Biomedical's medTester 5000C (US only).

CE

N10140

Key features

- Tests up to four infusion pumps simultaneously
- Compatible with virtually any type of infusion device
- Instantaneous and average flow measurement
- Occlusion pressure measurements to 45 psi
- Single- and dual-flow (piggyback) testing
- Full PCA testing (bolus volume, lockout time, and automated external triggering)
- Autostart mode enables unit to begin testing only when fluid is detected
- On-board graphing of pressure and flow
- Built-in memory to save test results for printing or downloading to computer
- Hydrograph graphical software to control unit and display results via PC
- Automated testing through Fluke Biomedical medTester 5000C (US only)
- RS-232 ports
- Optional keyboard, printer, and alarm/PCA

Specifications

Flow-rate measurement	
Technique	Calculated by measuring a volume over time
Range	0.5 ml/hr to 1000 ml/hr
Accuracy	1 % of reading ± 1 LSD for flows of 16 ml/hr to 200 ml/hr for volumes over 20 ml; otherwise, 2 % of reading ± 1 LSD after delivery of 10 ml
Volume measurement	
Technique	Volume measured directly by the transducer in minimum sample sizes of 60 µl
Range	0.06 ml to 9999 ml
Accuracy	1 % of reading ± 1 LSD for flows of 16 ml/hr to 200 ml/hr for volumes over 20 ml; otherwise, 2 % of reading ± 1 LSD after delivery of 10 ml
PCA bolus measurement	
Technique	Volume is measured directly by the transducer in minimum bolus volumes of 0.5 ml. The measurement is made with a continuous rate between 0 ml/hr and 30 ml/hr. The bolus flow rate should be at least four times the basal flow rate for reliable detection of boluses
Minimum bolus volume	0.5 ml
Accuracy	See volume measurement
Pressure measurement	
Technique	Direct occlusion of the infusion line and measurement of pressure prior to the glass transducer
Range	0 psi to 45 psi and equivalents in mmHg and kPa
Accuracy	1 % of full scale ± 1 LSD
Back pressure	-100 mmHg to 300 mmHg

Optional PCA Trigger Box

IDA 4 Plus

Multi-Channel Infusion Device Analyzer

FLUKE® Biomedical

Specifications

Electrical specifications	
Supply voltage	Autoswitching 90 V ac to 260 V ac
Supply frequency	50 Hz to 60 Hz
Supply power	< 30 VA
Fuse	20 mm 250 V, 1 A (T) (slow blow)
Earth leakage current	< 1 mA in single fault condition
Environmental conditions	
Operating temperature	15 °C to 30 °C (59 °F to 86 °F)
Storage temperature	0 °C to 40 °C (32 °F to 104 °F) at 85 % RH or less for storage (Do not leave for more than 48 hours at -20 °C/-4 °F)
General information	
Dimensions (LxWxH)	19.05 cm x 18.11 cm x 30.18 cm (7.5 in x 7.2 in x 11.9 in)
Weight	5 kg (11 lb)

HydroGraph™ Graphics Software

Use the moving color visual advantage of HydroGraph to troubleshoot up to four infusion pumps at once. Data is taken directly off the transducer and transmitted to HygroGraph. 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.

Optional accessories

2245061 External mini-keyboard, 83-key with PS/2 connector and AT adapter
2238072 Parallel Printer Cable (D25M-36M)
2209703 PCA Trigger/Nurse Call Box
2248899 Printer, Seiko DPU-414-30B (120 V power supply) (additional purchase required: parallel printer cable, p/n 2238072)
2399531 Printer, Seiko DPU-414-30B (220 V power supply) (additional purchase required: parallel printer cable, p/n 2238072)
2235375 Printer (120 V power supply)
2235382 Printer (220 V power supply)
2200102 Interface Cable, medTester to IDA 4 Plus (without wedge adapter) (RS-232; female DB25 to female DB9)
2201042 Interface Cable, medTester to IDA 4 Plus (with or without wedge adapter) (RS-232; female DB9 to female DB25)
2245092 Barcode Scanner (with long-reach coil cable with Y connector for keyboard attachment)
2238626 Null Modem Cable (female DB9 to female DB9)

Included accessories

2213506 Electronic Users Manual and HydroGraph software
2217231 20 ml Priming Syringe
2391750 Luerlock-3 way (one for each channel)
2238909 5-foot Plastic Drain Line
2238626 Null Modem Cable (female DB9 to female DB9)
XXXXXXX Detachable Power Cord (country specific)

Ordering information

IDA 4 Plus One-Channel Infusion Device Analyzer
2250063 United States, 120 V
2394575 Australia, 250 V
2394582 Denmark, 250 V
2394594 Shuko, 250 V
2394608 Israel, 250 V
2394613 Italy, 250 V
2394624 India, 250 V
2394636 Switzerland, 250 V
2394649 United Kingdom, 250 V

IDA 4 Plus Two-Channel Infusion Device Analyzer
Full testing for up to two infusion pumps simultaneously
2250088 United States, 120 V
2394651 Australia, 250 V
2394660 Denmark, 250 V
2394672 Shuko, 250 V
2394685 Israel, 250 V
2394697 Italy, 250 V
2394703 India, 250 V
2394715 Switzerland, 250 V
2394726 United Kingdom, 250 V

IDA 4 Plus Three-Channel Infusion Device Analyzer
Full testing capability for up to three infusion pumps simultaneously
2250109 United States, 120 V
2394732 Australia, 250 V
2394744 Denmark, 250 V
2394759 Shuko, 250 V
2394767 Israel, 250 V
2394771 Italy, 250 V
2394780 India, 250 V
2394798 Switzerland, 250 V
2394800 United Kingdom, 250 V

IDA 4 Plus Four-Channel Infusion Device Analyzer
Full testing capability for up to four infusion pumps simultaneously
2250127 United States, 120 V
2394817 Australia, 250 V
2394821 Denmark, 250 V
2394839 Shuko, 250 V
2394842 Israel, 250 V
2394856 Italy, 250 V
2394863 India, 250 V
2394874 Switzerland, 250 V
2394888 United Kingdom, 250 V

ESA620

Electrical Safety Analyzer

FLUKE® Biomedical

The ESA620 Electrical Safety Analyzer represents the next generation in manual, portable electrical safety testers. With selections of three test loads, two protective earth test currents, and two insulation test voltages this versatile product can be used worldwide to enhance productivity and test to standards of choice.

New DSP technology offers better accuracy of leakage measurements throughout the ranges specified in the standards.

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 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.

N10140

Specifications

Voltage	
Range (mains voltage)	90 V ac to 132 V ac rms, 180 V ac to 264 V ac rms
Range (accessible voltage)	0 V ac to 300 V ac rms
Accuracy	± (2 % of reading +2 LSD)
Earth resistance	
Modes	Two terminal or four terminal
Test current	> 200 mA ac or 10 A ac to 25 A ac
Ranges	0 Ω to 2 Ω
Accuracy	± (2 % of reading 0.015 Ω)
Equipment current	
Mode	AC rms
Range	0 A to 20 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 µA to 199.9 µA 200 µA to 1999 µA 2.0 µA to 10.0 mA
Frequency response	DC to 1 kHz 1 kHz to 100 kHz 100 kHz to 1 MHz
Accuracy	± (1 % of reading + 1 µA) ± (2 % of reading + 1 µA) ± (5 % of reading + 1 µA)

Key features

- Superior compliance with multiple standards: IEC60601, IEC62353, VDE 751, ANSI/AAMI ES1:1993, NFPA-99, AN/NZS 3551, IEC61010
- Three test loads
- 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 part (lead isolation) test
- 200 mA and 25 A AC PE test current
- DSP filter technology for improved accuracy in leakage measurements
- 20 A equipment current
- 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
- 2- or (optional) 4-wire ground wire resistance
- Large display with adjustable contrast
- Ergonomic design
- Optional Ansur plug-in software
- USB connection
- CE, C-TICK and CSA for USA and Canada
- RoHS compliance
- Optional Ansur test automation software to standardize testing procedures, capture waveforms, and print and document test result

ESA620

Electrical Safety Analyzer

FLUKE® Biomedical

Specifications

Leakage current (continued)	
Mains on applied part test voltage	110 % of mains @ 230 V for IEC 60601 100 % of mains @ 115 V per AAMI 100 % of mains @ 230 V per 62353
Differential leakage	
Ranges	10 µA to 199 µA 200 µA to 1999 µA 2 mA to 20 mA
Accuracy	± 10 % of reading ± (2 counts or .2 µA, whichever is greater)
Insulation resistance	
Ranges	0.5 MΩ to 20 MΩ 20 MΩ to 100 MΩ
Accuracy	± (2 % of reading + 2 counts) ± (7.5 % of reading + 2 counts)
Source test voltage	500 V dc 250 V dc
ECG performance waveforms	
Accuracy	± 2 % ± 5 % for amplitude of 2 Hz square wave only, fixed @ 1 mV Lead II configuration
Waveforms	**Rates** ECG complex (BPM): 30, 60, 120, 180, and 240
	Ventricular fibrillation Square wave (50 % duty cycle) (Hz): 0.125 and 2 Sine wave (Hz): 10, 40, 50, 60, and 100 Triangle wave (Hz): 2 Pulse (63 ms pulse width): 30 and 60
Power ratings	
Mains voltage outlet	120 V ac 230 V ac
Mains voltage inlet power range	90 V ac to 132 V ac rms 180 V ac to 264 V ac rms
Maximum current	20 A @ 120 V ac 16 A @ 230 V ac
Hz	50 or 60
Physical case	
Dimensions (LxWxH)	31 cm x 23 cm x 10 cm (12.2 in x 9 in x 2.9 in)
Weight	4.7 kg (10.25 lb)
Certifications	
Certifications	CE: IEC/EN61010-1 2nd Edition; Pollution degree 2 CSA: CAN/CSA-C22.2 No 61010-1; UL61010-1 C-Tick: Australian EMC
Environmental	
Operating temperature	10 °C to 40 °C (50 °F to 104 °F)
Storage temperature	-20 °C to 60 °C (-4 °F to 140 °F)
Operating humidity	10 % to 90 % non-condensing
Altitude	To 2,000 meters @ 230 V ac (main supply voltage)
	To 5,000 meters @ 120 V ac (mains supply voltage)

Optional accessories

3116463 Ansur ESA620 Plug-In
1903307 Retractable Test Leads
2242165 Ground Pin Adapter
2067864 Kelvin Cable Set for 4-wire Measurement

Included accessories

2814967 Operator's Manual CD
2814971 Multilingual Getting Started Guide
ESA620 Accessory Kit (country specific)
2195732 15 A to 20 A adapter (US only)
2814980 Carry case
1626219 Data Transfer cable
3326842 Null Post assembly
XXXXXXX Detachable Power Cord (country specific)
Test Lead Set

Ordering information

ESA620 Electrical Safety Analyzer
2785725 United States, 115 V, 20 A
3051408 Europe, 230 V
3051390 France, 230 V
3051413 Israel, 230 V
3051436 Australia, 230 V
3051449 United Kingdom, 230 V
3051451 Switzerland, 230 V
3326935 ESA620, US 115V 20A w/Test Automation
3326947 ESA620, EUR 230V w/Test Automation
3326958 ESA620, FR 230V w/ Test Automation
3326964 ESA620, ISR 230V w/Test Automation
3326986 ESA620, AUS 230V w/Test Automation
3326999 ESA620, SWI 230V w/Test Automation
3327002 ESA620, UK 230V w/ Test Automation

ESA612

Electrical Safety Analyzer

The ESA612 Electrical Safety Analyzer represents the next generation in testers for biomedical professionals that perform field service on medical equipment throughout their facilities, in clinics, and anywhere onsite service is required. Portable, lightweight, and designed for operation in tight spaces, the ESA612 offers the functionality of a simulator, multimeter and electrical-safety analyzer in a single test tool.

With selection of two test loads, this versatile product can be used worldwide to test to preventative maintenance electrical safety standards of choice: ANSI/AAMI ES1:1993 (NFPA-99), IEC62353 (VDE 751), and AN/NZS 3551.

The versatility of the multifaceted ESA612 is further expanded with optional automation software, which speeds and simplifies testing and provides high-end-analyzer productivity at software-level investment. Ansur-automated ESA612 standardizes test procedures, compares results to standards limits, and generates and stores reports for total digital data management.

Key features

- Portable, ergonomic, lightweight and easy to use
- 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 combine the functionality of a simulator, multimeter and electrical-safety analyzer in a single test tool
- Replaceable mains fuses keep the device in the field and out of the repair shop
- Internal memory for 100 test records
- 20 A at 120 V current capability
- USB connection for use with Ansur and Data Viewer software (for memory download to PC)
- Two-year extended warranty (no-cost, available after first-year calibration at the Fluke Biomedical Cleveland Service Center)
- Optional Ansur automation software standardizes test procedures, compares results to standards limits, generates/stores reports and provides total digital data management
- Rigorously tested for rugged field applications, with CE and CSA in addition to the Fluke-quality-design stamp of approval

Specifications

Voltage	
Range (mains voltage)	90 V ac to 132 V ac rms, 180 V ac to 264 V ac rms
Range (accessible voltage)	0 V ac to 300 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 Ω to 2 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

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

ESA612

Electrical Safety Analyzer

FLUKE® Biomedical

Specifications

Ranges	0 µA to 199.9 µA, 200 µA to 1999 µA, 2 mA to 10 mA	
Frequency response/ accuracy	DC to 1 kHz	± (1 % of reading + (1 µA or 1 LSD, whichever is greater))
	1 kHz to 100 kHz	± (2 % of reading + (1 µA or 1 LSD, whichever is greater))
	1 kHz to 5 kHz (current > 1.6 mA)	± (4 % of reading + (1 µA or 1 LSD, whichever is greater))
	100 kHz to 1 MHz	± (5 % of reading + (1 µA or 1 LSD, whichever is greater))
Note: Accuracy for Isolation, MAP, Direct AP, Alternative AP, and Alternative Equipment leakage tests all ranges are + (2.5 µA or 1 LSD, whichever is greater)		
Leakage tests	Ground wire (earth), Chassis (enclosure), Lead to ground (patient), Lead to lead (patient auxiliary), Lead isolation (mains on applied part), Direct equipment , Direct applied part, Alternative equipment, Alternative applied part, Point to point	
Mains on applied part test voltage	100 % of mains	
Differential leakage		
Ranges	10 µA to 199 µA, 200 µA to 2000 µA, 2 mA to 20 mA	
Accuracy	± 10 % of reading + (2 counts or 20 µA, whichever is greater)	
Insulation resistance		
Ranges	0.5 MΩ to 20 MΩ, 20 MΩ to 100 MΩ	
Accuracy	± (2 % of reading + 0.2 MΩ), ± (7.5 % of reading + 0.2 MΩ)	
Source test voltage	500 V dc , 250 V dc	
Insulation resistance tests	Mains-PE, AP-PE, Mains- PE, Mains-NE (non-earthed accessible conductive part) and AP- NE (non-earthed accessible conductive part)	
ECG performance waveforms		
Accuracy	± 2 % ± 5 % for amplitude of 2 Hz square wave only, fixed at 1 mV Lead II configuration	
Waveforms: rates	ECG complex (BPM): 30, 60, 120, 180, and 240	
	Square wave (50 % duty cycle) (Hz): 0.125 and 2	
Ventricular fibrillation	Sine wave (Hz): 10, 40, 50, 60, and 100	
	Triangle wave (Hz): 2	
	Pulse (63 ms pulse width): 30 BPM and 60 BPM	
Power ratings		
Mains voltage outlet	120 V ac or 230 V ac	
Mains voltage inlet power range	90 to 132 V ac rms	180 to 264 V ac rms
Maximum current	20 A	16 A
Hz	50 or 60	50 or 60
Physical case		
Dimensions (L x W x H)	17.63 cm x 8.38 cm x 28.45 cm (6.94 in x 3.30 in x 11.20 in)	
Weight	1.6 kg (3.5 lb)	
Environmental specifications		
Operating temperature	10 °C to 40 °C (50 °F to 104 °F)	
Storage temperature	-20 °C to 60 °C (-4 °F to 140 °F)	
Operating humidity	10 % to 90 % non-condensing	
Altitude	120 V ac mains supply voltage up to 5,000 m, 230 V ac mains supply voltage up to 2,000 m	
General		
Warranty	Two-year extended warranty (no-cost, available after first-year calibration at the Fluke Biomedical Cleveland Service Center, otherwise standard one-year warranty applies)	

Included accessories

3334509 Operator's Manual (multilingual CD)
3334511 Getting-Started Guide (hard copy, multilingual)
2795488 Ansur ESA612 Plug-In, CD with demo version
1626219 Data Transfer Cable
ESA612 Accessory Kit (country specific)
2195732 15 A to 20 A Adapter (US only)
3326842 Null Post Adapter
3359538 5-to-5 Banana Jack to ECG (BJ2ECG) Adapter
2248650 Carry Case
XXXXXXX Detachable Power Cord (country specific)
Test Lead Set

Ordering information

3367232 ESA612 Electrical Safety Analyzer (US), 115 V 20 A
3367259 ESA612 Electrical Safety Analyzer (Europe), 230 V
3367244 ESA612 Electrical Safety Analyzer (France), 230 V
3367267 ESA612 Electrical Safety Analyzer (Israel), 230 V
3367271 ESA612 Electrical Safety Analyzer (Australia), 230 V
3367280 ESA612 Electrical Safety Analyzer (UK), 230 V
3367298 ESA612 Electrical Safety Analyzer (Switzerland), 230 V
3454793 ESA612 Electrical Safety Analyzer (Thailand), 230 V
3461965 ESA612 Electrical Safety Analyzer (Japan), 100 V
3460932 ESA612 Electrical Safety Analyzer (US), 115 V 20 A w/Test Automation
3460959 ESA612 Electrical Safety Analyzer (Europe), 230 V w/Test Automation
3460944 ESA612 Electrical Safety Analyzer (France), 230 V w/Test Automation
3460967 ESA612 Electrical Safety Analyzer (Israel), 230 V w/ Test Automation
3460971 ESA612 Electrical Safety Analyzer (Australia), 230 V w/ Test Automation
3460980 ESA612 Electrical Safety Analyzer (UK), 230 V w/ Test Automation
3460998 ESA612 Electrical Safety Analyzer (Switzerland), 230 V w/Test Automation
3461001 ESA612 Electrical Safety Analyzer (Thailand), 230 V w/ Test Automation
3462285 ESA612 Electrical Safety Analyzer (Japan), 100 V w/ Test Automation

ESA601

Electrical Safety Analyzer

FLUKE® Biomedical

ESA601 Electrical Safety Analyzer tests laboratory and hospital equipment to both US and international standards. Users simply flip a switch to change between AAMI or IEC electrical safety testing load. The US version includes overlays in AAMI or IEC nomenclature so technicians use the terms that are most familiar to them. Multiple language overlays, outlets, and power cords are available for convenient use in many countries.

Ten applied part connections allow for lead-to-ground (patient), lead-to-lead (patient auxiliary), and lead isolation (mains on applied part) leakage testing of equipment with multiple applied parts.

Designed for on-the-go testing, the portable analyzer is lightweight and compact and comes with a sturdy handle for easy carrying.

For an automated solution, Fluke Biomedical's Ansur software plug-in for the ESA601 allows technicians to use a PC to run autosequences, document results, and print reports.

N10140

Key features

- Selectable AAMI or IEC test loads
- Ten applied parts-lead connectors
- 90 V (min) to 264 V (max) autoswitching power supply
- Dual-lead leakage and dual-lead voltage tests
- Easy-to-read display
- Compact and portable
- Ansur plug-in software available to automate testing and document results
- Multiple outlets and power cords for compatibility in multiple countries
- Overlays in English, German, French, and Italian
- Overlay for USA version with either IEC or AAMI nomenclature
- RS-232 serial port for PC control and printing
- Optional Ansur test automation software to standardize testing procedures, capture waveforms, and print and document test result

Specifications

Power	
Mains power operating range	90 min to 264 max V ac (47 Hz to 63 Hz), autoswitching
Power ratings	16 A at 264 V max
Mains inlet	
Mains inlet	The instrument uses a standard IEC 60320-1/C20 mains inlet rated at 16 A and 250 V for class-1 equipment in cold conditions.

Optional accessories

2556755 Ansur ESA601 Plug-in
2004175 Alligator Clamp
2391669 Banana/ECG Adapter
2248899 Printer, Seiko DPU-414-30B (with choice of 120 V power supply, p/n 2235375; or 220 V power supply p/n 2235382)
2185787 North American 220 V Adapter Kit
2238659 Interface Cable (RS-232; male DB9 to female DB9)

Product comparison chart

Model	175	180	232D	ESA620
Test modes	Manual	Manual	Manual	Manual
	–	–	–	Automated with Ansur
	–	–	–	–
Test loads	AAMI	AAMI	AAMI	AAMI
	–	–	–	IEC60601-1
	–	–	–	IEC61010
PE test current	10 mA dc	10 mA dc	10 mA dc	200 mA ac 25 mA ac
20A device testing	No	Yes	No	Yes
ECG waveforms	no	No	Yes	Yes

ESA601

Electrical Safety Analyzer

FLUKE® Biomedical

Specifications

Voltage measurements	
Range (mains voltage)	90 V to 264 V true-rms
Range (accessible voltage)	0 V to 264 V true-rms
Accuracy	± 2 % of reading ± 2 V dc
Earth-resistance measurements	
Range	0 Ω to 1.999 Ω
Accuracy	± 2 % of reading ± 5 MΩ
Current source amplitude	1 A dc (± 10 %)
Insulation measurements	
Range	0.5 M to 100 MΩ
Accuracy	0.5 MΩ to 20 MΩ, ± 2 % of reading, ± 200 kΩ; above 20 MΩ, ± 5 % of reading, ± 200 kΩ
Voltage source amplitude	500 V dc (± 10 %)
VDE differential current	
Range	10 µA to 10000 µA
Accuracy	± 2 % of full scale
Leakage-current measurements	
Measurement range	0 µA to 8000 µA true-rms
Accuracy	± 1 % of reading (± 2 µA) @ dc and 25 Hz to 1000 Hz*; ± 2.5 % of reading (± 2 µA) 1 kHz to 200 kHz * Full scale input Accuracy of mains-on-applied-part leakage currents: ± 2 % of reading ± 6 µA
	Frequency response: DC to 1 MHz (-3 dB)
Crest factor	< 3
Input impedance	Per figure 15 of IEC601-1 or AAMI ES 1
Dual lead leakage	500 µA to 8000 µA
Environmental specs	
Operating temperature	10 °C to 40 °C (50 °F to 104 °F)
Storage temperature	-25 °C to 50 °C (-13 °F to 122 °F)
Maximum humidity	80 % relative humidity up to 31 °C (88 °F), decreasing linearly to 50 % relative humidity at 40 °C (104 °F)
Dimensions (LxWxH)	24.0 cm x 21.1 cm x 7.6 cm (9.8 in x 8.2 in x 3.0 in)
Weight	2.4 kg (5.2 lb)

Model	**ESA601**	**ESA601 Pro SeriesXL**	**medTester 5000C**
Test modes	Manual	Automatic	Automatic
	Automated with Ansur	Stepwise	Manual
	–	Manual	–
Test loads	AAMI	AAMI	AAMI
	IEC60601	IEC60601	–
	–	IEC61010	–
PE test current	1 A dc	1 A ac 10 A ac 25 A ac	100 mA dc
20A device testing	No	No	Yes
ECG waveforms	No	Yes	Yes

Included accessories

2388919 Users Manual and Ansur ESA601 Plug-in Demo Software on CD
2243822 Getting Started Guide
2248650 Soft-sided Carrying Case
2391738 Red Lead
2391723 Black Lead
2391714 Alligator/Banana Adapters (five each)

Ordering information

ESA601 Electrical Safety Analyzer

2249883 Australian outlet, Australian line cord, and English 1 overlay
2249909 Schuko outlet, Schuko line cord, and German overlay
2249927 Schuko outlet, Schuko line cord, and French overlay
2249948 Schuko outlet, Schuko line cord, and Italian overlay
2434154 Israeli outlet, Israeli line cord, and English 1 overlay
2404834 Schuko outlet, Schuko line cord, and English 1 overlay
2249966 UK outlet, UK line cord, and English 1 overlay
2249982 US outlet, US line cord, and English 1 overlay utilizing IEC nomenclature
2404852 US outlet, US line cord, and English 2 overlay utilizing AAMI (NFPA99) nomenclature
3334732 ESA601, 230V AUS w/Test Automation
3334744 ESA601, DEU 230V SHK w/Test Automation
3334759 ESA601, FRA 230V SHK w/Test Automation
3334767 ESA601, ITA 230V SHK w/Test Automation
3334771 ESA601, ISR 230V w/Test Automation
3334780 ESA601, 230V SHK w/Test Automation
3334798 ESA601, 230V UK w/Test Automation
3334800 ESA601, 115V IEC w/Test Automation
3334817 ESA601, 115 AAMI w/Test Automation

601 Pro Series$_{XL}$

Electrical Safety Analyzer

FLUKE®
Biomedical

Key features

- IEC60601-1, IEC61010-1, and ANSI/AAMI ES1 test loads, user selectable
- Multiple patient-applied-part types
- Power ON/OFF delays
- DC-only current for patient- and auxiliary-leakage tests
- User-programmable test sequences
- Manual, auto, step, and computer-control modes
- 1 A, 10 A, or 25 A ac protective-earth-resistance test circuit
- Memory for up to 1000 device-information records
- Integrated printer

N10140

The 601 Pro Series$_{XL}$ is the most advanced Electrical Safety Analyzer on the market. The One-Touch-Testing user interface is an industry exclusive that allows the user to perform rapid tests on various medical devices without having to maneuver around cumbersome menus. This full-featured safety analyzer combines the IEC60601-1, IEC61010-1, and ANSI/AAMI ES1 standard test loads into one device, so you can do all your testing at once.

Templates feature reduces your data entry, making your electrical-safety testing faster and easier!

Save the protective-earth test current at the default value you prefer, whether it is 1 A, 10 A, or 25 A. You are no longer limited to the 1 A default.

Specifications

	Voltage (single and dual lead)	Insulation resistance	Protective earth resistance	Current consumption
Range	0 V to 300 V	0.5 MΩ to 400 MΩ	0 to 2.999	0 A to 15 A
Accuracy	DC to 100 Hz ± 1.5 % of reading ± 1 LSD	± 5 % of reading ± 2 LSD	± 5 % of reading ± 4 mΩ (1 A, 10 A, and 25 A test currents)*	± 5 % of reading ± 2 LSD

*For additional specifications qualifying the varying effects on accuracy, please contact us.

601 Pro Series$_{XL}$

Electrical Safety Analyzer

FLUKE® Biomedical

Specifications

IEC60601-1 and AAMI leakage current	
Range	0 µA to 8000 µA true-rms or dc only
Accuracy	(per IEC60601-1 or AAMI) DC to 1 kHz ± 1 % of reading ± 1 µA 1 kHz to 100 kHz ± 2 % of reading ± 1 µA 100 kHz to 1 MHz ± 5 % of reading ± 1 µA
Mains on applied part , equivalent device, and equivalent patient l eakage current tests the following exceptions apply	
Applied voltage	≥ 110 % of mains voltage
Accuracy	± 2 % of reading ± 6 µA
IEC61010-1 leakage current	
Range	0 µA to 16000 µA true-rms or dc only
Accuracy	(per IEC 61010-1 Fig. A.1 filter) DC to 1 kHz ± 2 % of reading ± 1 µA 1 kHz to 100 kHz ± 4 % of reading ± 2 µA 100 kHz to 1 MHz ± 10 % of reading ± 10 µA
Waveform simulation	
Normal sinus rhythm	30 BPM, 60 BPM, 120 BPM, 180 BPM, and 240 BPM
Performance pulse	30 BPM and 60 BPM
Sine	10 Hz, 40 Hz, 50 Hz, 60 Hz, and 100 Hz
Square	0.125 Hz 2 Hz (50 % duty cycle)
Triangle	2 mV 2 Hz
Arrhythmia	A-Fib A-Flutter A-TAC Idioventricular PVC1 R-on-T Run V-Fib V-Tach
Performance	± 2 % of reading for rate of ± 5 % of reading for amplitude, fixed at 1 mV peak on a Lead II ECG connection (except for triangle wave, which is 2 mV peak to peak)
General	
Power	Autoswitching, 90 V ac to 265 V ac
Dimensions (LxWxH)	42.2 cm x 30 cm x 14.1 cm (16.62 in x 11.75 in x 5.56 in)
Weight	7.7 kg (17 lb)

Optional accessories

2248899 External Parallel Printer Port
2245061 Compact Keyboard
2234065 Carrying Case
2238659 RS-232 Cable
2245092 Barcode Scanner (optical)
2238072 Parallel Printer Cable, D25M-C36M
2235375 120 V ac Adapter
2235382 220 V ac Adapter

Included accessories

2234222 Operator's Manual
2391723 Black Test-Lead Set
2391738 Red Test-Lead Set

Ordering information

ESA601 Pro Series$_{XL}$
2250323 Schuko receptacle, english overlay, with internal printer
2250314 Schuko receptacle, english overlay, without internal printer
2250361 UK receptacle, english overlay, with internal printer
2250350 UK receptacle, english overlay, without internal printer
2250306 Australian receptacle, english overlay, with internal printer
2250298 Australian receptacle, english overlay, without internal printer
2250389 601 Pro Series$_{XL}$—USP: US receptacle, english overlay, with internal printer
2250377 US receptacle, english overlay, without internal printer
2250345 Schuko receptacle, german overlay, with internal printer
2250338 Schuko receptacle, english overlay, without internal printer

QA-90 MKII

Electrical Safety Analyzer

FLUKE® Biomedical

Ansur test automation software plug-in

The QA-90 represents a new generation of safety testing equipment. QA-90 is the only automatic safety tester that can test Instruments containing modules with different classes of protection in one test run (i.e. CF and BF defibrillators). It is simple to use. All you need to do is select the type and class of the equipment to be tested. When you press START, the QA-90 will execute the tests prescribed in the selected standard.

The test result can either be printed out immediately or stored internally in the unit for later use. The QA-90 can be fully remotely controlled via ansur software. With ansur, you can make your own test protocols, store the information on disk and export formatted data to equipment management databases.

Key features

- Small size—easy to carry
- Can operate completely stand-alone or by remote control with the ansur software
- Tests instruments containing modules with different protection classes in one test run i.e. CF and BF (defibrillator)
- Tests module separation
- Residual current measurements (optional)
- 11 patient inputs (laboratory style)
- Test according to: IEC 60601.1, IEC 60601.1.1, IEC 60601.2.4, IEC 61010, VDE 751-1:1990, VDE 751-1: 2001, UL 2601.1, AS 3200.1, DB 9801, HEI 95, AAMI
- Testing against standard or user defined limits
- Automatic, stepwise and manual test modes
- Programmable power up delay time before measurements
- Integrated keypad
- Internal memory for uploading test sequences and storing typically up to 200 equipment test results
- Built-in standard A4 protocols for on site documentation (localized)
- RS-232, centronics and bar code interface
- Optional Ansur test automation software to standardize testing procedures, capture waveforms, and print and document test result

Specifications

Test sequence	
Individual test sequences may be compiled to satisfy national and international standards: IEC 60601.1, VDE 0750 T1/12-91, BS 5724, UL 2601.1, CAN/CSA-C22.2 No 601.1-M90, AS 3200.1, NZS 6150:1990, VDE 0751:1990, VDE 0751:2001, IEC 60601.1.1, IEC 60601.2.4, UL 544, HEI 95, DB9801 and more	
Voltage measurement	
The voltage measurement may be executed in the following ways	– Between lead 1 and 2 – Between lead 1 and Earth – Between lead 2 and Earth – Between input/output E+ and E- (floating inputs/outputs)
Range	0 V to 400 V true-rms
Resolution	0.1 V
Accuracy	DC to 100 Hz 1 % of full scale ± 1 LSD 100 Hz to1 kHz 2 % of scale ± 1 LSD
Number of tests	Four or multiple
Current consumption	
The current measurement may be executed in lead no. 1 (live)	
Range 1	0 mA to 1000 mA true-rms (@ < 250 V ac)
	Resolution : 1 mA
	Accuracy : ± 2 % of full scale ± 1 LSD
	Number of tests: 1 or multiple
Range 2	1 A to 16 A true-rms (@ < 250 V ac)
	Resolution: 1 mA
	Accuracy: ± 1 % of full scale ± 1 LSD
	Number of tests: 1 or multiple
Protective earth	
The test current is 25 A or 1 A, delivered from a transformer with a maximum idle voltage of 6 V. The measurement can be performed on ground leads or between E+ and E- (floating inputs/outputs)	
Range	0 MΩ to 2000 MΩ
Resolution	1 MΩ
Accuracy	± 2 % of full scale or 5 % of reading
Number of tests	1, 2, or multiple
Insulating resistance	
The measurement of the insulating resistance may be executed between casing and power unit, or between patient module and power unit	
Test voltage	500 V dc through a 130 kΩ limiting resistor
Number of tests	1, 2, or multiple

QA-90 MKII

Electrical Safety Analyzer

FLUKE® Biomedical

Specifications

Range 1	1 MΩ to 50 MΩ Resolution: 1 MΩ Accuracy: ± 2 % of full scale ± 1 LSD
Range 2	5 MΩ to 200 MΩ Resolution: 1 MΩ Accuracy: ± 2 % of full scale ± 1 LSD
Leakage currents	
All measurements can be performed with a IEC 601.1 filter (patient equivalent), or without (flat frequency response). The filter can be exchanged with filters covering other standards. All measurements can be performed as true-rms measurements, or ac/dc measurements.	
Leakage currents are measured	**Number of tests:** Earth leakage current – 4 Enclosure leakage current – 6 or multiple Residual current – 2 Substitute equipment current – 1 Direct current – 2 Current Fig. 9 – 1
Leakage currents are measured for each module In one test run a maximum of 11 modules with different protection classes may be tested	**Number of tests:** Patient leakage current – 6 Mains on applied part leakage current – 2 Patient Auxiliary current – 6 Floating dual lead measurement of leakage currents – Multiple Substitute patient current – 1
Accuracy	
Range 1	0 to 99.9 µA Resolution: 0.1 µA Accuracy: ± 2 % of full scale ± 1 LSD
Range 2	100 µ to 1000 µA Resolution: 1 µA Accuracy: ± 2 % of full scale ± 1 LSD
Range 3	1.0 mA to 10.0 mA Resolution: 1 µA Accuracy: ± 1 % of full scale ± 1 LSD
Frequency response	
Dc to 1 MHz (-3 dB) with a crest factor: > 2. The test voltage for the mains on applied part measurement is 110 % of the line voltage, delivered through a limiting resistor of 47 kΩ.	
Ansur software	
Remote control	All functions and tests in QA-90 may be performed from the PC
User-definition of test standards	Select predefined standards or create your own local/new standard with test limits
User-programmable test sequences	Allows user-defined test sequences with a selection of tests from the selected test standard
Customized protocols	Create your own protocol format including a header, checklist, job instructions, a command field and a test sequence
Storage and recall	Protocol formats and data may be stored, recalled, printed out, or transferred to D-base systems
General information	
Temperature requirements	+ 15 °C to +35 °C while operating; 0 °C to +50 °C for storage
Display	Type: LCD Alphanumeric format: Four lines by 40 characters Display control: 7 F-keys and a keypad
Data input/outputs (2)	Parallel printer port (1); bi-directional RS-232 (1) for computer control Bar code interface
Power	From 100 V ac to 240 V ac, 47 Hz to 63 Hz
Housing	Metal case
Dimensions (LxWxH)	305 mm x 342 mm x 132 mm
Weight	5.8 kg
Recommended printers	HP Desk Jet, Canon Bubble Jet or compatible

Optional accessories

Data transfer cable, RS-232

2462909 Carrying Case

2463016 Ansur test software, QA-90 plug-in license

Included accessories

2462072 Banana Adapter, 10 pk

2462975 E-Input Measuring Cable, 2 m, black

2523266 Clamp, Crocodile Style, black

QA-90-1CD Users Manual on CD

XXXXXXX Detachable Power Cord (country specific)

Ordering information

QA-90 MKII Electrical Safety Analyzer

2462865 United States, 115 V

2462876 Europe, 230 V

2556858 United Kingdom, 230 V

2557155 Australia, 230 V

3277167 Denmark, 230 V

FLUKE®
Biomedical

180

Electrical Safety Analyzer

N10140

The handheld 180 Electrical Safety Analyzer is a lightweight, portable device for testing electrical systems, medical devices, and physiological instrumentation. The device includes the AAMI test load and has five jacks for patient applied parts testing.

Small enough to fit in a briefcase, the analyzer works well as a bench-top instrument in the laboratory or a portable testing device in the mobile engineer's toolbox. With its uncomplicated design, the 180 is simple to use. A single master function switch, directly labeled with the test to be performed, leads the user through a complete measurement procedure.

The analyzer uses simple, yet sophisticated, electronics for true-rms measurement of current and voltage. The 180 also performs dual-lead leakage and resistance tests.

Key features

- Handheld
- Self-switching 120 V and 240 V operation
- 15 A and 20 A capabilities
- Five patient applied parts jacks
- Dual-lead testing

Specifications

Operating mains voltage range	90 V ac to 240 V ac
Current capacity for DUT	Line 90 V to 140 V: 20 A for 5 min, 15 A for 30 min; line over 140 V: 10 A
Line-voltage measurement	
Range	90 V to 240 V
Accuracy	± 3 % of reading ± 1 LSD
Load-Current measurement	
Range	1 A to 19.99 A
Accuracy	± 5 % of reading ± 1 LSD
Leakage-current measurement	
Range	0 µA to 1999 µA
Accuracy	DC and 25 Hz to 1 kHz: ± 1 % of reading ± 1 µA; 1 kHz to 100 kHz: ± 2.5 % of reading ± 1 µA; 100 kHz to 1 MHz: ± 5 % of reading ± 1 µA
Measurement type	True-rms; input impedance per AAMI ES1-1993
Isolation test	
Isolation source voltage	110 % of mains, ± 5 % of reading
Current limit	1 mA @ 120 V ac
Resistance measurement	
Range	0.01 Ω to 19.99 Ω
Accuracy	± 1 % of reading ± 1 LSD
Resolution	0.01 Ω
Current source	10 mA dc
Environmental requirements	
Operating temperature	15 °C to 40 °C (59 °F to 104 °F)
Storage temperature	-20 °C to 65 °C (-4 °F to 149 °F)
Relative humidity	90 % max
Mains voltage range	90 V to 240 V
General information	
Display	LCD 3.5 digit
Dimensions (LxWxH)	13.3 cm x 18.4 cm x 5.4 cm (5.25 in x 7.25 in x 2.1 in)
Weight	Max weight 1 kg (2.25 lb)

Optional accessories

2248864 Soft-sided Vinyl Carrying Case
2392409 Chassis Cable, coil cord, 8-foot extended
2392411 Chassis Cable, coil cord, 16 foot extended
2392448 External Leakage Cable, coil cord, 8 foot extended
2231563 External Leakage Cable, coil cord, 16 foot extended
2185787 North American 220 V adapter kit

Included accessories

2185754 Users Manual
2392409 Test Lead 8 foot, black

Ordering information

2249852 180 Electrical Safety Analyzer, US, 90 V to 265 V

FLUKE®
Biomedical

175

Electrical Safety Analyzer

N10140

The 175 Electrical Safety Analyzer is ideal for performing quick electrical safety checks on electrical systems, medical devices, and physiological instrumentation.

Small enough to fit in a briefcase, the analyzer works well as a bench-top instrument in the laboratory or a portable testing device in the mobile engineer's toolbox.

With its uncomplicated design, the 175 is simple to use. A single master function switch, directly labeled with the test to be performed, leads the user through a complete measurement procedure. The unit features both IEC601-1 and AAMI test loads. Technicians simply flip a switch to perform leakage measurements to a particular standard.

The analyzer uses simple, yet sophisticated, electronics for true-rms measurement of current and voltage. The 175 also performs dual-lead leakage tests.

Key features

- Portable
- IEC601-1 and AAMI test loads
- Self-switching 120 V and 240 V operation
- Dual-lead testing

Specifications

Operating mains voltage range	90 V ac to 240 V ac
Current-capacity for DUT	15 A for 10 min
Voltage measurement	
Range	90 V to 240 V
Accuracy	± 3 % of reading ± 1 LSD
Load-current measurement	
Range	1 A to 19.99 A
Accuracy	± 5 % of reading ± 1 LSD
Resistance measurement	
Range	0.01 Ω to 19.99 Ω
Accuracy	± 1 % of reading ± 1 LSD
Resolution	0.01 Ω
Current source	10 mA dc
Leakage-current measurement	
Range	0 µA to 1999 µA
Accuracy	DC and 25 Hz to 1 KHz: ± 1 % of reading ± 1 µA; 1 KHz to 100 KHz: ± 2.5 % of reading ± 1 µA; 100 KHz to 1 MHz: ± 5 % of reading ± 1 µA
Measurement type	True-rms
Input impedance	1000 Ω per AAMI ES1-1993, IEC601-1
Environmental requirements	
Operating temperature	15 °C to 40 °C (59 °F to 104 °F)
Storage temperature	-20 °C to 50 °C (-4 °F to 122 °F)
Relative humidity	Max 80 % up to 31 °C (88 °F), decreasing linearly to 50 % at 40 °C (104 °F)
General information	
Display	LCD 3.5 digit
Dimensions (LxWxH)	13.3 cm x 18.4 cm x 5.4 cm (5.25 in x 7.25 in x 2.1 in)
Weight	Max weight: 1 kg (2.25 lb)

Optional accessories

2248864 Soft-sided Vinyl Carrying Case
2392409 Chassis Cable, coil cord, 8-foot extended
2392411 Chassis Cable, coil cord, 16 foot extended
2392448 External Leakage Cable, coil cord, 8 foot extended
2231563 External Leakage Cable, coil cord, 16 foot extended
2185787 North American 220 V adapter kit

Included accessories

2185754 Operator's Manual
2392409 Test Lead 8 foot, black

Ordering information

2249841 175 Electrical Safety Analyzer, US, 90 V to 265 V

LT544DLITE

Digital Safety Tester

FLUKE® Biomedical

This device is designed to perform simple electrical safety tests on any type of medical equipment, whenever patient lead testing is not required.

The rugged, hand-held instrument is built for quick and easy use. A simple selector knob controls the functions: Leakage Current and Chassis Resistance. Accurate test measurements are shown on the large display.

Heavy-duty switches change polarity, open and close the neutral and select Chassis or Earth Leakage Current measurements. A four-wire Kelvin bridge eliminates reading errors in resistance due to cable length and contact resistance. True-rms measurements are provided for all current readings. The AAMI test load is utilized.

Key features

- Small, lightweight, self-contained portable instrument
- Universal power supply – input voltage from 85 V ac to 265 V ac
- Chassis resistance measurements are made with a four-wire Kelvin bridge to eliminate errors due to cable length
- Test method complies with AAMI load per ANSI/AAMI ES1-1993
- Leakage current can be measured in Open/Closed Neutral, Normal/Reversed Polarity and Open/Closed Ground
- All Leakage current measurements are displayed directly in µA

Specifications

Ground resistance	
Range	0 Ω to 19.99 Ω
Accuracy	± 1% R, ± 1 LSD
Resolution	10 mΩ
Leakage current	
Range	0 µA to 1, 999 µA
Accuracy	DC and 25 Hz to 1kHz: ± 1 % of reading, ± 3 LSD 1.0 KHz to 100 KHz: ± 2.5 % of reading, ± 3 LSD 100 KHz to 1 MHz: ± 5 % of reading, ± 3 LSD
Current capacity	
LT544DLite- 1515	15 A at 120 V ac
LT544DLite- 230 V	10 A at 230 V ac
LT544DLite- 1520/2020	20 A, at 230 V ac, 20 % duty cycle (2 minutes on, 8 minutes off)
Controls	1. Function switch – 4 position rotary 2. Neutral switch – 2 position rocker (Open/Closed) 3. Polarity switch – 3 position rocker (Normal/Off/Reversed) 4. Leakage switch – 2 position rocker (Chassis/Earth)
DUT power	85 V ac to 265 V ac, 16 A @ 120 V, 10 A @ 230 V
Physical size	90 mm x 180 mm x 38 mm (3.5 in x 6.2 in x 1.6 in)

Included accessories

600/100 Chassis Cable, coil cord, 8 ft

600/101 Chassis Cable, coil cord, 16 ft

600/102 Chassis Ground Probe, 8 ft

600/215 Conductivity Cable – PCI

600/600 Soft Carrying Case (6 in x 10 in x 4 in)

Ordering information

LT544DLITE Digital Safety Tester

2250751 United States, 85 V ac to 265 V ac, 50/60 Hz

2250805 Europe, 85 V ac to 265 V ac, 50/60 Hz

2250797 Australia, 85 V ac to 265 V ac, 50/60 Hz

2250810 Israel, 85 V ac to 265 V ac, 50/60 Hz

2250822 Italy, 85 V ac to 265 V ac, 50/60 Hz

2250831 Switzerland, 85 V ac to 265 V ac, 50/60 Hz

2250846 United Kingdom, 85 V ac to 265 V ac, 50/60 Hz

LT544DPLUS

Digital Safety Tester

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This device is designed to perform simple electrical safety tests on any type of medical equipment, whenever patient lead testing is not required.

The rugged, hand-held instrument is built for quick and easy use. A simple selector knob controls the functions: Line Voltage, Instrument Current, Leakage Current and Chassis Resistance. Accurate test measurements are shown on the large display.

Heavy-duty switches change polarity, open and close the neutral and select Chassis or Earth Leakage Current measurements. A four-wire Kelvin bridge eliminates reading errors in resistance due to cable length and contact resistance. True-rms measurements are provided for all current readings. The AAMI test load is utilized.

Key features

- Small, lightweight, self-contained portable instrument
- Universal power supply – input voltage from 85 V ac to 265 V ac
- Chassis resistance measurements are made with a four-wire Kelvin bridge to eliminate errors due to cable length
- Test method complies with AAMI load per ANSI/AAMI ES1-1993
- Leakage current can be measured in Open/Closed Neutral, Normal/Reversed Polarity and Open/Closed Ground
- All Leakage current measurements are displayed directly in µA

Specifications

Line voltage	
Range	85 V ac 265 V ac
Resolution	1 Volt
Accuracy	2 % R ± 1 LSD
Instrument current	
Range	0.0 A to 19.99 A
Resolution	10 mA
Accuracy	5 % R ± 1 LSD
Ground resistance	
Range	0 W 19.99 W
Accuracy	± 1 % R, ± 1 LSD
Resolution	10 mW
Load current	
Range	0 A to 14.99 A (LT544Dplus – 1515) 0 A to 19.99 A (LT544Dplus – 2020) 0 A to 9.99 A (LT544Dplus – 230 V)
Accuracy	± 4 % R, ± 1 LSD
Leakage current	
Range	0 µA to 1, 999 µA
Accuracy	DC and 25 Hz to 1 kHz: ± 1 % g, ± 3 LSD 1.0 KHz to 100 KHz: ± 2.5 % of reading, ± 3 LSD 100 KHz to 1 MHz: ± 5 % of reading, ± 3 LSD
Current capacity	LT544Dplus-1515: 15 A at 120 V ac LT544Dplus-230V: 10 A at 230 V ac LT544Dplus-2020: 20 A, at 120 V ac, 20 % duty cycle (2 minutes on, 8 minutes off)
Controls	1. Function Switch - 4 position rotary 2. Neutral Switch - 2 position rocker (Open/Closed) 3. Polarity Switch - 3 position rocker(Normal/Off/Reversed) 4. Leakage Switch - 2 position rocker (Chassis/Earth)
DUT power	85 V ac to 265 V ac, 16 A @ 120 V, 10 A @ 230 V
Power connectors	LT544Dplus – Standard US LT544Dplus-EUR – Schuko
Physical size	90 mm x 180 mm x 38 mm (3.5 in x 6.2 in x 1.6 in)

Included accessories

600/100 Chassis Cable, coil cord, 8 ft

600/101 Chassis Cable, coil cord, 16 ft

600/102 Chassis Ground Probe, 8 ft

600/215 Conductivity Cable – PCI

600/600 Soft Carrying Case (6 in x 10 in x 4 in)

Ordering information

LT544DPLUS Digital Safety Tester

2250854 United States, 85 V ac to 265 V ac, 50/60 Hz

2250893 Europe, 85 V ac to 265 V ac, 50/60 Hz

2250887 Australia, 85 V ac to 265 V ac, 50/60 Hz

2250902 Israel, 85 V ac to 265 V ac, 50/60 Hz

2250916 Italy, 85 V ac to 265 V ac, 50/60 Hz

2250925 Switzerland, 85 V ac to 265 V ac, 50/60 Hz

2250933 United Kingdom, 85 V ac to 265 V ac, 50/60 Hz

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ULT800

Ultrasound Transducer Leakage Tester

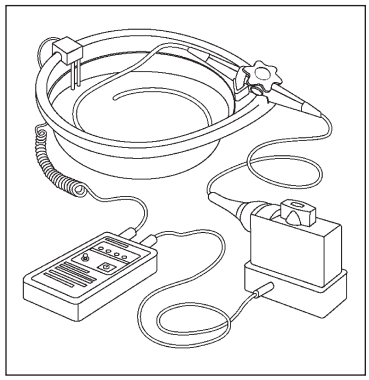
ULT800 tests the electrical safety of ultrasound transducers independent of their ultrasound machines. A variety of adapters allow for testing of many different makes and models, including transesophageal echocardiography (TEE) transducers.

With the ULT800, transducer testing easily fits into routine disinfecting procedures. Technicians conduct the tests in a cleaning basin at the beginning of the day and between patients. Simple Pass/Fail indicators make it simple to use even non-technical medical personnel, such as sonographers and central sterile-supply technicians, can perform the tests.

The ULT800 is available by itself or as a kit, which includes two transducer adapters, a dual-conductivity electrode, and carrying case.

Key features

- Handheld
- Stand-alone operation
- Direct measurement of leakage current
- Battery-operated
- Independent of 120 V or 240 V systems
- Built-in self-test circuit
- Auto shut-off to conserve battery



ULT800 Ultrasound Electrical Leakage testing system (TEE transducer not included)

Specifications

Power	9 V alkaline battery, approximately 1000 uses per battery
Conductivity	Limit to pass: > 133 µA +1 %
Leakage	Limit to pass: < 185 µA +1 %; > 20 µA +1 %
Dimensions (LxWxH)	17 cm x 10 cm x 4 cm (6.5 in x 3.7 in x 1.5 in)
Weight	0.34 kg (0.75 lb)
Operating temperature	15 °C to 40 °C (59 °F to 104 °F)
Storage temperature	15 °C to 65 °C (59 °F to 149 °F)
Humidity	90 % max

Optional accessories

2392502 Dual Conductivity Electrode
2392525 Hard-sided Carrying Case
2392569 Dual Conductivity Electrode—for use with Cidex 2032 Tray
2801776 600/220PLUS, Dual Conductivity Electrode for use with 800-Cleaning Tub,
2392533 Conductivity Adapter Cable for PCI GUS cleaning
2231616 Universal Ultrasound Probe for DALE601 and DALE601E
2392427 Chassis Ground Probe for DALE601/DALE601E
2392430 Acuson/Siemens ultrasound transducer adapter for Acuson 156 and V510B Transducers
2743055 800-Cleaning Tub, Cleaning/Testing Basin for ULT800 Testing System
2392578 Acuson/Siemens Ultrasound Transducer Adapter for Acuson 260 Transducers
2392591 Acuson/Siemens Ultrasound Transducer Adapter for Acuson MP and 3V2c Transducers
2392516 Acuson/Toshiba Ultrasound Transducer Adapter for Acuson XP, Acuson Aspen, Acuson Capasee, Acuson 3-Needle Guide C3, ATL 3.5 DFT, Toshiba PSF-37HT, and Toshiba F Series Transducers
2392482 HP/Agilent Ultrasound Transducer Adapter (600/210)
2392494 HP/Agilent Ultrasound Transducer Adapter (600/211)
2392475 GE LogiQ Ultrasound Transducer Adapter (600/204)
2231602 GE LogiQ Ultrasound Transducer Adapter (600/205)
2392453 GE YMS/RT Ultrasound Transducer Adapter for GE YMS/RT Transducers
2392466 GE CGR Ultrasound Transducer Adapter for GE CGR radius and GE SONO Transducers
2392557 Philips Ultrasound Transducer Adapter (ATL/600/218)
800/PHILIPS-04 Ultrasound Transducer Adapter (for use with Philips iE33 and iU22 diagnostic ultrasound TEE transducers)
2540999 SonoSite TEE Ultrasound Transducer Adapter (for use with all SonoSite Transducers-including TEE)

Ordering information

2434187 ULT800 Ultrasound Transducer Leakage Tester Kits
2491569 Cust1 Ultrasound Transducer Leakage Tester Kit
Standard accessories: ULT800 (2491569), dual-conductivity electrode (2392502), and hard-sided carrying case (2392525)
2491578 Cust2 Ultrasound Transducer Leakage Tester Kit
Standard accessories: ULT800 (2491569), 800-Cleaning Tub, Cleaning/Testing Basin for ULT800 Testing System (2743055, includes foam, Velcro strap, and shipping container), 600/220PLUS, Dual conductivity electrode for use with 800-Cleaning Tub, Cleaning/Testing Basin for ULT800 Testing System (2801776)

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BP Pump 2

Non-Invasive Blood Pressure Simulator

The BP Pump 2 is a second-generation non-invasive blood pressure (NIBP) monitor analyzer that efficiently verifies oscillometric adult and neonatal NIBP. The BP Pump 2's unique feature set includes tests to accurately interrogate wrist-cuff monitors, internal cuff volumes, and optional 5-lead synchronized ECG simulations for spot checks on the monitor. The simulated peripheral pulse is synchronized with this electrical ECG signal for testing NIBP monitors utilizing gated measurement for noise/artifact rejection.

Key features

- Dynamic BP simulators for arm- and wrist-cuff monitors
- ECG and arrhythmia simulation synchronizedwith BP (optional)
- Internal pump for high- and low-pressure release verification, leak testing, and pressure sourcing
- Internal adult/neonatal cuffs elimates need for external cuffs
- Four respiratory artifacts, including spontaneous breathing and controlled ventilation
- Multiple arrhythmia simulations, including premature atrial contractions #1 and #2, atrial fibrillation, and PVCs
- Optional Ansur test automation software to standardize testing procedures, capture waveforms, and print and document test result

Specifications

Pressure generation/ measurement	Static-pressure range: 0 mmHg to 400 mmHg (53 kPa)			
	Difference between target pressure and actual pressure: -5 mmHg			
	Internal leak rate: < 2 mmHg per minute with minimum volume of 300 cc			
Four respiratory artifacts	3 spontaneous breathing; controlled ventilation			
Three adult wrist-cuff simulations	Normal, Hyper, Hypo			
Pressure source	Specified pressure generated from 50 mmHg to 400 mmHg in selectable increments of 1 mmHg			
Pressure gauge	Static pressure measured from 0 mmHg to 400 mmHg at the pressure port			
Pressure relief test	Test for the NIBPM pressure relief valve (0 mmHg to 400 mmHg) with display of peak pressure			
Neonate internal cuff simulations	Internal neonate cuff; four standard neonate pressures			
Neonate simulations	Cuff #1:	Blood pressure: 35/15	Heart rate: 120 BPM	Pulse volume: 0.3
	Cuff #2:	Blood pressure: 60/30	Heart rate: 120 BPM	Pulse volume: 0.3
	Cuff #3:	Blood pressure: 80/50	Heart rate: 120 BPM	Pulse volume: 0.3
	Cuff #4:	Blood pressure: 100/70	Heart rate: 120 BPM	Pulse volume: 0.3
Normal sinus rhythm	BP and ECG: Healthy heart, weak pulse, mild exercise strenuous exercise, obese subject, geriatric subject, tachycardia, bradycardia			
Irregular pulse	BP and ECG: Premature atrial contractions # 1, premature atrial contractions # 2, premature ventricular contractions, atrial fibrillation and PVCs			
User-definable simulations	User-definable systolic and diastolic values, along with heart rate and pulse volume Ranges:			
	Systolic pressure range	Diastolic pressure range	Heart rate	Pulse volume
	20 mmHG to 250 mmHG	10 mmHG to 200 mmHG	30 BPM to 250 BPM	0.1 cc to 2.4 cc in increments of 0.1 cc
Simulation parameters performance	Max pulse volume: 2.4 cc			
	Max heart rate: 200 BPM at 2.4 cc pulse volume; 250 BPM at 1.2 cc pulse volume			
	Internal neonatal cuff volume: 20 cc			
	Internal adult cuff volume (including NN volume): 310 cc			
	Heart rate setting accuracy: ± 1 BPM			
	Simulation units: kPa and mmHg (user selectable)			
Pressure leak test	The pressure port is pressurized from 0 mmHg to 400 mmHg and keeps track of the pressure loss over time. Peak pressure and present pressure are displayed at all times; leak rate is displayed when it is available.			
Autosequences	Nine autosequences are provided for four tests and up to five simulations			
Electrical ECG (optional)	Signals: RA, LA, RL, LL, V			
	Waveform: Lead II			
	Amplitude: 1 mV peak (± 10 %) NIBP peripheral pulse synchronized with ECG signal			
	Connections: Optional external ECG adapter, physiological synchronization with NIBP			

BP Pump 2

Non-Invasive Blood Pressure Simulator

FLUKE® Biomedical

Serial port	Bidirectional RS-232 port; baud rate of 9600 with no parity, one stop bit, and eight data bits
Pressure measurement	Pressure-measurement units: kPa, mmHg, cmH20, cmH20 and psi (user selectable) Range: 0 mmHg to 400 mmHg
Accuracy	Basic model (BP Pump 2_L): 0 mmHg to 300 mmHg: + 0.5 % of reading + 1 mmHg; 301 mmHg to 400 mmHg: + 2 % of reading High-accuracy version (BP Pump 2_M): < 0.8 mmHg (0.1 kPa) throughout range
Parallel port	25-pin female connector, with D-subminiature style and pinouts conforming to IBM PC printer port (unidirectional), HP and ASCII printers
Sample adult arm-cuff simulation (standard parameters)	Standard set of blood pressures: BP #1: Blood pressure: 120/80 (93) Heart rate: 80 Pulse volume: 0.68 cc BP #2: Blood pressure: 150/100 (116) Heart rate: 80 Pulse volume: 0.65 cc BP #3: Blood pressure: 200/150 (166) Heart rate: 80 Pulse volume: 0.6 cc BP #4: Blood pressure: 255/195 (215) Heart rate: 80 Pulse volume: 0.55 cc BP #5: Blood pressure: 60/30 (40) Heart rate: 80 Pulse volume: 0.75 cc BP #6: Blood pressure: 80/50 (60) Heart rate: 80 Pulse volume: 0.7 cc BP #7: Blood Pressure: 100/65 (76) Heart rate: 80 Pulse volume: 0.69 cc
Patient condition simulations	Healthy heart, weak pulse, mild exercise #1, strenuous exercise #2, obese subject, geriatric subject, tachycardia, bradycardia
Arrhythmia simulations	Premature atrial cont. #1, premature atrial cont. #2, premature ventricular cont., atrial fib and PVCs
Wrist simulations	Simulation #1: Blood pressure 120/80 (93) Heart rate: 80 BPM Pulse volume: 0.5 cc Simulation #2: Blood pressure 160/100 (120) Heart rate: 80 BPM Pulse volume: 0.5 cc Simulation #3: Blood pressure: 80/55 (63) Heart rate: 80 BPM Pulse volume: 0.5 cc
Temperature	Operating: 15 °C to 40 °C (59 °F to 104 °F) Storage: -20 °C to 65 °C (-4 °F to 149 °F)
Display	Bright, large 4-line x 40-character alphanumeric display with backlighting
Dimensions (WxDxH)	25.4 cm x 25.4 cm x 12.7 cm (10 in x 10 in x 5 in)
Weight	3.4 kg (7.5 lb)

Optional accessories

2755836 Ansur BP Pump 2 Plug-in
2222822 Soft-sided Vinyl Carrying Case
2391894 ECG Adapter Block (allows simulation of 5-lead ECG waveforms)
2248899 Printer, Seiko DPU-414-30 B, 120 V power supply
2399531 Printer, Seiko DPU-414-30B, 200 V power supply
2238659 Serial Cable, D9M-D9F
2392328 Neonatal/external cuff mandrel (truncated plastic cylinder diameters: 7.6, 10, and 14 cm)
2391875 Wrist cuff mandrel (adult)

Included accessories

2391882 Accessory Kit (tubings and fittings)
Users Manual
XXXXXXX Power Cord (country specific)

Ordering information

BP Pump 2_L (standard pressure transducer)
2249036 United States, 120 V
2394895 Australia, 250 V
2394901 Denmark, 250 V
2394912 Schuko, 250 V
2394920 Israel, 250 V
2394935 Italy, 250 V
2394947 India, 250 V
2394958 Switzerland, 250 V
2394964 United Kingdom, 250 V
3334821 US 120V w/Test Automation
3334839 AUS w/Test Automation
3334842 DEN w/Test Automation
3334856 SHK w/Test Automation
3334863 ISR w/Test Automation
3334874 ITAL w/Test Automation
3334888 IND w/Test Automation
3334895 SWZ w/Test Automation
3334901 UK w/Test Automation

BP Pump 2_M (high-accuracy pressure transducer)
2249049 United States, 120 V
2394973 Australia, 250 V
2394986 Denmark, 250 V
2394999 Schuko, 250 V
2395003 Israel, 250 V
2395015 Italy, 250 V
2395026 India, 250 V
2395032 Switzerland, 250 V
2395044 United Kingdom, 250 V
3334912 US w/Test Automation
3334920 AUS w/Test Automation
3334935 DEN w/Test Automation
3334947 SHK w/Test Automation
3334958 ISR w/Test Automation
3334964 ITAL w/Test Automation
3334973 IND w/Test Automation
3334986 SWZ w/Test Automation
3334999 UK w/Test Automation

CuffLink

Non-Invasive Blood Pressure Simulator

The CuffLink Non-Invasive Blood Pressure (NIBP) Analyzer offers a quick, reliable, and consistent way to evaluate the operation and performance of oscillometric NIBP signals.

With user-programmable selections, the CuffLink will simulate the full range or normal, hypertensive, and hypotensive dynamic NIBP waveforms representing typical adult, infant, and neonatal patients. The analyzer can also generate normal, bradycardia, and tachycardia rhythm selections with a wide range of weak, normal, and strong peripheral pulses. A variety of parameters allow creation and storage of five custom autosequences within the unit. In addition to the programmable blood-pressure target values, these autosequences can include static pressure, leak, and over-pressure relief valve pop-off tests.

Key features

- Dynamic oscillometric non-invasive blood-pressure simulation
- Automated static-pressure measurements, leakage testing, and relief-valve testing
- Five automated NIBP testing autosequences
- Five arrhythmia selections
- Adult and neonatal NIBP selections
- Adjustable heart rate values
- Direct interface with medTester 5000C

CuffLink standard accessories

Specifications

Power	120/250 V ac, 50 Ω average, 100 Ω peak, 50/60 Hz
Analog outputs	Cuff pressure: 0 mmHg to 499.95 mmHg FS ± 1 % of reading, 10 mV/mmHg
	Pulse pressure: 0 mmHg to 5 mmHg FS ± 1 of reading, 1 V/mmHg
Digital manometer	Pressure: -499.75 mmHg to 499.75 mmHg
	Measurement parameters: instantaneous and peak
Displayed graphics	Dynamic real-time NIBP cuff-pressure waveform programmed peripheral pulse and envelope waveforms
Display	Alphanumeric graphic display (LCD)
	Alphanumeric mode: 8 lines x 40 characters
	Graphics mode: 64 vertical x 240 horizontal dot matrix, backlight with viewing angle adjustment
Digital interfaces	RS-232/serial: bidirectional: downloads cuff measurement data and controls test features with a compatible computer or via the medTester 5000C with the medCheck option.
	Parallel printer: Centronics compatible
	Pulse sync: 0 V dc to 5 V dc (TTL)
Cuff mandrel	Interlocking plastic blocks: four cuff circumferences, including 39.5 cm (large adult), 33 cm (adult), 26.6 cm (small adult) and 20 cm (child); maximum cuff: 15.25 cm
	Truncated plastic cylinders: three neonatal cuff circumferences, including 14 cm, 10 cm, and 7.6 cm; maximum cuff width of 7.6 cm
Pop-off valve testing	Automatic test for operation of the monitor's relief valve
	Measurement parameters: instantaneous and peak pressure
	Maximum pressure: 499.75 mmHg
System leak testing	Start pressure: 499.75 mmHg max
	Elapsed time: 60 s (fixed)
	Leak-rate range: 0.25 mmHg/min to 499.75 mmHg/min
	Pump: 2 liters/minute minimum (free flow)
Accuracy	Dynamic NIBP Response Repeatability (Systolic/Diastalic/Mean): 1 % of target value
	Cuff pressure: ± 1 % of reading ± 1 mmHg
	Input overpressure limit: ± 1500 mmHg

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CuffLink

Non-Invasive Blood Pressure Simulator

Specifications

Autosequences	Up to five user-programmable sequences to test NIBP monitors with a specific series of cuffLink performance tests, including static pressure test, leak test, and pop-off test
	Up to eight adult-neonatal-arrhythmia dynamic NIBP selections, each of which can be cycled up to 99 times during the sequence
	Printable test report
Displayed real-time parameters	Instantaneous cuff pressure: 0 mmHg to 300 mmHg Peak cuff pressure: 0 mmHg to 500 mmHg peak Inflate/deflate time: 0.1 s to 999.9 s Inflate/deflate rate: 0.1 mmHg/s to 999.9 mmHg/s Total measurement time: 0 s to 999.9 s max
	Selected heart rate: Selected systolic/diastolic (mean) target values User-programmed vertical and horizontal shifts
Dynamic non-invasive blood pressure	Simulation of a range of normal, hypertensive and hypotensive dynamic noninvasive blood pressures for typical adult, infant, and neonatal patients. Generation of normal, bradycardia, and tachycardia rhythm selections with a wide range of user-programmable peripheral pulse amplitudes (weak, normal and strong). Compatible with oscillometric NIBP devices.
	Preprogrammed target value selections: Adult systolic/diastolic (MAP) (mmHg): 60/30 (40), 80/50 (62), 100/65 (75), 120/80 (90), 150/100 (115), 200/150 (165) and 255/195 (215)
	Neonatal/pediatric systolic/diastolic: above selections, excluding 255/195 and 200/150
	Repeatability: ± 1 % of selected target value
	Adult arrhythmia selections: • Baseline NIBP target value: (120/80) (NSR) • Atrial fibrillation (A-Fib) • Premature atrial contraction (PAC) • Premature ventricular contraction (PVC) • Missed beat (MB) • Aberrant sinus conduction (AS)
	Preprogrammed peripheral pulse waveforms: • Pulse amplitude at MAP: 2 mmHg (typical adult value) • Pulse volume range: 0 ml to 5.1 ml • Pulse rise time: 80 ms (min) • Heart rates (adult and neonate): 30 BPM, 40 BPM, 60 BPM, 80 BPM, 120 BPM, 160 BPM, 200 BPM, and 240 BPM • Heart-rate accuracy: ± 1 % of selected rate
	Pre-programmable target value shifts: Horizontal axis: preprogrammed target value selections shifted in 1.0 mmHg steps over a maximum range of ± 300 mmHg to increase or decrease dynamic pressure values Vertical axis: relative amplitude shifted in 1 % increments over a maximum range from 0 % to 200 % to simulate weak, normal, and strong peripheral pulses
Environmental	Operating temperature: 15 °C to 35 °C (59 °F to 95 °F)
	Storage temperature: 0 °C to 50 °C (32 °F to 122 °F)
Dimensions (LxWxH)	38.1 cm x 31.75 cm x 12.7 cm (15 in x 12.5 in x 5 in)
Weight	6.82 kg (15 lb)

Product comparison chart

Model	BP Pump 2	CuffLink
Wrist cuff simulations	Yes	No
ECG syncronized	Option	No
Leak test	Yes	Yes
Over pressure test	Yes	Yes
Manometer	Yes	Yes
medTester compatible	No	Yes

Included accessories

2242915 Operator's Manual
2392381 Adult Cuff Mandrel Spacer Blocks
2230305 Adult Cuff Mandrel End Blocks (qty 2)
2392328 External Cuff Mandrel Neonatal (truncated plastic cylinder diameters: 7, 6, 10, and 14 cm)
2245300 CuffLink Adapter Kit
2198846 Hospital Grade Power Cord Set
2248408 Soft Vinyl Accessory Pouch

Ordering information

CuffLink Non-Invasive Blood Pressure Simulator
2246985 United States, 120 V
2399820 Australia, 250 V
2399835 Denmark, 250 V
2399873 India, 250 V
2399858 Israel, 250 V
2399864 Italy, 250 V
2399847 Schuko, 250 V
2399886 Switzerland, 250 V
2399899 United Kingdom, 250 V

MPS450

Patient Simulator

The MPS450 is Fluke Biomedical's next-generation, portable, multiparameter patient simulator for your comprehensive testing and training needs. Whether it's a quick check on a bedside monitor, arrhythmia recognition training, or pe forming a complete PM on the latest patient-monitoring systems, this simulator is a clear choice with its broad range of physiological waveforms, easy-to-use interface, and compact, portable size.

Key features

- 12-lead ECG simulation with independent outputs
- 43 arrhythmia selections
- Four invasive BP channels, including Swan-Ganz simulation
- Respiration and temperature simulations
- ECG performance testing, including R-Wave detection
- Large, bright 4-line x 20-character display
- RS-232 serial port
- Expansion port
- Compact and lightweight

MPS450 optional accessories

Specifications

ECG normal sinus rhythm	12-lead configuration with independent outputs
	Amplitude: 0.05 mV to 5.5 mV
	Rates: 30 BPM to 300 BPM
	ECG waveform selections: Adult or pediatric
	Superimposed artifact: 50 Hz and 60 Hz, muscle, baseline wander, respiration
ECG performance	Amplitude: 0.05 mV to 5.5 mV Square wave: 2 Hz , 0.125 Hz Pulse: 30 BPM, 60 BPM, 60 ms pulse width Sine waves: 0.5 Hz to 100 Hz Triangle wave: 2 Hz, 2.5 Hz
ST segments	Elevated/depressed: -0.8 mV to 0.8 mV in 0.1 mV steps; plus -0.05 mV and 0.05 mV steps
Accuracy	All amplitudes ± 2 % of setting Lead II All rates ± 1 % All widths ± 1 %
Arrhythmia selections (43 Total)	Premature rhythms Supraventricular rhythms Ventricular rhythms Conduction defects Pacemaker
Respiration	Baseline impedance: 500 Ω to 2000 Ω, leads I, II, III Impedance variations: 3 Ω, 1 Ω, 0.5 Ω, 0.2 Ω Rates: 15 BrPM to 120 BrPM and APNEA Apnea periods: 12 seconds, 22 seconds, 32 seconds, and continuous

Product comparison chart

Model	MPS450	medSim 300B	PS420	PS415
Arrhythmia selections	43	32	35	14
Respiration	Yes	Yes	Yes	Yes
BP channels	Yes, four	Yes, four	Yes, two	Yes, two
Swan-Ganz procedure	Yes	Yes	Yes	Yes
Temperature channels	Yes, one	Yes, two	Yes, one	Yes, one
User-programmable auto-sequences	Yes (with HHC3)	Yes, internal feature plus HHC3 capability	No	Yes
Cardiac output	Optional	Optional	Standard	No

MPS450

Patient Simulator

FLUKE® Biomedical

Specifications

Blood pressure channels	**Channels** 4; synchronized with normal sinus rhythm rates; tracks arrhythmia activity
	Transducer Exciter voltages: ac and dc compatible Sensitivity: 5 µV/V/mmHg and 40 µV/V/mmHg Calibrated Rate: 80 BPM
Available selections	Static pressure
	Dynamic pressure: Art (120/80), Radial Art (120/80), LV (120/0), RA/CVP (15/10), RV (25/0), PA (25/10), PAW (10/2), and LA (14/4)
	Swan-Ganz procedure: automated and manual control
Temperatures	0 °C, 24 °C, 37 °C, and 40 °C
Cardiac output (optional)	Faulty-injectate curve Left-to-right shunt curve C.O. for 0°: 2.5 l/min, 5 l/min, and 10 l/min C.O. for 24°: 2.5 l/min, 5 l/min, and 10 l/min Cal Pulse: 1.5° for 1 second
Fetal/Maternal ECG and IUP simulations (optional)	Fixed fetal heart rates: 60 BPM to 240 BPM
	Dynamic fetal heart activity: Uniform deceleration, uniform acceleration, early deceleration, late deceleration
	Maternal heart rate: 80 BPM
	Dynamic intrauterine pressure (IUP)
	Waveform: positive bell-shaped pressure curve
	Peak pressure: 90 mmHg, ± 4 mmHg (max)
	Contraction interval: 2 minutes, 3 minutes, and 5 minutes (manual)
	Duration: 90 seconds
Dimensions (WxDxH)	18.4 cm x 19 cm x 5 cm (7.3 in x 7.5 in x 2 in)
Weight	0.6 kg (1.4 lb)

Model	PS410	PS400	DataSim 6100
Arrhythmia selections	35	12	34
Respiration	No	No	Yes
BP channels	No	No	Yes, three
Swan-Ganz procedure	No	No	Yes
Temperature channels	No	No	No
User-programmable auto-sequences	No	No	Yes
Cardiac output	No	No	Optional

Optional accessories

2248623 Soft-Sided Vinyl Carrying Case
2238659 Serial Cable D9M-D9F
2226608 Cardiac-Output Adapter Box
2645641 HHC3 Handheld Controller

Cardiac output adapters

2392285 GE Medical/Marquette Cardiac Output Cable (interface cable for GE Medical/Marquette plus monitors, including in-line switch box to select injectate temperature)
2227016 Gould/Spectramed 1445 Injectate Temperature Adapter (4 pin)
2227025 Gould/Spectramed 1465 Injectate Temperature Adapter (phone jack)
2226973 HP Injectate Temperature Adapter (1/4 in phone plug)
2391990 Universal Injectate Temperature Adapter Pigtail (unterminated)
2392158 General Purpose Connector

For a complete list of temperature and blood-pressure cables, contact us.

Included accessories

2720054 AC Battery Eliminator
2243350 Users Manual

Ordering information

2251364 MPS450 (ECG 12-lead simulation; invasive BP; respiration; temperature; BP in sync with ECG; large, bright 4-line x 20-character display; R-wave-detection test; RS-232 port for computer control; soft-key navigation; universal ECG connectors; and flash memory for easy program upgrade)

2251373 MPS450-CO (base model plus cardiac-output simulation)

2251399 MPS450-FET (base model plus direct fetal/maternal ECG simulations with maternal heart rate, selectable fetal heart rate, and dynamic intrauterine pressure waveform [IUP])

2251386 MPS450-CO/FET (base model plus cardiac-output simulation and direct fetal/maternal ECG simulations with maternal heart rate, selectable fetal heart rate, and dynamic intrauterine pressure waveform [IUP])

medSim 300B

Patient Simulator

FLUKE®
Biomedical

Key features

- 12-lead ECG simulation with independent output
- Four invasive BP channels including Swan-Ganz simulation
- Respiration and temperature
- 9 V dc battery and lead test
- ECG-performance testing including R-Wave detection
- Interactive defibrillation training
- 2-line x 20-character display
- RS-232 serial port

If your physiological-monitor testing requirements call for a full-featured, comprehensive instrument, the medSim 300B is your answer. Used by thousands of biomedical departments and many medical-device manufacturers around the world, this simulator delivers an entire array of parameters with ultimate flexibility.

Specifications

Arrhythmia selections	Supraventricular, premature, conduction, ventricular, and transvenous pacemaker
Programmable sequences	15 preprogrammed selections or user programmable
ECG parameters	Normal sinus rhythm Performance ST segments Arrhythmia selections
medSim 300B option 1	Fetal/maternal ECG and IUP Intra-aortic balloon assist pump Cardiac catheterization Cardiac Output Option Flow rates: 3 lpm to 7 lpm Curves: Normal, interrupt, slow, L/R shunt Trends: Avg = 5 l/min
Controller option	Direct waveform access
Premature beat selections	Manual: Push button insertions of one PVC, PAC, or PNC Automated: User-programmable PVC activity PVC types: 4 LV and RV foci PVC timing: Standard, early, and R-on-T PVC rate: 0 to 25/min or automated PVC-rate variance
Pacemaker	Amplitude: -700 mV to 700 mV Width: 0.1 ms to 2 ms
Defibrillator training	Three scenarios available

medSim 300B

Patient Simulator

FLUKE® Biomedical

Specifications

Blood pressure channels	**Channels** Four synchronized with normal sinus rhythm rates; tracks arrhythmia activity
	Transducer Exciter voltages: ac and dc compatible Sensitivity: 5 µV/V/mmHg and 40 µV/V/mmHg Calibrated rate: 80 BPM
Available selections	Static pressure
	Dynamic pressure: Art (120/80), LV (120/0), RA/CVP (15/10), RV (25/0), PA (25/10), PAW (10/2)
	Swan-Ganz procedure (manual)
	Triangle wave
Respiration	Normal physiological simulation Baseline impedance: 500 Ω to 2000 Ω Impedance variations: 0 Ω to 3 Ω Rates: 15 BrPM to 120 BrPM Apnea: Off, momentary, continuous, timed (12 sec and 32 sec)
Auxiliary features	I/E Ratio: 5/1, 4/1, 3/1, 2/1, 1/1
	Baseline shift: Delta impedance is reduced to 1/6 and shifted either positive or negative. The rate is changed to 120 BrPM for 12 sec/min.
	Ventilator simulation: 40 BrPM at fixed ratio
Artifact	ECG: 50 Hz, 60 Hz, muscle, and baseline wander. All or single leads. BP/respiration: Two pressure values
Temperature	Channel 1: Fixed at 37 °C (98.6 °F) Channel 2: 34 °C (86 °F), 37 °C (98.6 °F), 40 °C (104 °F) Hypothermia, hyperthermia, and spike
Power	Two 9 V dc alkaline batteries, battery eliminator
Dimensions (WxDxH)	17.8 cm x 25.4 cm x 7.6 cm (7 in x 10 in x 3 in)
Weight	1.6 kg (3.5 lb)

Optional accessories

2248554 Multipurpose Hard-sided Watertight Carrying Case

2199070 PC remote control interface cable (right-angle DIN to female DB25)

2199225 Patient Simulator to medTester interface cable (right-angle DIN to female DB25)

2199747 DS-A Datascope System 9 (DS-1 BP cable required) intra-aortic balloon assist sync cable

2199786 KT-A Kontron K200, KAAT (KT-1 BP cable required) intra-aortic balloon assist sync cable

2645641 HHC3 Handheld Controller

For a complete list of cardiac adapters, temperature and blood-pressure cables, contact us.

FLUKE®
Biomedical

PS420

Patient Simulator

The PS420 is a handheld, high-performance simulator for testing patient monitors.

Small enough to fit in a pocket, the handy PS420 features a wide variety of simulation capability, including a full range of ECG, respiration, blood pressure, temperature and cardiac output conditions. The tool includes 12-lead ECG, two-channel blood pressure simulation, 35 arrhythmia selections, pacemaker simulation as well as adult and pediatric normal sinus rhythms.

For convenient use, labeled hot keys on the keypad guide users to the most common settings.

Key features

- Compact, lightweight, pocket size
- Labeled hot keys for common settings
- 12-lead ECG
- Respiration and temperature selection
- Two-channel blood pressure simulation
- Optional cardiac output
- Adult and pediatric normal sinus rhythms
- 35 arrhythmia selections
- ECG performance waveforms
- ST segment levels
- ECG artifact
- Pacemaker simulation
- RS-232 serial port for computer control
- Battery operated

Specifications

ECG	
Normal rate	80 BPM
Selectable rates	30 BPM, 40 BPM, 60 BPM, 80 BPM, 100 BPM, 120 BPM, 140 BPM, 160 BPM, 180 BPM, 200 BPM, 220 BPM, 240 BPM, 260 BPM, 280 BPM, and 300 BPM
Accuracy	± 1 %
Output impedance	500 Ω, 1000 Ω, 1500 Ω, and 2000 Ω for leads I, II, and III
ECG amplitudes	0.5 mV, 1 mV, 1.5 mV, and 2 mV
Amplitude accuracy	± 2 % lead II
Adult or pediatric ECG waveform performance waveform	
Lead II square wave	2 Hz, 0.125 Hz
Pulse	30 BPM and 60 BPM, 60 ms pulse width
Sine wave	0.5 Hz, 4 Hz, 10 Hz, 40 Hz, 50 Hz, and 60 Hz (1 mV amplitude, lead II)
Triangle wave	2 Hz
ST segment analysis	
Elevated or depressed	-0.8 mV to +0.8 mV in 0.1 mV steps
Pacemaker	
Pacer spike	Amplitude: 2 mV, 4 mV, 8 mV, and 10 mV in lead II Accuracy: ± 5 %, Lead II
Pacer spike	Duration: 0.1 ms, 0.5 ms, 1 ms, 1.5 ms, and 2 ms Accuracy: ± 5 %
Functions	Asynchronous pacemaker Pacer non-function Pacer non-capture Demand occasional sinus Demand frequent sinus AV sequential

PS420

Patient Simulator

FLUKE® Biomedical

Specifications

Blood pressure	
Input/output impedance	350 Ω
Exciter input limit	± 10 V
Exciter input frequency range	DC to 4000 Hz
Transducer sensitivity	5 µV/V/mmHg or 40 µV/V/mmHg
Level accuracy	± 1 %, ± 1 mmHg
Static levels BP1	-10 mmHg, 0 mmHg, 50 mmHg, 100 mmHg, 150 mmHg, 200 mmHg, and 250 mmHg
Static levels BP2	-10 mmHg, 0 mmHg, 80 mmHg, 160 mmHg, 240 mmHg, 320 mmHg, and 400 mmHg
Channel selections:	Arterial 120/80, channel 1 and 2 Radial artery 120/80, channel 1 and 2 Left ventricle 120/00, channel 1 and 2 Right ventricle 25/00, channel 1 and 2 Central venous 15/10, channel 2 Pulmonary artery 25/10, channel 2 Pulmonary wedge 10/2, channel 2 Left atrium 14/4; automatic Swan/Ganz (every 20 sec) Manual swan/ganz (changes when entry is selected), channel 2 Synchronized with all normal sinus rates. Physiologically track all arrhythmia selection
Cardiac output (must have optional cardiac output adapter box p/n 2462200)	
Catheter type	Baxter edwards, 10 cc
Blood temperature	37 °C (98.6 °F) CO for 2 °C (35.6 °F): 3, 5, 7 l/min CO for 20 °C (68 °F): 3, 5, 7 l/min
Cal pulse	Of 1 °C for 1 sec; of Delta 402 Ω for 4 sec.
Computational constant	For 2 °C (35.6 °F) is 0.561; for 20 °C (68 °F) is 0.608
Left to right shunt	2 °C and 20 °C (35.6 °F and 68 °F)
Faulty injectate	2 °C and 20 °C (35.6 °F and 68 °F)
Accuracy	± 5 % Calibrated or uncalibrated cardiac output waves for 4 different CO values
Respiration	
Baseline impedance	500 Ω, 1000 Ω, 1500 Ω, and 2000 Ω, leads I, II, and III
Lead selections	LL or LA
Impedance variations	3 Ω, 1 Ω, 0.5 Ω, and 0.2 Ω
Accuracy	± 5 %
Rates	15 BPM, 20 BPM, 30 BPM, 40 BPM, 60 BPM, 80 BPM, 100 BPM, 120 BPM, and 0 BPM for apnea
Accuracy	± 2 %
Apnea	12 seconds, 22 seconds, 32 seconds, and continuous
Temperature	
Compatibility	YSI 400/700 series
Temperature	30 °C, 35 °C, 37 °C, 40 °C, and 42 °C (86 °F, 95 °F, 98.6 °F, 104 °F, and 107.6 °F)
Temperature simulation accuracy	± 0.25 °C

PS420

Patient Simulator

FLUKE® Biomedical

Specifications

Arrhythmias	Base rate of 80 BPM Sinus arrhythmia Atrial (PAC)* Missed beat* Atrial tachycardia Atrial flutter Nodal (PNC)* Nodal rhythm Supraventricular tachycardia PVC1 left ventricular focus* PVC 1 early, LV focus * PVC1 R on T, LV focus* PVC2 right ventricular focus* PVC2 early, RV focus* PVC2 R on T, RV focus* Multifocal PVCs* Atrial fibrillation coarse/fine PVCs 6/minute PVCs 12/minute PVCs 24/minute Frequent multifocal PVCs Bigeminy Trigeminy Pair PVCs* Run 5 PVCs * Run 11 PVCs* Ventricular tachycardia Ventricular fibrillation coarse/fine Asystole Conduction defects First degree Second degree Third degree Right bundle branch block Left bundle branch block *Will go to NSR ECG @ 80 BPM after completion
Artifacts	50/60 Hz Muscle Baseline Respiration
General	
Dimensions (LxWxH)	15.6 cm x 9.4 cm x 3.4 xm (6.1 in x 3.7 in x 1.3 in)
Weight	0.4 kg (0.9 lb)

Key features

- Range: 10^{-1} to 10^{7} mR/h
- Energy response: 10 % from 55 keV to 3 MeV

Optional accessories

2462072 Universal Banana Adapter (17024)

2462189 Carrying Case, single pocket

2462177 Carrying Case, double pocket

2651740 Cardiac Output Adapter Box PS420 (17290)

2462295 BP Cable, unterminated PS420

2462312 Temperature Cable, unterminated PS420

2462217 RS-232 Cable

Included accessories

2631808 PS420 Users Manual (printed)

2631721 PS420 Users Manual (electronic, CD)

2647372 Battery Eliminator 100 V ac to 240 V ac

9 V Battery

Ordering information

2631290 PS420 Patient Simulator

PS415

Patient Simulator

The PS415 is a high-performance multiparameter patient simulator for testing full-function monitors. Compact and lightweight, the handheld PS415 provides the versatile features and convenience to meet the needs of mobile field service technicians.

The device features 12-lead ECG output, two invasive blood-pressure channels, a wide range of arrhythmia selections, and respiration and temperature simulation. With its broad capability, the PS415 provides one of the best cost-benefit ratios among simulators on the market today.

Technicians control the PS415 with manual commands or onboard autosequences. A convenient pullout card provides quick menu access for all the manual simulations, and the front panel features an easy-to-use soft-key interface.

Key features

- Handheld
- 12-lead ECG simulations
- Wide range of arrhythmia selections
- Automatic or manual operation
- RS-232 port for computer control
- Two invasive blood pressure channels
- Respiration simulation
- Temperature simulation
- Battery operated
- Pullout card for quick menu access

Normal sinus rhythm:	
Selectable rates	30 BPM, 40 BPM, 60 BPM, 70 BPM, 80 BPM, 90 BPM, 100 BPM, 120 BPM, 140 BPM, 150 BPM, 160 BPM, 180 BPM, 200 BPM, 210 BPM, 220 BPM, 240 BPM, 270 BPM, 300 BPM, and 350 BPM
Accuracy	± 1 %
Auto-step rate	30 BPM, 60 BPM, 80 BPM, 120 BPM, 180 BPM, and 240 BPM at 30-second intervals
Amplitude lead II	0.5 mV, 1 mV, 1.5 mV, and 2 mV
Amplitude accuracy	+5 % 2 Hz square wave at 1 mV p-p (Lead II)
Limb-lead impedance selections	500 Ω or 1000 Ω
V-lead impedance	1000 Ω
Accuracy	± 5 %
General information	
Power	9 V battery for 50-hour life or line-operated via battery eliminator
Output	7.7 V ac, 100 mA, unregulated
Display	2-digit LCD
Lead test	If the resistance is less than 1 kΩ, the display flashes at the rate of 4 Hz
Data interface	RS-232 compatible, bidirectional port
	5-pin DIN female connector
	Baud rate: 2400
Connector	2.5 mm, center (+)
Dimensions (LxWxH)	16 cm x 10.4 cm x 3.8 cm (6.3 in x 4 in x 1.5 in)
Weight	0.3 kg (0.8 lb)
Temperature	Operating: 15 °C to 35 °C (59 °F to 95 °F)
	Storage: 0 °C to 55 °C (32 °F to 131 °F)

Optional accessories

For a complete list of cardiac adapters, temperature and blood-pressure cables, contact us.

Included accessories

2572338 Operating Manual
2183983 Battery Eliminator
2392729 Lead-test Adapter
2248505 Soft-sided Carrying Case

Ordering information

2558944 PS415 Patient Simulator

FLUKE®
Biomedical

PS410

Patient Simulator

The PS410 ECG/Arrythmia Simulator is a compact, high-performance simulator for patient monitor testing.

This handheld device simulates a full range of cardiac rhythms and a wide variety of ECG conditions. It includes pacemaker simulation, 35 arrhythmia selections, and adult and pediatric normal-sinus rhythms.

Small enough to fit in a pocket, the handy PS410 weighs less than a pound and is easy to operate. Technicians simply connect the simulator to the device under test and use the PS410 keypad to enter the code presets. The simulator then transmits the selected preset simulations to the device.

Key features

- Handheld
- 12-lead ECG simulation
- 12 arrhythmia selections
- Universal ECG jacks
- Auto sequencing of performance waveforms
- Battery operated

Specifications

Normal sinus rhythm: 12-lead with independent outputs referenced to RL	
Normal rate	80 BPM
Selectable rates	30 BPM, 40 BPM, 60 BPM, 80 BPM, 100 BPM, 120 BPM, 140 BPM, 160 BPM, 180 BPM, 200 BPM, 220 BPM, 240 BPM, 260 BPM, 280 BPM, and 300 BPM
Accuracy	± 1 %
Output impedance	940 Ω between leads
ECG amplitudes	0.5 mV, 1 mV, and 2 mV
Amplitude accuracy	± 2 % Lead II
High-level output	1000x Lead II
Waveforms	Adult or pediatric ECG waveform
ECG performance: Lead II	
Square wave	2 Hz and 0.125 Hz
Pulse	30 BPM, 60 BPM, and 120 BPM; 60 ms pulse width
Sine waves	0.5 Hz, 5 Hz, 10 Hz, 40 Hz, 50, and 60 Hz (1 mV amplitude only, lead II)
Triangle wave	2 Hz
ST Segment analysis	Elevated or depressed: -0.6 mV to 6 mV in 0.2 mV steps
Pacemaker	Pacemaker rhythm Pacer non-capture Pacer non-function Demand pacer with occasional sinus Demand pacer with frequent sinus A-V sequential
Artifact selection	50 Hz artifact 60 Hz artifact Muscle artifact Baseline artifact Respiration artifact

Optional accessories

2647372 Battery Eliminator 100 V ac to 240 V ac
2462189 Carrying Case, single pocket
2462177 Carrying Case, double pocket
2462072 10 Universal Banana Adapters

Included accessories

2631742 PS410 Users Manual (electronic, CD)
2631795 PS410 Users Manual (printed)
2647372 Battery Eliminator 100 V ac to 240 V ac
9 V battery

Ordering information

2631276 PS410 Patient Simulator

PS400

Patient Simulator

FLUKE® Biomedical

The PS400 is a basic patient simulator for quality-assurance testing of ECG machines, monitors and telemetry units.

The lightweight, handheld device features 12-lead ECG output and a single high-level output. Technicians can use manual or automatic sequence modes to check low- and high-frequency response, linearity, gain, damping, and paper speed. The PS400 also includes 12 arrhythmia selections to check arrhythmia detection systems and teach health care workers how to recognize normal and abnormal heart rhythms.

Using the PS400 is easy. The user interface features a menu selector switch and a simple-to-use rotary knob for selecting waveforms.

Key features

- Handheld
- 12-lead ECG simulation
- 12 arrhythmia selections
- Universal ECG jacks
- Auto sequencing of performance waveforms
- Battery operated

Specifications

Waveforms	
ECG	30 BPM, 60 BPM, 120 BPM, 180 BPM, and 240 BPM
Square wave	2 Hz
Sine waves	10 Hz, 40 Hz, 50 Hz, 60 Hz, and 100 Hz
Arrhythmias	Atrial fibrillation Second-degree A-V block, type 1 Right-bundle-branch block Premature atrial contraction Premature ventricular contraction, early Premature ventricular contraction, R on T Multifocal PVCs Bigeminy Run of 5 PVCs Ventricular tachycardia Ventricular fibrillation Paced
Automated sequence	
Pulse	4 seconds
Sine waves	10 Hz, 40 Hz, 60 Hz, and 100 Hz
Triangle wave	2 Hz
Rate accuracy	± 0.5 %
Amplitudes	
Lead I	0.5 mV, 1 mV, 1.5 mV, and 2 mV
High-level output	0.25 V, 0.5 V, 0.75 V, and 1 V
Accuracy	± 2 %
Hz	2 Hz square wave at 2 mV (all leads)
General information	
Power	9 V alkaline battery for 200-hour life or line-operated via battery eliminator
	115 V ac or 230 V ac or 7.7 V dc, 100 mA, unregulated
	Connector, 2.5 mm center (+)
Dimensions (LxWxH)	13.2 cm x 9.9 cm x 3.6 cm (5.2 in x 3.9 in x 1.4 in)
Weight	0.4 kg (0.9 lb)
Operating temperature	15 °C to 35 °C (59 °F to 95 °F)
Storage temperature	0 °C to 55 °C (32 °F to 131 °F)

Optional accessories

2200116 High-level ECG Cable

Included accessories

2572345 Operating Manual
2248424 Soft-sided Carrying Case
2183983 Battery Eliminator
9 V Battery

Ordering information

2558932 PS400 ECG/ Arrhythmia Simulator

DataSim 6100

Patient Simulator

FLUKE® Biomedical

The DataSim 6100 offers six channels for generating ECG arrhythmias, blood pressure, and respiration. Features include a standard defibrillator training capability, along with an internal battery. All control keys and display prompts can be found on DataSim's convenient, handheld keypad, which is connected to the unit with a flexible, 6.1 m (20 ft) telephone-style cord for exceptional range of motion.

Critical Care Nurses, ACLS program instructors, and other clinical educators can use DataSim 6100 to generate an extensive range of simulations, from a simple normal sinus rhythm to a complex Swan-Ganz catheter insertion.

Key features

- Interface with Resusci-Anne™, Arrhythmia Anne™, and Chris Clean™
- Synchronized hemodynamic waveforms
- ECG/Respiration
- Manual PAC and PVC insertions
- Swan-Ganz procedure
- Expansion modules
- Training capabilities

Optional accessories

For a complete list of blood-pressure cables and personality modules, contact us.

Specifications

Optional personality modules	• Pediatric ECG • Intracranial pressures • Advanced pacemaker • MCL1 atrials • MCL1 blocks • MCL1 ectopy/aberrancy • MCL1 set • Normal/diseased left heart • 12-lead set • ST segments • Intra-aortic balloon assist (interactive) • Cardiac output
Dimensions (WxDxH)	25.4 cm x 33 cm x 10.2 cm) (10 in x 13 in x 4.7 in)
Weight	3.2 kg (7.1 lb)

Included accessories

2242959 Operator's manual
2392337 LCD pendant controller
2426360 Universal Battery Charger
XXXXXXX Power Cord (country specific)

Ordering information

DataSim 6100
Patient Simulator
2247742 United States, 120 V
2395218 Australia, 250 V
2395229 Denmark, 250 V
2395234 Schuko, 250 V
2395241 Israel, 250 V
2395252 Italy, 250 V
2395265 India, 250 V
2395276 Switzerland, 250 V
2395283 United Kingdom, 250 V

HHC3

Hand Held Controller

The HHC3 Hand Held Controller is used to remotely operate medSim 300B, MPS450 and Marq III simulators in an easy and efficient manner. The HHC3 has all the output controls for these simulators and enables current simulator users, including hospital biomedical technicians and manufacturers, to simplify and standardize their testing, training, and preventive maintenance protocols. In addition, the HHC3 is an excellent device for biomedical training and demonstration use.

The HHC3 facilitates the direct selection of parameters for the Fluke Biomedical medSim 300B, MPS450, and Marq III simulators. The HHC3 uses flexible coiled cable to connect to a simulator. The HHC3 provides single-key commands, dual-key commands, factory-defined sequences and easy programming of user-defined sequences. Customers can use the HHC-Utility software to upload user-defined sequences from a PC and download the sequences to multiple controllers.

Key features

- Full-functionality control of the simulator, up to 6.1 m (20 ft) away
- Small and light weight
- Factory-defined sequences provided
- Easy programming for user-defined sequences
- Ability to run defined sequences repeatedly
- PC interface for simple configuration (utility)

Specifications

Power requirements	
medSim 300B	RS-232 cable supplies power to the HHC3
MPS450	Four alkaline AA batteries or battery eliminator
Marq III	Four alkaline AA batteries or battery eliminator
Battery power supply	
Four alkaline AA cells, non-rechargeable voltage	1.5 V dc x 4 V dc
Battery life (continuous use)	60 hours
Battery eliminator supply	Output voltage: 9 V dc
	Output current: 50 mA
General information	
Display	2 x 16 LCD, adjustable viewing angle
Controls	20 control keys and ON/OFF power switch
	Embossed keys in 4 x 5 matrix
Interface	RS-232 bidirectional interface
	Auto connect to simulator parameters
Altitude	Up to 2000 m
Dimensions (LxWxH)	3.6 cm x 8.1 cm x 16 cm (1.4 in x 3.2 in x 6.3 in)
Weight (with batteries)	0.36 kg (0.8 lb)

Optional accessories

2720054 Battery Eliminator

Included accessories

2671068 Users Manual
2712829 medSim 300B Serial Interface Cable
2702279 MPS450 and Marq III Serial Interface Cable
2702287 Serial Interface Cable HHC3 to Computer
2671031 Utility Software
2671046 medSim 300B Instruction Card
2671022 MPS450 and Marq III Instruction Card
2242666 4-way Stop Cock Adapter
AA alkaline batteries (4)

Ordering information

2645641 HHC3 Hand Held Controller

PS320

Fetal Simulator

FLUKE® Biomedical

The PS320 simulates fetal and maternal ECG as well as uterine activity to test and troubleshoot fetal electronic monitors and to train clinical staff.

The unit is battery operated and small enough to fit in a pocket so mobile technicians and clinical instructors can take it anywhere.

The PS320 simulates several fetal parameters, including twins, as well as a wide range of clinical scenarios for training labor-and-delivery staff in how to recognize normal and abnormal responses. An optional mechanical heart creates fetal heart sounds for testing fetal monitor ultrasound cables and transducers.

PS320 offers an easy user interface, providing a 2 x 16-character LCD display with adjustable contrast. The unit operates on a 9 V battery with low-battery monitoring or functions with the supplied battery eliminator.

Key features

- 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

Specifications

Fetal ECG	
Static rates	30 BPM, 60 BPM, 90 BPM, 120 BPM, 150 BPM, 180 BPM, 210 BPM, and 240 BPM
ECG sensitivity	50 µV, 100 µV, 200 µV, 0.5 mV, 1 mV, and 2 mV
	US-1 tracks primary fetal ECG rates
	US-2 tracks secondary fetal activity for either independent "normal or "twins simulation, US-2 rate fixed at 140 BPM
Fetal patterns **Note**: US-1 and fetal ECG track these selections. US-2 is in normal pattern, except during TREND #1 selection.	**Trend #1: Twin fetal patterns**
	Normal: Normal pattern Tachycardia: Tachycardia pattern Bradycardia: Bradycardia pattern Arrhythmias: Arrhythmia pattern Late deceler.: Late deceler. Early deceler.: Early deceler. Moderate deceler.: Moderate variable deceler. Acceler.: #1: Acceler. wave #1 Acceler.: #2: Acceler. wave #2 Sinusoidal (high): Sinusoidal pattern, large change Sinusoidal (low): Sinusoidal pattern, small change Severe var. deceler.: #1: Severe deceler. wave #2 Severe var. deceler.: #2: Severe variable deceler Prolonged deceler.: Prolonged deceler Biphasic deceler.: Biphasic deceler Exaggerated deceler.: Exaggerated deceler Non-uniform deceler.: Non-uniform deceler Var. deceler. (u): Variable deceler, "U shaped Var. deceler. Tach: Variable deceler. with high-rate BPM Var. deceler. (v): Variable deceler. "V shaped Var. deceler. (post): Variable deceler. post exaggerated Var. deceler.: Variable deceler. Deceler. (position): Variable deceler. with position changes Long deceler.: Long deceler. Compensatory acceler.: Compensatory acceler

Optional accessories

2647372 Battery Eliminator 100 V ac to 240 V ac
2462177 Carrying Case, Double Pocket
2462478 Philips 50 Series—Ultrasound Cable
2462491 Agilent 50 Series TOCO—External Cable
2462528 Agilent 50 and 8040 Series TOCO—IUP Cable
2462469 Corometrics TOCO—External Cable
2462484 Corometrics—Ultrasound Cable
2462519 Corometrics TOCO—IUP Cable
2462528 HP/AG/PHILIPS IUP TOCO Simulation Cable
2462537 HP (8040 Series) Ultrasound Simulation Cable
2462543 HP (8040 Series) Ext TOCO Simulation Cable
2462555 **2462562** Oxford Ultrasound Simulation Cable 2.0 MHz (blue)
2462570 Oxford IUP Simulation Cable
2462217 RS-232 Cable
2651757 Mechanical Fetal Heart Probe
2462123 Mechanical Fetal Heart Cable

PS320

Fetal Simulator

Specifications

Fetal ECG (continued)	
Variability selections (added to fetal ECG)	Absent variability, low variability, mild variability, high variability severe variability, long-term variability **Note**: These patterns repeat and toco channel will perform toco wave selected.
Optional mechanical heart	Provides a mechanical interface to the ultrasound transducer; can be connected to either ultrasound channels. This option, due to its power consumption, requires an ac adapter to be connected.
Maternal ECG	ECG static rates: 60 BPM, 80 BPM, 100 BPM, 120 BPM, 140 BPM, and 160 BPM ECG sensitivity: 0.5 mV, 1 mV, and 2 mV Pattern selected during Trend #1 selection
Uterine activity **Note**: Toco waveform selection not available during Trend #1.	Execute waveform: Start toco waveform Uterine wave Off: Stop toco waveform Analog 0 V TO 1 V: Analog range 0 V to 1 V (1 V = 100 mmHg) Uterine wave 0 to 25: Range of toco waveform Uterine wave 0 to 50: Range of toco waveform Uterine wave 0 to 100: Range of toco waveform Short duration: Toco waveform of short duration Normal duration: Normal duration of toco waveform Increased duration: Long duration of toco waveform Uterine level = Zero: Zero toco channel (automatic on power up) Uterine static +20: Increase toco static level by 20 mmHg (0 mmHg to 100 mmHg) Incr. resting tone: Resting tone increases Couping: 2 close toco waves Tripling: 3 close toco waves Uterine pressure sensitivity: 5 µV or 40 µV on power up
Important notes	• US-1 tracks the fetal ECG rates • US-2 is the second ultrasound channel with a normal fetal ECG pattern • On the fetal and maternal ECG, the fetal ECG is 1/4 the size of the maternal ECG
The PS320 turns on in the following state:	• Fetal ECG static rate @ 150 BPM • US-1 tracks @ 150 BPM • US-2 normal pattern • Pressure sensitivity @ 5 µV/mmHg • Pressure/Toco set to zero • Maternal ECG rate @ 80 BPM • ECG sensitivity @ 1 mV • Toco wave is normal duration @ 0 to 50 divisions (i.e. 0 mmHg to 50 mmHg)
Temperature	
Operating	15 °C to 35 °C (59 °F to 95 °F)
Storage	0 °C to 50 °C (32 °F to 122 °F)
General information	
Display	2-line x 16-character LCD with keypad
RS-232	Bidirectional interface, 9600 baud
Power	9 V battery/battery eliminator; low battery indication set at 6 V
Housing	Plastic case
Dimensions	15.6 cm x 9.4 cm x 3.4 cm (6.1 in x 3.7 in x 1.3 in)
Weight	0.4 kg (0.9 lb)

Ordering information

2583030 PS320 Fetal Simulator

Kit #1: GE Corometrics
2794057 PS320 Fetal Monitoring Kit, GE Corometrics, includes:
2583030 PS320 Fetal Simulator (includes Operator Manual (2631693), Battery Eliminator (2647372), 9 V Battery)
2651757 MFH-1 Mechanical Fetal Heart Probe [includes Fetal Heart Cable (2462123)]
2397628 Soft-Sided Carrying Case for kit
2462217 17291 RS-232 Cable, PS320/420
2462484 Corometrics Ultrasound Simulation Cable
2462469 Corometrics EXT. TOCO Simulation Cable
2462519 Corometrics IUP TOCO Simulation Cable

Kit #2: Hewlett-Packard, Agilent, Philips Medical
2794069 PS320 Fetal Monitoring Kit, Series 50/8040 Philips Medical, Hewlett-Packard, Agilent, includes:
2583030 PS320 Fetal Simulator (includes Operator Manual (2631693), Battery Eliminator (2647372), 9 V Battery)
2651757 MFH-1 Mechanical Fetal Heart Probe [includes: Fetal Heart Cable (2462123)]
2397628 Soft-Sided Carrying Case for kit
2462217 RS-232 Cable, PS320/420
2462478 HP/AG/PHILIPS (50 Series) Ultrasound Simulation Cable PS320
2462491 HP/AG/PHILIPS (50 Series) EXT TOCO Simulation Cable PS320
2462528 HP/AG/PHILIPS (50 & 8040 Series) IUP TOCO Simulation Cable PS320
2462537 HP (8040 Series) Ultrasound Simulation Cable PS320
2462543 HP (8040 Series) EXT TOCO Simulation Cable PS320

Kit #3: Oxford Medical
2794078 PS320 Fetal Monitoring Kit, Oxford Medical, includes:
2583030 PS320 Fetal Simulator (includes Operator Manual (2631693), Battery Eliminator (2647372), 9 V Battery)
2651757 MFH-1 Mechanical Fetal Heart Probe [includes: Fetal Heart Cable (2462123)]
2397628 Soft-Sided Carrying Case for kit
2462217 RS-232 Cable, PS320/420
2462570 Oxford TOCO IUP Simulation Cable PS320
2462562 Oxford Ultrasound Simulation Cable 2 MHz (blue) PS320
2462555 Oxford Ultrasound Simulation Cable 1.5 MHz (yellow) PS320

Kit #4: Spacelabs Medical
2794040 PS320 Fetal Monitoring Kit, Spacelabs Medical, includes:
2583030 PS320 Fetal Simulator (includes Operator Manual 2631693), Battery Eliminator (2647372), 9 V Battery)
2651757 MFH-1 Mechanical Fetal Heart Probe [includes Fetal Heart Cable (2462123)]
2397628 Soft-Sided Carrying Case for kit
2462217 17291 RS-232 Cable, PS320/420
2462581 Spacelabs Ultrasound Simulation Cable PS320
2462596 Spacelabs TOCO Simulation Cable PS320

Index 2

Pulse Oximeter Simulator

The Index 2 is the most versatile optical simulator for oximeters on the market today. This lightweight, portable tool includes preloaded manufacturers' R-curves and the ability to define other "makes for most pulse oximeters.

Motion presets, player mode, transmission level control (TLC), and computer commands boost testing ability. The Index 2 can also be configured to include an optional electrical simulation feature with probe test. Optical and electrical simulations allow technicians to isolate problems quickly. The probe test identifies defective probes with quantitative test results.

Key features

- Portable
- 10 preloaded manufacturers' R-curves
- User-definable "makes for most other manufacturers
- New R-curves for Masimo, Nonin and Philips Medical Systems (formerly Agilent/H-P) oximeters
- Six downloadable R-curve spaces available
- Simultaneous simulation of motion and arterial-oxygen levels
- Arterial wave-amplitude scale, calibrated in units of perfusion
- Tap/shiver motion simulations to explore the impact of motion
- RS-232 port for computer control
- Physiological finger for complete SpO_2 tests
- Electrical simulations with probe testing (optional)

Specifications

O_2	Range: 35 % to 100 %
	Resolution: 1 %
	Accuracy: 100 % to 75 %: ± 1 % ± accuracy of the pulse oximeter under test; 74 % to 50 %: ± 3 % ± the accuracy of the pulse oximeter under test; < 50 % unspecified
	Repeatability: ± 1 standard deviation
Rate	Range: 30 BPM to 250 BPM
	Resolution: 1 BPM
	Accuracy: 1 % ± 1 BPM
Pulse amplitude	Range: 0 % to 100 % of nominal pleth amplitude
	Resolution: 1 %
	Pulse amplitude is 20 % of maximum pass-through brightness
Probe test	Continuity/resistance test matrix: Measures all combinations of possible interconnections in an XX point matrix
	Range: 250 Ω to 150 kΩ
	Accuracy: ± 5 % of reading
LED/detector voltage test	Test format: Measures the voltage drop across Red LED, infrared LED, and the photo detector when the internally generated test signal is applied
	Test signal: Constant current source @ 1 mA
	Open circuit: 2.5 V max
	Measurement/display range: 0 V to 4 V
	Accuracy: ± 5 % of reading, 0.4 V to 4 V
Dynamic test	Test format: Photodetector/diode response to both the red and infrared light generated by the probe when pulsed by an internal test signal
	Test signal: Pulsed between the two LEDs; constant current level @ 1 mA
	Test results: Nominal range of 0 to 2000
Checksum	Sum of all locations in the program chip; for service use only
General information	
Display	2-line x 24-character super twist LCD
Battery life	At least four hours of continuous use
Dimensions (LxWxH)	45.7 cm x 40.6 cm x 22.9 cm (18 in x 16 in x 9 in)
Weight	4.5 kg (10 lb)

Optional accessories

2204282 Soft Vinyl Carrying Case
2200102 Interface Cable, medTester to Index 2 (RS-232; female DB25 to female DB9)

For a complete list of electrical simulation and probe test cables, contact us.

Included accessories

2226196 Operator's Manual
2521465 Battery Charger
Nellcor and Ohmeda Electrical Simulation and Probe Test Cable (for Index2$_{XLFE}$ only)

Ordering information

Index 2XLF Pulse Oximeter Simulator – Optical Finger Simulation
2250232 United States, 120 V
2395290 Shuko, 250 V
2399900 Australia, 250 V
2399917 United Kingdom, 250 V
2447476 Japan, 100 V

Index 2XLFE Pulse Oximeter Simulator – Optical Finger and Electrical Simulation with Probe Test
2250244 United States, 120 V
2395309 Shuko, 250 V
2399921 Australia, 250 V
2399939 United Kingdom, 250 V
2447465 Japan, 100 V

ACCU LUNG

Portable Precision Test Lung

The ACCU LUNG Precision Test Lung is a lung simulator that presents a specific load comprised of a user-selectable compliance and resistance for the purpose of evaluating ventilator performance according to clinical expectation and manufacturers' specification. It is a portable unit that can be hung from a cart, the ventilator itself, or can be hand-held, thus presenting a "zero footprint.

Key features

- Portable (light weight, small footprint)
- User-selectable compliance and resistance settings (three selections each)
- Calibrated accuracy for both resistance and compliance
- Complies with IEC standard for breathing-circuit connection
- Certified test lung for test system traceability to standards

Specifications

Environmental parameters	
Operating temperature	10 °C to 40 °C
Storage temperature	0 °C to 50 °C
Performance characteristics	
Static compliance	C50 0.5 l/kPa ± 10 % at 500 ml tidal volume
	C20 0.2 l/kPa ± 10 % at 500 ml tidal volume
	C10 0.1 l/kPa ± 10 % at 300 ml tidal volume
Resistance	Parabolic (orifice) resistor pressure drops selected from ASTM F1100 (K values), for inspiratory flows at 2, 1, and 0.5 l/s, respectively.
	Rp5 K 2.70 ± 20 % (equivalent orifice size = 8.48 mm) pressure drop 10.80 cmH_2O at 2 l/s
	Rp20 K 17.61 ± 20 % (equivalent orifice size = 5.31 mm) pressure drop 17.61 cmH_2O at 1 l/s
	Rp50 K 108.70 ± 20 % (equivalent orifice size = 3.37 mm) pressure drop 27.20 cmH_2O at 0.5 l/s
Physical characteristics	
Ventilator circuit connection	ISO 22 mm female
Warranty specifications	15 month extended warranty on all parts and labor with the following limitations: a) All rubber parts (including bellows made from Hypalon®) are warranted to be free from defects at the time of delivery b) Springs are considered limited lifecycle parts and are expected to survive 1 x 10^6 cycles
Dimensions (LxWxH)	27.9 cm x 21.6 cm x 10.2 cm (11 in x 8.5 in x 4 in)
Weight	1.8 kg (4 lb)

Included accessories

Operator's/Service Manual
2397628 Soft-sided Carrying Case

Ordering information

2387318 ACCU LUNG Precision Test Lung

VT MOBILE

Portable Gas-Flow Analyzer

The VT MOBILE is a compact and portable general purpose gas-flow analyzer designed to meet the needs of the traveling technician or engineer. This versatile tool evaluates performance of a wide variety of medical gas-flow/pressure devices and measures 16 ventilator parameters.

EC.6.20 now requires completion of 100 % of life-support device preventive maintenance every year. VT MOBILE can help you meet those requirements.

The base unit measures high- and low-flow ranges, volume, pressure, and oxygen concentration. Additionally, the temperature and relative humidity option can be ordered separately to ensure the most accurate gas-flow measurements.

Key features

- Bidirectional flow (high- and low-flow ranges), volume, vacuum, pressure and oxygen concentration measurements
- 16 ventilator parameter measurements
- Trending and statistical analysis of all measured values
- Onboard graphical display
- Portable and compact
- RS-232 for computer control
- Memory for storing results
- VT for Windows PC software
- Optional sensor assembly for temperature and humidity measurements

VT MOBILE Tilt Stand in low-tilt position

Specifications

Display	64 pixels x 128 pixels, reflective LCD, blue on yellow
Gas types	Air, N_2, N_2O, CO_2, O_2, N_2O bal O_2, N_2 bal O_2
Battery power supply	Input voltage range: 9 V dc
	Battery life: > 7 hours
Dimensions (LxWxH)	20 cm x 10 cm x 3.8 cm (8 in x 4 in x 1.5 in)
Weight	0.45 kg (1 lb)

	Low-pressure port	**High-pressure port**	**Airway pressure**
Maximum applied pressure	5 psi	125 psi	5 psi
Operating ressure	-20 cmH_2O to 120 cm H_2O	-2 psi to 100 psi	-20 cmH_2O to 120 cmH_2O
Span accuracy	+2 % of reading or 1.5 mmHg	+2 % of reading or +0.2 psig	+2 % of reading or +0.5 cmH_2O

Product comparison chart

Model	**VT MOBILE**	**VT PLUS HF**
Flow range	25 to 200 l/min (high flow sensor) 0 to 25 l/min (low flow sensor)	25 to 300 l/min (high flow channel) 0 to 25 l/min (low flow channel)
Features and benefits	Portable, battery-powered, all ranges of pressure, flow, temperature, and RH measurement, easy-to-use	Bench-top or portable, line-powered, all ranges of pressure, flow, easy-to-use
	16 ventilator parameters on three screens	21 ventilator parameters on one screen
	On-screen pressure, flow and volume waveforms	On-screen pressure, flow and volume waveforms
	Ventilator and non-ventilator flow measurements	Ventilator and non-ventilator flow measurements
	On-board memory for temporary test result storage	On-screen pressure, flow and volume waveforms
	–	Special modes for High Frequency ventilators and RT-200 emulation
	Compatible with VT for Windows® PC software (standard accessory)	Compatible with VT for Windows® PC software (standard accessory)

VT MOBILE

Portable Gas-Flow Analyzer

FLUKE® Biomedical

Specifications

	High-flow port	Low-flow port
Operating flow range	± 200 lpm	+25 lpm
Accuracy	± 3 % of reading or ± 2 % of range	+3 % of reading or +1 % of range
Floor for absolute accuracy	25 lpm	3 lpm
Low-flow dropout	2.5 lpm	0.24 lpm
Volume range	> ± 60 l	+60 l
Tidal volume accuracy	± 3% of reading or ± 20 ml, whichever is greater	+3 % of reading or +2 ml

	Oxygen measurement	Barometric pressure measurement
Range	0 % to 100 %	8 psia to 18 psia (400 mmHg to 900 mmHg)
Accuracy	+2 % full-scale output	+2 % of reading
Sensor technology	Galvanic fuel cell	–
Calibration	Allows user calibration using air and 100 % O_2	Not required; however, device allows user calibration of offset

Notes:

• Automatic partial pressure compensation for barometric and airway pressure changes.

• Recommended interval for changing oxygen sensor is one year. However, sensor may last longer. During user calibration of the sensor, the VT MOBILE can detect if the sensor needs to be replaced.

Secondary parameter-accuracy specifications	Resolution	Range	Accuracy
Inspiratory and expiratory tidal volume	0.1 ml	> 10 l	± 3 % expiratory minute volume
	0.001 lpm	0 l to 60 l	± 3 %
Breath rate	0.1 BPM	2 BPM to 150 BPM	± 1 % inspiratory-to-expiratory time ratio (I:E ratio)
	0.01 Range: 0.25 to 9.99	–	± 2 % or 0.1 s
Peak inspiratory pressure	0.1 cmH_2O	± 120 cmH_2O	+3 % or 1 cmH_2O
Inspiratory pause pressure	0.1 cmH_2O	± 120 cmH_2O	+3 % or 1 cmH_2O
Mean airway pressure	0.1 cmH_2O	+80 cmH_2O	+3 % or 0.5 cmH_2O
Positive-end expiratory pressure (PEEP)	0.1 cmH_2O	-5 cmH_2O to 40 cmH_2O	+3 % or 0.5 cmH_2O
Peak expiratory flow	0.01 lpm	0 lpm to 150 lpm	± 3 % or 2 % of range
Temperature	0.1 °C	0 °C to 50 °C	± 1 °C
	Units: °C, °F, °K		
Humidity	0.1 %	0 % to 100 %	± 5
RS-232 serial communications	4-pin modular connector located on upper-left side of panel. RS-232 compatible with the VT Plus for Windows software application (version 2.01.00 or higher.)		

Environmental specifications	
Operating temperature	10 °C to 40 °C (50 °F to 104 °F)
Storage temperature	-25 °C to 50 °C (-13 °F to 122 °F)
Operating humidity	0 % to 80 % non-condensing at temperatures to 31 °C, decreasing linearly to 50 % relative humidity at 40 °C (104 °F)
Storage humidity	0 % to 95 % non-condensing
Operating barometric	7 psia to 18 psia
Storage barometric	787.9 mmHg to 522.7 mmHg (-1000 ft to 10000 ft)

Optional accessories

2548405 Accessory Kit
2548431 High-flow Sensor
2548422 Low-flow Sensor
2548303 High-pressure Adapter, male to male
2548315 High-pressure Adapter, male to female
2454175 Low-pressure Adapter
2541622 Temperature and RH Sensor, Cable and T Adapter, 6 ft
2457028 Oxygen-Sensor Cable, 6 ft
2448051 T Adapter for Oxygen Sensor
2558269 VT for Windows® PC Software
2075257 Serial Communications Cable (RS-232), 6 ft
2547455 Power adapter, universal (USA and international)
2551236 Soft Carrying Case
2387318 ACCU Lung Portable Precision Test Lung

Included accessories

2548405 Accessory Kit
2544903 CD, includes: quick-reference card, operators manual, getting-started manual, other matter
2544892 Getting Started Manual
2544630 Quick Reference Card
2548431 High-flow Sensor
2548422 Low-flow Sensor
2548315 High-pressure Adapter, Male to Female
2454175 Low-pressure Adapter
2448051 Oxygen-sensor Cable, 6 ft
2457028 T Adapter for Oxygen Sensor
2248801 Oxygen Sensor
614487 9 V dc Battery (alkaline)
2075257 Serial Communications Cable (RS-232), 6 ft
2558269 VT for Windows® PC Software
2551236 Soft Carrying Case

Ordering information

VT MOBILE Portable Gas-Flow Analyzer

2427911 United States, English overlay
2553550 France, French overlay
2542531 Denmark, German overlay
2542546 Italy, Italian overlay
2542554 Spanish, Spanish overlay
2553610 Japan, Japanese overlay
2553605 Chinese, Chinese overlay

VT PLUS HF

Gas Flow Analyzer

FLUKE® Biomedical

The VT PLUS HF is Fluke Biomedical's premier general-purpose gas flow analyzer. In addition, special display modes and bidirectional flow make it perfect for fully and efficiently testing both conventional mechanical ventilators and high-frequency ventilators. EC.6.20 now requires 100 % completion of scheduled life-support device preventive maintenance every year, and VT PLUS HF can help meet those requirements. Multiple special-function tests make troubleshooting quick and efficient.

Learning to use the VT PLUS HF is simple. Technicians control the unit using the VT PLUS HF user-friendly command system, or, if they're familiar with the RT-200, they can switch to a special control mode that uses RT-200-style commands.

Key features

- Bidirectional flow, pressure, volume, and oxygen concentration, and pressure measurements
- Low- and high-pressure, and flow measurement capability
- Special HF mode—up to 900 BPM (15 Hz)
- RS-232 and printer ports
- Included Windows-compatible graphics software
- All 21 ventilator parameters displayed at once on one screen
- Operation by user-friendly VT PLUS HF command mode or special RT-200 command mode
- Minimum, maximum, average, absolute, and graph for all parameters
- Multiple special-function tests for efficient troubleshooting

Optional features

- Operation with a variety of precision test lungs available from Fluke Biomedical to complete a fully NIST-traceable ventilator testing system

Specifications

	Low-pressure	High-pressure	Airway-pressure
Range	± 500 mmHg (10 psi)	± 100 psi	± 120 cmH_2O
Accuracy	± 0.5 % of reading or ± 1.5 mmHg, whichever is greater	± 1 % of reading or ± 0.1 psig, whichever is greater	± 0.75 % of reading or ± 0.5 cmH_2O, whichever is greater
Note	Fluid pressure may be applied to the positive port; however, fluids should be kept from entering the pressure port by using a suitable length of connection tubing.		Airway pressure is internally tapped off the proximal-flow sensor port, which is the port closest to the exhaust port on the VT PLUS HF

	Low-flow	High-flow
Flow range	-25 lpm to 25 lpm	-300 lpm to 300 lpm
Accuracy	± 2 % of reading or ± 1 % of range, whichever is greater	± 2 % of reading or ± 2 % of range, whichever is greater
Low-flow dropout	0.01 lpm	–
High-flow dropout	–	25 lpm
Volume range	> ± 60 l	> ± 60 l
Notes	• Tidal-volume accuracy: ± 3 % of reading or ± 2 ml, whichever is greater • Volume accuracy tested to 1 liter • Flow accuracy is specified for dry air or oxygen • Below 3.0 lpm, measurement accuracy is obtained by allowing the VT PLUS HF to fully warm up or manually zeroing before reading or documenting measurement.	• Tidal-volume accuracy: ± 3 % of reading or ± 10 ml, whichever is greater • Volume accuracy tested to 7 liters • Flow accuracy is specified for dry air or oxygen

General	
Dimensions (LxWxH)	25.4 cm x 25.4 cm x 12.7 cm (10 in x 10 in x 5 in)
Weight	4.53 kg (10 lb)

VT PLUS HF standard accessories

VT for Windows PC Software (PC not included)

VT PLUS HF

Gas Flow Analyzer

FLUKE® Biomedical

Specifications

Ventilator parameter	Resolution	Range	Accuracy
Inspiratory and expiratory tidal volume	0.1 ml	As specified in high-flow/low-flow specification	
Expiratory minute volume	0.001 lpm	0 L to 60 L	± 3 %
Breath rate	0.1 BPM	0.5 BPM to 150 BPM	± 1 %
Inspiratory-to expiratory time ratio (I:E ratio)	0.01	1:200 to 200:1	± 2 % or ± 0.1 s
Inspiratory time	0.01 s	0 s to 60 s	± 1 % or ± 0.02 s
Expiratory time	0.01 s	0 s to 90 s	± 1 % or ± 0.01 s
Peak inspiratory pressure	0.1 cmH_2O	± 120 cmH_2O	± 3 % or ± 1 cmH_2O
Inspiratory pause pressure	0.1 cmH_2O	± 120 cmH_2O	± 3 % or ± 1 cmH_2O
Mean airway pressure	0.1 cmH_2O	± 80 cmH_2O	± 3 % or ± 0.5 cmH_2O
Positive end-expiratory pressure (PEEP)	0.1 cmH_2O	-5 cmH_2O to 40 cmH_2O	± 3 % or ± 0.5 cmH_2O
Inspiratory hold time	0.01 s	0 s to 60 s	± 1 % or ± 0.1 s
Expiratory hold time	0.01 s	0 s to 90 s	± 1 % or ± 0.1 s
Peak expiratory flow	0.01 lpm	0 lpm to 300 lpm	± 3 % or ± 2 lpm
Peak inspiratory flow	0.01 lpm	0 lpm to 300 lpm	± 3 % or ± 2 lpm
Lung compliance	0.1 ml/cmH_2O	0 ml/cmH_2O to 150 ml/cmH_2O	± 5 % or ± 5 ml/cmH_2O
	Inspiratory pause time: > 0.5 s		
Flow bias	0.01 lpm	0 lpm to 30 lpm	± 2 % or ± 0.5 lpm
	Expiratory pause time: > 0.5 s		

Optional accessories

2222822 Soft Vinyl Carrying Case for VT PLUS HF

2248587 Hard-sided Protective Carrying Case for VT PLUS HF (limited to stock on hand)

2397628 Soft-sided Carrying Case for ACCU LUNG

Test Lungs

2387318 ACCU LUNG Portable Precision Test Lung (with Soft-sided carrying case for ACCU LUNG, model 2397628)

2251049 Michigan Instruments Non-instrumented Single-adult Test Lung

2251008 Michigan Instruments Non-instrumented Dual-adult Test Lung

2251013 Michigan Instruments Non-instrumented Adult/Infant Test Lung

2213774 Siemens 190 Test Lung

Parabolic Airway Resistors (for use with Michigan Instruments test lungs)

2212830 Parabolic Airway Resistor: RP5

2212934 Parabolic Airway Resistor: RP10

2212848 Parabolic Airway Resistor: RP20

2212853 Parabolic Airway Resistor: RP50

2212918 Parabolic Airway Resistor: RP200

2213140 Parabolic Airway Resistor: RP500

Printers

2248762 Printer 110 V, Citizen IDP 3110

2719653 Printer 220 V, Citizen IDP 3110

2238072 Parallel Printer Cable, D25M-C36M

Accessory Kit Parts

2133712 Filter, External (bacterial), 1 each

2391777 Adapter, DISS O2 nut and nipple with 1/4 in I.D. hose barb, 1 each

2133310 Tubing Adapter, Directional (15 mm OD x 15 mm OD), 2 each

2133305 Tubing Adapter (22 mm OD x 22 mm ID), 2 each

2133291 Tubing Adapter (22 mm OD x 22 mm OD), 2 each

2133269 Tubing Adapter (15 mm OD x 22 mm OD), 2 each

2133278 Tubing Adapter (15 mm OD x 15 mm OD), 2 each

2133284 Tubing Adapter (15 mm ID x 15 mm OD), 2 each

2133322 Tubing Adapter, Narrow Bore, 2 each

2213679 Barb (luer lock – male to 1/89 in ID tubing), 2 each

2133240 Tubing Adapter (1/4 in NPT male to 1/8 in ID tubing barb fitting), 2 each

2133202 Tubing Adapter (luer lock 1/16 in to bulkhead connection), 2 each

Included accessories

2137275 Operator's Manual

2392054 VT for Windows® PC Software

2238659 Serial Cable

2133387 Tilt Stand

Power cord (country specific)

2131367 Accessory Kit (includes 16 accessories)

Ordering information

VT PLUS HF Gas Flow Analyzer

2128272 United States, 120 V

2399376 Australia, 250 V

2399383 Schuko, 250 V

2399390 United Kingdom, 250 V

Premium Precision Ventilator Test Kit

(VT PLUS HF Gas Flow Analyzer; and ACCU LUNG portable precision test lung)

2387329 United States, 120 V

2425682 Australia, 250 V

2425694 Schuko, 250 V

2425701 United Kingdom, 250 V

VT-Plus Upgrades

(adds HF capability and RT-200 mode)

2240945 VT PLUS HF hardware and firmware factory service upgrade (for units lower than hardware v1.01.01; additional flat-rate charge required for factory service/calibration)

DPM4

Parameter Tester

N10140

The versatile DPM4 tests and calibrates flow and pressure generators used in many medical devices. With several measurements combined in a single, handheld device, the DPM4 provides a cost-effective solution, eliminating the need for multiple test meters.

The DPM4 features a menu-driven interface for simple operation and an easy-to-read screen that displays multiple parameter measurements simultaneously.

Specifications

Model 1H or 2H

Pressure measurement	
Operating range	-350 mmHg to 350 mmHg
Accuracy	± 0.3 % of range
Units of measure	mmHg, mBar, cmH_2O, psi, inHg, inH_2O, kg/cm^2, and kPa

Model 1G or 2G

Pressure measurement	
Operating range	-700 mmHg to +5000 mmHg
Accuracy	± 0.3 % of range for temperatures from 21 °C to 25 °C and relative humidity from 30 % to 70 % ± 0.3 % of range;
	± 0.02 % of range per degree °C for temperatures < 21 °C or > 25 °C with relative humidity from 30 % to 70 %
Units of measure	mmHg, mBar, cmH_2O, psi, inHg, inH_2O, kg/cm^2, and kPa
Temperature measurement (with optional temperature probe)	
Operating range	-40 °C to 200 °C (-40 °F to 392 °F)
Accuracy	± (2 % of reading, + 0.5 °C)
Temperature units	°C, °F

Key features

All models

- Palm size
- High accuracy
- Differential pressure, vacuum, and temperature measurements
- Multiple user-selectable units of measurement
- Simultaneous display of multiple parameter measurements
- Leak-detection/leak-rate calculation
- Peak test function to capture peak pressure
- RS-232 for computer control

Model 1G

- Pressure measurements in -700 mmHg to 5000 mmHg range

Model 1H

- Pressure measurements in -350 mmHg to 350 mmHg range

Model 2G

- Barometric pressure, gas flow, and humidity measurements
- Pressure measurements in -700 mmHg to 5000 mmHg range

Model 2H

- Barometric pressure, gas flow, and humidity measurements
- Pressure measurements in -350 mmHg to 350 mmHg range

DPM4

Parameter Tester

FLUKE® Biomedical

Specifications

Temperature Probe PT-100 and PT-1000

PT-100 Operating range	-200 °C to 750 °C (-328 °F to 1382 °F)
Accuracy	± 0.13 °C @ 100 °C (0.23 °F at 212 °F) ± 0.1 °C @ 0 °C (0.18 °F @ 32 °F) ± 0.2 °C @ 100 °C (0.36 °F @ 212 °F)
PT-1000 operating range	-200 °C to 750 °C (-328 °F to 1382 °F)
Accuracy	0.3 °C (0.5 °F)

Model 2G or 2H

Note: It is possible to compensate for the sea level and calibrate for offsets.

Pressure measurement	
Operating range	380 mmHg to 825 mmHg
Accuracy	± 2 % of reading
Units of measure	mmHg, mBar, cmH_2O, psi, inHg, inH_2O, kg/cm^2, and kPa
Relative humidity **Note**: An integrated sensor in the instrument determines relative humidity measurements.	
Operating range	12 % RH to 95 % RH
Accuracy	± 3.5 % of reading ± 2 % @ 25 °C (77 °F)
Gas flow **Note**: Gas flow measures with an embedded sensor with 11 calibration points to compensate non-linearity: calibration constants are stored in firmware.	
Gas compatibility	Air, N_2, O_2, CO, NO, CO_2, N_2O, NO_2
Operating range	-750 ml/min to 750 ml/min
Accuracy	± 1 % of range or ± 5 % of reading
Gas flow units	ml/min or sccm (Standard Cubic Centimeter per Minute)
Peak flow test	Peak flow is captured in the unit selected for flow. A reset key allows to restart the test.

Model 1G, 1H, 2G and 2H

Leak test and peak test	
Leak test	Leak rate is computed in the unit selected for pressure over 15, 30, 45 or 60 seconds
Peak test	Peak pressure is captured in the unit selected for pressure. A reset key allows to restart the test.
Temperature	
Operating	15 °C to 35 °C (59 °F to 95 °F)
Storage	0 °C to 50 °C (32 °F to 122 °F)
General information	
Power	9 V alkaline battery RG9 or battery eliminator
Battery life	> 7 hours
Dimensions (LxWxH)	156 mm x 94 mm x 34 mm (6.1 in x 3.7 in x 1.3 in)
Weight	0.4 kg (0.9 lb) with battery

Optional accessories

2462177 Soft-Sided Carrying Case
2461910 PT-100 Temperature Probe
2461922 PT-1000 Temperature Probe
2461905 Expansion Chamber
2461946 Tubing Kit with Inflation Bulb
2462335 RS-232 Cable

Included accessories

2572323 Users Manual
2647372 Battery Eliminator
XXXXXXX Power Cord (country specific)
XXXXXXX One 9 Volt Alkaline Battery

Ordering information

DPM4 Parameter Tester
2583121 Model 1H (± 350 mmHg)
2631330 Model 1G (-700 to 5000 mmHg)
2637760 Model 2H (± 350 mmHg, Press, Temp, Flow, RH)
2637772 Model 2G (-700 to 5000 mmHg, Press, Temp, Flow, RH)

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.

Key features

- Battery operated
- Generates and measures positive or negative pressures
- Operates with gas and liquid
- Troubleshooting with 1 % accuracy

Product comparison chart

Model	DPM1B	DPM2Plus	DPM4-1G
Pressure measurement range	-300 mmHg to +300 mmHg	-698 mmHg to +802 mmHg -949 cmH_2O to +1090 cmH_2O -374 inH_2O to +429 inH_2O -13.50 psi to +15.50 psi -13.50 psi to +100.00 psi	-700 mmHg to +5000 mmHg -950 cmH_2O to +6797 cmH_2O -374 inH_2O to +2678 inH_2O -13.5 psi to +96.7 psi -93.4 kPa to +666 kPa
Pressure units	1 unit: mmHg	4 units: mmHg, cmH_2O, inH_2O, psi	8 units: mmHg, cmH_2O, inHg, inH_2O, psi, mBar, kg/cm^2, and kPa
Pressure Generation	Internal	With optional inflation bulb	With optional inflation bulb
Gas/Liquid operation	Both	Both	Gas only
Temperature measurement	–	–	With optional temperature probe in °C or °F
Barometric pressure	–	–	–
Relative Humidity measurement	–	–	–
Gas flow measurement	–	–	–

Specifications

Pressure measurement	
Operating range	± 300 mmHg
Pressure generation range	± 300 mmHg
Accuracy	± 1 % of reading or ± 1 mmHg
Resolution	0.1 mmHg
Units of measure	mmHg
Environmental requirements	
Operating temperature	10 °C to +40 °C (+50 °F to +104 °F)
General information	
Display/control	0.5 in LCD with LO BATT indication
Power	9 V alkaline battery
Dimensions (WxDxH)	15.9 cm x 14.6 cm x 3.8 cm (3.6 in x 5.8 in x 1.5 in)
Weight	260 g (10 oz)

Included accessories

2572314 Users Manual
2242666 3-way Stop Cock Adapter
6144879 9 V alkaline battery

Ordering information

2249779 DPM 1B Pneumatic Transducer Tester

DPM2Plus

Pressure Meter

FLUKE® Biomedical

The DPM2Plus 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.

When coupled with the optional Parabolic Flow Adapter accessory, the displayed pressure can be interpreted, using the look up table supplied with the parabolic flow adapter to determine flow from medical devices.

Key features

- Five selectable pressure ranges
- Voltage output to drive a recorder for assessing electronics of pressure-measurement circuit
- Capability to test ophthalmology equipment, lasers, dialysis machines, automatic tourniquets, drainage devices, IV pumps, pressure gauges, ventilators, diagnostic, surgical suction devices, and more
- Air or liquid measurement

Optional accessories

2242653 Catheter Adapter
2249177 Parabolic Flow Adapter
2200116 Phone to BNC Cable

Product comparison chart

Model	DPM4-1H	DPM4-2G	DPM4-2H
Pressure measurement range	-350 mmHg to +350 mmHg -475 cmH_2O to +476 cmH_2O -187 inH_2O to +187 inH_2O -6.8 psi to +6.8 psi -46.7 kPa to +46.7 kPa	-700 mmHg to +5000 mmHg -950 cmH_2O to +6797 cmH_2O -374 inH_2O to +2678 inH_2O -13.5 psi to +96.7 psi -93.4 kPa to +666 kPa	-350 mmHg to +350 mmHg -475 cmH_2O to +476 cmH_2O -187 inH_2O to +187 inH_2O -6.8 psi to +6.8 psi -46.7 kPa to +46.7 kPa
Pressure units	8 units: mmHg, cmH_2O, inHg, inH_2O, psi, mBar, kg/cm^2, and kPa	8 units: mmHg, cmH_2O, inHg, inH_2O, psi, mBar, kg/cm^2, and kPa	8 units: mmHg, cmH_2O, inHg, inH_2O, psi, mBar, kg/cm^2, and kPa
Pressure Generation	With optional inflation bulb	With optional inflation bulb	With optional inflation bulb
Gas/Liquid operation	Gas only	Gas only	Gas only
Temperature measurement	With optional temperature probe in °C or °F	With optional temperature probe in °C or °F	With optional temperature probe in °C or °F
Barometric pressure	–	Yes, 4 units: mmHg, inHg, mBar, and hPa	Yes, 4 units: mmHg, inHg, mBar, and hPa
Relative Humidity measurement	–	Yes	Yes
Gas flow measurement	–	-750 ml/min to +750 ml/min Compatible with Air, N_2, O_2, CO, NO, CO_2, N_2O, NO_2	-750 ml/min to +750 ml/min Compatible with Air, N_2, O_2, CO, NO, CO_2, N_2O, NO_2

Specifications

Operating range	-698 mmHg to 802 mmHg -949 cmH_2O to 1090 cmH_2O -374 inH_2O to 429 inH_2O -13.50 PSI to 15.50 PSI -13.5 PSI to 100 PSI
Accuracy	± 1 % of range
Units of measure	mmHg, cmH_2O, PSI, inH_2O
Temperature operating requirements	0 °C to 30 °C (32 °F to 86 °F)
Display/control	0.5 in LCD with LO BATT and negative polarity indication
Data outputs	V/psi (all ranges except 100 psi) 0.01 V/psi for 100 psi range
Power	9 V alkaline battery
Dimensions (LxWxH)	14.61 cm x 9.14 cm x 4.83 cm (5.75 in x 3.6 in x 1.9 in)
Weight	0.4 kg (1 lb)

Included accessories

2572323 Operator's Manual
2242653 Catheter Adapter
2249768 One 9 V Alkaline Battery

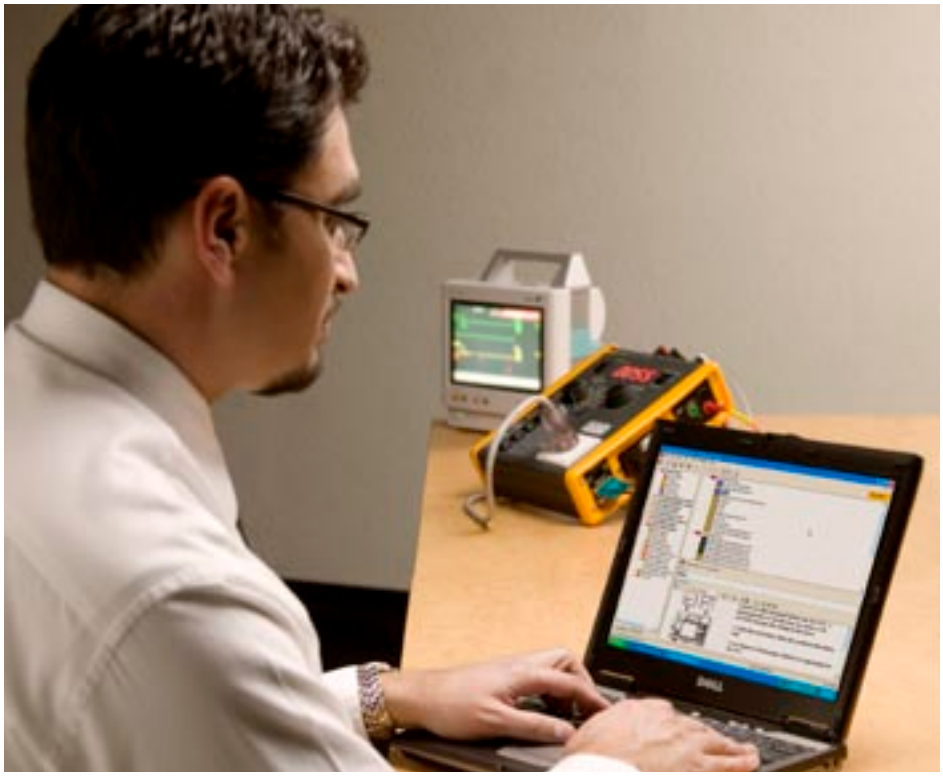
Ordering information

2249768 DPM2Plus Pressure Meter

FLUKE®
Biomedical

Ansur

Test Automation Software



Key features

- General framework software for performing all types of tests and inspections
- Remote control of Fluke Biomedical testers, and acquisition of test results via RS-232
- Manual/visual tests, performance tests, and electrical-safety tests all executed in one procedure
- Test-procedure and test-result files stored in industry-standard XML format
- Interface capability with some equipment management systems and computerized maintenance management systems
- Ready-to-use or customized test templates make creating standard work easy
- Compatible with a variety of test instruments by Fluke Biomedical for easy standardization

How well do your PM Inspection and post-repair performance-testing processes eliminate sources of human error?

Wish that all technicians woulddocument results the same way?

Do you have enough time to complete all PM Inspection and repair work on your shelf?

Ansur offers a solution:

Repeatability—Creates standard work since everyone tests the same way every time

Quality—Can automatically configure and collect data from the compatible test devices to minimize human error and save time

Productivity—Ensure that the amountof time required to perform testing is uniform and therefore predictable

Ansur test automation system collects all the observe-and-record manual entries as well as automated measurements from compatible simulators and performance analyzers from Fluke Biomedical.

Automate with Ansur

Look for this logo in the Fluke Biomedical product catalog to see where test automation can benefit you.

test automation software
Ansur
plug-in

Specifications

PC requirements	64 MB RAM
	50 MB unused hard drive space for software
	IBM PC/XT compatable Pentium 266 MHz or faster processor
	Hard drive space for result and template files
	32-bit Microsoft Windows® operating system (2000/XP)
	RS-232 ports or USB-RS-232 adapter
Other requirements	License key for each Fluke Biomedical or Metron simulator/analyzer plug-in (accesses full functionality of Ansur and its plug-ins)
	One or more Ansur-compatible Fluke Biomedical or Metron simulators/ analyzers (ensures best results for minimizing human error and opportunity for best productivity)

Ansur

Test Automation Software

"We used Ansur to create test sequences that match service manual procedures so every inspection is done the same way every time. We improved quality and uniformity by creating standard work."

-Robert Dorrian, TBS U.K. Telematic & Biomedical Services Ltd. Hope Hospital

Ordering information

2462982 Ansur Test Executive

Plug-ins available: Purchase the modules you need, and then add modules as you acquire new Fluke Biomedical analyzers and simulators.

2755836 BP Pump 2
2556755 ESA601
3454829 ESA612
3116463 ESA620
2817641 Impulse 4000
3091370 Impulse 6000D/7000DP
2461775 QA-40M/45
2463016 QA-90
2462644 QA-1290
2461802 QA-ES
2461979 QA-IDS/lagu
2463002 QA-ST
2462024 QA-VTM
2817226 QED 6
3337356 TNT 12000

Test Automation Bundles available: Purchase modules along with the Fluke Biomedical instrument of choice

3334821 BP Pump 2L NIBP, US 120V w/Test Automation
3334839 BP Pump 2l NIBP, AUS 250V w/Test Automation
3334842 BP Pump 2L NIBP, DEN 250V w/Test Automation
3334856 BP Pump 2L NIBP, SHK 250V w/Test Automation
3334863 BP Pump 2L NIBP, ISR 250V w/Test Automation
3334874 BP Pump 2L NIBP, ITAL 250V w/Test Automation
3334888 BP Pump 2L NIBP, IND 250V w/Test Automation
3334895 BP Pump 2L NIBP, SWZ 250V w/Test Automation
3334901 BP Pump 2L NIBP, UK 250V w/Test Automation
3334912 BP Pump 2M NIBP, US 120V w/Test Automation
3334920 BP Pump 2M NIBP, AUS 250V w/Test Automation
3334935 BP Pump 2M NIBP, DEN 250V w/Test Automation
3334947 BP Pump 2M NIBP, SHK 250V w/Test Automation
3334958 BP Pump 2M NIBP, ISR 250V w/Test Automation
3334964 BP Pump 2M NIBP, ITAL 250V w/Test Automation
3334973 BP Pump 2M NIBP, IND 250V w/Test Automation
3334986 BP Pump 2M NIBP, SWZ 250V w/Test Automation
3334999 BP Pump 2M NIBP, UK 250V w/Test Automation
3334732 ESA601, 230V AUS w/ Test Automation
3334744 ESA601, DEU 230V SHK w/Test Automation
3334759 ESA601, FRA 230V SHK w/Test Automation
3334767 ESA601, ITA 230V SHK w/Test Automation
3334771 ESA601, ISR 230V w/ Test Automation
3334780 ESA601, 230V SHK w/ Test Automation
3334798 ESA601, 230V UK w/ Test Automation
3334800 ESA601, 115V IEC w/ Test Automation
3334817 ESA601, 115 AAMI w/ Test Automation
3460932 ESA612, US 115 V w/ Test Automation
3460959 ESA612, EUR 230 V w/ Test Automation
3460944 ESA612, FR 230 V w/ Test Automation
3460967 ESA612, ISR 230 V w/ Test Automation
3460971 ESA612, AUS 230V w/ Test Automation
3460980 ESA612, UK 230 V w/ Test Automation
3460998 ESA612, SWI 230V w/ Test Automation
3461001 ESA612, THAI 230V w/ Test Automation
3462285 ESA612, JPN 230V w/ Test Automation
3326935 ESA620, US 115V 20A w/Test Automation
3326947 ESA620, EUR 230V w/ Test Automation
3326958 ESA620, FR 230V w/ Test Automation
3326964 ESA620, ISR 230V w/ Test Automation
3326986 ESA620, AUS 230V w/ Test Automation
3326999 ESA620, SWI 230V w/ Test Automation
3327002 ESA620, UK 230V w/ Test Automation
3326874 Impulse 7KDP, US 120V w/Test Automation
3326888 Impulse 7KDP, SHK w/ Test Automation
3326895 Impulse 7KDP, UK w/ Test Automation
3326901 Impulse 7KDP, JPN w/ Test Automation
3326912 Impulse 7KDP, AUS w/ Test Automation
3326920 Impulse 7KDP, IN w/ Test Automation
3319736 QA-ES, US 115V w/ Test Automation
3319749 QA-ES, SHK 230V w/ Test Automation
3319751 QA-ES, UK 230V w/ Test Automation
3319760 QA-ES, AUS 230V w/ Test Automation
3319772 QA-ES, JPN 100V w/ Test Automation
3327016 Kit, TA-LAGU, 1 Channel Lagu, with Test Automation
3327025 Kit, TA-LAGU, 2 Channel Lagu with Test Automation
3335538 TNT 12000, w/Test Automation
3340639 TNT 12000WD, w/Test Automation

medTester 5000C

Automated Biomedical Equipment Test System

FLUKE® Biomedical

The medTester 5000C is an automated system designed for electrical safety testing and performance verification. It is compatible with most Fluke Biomedical testing devices and a majority of the popular Computerized Maintenance Management Systems (CMMS) in the US. The medTester 5000C provides a completely integrated solution for standardized and streamlined testing and record keeping.

Key features

- Easy verification of biomedical equipment to manufacturer's specifications
- Ten preprogrammed and five user-programmable electrical-safety-testing sequences
- Convenient transfer of equipment inventory and testing procedures from CMMS
- Module options to automate testing of most Fluke Biomedical testing devices
- Automatic storage of detailed test results for printing or transfer to CMMS
- Compliant with ANSI/AAMI (1993) and NFPA-99 (2005) standards
- 20 A device testing with GFCI protection
- Wedge hardware option for extended serial port use, optional PC-style keyboard and barcode scan gun

Specifications

Modes of operation	Fully equipped, with four operational modes: manual, autosequence, medCheck, and remote control
Input power supply	Line voltage/frequency input: 115 V ac ± 10 %/60 Hz
Test-receptacle type	USA, 20 A
System/line voltage	
Range (full scale)	200 V
Accuracy	± 5 % of range ± 1 LSD
Resolution	0.1 V
Equipment current	
Range (full scale)	0 A to 20 A
Accuracy	± 5 % of range
Resolution	0.01 A
Ground resistance	
Range (full scale)	0 Ω to 2 Ω
Accuracy	± 1 % of range
Resolution	0.001 Ω (1 mΩ)
Current source	100 mA dc
Measurement type	True four-terminal technique
Test leads	Kelvin (2) insulated clip
Leakage-current/voltage gradient	
Ranges (full scale)	200 µA and 2000 µA or mV
Accuracy	DC and 48 Hz to 1 kHz, ± 1 % of reading; 1 kHz to 100 kHz, ± 2.5 % of reading; 100 kHz to 1 MHz, ± 5 % of reading
Resolution	0.1 µA or 0.1 mV
Measurement type	True-rms (autoranging) (ac + dc or dc only response)
Test-load selection	ANSI/AAMI ES1 1993
Test-load impedence	1000 Ω ± 1 % at dc
Isolation test	
Test selection (full scale)	Patient leads to ground
Lead combinations	All leads; or individual leads RL, RA, LA, LL, and V1/V6 (V1 through V6 tested as a single lead)
Available current	Limited by internal 120 kΩ resistor
Resolution	0.1 µA
Ranges (full scale)	200 µA and 2000 µA

Optional accessories

2245136 Performance Enhancement Module 2: RS-232/printer

2245149 Performance Enhancement Module 3: 100 records

2245151 Performance Enhancement Module 4: Expanded memory

2245160 Performance Enhancement Module 5: Waves/extended test

2245172 Performance Enhancement Module 6: Data transfer

2245185 Performance Enhancement Module 7: medCheck

2245197 Performance Enhancement Module 8: Defibrillator

2245201 Performance Enhancement Module 9: IV pump

2245212 Performance Enhancement Module 10: CMMS interface

2245220 Performance Enhancement Module 11: ESU

2245235 Performance Enhancement Module 12: SpO_2

2245247 Performance Enhancement Module 13: Pacer

2245258 Performance Enhancement Module 14: NIBP

medTester 5000C

Automated Biomedical Equipment Test System

FLUKE® Biomedical

Specifications

Isolation test (continued)	
ECG binding posts	10 posts, American Hospital Association color-coded RL, RA, LA, LL, V1-V6
Compatibility	Compatible with both 3.2 mm and 4 mm pins and disposable snap electrodes
Performance waveforms	
ECG performance test waves (lead I, Vp-p)	Square wave: 2 Hz, 1 mV
DC pulse	4 s, 1 mV
Sine wave	0.5 Hz, 10 Hz, 40 Hz, 60 Hz, and 100 Hz, 1 mV
Square wave	1 kHz, 1 mV
Triangle	2 Hz, 1 mV
CMRR	60 Hz sine wave with 1 kΩ imbalance in LA
Normal sinus	30 BPM, 60 BPM, 120 BPM, and 240 BPM
Arrhythmias	Atrial fibrillation Second-degree A-V block, type 1 Premature atrial contractions Missed beat at 80 BPM and 120 BPM PVC 1 left PVC 2 right Multifocal PVCs PVC 1, R on T A pair of PVCs Run of 5 PVCs Run of 11 PVCs, MF Right bundle branch block; Ventricular tachycardia Ventricular fibrillation Asystole
Environmental requirements	
Operating temperature	15 °C to 55 °C (59 °F to 95 °F)
Storage temperature	0 °C to 50 °C (32 °F to 122 °F)
General information	
Clock/date functions	Time and date formats: 24 hour (hh:mm:ss) and mm/dd/yy
Safety certification	Canadian Standards Association CSA C22.2 No 231-M89 (1989)
Display characteristics	Type: 80 character, alphanumeric liquid crystal display (LCD)
	Size: 2 lines x 40 characters
Backlight	LED with adjustable brightness control
Dimensions (LxWxH)	25.4 cm x 35.0 cm x 10.2 cm (10 in x 13.8 in x 4 in)
Weight	5 kg (11 lb)

medTester 5000C is compatible with the following test tools:

- Impulse 4000 Defib Analyzer
- IDA 4 plus IV Pump Analyzer
- RF303RS ESU Analyzer
- Index 2XL Sp02 Analyzer
- SigmaPace 1000 Pacemaker Analyzer
- Cufflink NIBP Simulator

medTester also interfaces with the following legacy test tools:

- Impulse 3000 Defib Analyzer
- Infustest 2000 Series D IVPUMP Analyzer
- IPT-1 IVPUMP Analyzer
- IPT-MC IV IVPUMP Analyzer
- 402A ESU Analyzer
- 454A ESU Analyzer
- Oxitest Plus/Plus7 SpO_2 Analyzer
- CardioSat 100 SpO_2 Analyzer

Optional accessories (continued)

2245264 Wedge Adapter (eight 25 in serial ports, as well as AT or PS/2 keyboard port)

2245061 Mini PC-style External Keyboard (83 keys, AT or PS/2, wedge adapter required

2245092 Laser Barcode Gun (wedge adapter required)

2245515 5000C-PRINTER, Brady TLS Test Label Printer Kit medTester 5000C V 5.10 or greater and 115 V ac only

2248606 Multipurpose Hard-sided Carrying Case for medTester 5000C with wedge adapter

2248587 Multi-purpose Hard-sided Carrying Case for medTester 5000C without wedge adapter

Interface cables: Call for specific test-device connection cables

Included accessories

medTester 5000C

2243153 Users Manual

2392871 Soft Vinyl Accessory Pouch

2392617 Two Kelvin Cables

2392639 Two Ground-pin Adapters

medTester 5000C/B, CMMS Connectivity Bundle

2245136 RS-232/Printer Module

2245149 100 Record Storage Module

2245151 Expanded Record Storage Module

2245172 Data-Transfer Module Med

2245185 Check Module

2245212 CMMS Interface Module

Ordering information

2247382 medTester 5000C (20 A, 115 V ac)

2585098 medTester 5000C/B, CMMS Connectivity Bundle

FLUKE®
Biomedical

INCU™

Incubator Analyzer

Faulty incubator controls lengthen hospital stays, and increase healthcare costs, making thorough incubator testing essential.

Designed around AAMI and IEC standards that specify incubator and radiant warmer sound levels and thermal characteristics, the INCU simultaneously measures airflow, relative humidity, sound, and four independent temperatures. Adjustable measurement intervals allow technicians to configure the unit to meet their facilities' testing requirements. Technicians are free to do other work while the device collects and records data.

INCU software lets technicians upload setup parameters and download the test results to a PC file, or print the data in reports with full-color charts and graphs.

Key features

- Simultaneous measurement of humidity, airflow, sound, and 4 independent temperatures
- 24-hour continuous testing (battery); 35-hour continuous testing (main power)
- Battery operated
- Adjustable measurement intervals
- Compatible with closed, forced-convection incubators and open infant warmers
- Stand-alone measurement or automated testing with PC
- Windows® compatible INCU software for easy data collection, analysis, and documentation
- Numerical and full-color graphical reports

Specifications

Power supply	
Input voltage range	100 V ac to 240 V ac
Input frequency range	47 Hz to 63 Hz
Battery	Rechargeable sealed lead-acid type NP7-6 YUASA, 6 V, 7 Ah; operates for 24 hours continuously; low-battery alert
Sound level	
Measuring range	30 dbA to 80 dbA
Resolution	0.1 dbA
Accuracy	+5 dbA @ 30 dbA to 80 dbA
Relative humidity (without condensation)	
Measuring range	0 % to 100 % RH, non-condensing
Resolution	0.1 % RH
Accuracy	± 5 % RH for 0 % to 90 % RH at 77 °F to 104 °F (25 °C to 40 °C) **or** ± 5.3 % RH for 0 % to 100 % RH at 77 °F to 104 °F (25 °C to 40 °C)
Temperature measurement	
Measuring range	5 °C to 70 °C (41 °F to 158 °F)
Resolution	0.1 °C (32 °F)
Accuracy	+0.5 °C (+0.9 °F) +1 LSB of range from 25 °C to 40 °C (77 °F to 104 °F)
Airflow	
Measurement range	0.1 m/s to 0.7 m/s
Resolution	0.01 m/s
Accuracy	from 0.1 m/s to 0.5 m/s reading ± 0.1 m/s at temperature 25 °C to 40 °C (77 °F to 104 °F) and humidity 50 % RH ± 15 % RH
General information	
Measurement interval	Via PC: Adjustable from 1 minute to 10 minutes
Storage temperature	-20 °C to 50 °C (-4 °F to 122 °F)
Operating temperature	10 °C to 40 °C (50 °F to 104 °F)
Dimensions (LxWxH)	27 cm x 20 cm x 14 cm (10.6 in x 7.8 in x 5.5 in)
Weight	3 kg (6.6 lb)

Included accessories

2206965 Users Manual
2248900 Soft-Sided Carrying Case
2239025 Airflow Sensor
2391761 Universal AC Battery Charger with Worldwide Mains Adapter Set
2391866 Serial Cable DB9F to DB9F
2391789 Serial Adapter DB-9M to DB-25F
2213928 Outside Temperature probe holder
2239002 Adapter for Radiant Infant Warmer Assembly
2213919 INCU PC Software (one CD)

Ordering information

2250148 Incubator Analyzer

$MAXO_2$+AE

Oxygen Analyzer

FLUKE® Biomedical

The $MAXO_2$+AE is an oxygen analyzer that measures the oxygen concentration in a flow of gas from a medical gas source or through a medical gas-flow device such as a ventilator or anesthesia system, or within an infant incubator. It is handheld and rugged to suit the needs of portable use. The $MAXO_2$+ AE comes equipped with a two-year warranty on both analyzer and sensor.

CE

Key features

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

Specifications

Measurement range	0 % to 100 %
Resolution	0.1 %
Accuracy and linearity	1 % of full scale at constant temperature, RH and pressure when calibrated at full scale
Total accuracy	± 3 % actual oxygen level over full operating range
Response time	90 % of final value in approx. 15 sec at 23 °C
Warm-up time	None required
Power supply	
Battery life	Approx. 5000 hours with continuous use
Low battery indication	"BAT icon displayed on LCD
Sensor type	Maxtec® MAX-250E for AE model
Expected sensor life	> 900,000 02 % hours minimum, 2 years in typical medical applications
Power requirements	2, AA alkaline batteries
Environmental requirements	
Operating temperature	15 °C to 40 °C (59 °F to 104 °F)
Storage temperature	-15 °C to 50 °C (5 °F to 122 °F)
Atmospheric pressure	-800 mBar to 1013 mBar
Relative humidity	Operating range: 0 % to 95 % (non-condensing)
General information	
Dimensions (LxWxH)	38 mm x 76 mm x 914 mm (1.5 in x 3.0 in x 36.0 in)
Weight	285 g (0.6 lb)

Included accessories

Users Manual
MAX-250 External Oxygen Sensor
Oxygen Sensor Cable
2448051 Breathing Circuit tee

Ordering information

2511920 $MAXO_2$+AE Oxygen Analyzer

Service and Calibration

World-class facility. World-class service.

Fluke Biomedical's Global Calibration Lab is NVLAP Lab Code 200566-0 accredited, adheres to ISO 17025:2005, ANSI Z540, Mammography MQSA, and CNSC, and is traceable to national and international standards.

Fluke Biomedical offers one-stop, bulk contracts for managing larger instrument pools, including various asset-management alternatives for pools larger than 150 units. Fluke Biomedical's asset-management program takes over your grueling task of instrument tracking and allows you to use your time more productively.

If you have a large number of instruments that require service, you can greatly benefit from this quality service. Proper protocols are strictly followed, eliminating the problems with inspectors and audits that can result when other less-qualified labs perform the calibrations. Instrumentation includes Fluke Biomedical as well as other industry models.

Fluke Biomedical's Global Calibration Laboratory is equipped to calibrate and repair the following types of instruments:

- Area Monitors
- Barometers
- Blood Pressure Simulators
- Defibrillators/External Pace Maker Analyzers
- Densitometers
- Diode Detectors
- Dosimeters
- Electrical Safety Analyzers
- Incubator Analyzers
- Ion Chambers
- IV Pump Analyzers
- kVp Meters
- mAs Meters
- Electrical Multimeters
- Oscilloscopes
- Patient Simulators
- Pressure Meters/Parameter Testers
- Radiation Multimeters
- Sensitometers
- SpO_2 Simulators/Analyzers
- Thermometers
- Test Lungs
- Ultra Sound Analyzers
- Velometers
- Ventilators/Gas flow Analyzers

Calibration Beam Specifications

Tungsten Anode

NIST-Traceable Techniques

Equivalent Beam Code	Potential (kV)	Filtration				HVL mm Al
		mm Al	mm Cu	mm Sn	mm Pb	
L20	20					0.07
L100	100	1.98				2.75
M30	30	0.50				0.33
M50	50	1.00				0.98
M60	60	1.50				1.68
M80	80	2.6				2.98
M100	100	5.0				5.1
M150	150	5.0	0.25			10.2
M200	200	4.1	1.12			14.9
M250	250	5.0	3.2			18.5
H50	50	4.0			0.12	4.4
H60	60	4.0	0.6			6
H100	100	4.0	5			13.5
H150	150	4.0	4	1.5		16.8
H200	200	4	0.6	4	0.7	19.5
H250	250	4	0.6	1	2.7	21.5

PTB-Traceable Techinques

Equivalent Beam Code	Potential (kV)	Filtration				HVL mm Al
		mm Al	mm Cu	mm Sn	mm Pb	
DV30	30	2.5				0.98
DV40	40	2.5				1.44
DV50	50	2.5				1.81
DV60	60	2.5				2.13
DV70	70	2.5				2.45
DV80	80	2.5				2.78
DV90	90	2.5				3.1
DV100	100	2.5				3.48
DV120	120	2.5				4.15
DV150	150	2.5				5.36
DH40	40	4				2.2
DH50	50	10				3.75
DH60	60	16				5.35
DH70	70	21				6.77
DH80	80	26.0				8.12
DH90	90	30.0				9.26
DH100	100	34.0				10.15
DH120	120	40.0				11.67
DH150	150	45.0				13.36

Service and Calibration

World-class facility. World-class service.

FLUKE® Biomedical

Calibration Beam Specifications

Molybdenum/Rhodium Anode

NIST-Traceable Techniques					
Equivalent Beam Code	Potential (kV)	Filtration			HVL mm Al
		mm Mo	mm Rh	mm Al	
Mo/Mo 28	28	0.032			0.33
Mo/Mo 35	35	0.032			0.39
Mo/Rh 28	28	0.029			0.41
Rh/Rh 25	25		0.029		0.35
Rh/Rh 40	40		0.029		0.56
Mo/Mo28x	28	0.030		2	0.63
Rh/Rh/35x	35		0.029	2	0.898

PTB-Traceable Techinques					
Equivalent Beam Code	Potential (kV)	Filtration			HVL mm Al
		mm Mo	mm Rh	mm Al	
MV20	20	0.030			0.223
MV25	25	0.030			0.282
MV30	30	0.030			0.337
MV35	35	0.030			0.374
MV40	40	0.030			0.402
MV50	50	0.030			0.440
MV20	20	0.030		2	0.450
MV25	25	0.030		2	0.580
MV30	30	0.030		2	0.670
MV35	35	0.030		2	0.749
MV40	40	0.030		2	0.825
MV50	50	0.030		2	0.968

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