FLUKE®

Biomedical

Biomedical Test

Product Catalog

2011/2012

ProSim 8 Vital Signs Simulator

ESA612 Electrical Safety Analyzer

Impulse 7000DP Defibrillator/Transcutaneous Pacemaker Analyzer

IDA 4 Plus Multi-Channel Infusion Device Analyzer

Fluke Biomedical.

Better products. More choices. One company.

Biomedical Test Product Catalog
2011/2012

FLUKE ®
Biomedical

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, 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
- Imaging and Therapy QA

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
Contents

Contact information

Fluke Biomedical
6045 Cochran Road
Cleveland, OH 44139-3303 U.S.A.

Fluke Biomedical Europe
Science Park Eindhoven 5110
5692EC Son, The Netherlands

For more information, contact us
In the U.S.A. (800) 850-4608 or
Fax (440) 349-2307
In Europe/M-East/Africa +31 40 267 5435 or
Fax +31 40 267 5436
From other countries +1 (440) 248-9300 or
Fax +1 (440) 349-2307
Email: sales@flukebiomedical.com
Web access: **www.flukebiomedical.com**

Service Center/Repair/Calibration US
Fluke Biomedical
6045 Cochran Road
Cleveland OH 44139-3303
Tel: 440-498-2560
Toll free: 800-850-4608 ext 2564
Email: globalcal@flukebiomedical.com

Service Center/Repair/Calibration Europe
Fluke Biomedical Europe
Science Park Eindhoven 5110
5692EC Son, The Netherlands
Tel: +31 (40) 267 5435
Fax: +31 (40) 267 5436
Email: servicedesk@fluke.nl

Fluke Biomedical CarePlans

Priority services to keep you up and running

Look for the CarePlans logo in this catalog for products with available extended service and support plans. Fluke Biomedical's CarePlan packages offer comprehensive priority service and support to help you get the most out of your test equipment investments. Our CarePlan members enjoy priority bench service, extended warranties, value pricing on services, VIP technical support, expedited return shipping, productivity consultation services, educational training, and more. Take advantage of CarePlan priority service and support and let us take care of you.

priority Gold Instrument CarePlans Biomedical Products Silver Bronze

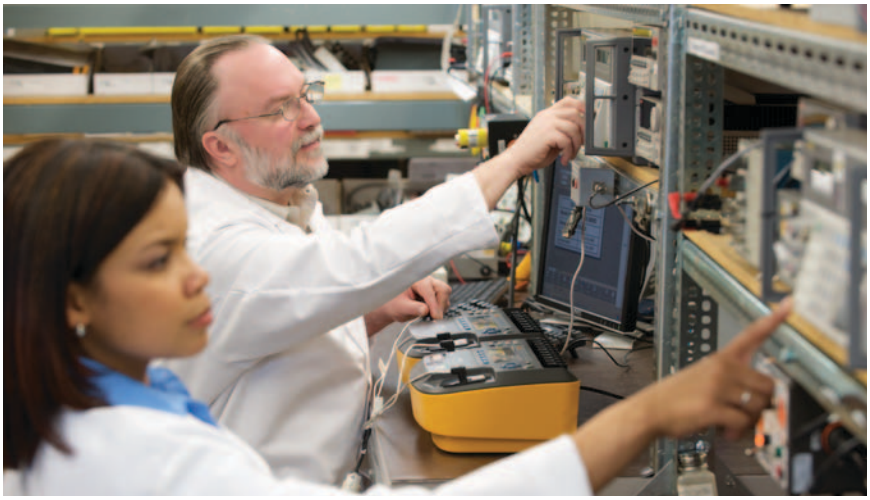
priority Gold Biomedical Products Instrument CarePlan

Silver Biomedical Products Instrument CarePlan

Bronze Biomedical Products Instrument CarePlan

Choose the best plan for you

	Gold	Silver	Bronze
First-on-bench priority service	•	•	•
Reminder notifications 60 and 30 days prior to expiration of calibration	•	•	•
Discounts on additional service requests	•	•	•
VIP access to technical support hotline	•	•	•
Turn-around time for repair	3-day	3-day	5-day
Turn-around time for calibration	1-day	3-day	5-day
Operational upgrades	•	•	
Accredited calibration to manufacturer's specifications	•	•	
OEM onsite calibration (where available) ensuring manufacturer's specifications	•	•	
One-year extended warranty beyond your original factory warranty. No-cost repair service.	•		•
1-day turnaround time for calibration	•		
No-cost loaner units during extended repair	•		
24x7 web user training	•		
Protocol development to increase productivity	•		



Impulse 6000D/7000DP

Defibrillator/Transcutaneous Pacemaker Analyzer

FLUKE® Biomedical

N10140

Ansur plug-in

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.

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

Note: AC pulsed biphasic waveform has not been approved in the United States.

Impulse 6000D/7000DP
Defibrillator/Transcutaneous Pacemaker Analyzer

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 defibrillatorinput 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

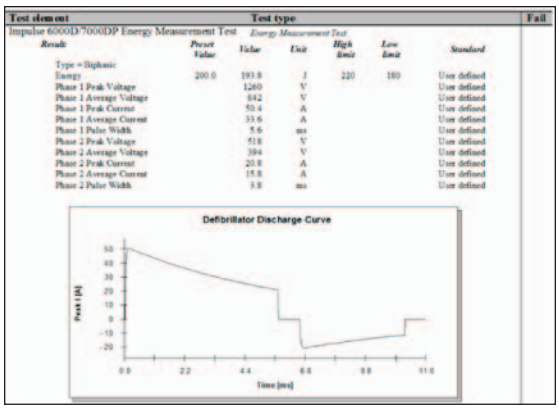
Specifications

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



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

Optional accessories

ANSUR IMPULSE 7000 Ansur Impulse 6000D/7000DP Plug-In

I6/7 D/P ADPT106 MedtronicERS/ Physio-Control (FAST PATCH) (set of two): 4 mm defibrillator adapters

I6/7 D/P ADPT103 Kimberly Clark/R2 Darox MRL/MDE/NK: 4 mm defibrillator adapters

I6/7 D/P ADPT102 Internal discharge paddle contacts (set of two)

I6/7 D/P ADPT105 Medtronic ERS/ Physio-Control (QUIK PACE) (set of two): 4 mm pacer adapters

I6/7 D/P ADPT110 Zoll Medical NTP/ PD1400: 4 mm pacer adapters

I6/7 D/P ADPT104 Medtronic ERS/ Physio-Control (QUIK COMBO): 4 mm defib/pacer adapters

I6/7 D/P ADPT107 Philips/Agilent/HP (CODEMASTER Series-Round): 4 mm defib/pacer adapters

I6/7 D/P ADPT108 Philips/Agilent HEARTSTART FR2/MRX: 4 mm defib/ pacer adapters

I6/7 D/P ADPT109 Zoll PD-2200 Multi-Function PD-Series, M-Series, M-Series CCT, AED PRO® and AED Plus™ defib/pacer adapters

I6/7 D/P ADPT101 GE Marquette (RESPONDER 1500/1700 Series) (set of two): 4 mm defib/pacer adapters

IMPULSE 7010 Impulse 7010 Defibrillator Selectable Load Accessory

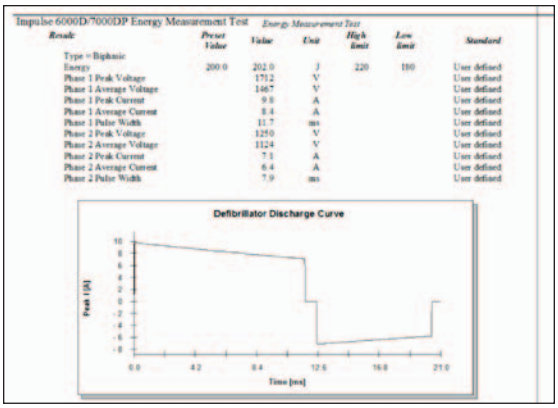
Impulse 6000D/7000DP
Defibrillator/Transcutaneous Pacemaker Analyzer

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



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.

Ordering information

Impulse 6000D Defibrillator Analyzer
IMPULSE 6000D United States, 120 V
IMPULSE 6000D-01 Schuko
IMPULSE 6000D-02 United Kingdom
IMPULSE 6000D-03 Japan
IMPULSE 6000D-04 Australia
IMPULSE 6000D-05 India
IMPULSE 6000D-06 Brazil

Impulse 7000DP Defibrillator/ Transcutaneous Pacemaker Analyzer
IMPULSE 7000DP United States, 120 V
IMPULSE 7000DP-01 Schuko
IMPULSE 7000DP-02 United Kingdom
IMPULSE 7000DP-03 Japan
IMPULSE 7000DP-04 Australia
IMPULSE 7000DP-05 India
IMPULSE 7000DP-06 Brazil

Impulse 7000DP Defibrillator/ Transcutaneous Pacemaker Analyzer with test automation
TA-IMP7KDP United States, 120 V
TA-IMP7KDP-01 Schuko
TA-IMP7KDP-02 United Kingdom
TA-IMP7KDP-03 Japan
TA-IMP7KDP-04 Australia
TA-IMP7KDP-05 India
TA-IMP7KDP-06 Brazil

Impulse 7000DP Defibrillator/ Transcutaneous Pacemaker Analyzer with Impulse 7010 and test automation
TA-IMP7K/7010US United States, 120 V
TA-IMP7K/7010SHK Schuko
TA-IMP7K/7010UK United Kingdom
TA-IMP7K/7010JPN Japan
TA-IMP7K/7010AUS Australia
TA-IMP7K/7010BRA Brazil

Included accessories
CD-ROM Users Manual CD
MANUAL Getting Started Guide
Battery Eliminator (country specific)
SOFT CASE Carrying Case
FBC-IMP7000-8003 Defibrillator Paddle Contact Plates
CABLE ASSEMBLY USB Computer Communication Cable

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.

test automation software® Ansur plug-in

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 400 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	400 J range: ± 2 % of reading 100 J to 400 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	400 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

Specifications

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

ANSUR QED 6 Ansur QED 6 Plug-in
Soft-Sided Soft-Sided Carrying Case
3370512 RS-232/Printer Cable
3370512 Serial Cable D9F-D9F

Printer Cable DPU 411
3370513 Serial Printer Cable DPU 414, DB9F to DB9F
PRINTR/414-US120V Printer, Seiko DPU-414-30B 120 V Power Supply
PRINTR414-SHK220V Printer, Seiko DPU-414-30B 220 V Power Supply
61096 Printer, 120 V Power Supply
61097 Printer, 220 V Power Supply
97116 Printer Paper (7 roold minimum, priced per roll)

Defibrillators electrode adapters
Note: Refer to your sales representative or directly to Fluke Biomedical for most current listing of available adapters.
3010-0447 Agilent/HP: Codemaster XL + series (inline round connector included)
3010-0537 Agilent/Philips: HEARTSTREAM FR2, XL and XLT series (inline rectangular connector)
5215-0258FG GE-Marquette: Responder series (snap connector included; two adapters required)
5215-0278FG Laerdal: HEARTSTART/ SpaceLabs: FIRST MEDIC (early series) round snap connector included; two adapters required
3010-0302 MDE (Medical Data Electronics: All) (inline R2/Darox connector included)
3010-0513FG Medtronic Physio-Control LifePak series: QUIK COMBO (inline connector included)
5215-0256FG Medtronic Physio-Control LifePak series: FAST PATCH (snap connector included; two adapters required)
3010-0378 Zoll Medical PD series, M series, M series CCT and AED Plus™ (Testing the AED Plus™ requires the purchase of an additional auxiliary adapter directly from Zoll Medical (Zoll Medical model: 8000-0804-01)
3360504FG 9 V dc Adapter

Ordering information

QED 6 Defibrillator Analyzer

Included accessories
3371002 Users Manual
3360501 Internal Paddle Adapters (two each)
BEUNVSL IEC320C14P Battery Eliminator, 90-264 V ac/9 V dc
POWER SUPPLY Power Supply, 90-264 V ac/9 V dc

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 pacemaker 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

- 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

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

9513-0202 Electrode adapters (including the brand/model-specific interface connector and a pair of 4 mm "safety-type banana plugs)

3010-0605 Aligent (HP) CodeMaster Series

3010-0606 GE Marquette Medical

3010-0607 Medical Data Electronics (MDE); Medical Research Laboratories (MRL)

3010-0604 Medtronic Physio-Control Quick Combo

3010-0603 Medtronic Physio-Control Quick Pace

3010-0639 Philips/Agilent Codemaster Series

3010-0608 Zoll Medical NTP Series

3010-0609 Zoll Medical PD Series and M Series

3010-0441 Interface Cable (RS-232; female DB9 to female DB25; medTester to SigmaPace™ 1000/PC/Index 2XL/IDA 4 Plus; Impulse 4000 to PC)

3010-0654 Detachable cord set—Japan (IEC 320 C6 type 3-pin inlet)

3010-0656 Detachable cord set—Schuko—Euro (IEC 320 C6 type 3-pin inlet)

3010-0655 Detachable cord set—UKI (IEC 320 C6 type 3-pin inlet)

3010-0658 Detachable cord set—USA (IEC 320 C6 type 3-pin inlet)

3010-0657 Detachable cord set—Australia (IEC 320 C6 type 3-pin inlet)

Ordering information

SIGMAP1K-USA120V United States, 120 V

SIGMAP1K-JPN100V Japan, 100 V

SIGMAP1K-SHK250V Schuko, 250 V

SIGMAP1K-UK250V United Kingdom, 250 V

Included accessories

9508-0295 Users Manual

9530-0069FG Soft-sided Vinyl Carrying Case

3010-0611 Transvenous Pacer Test Leads (2 sets, red)

3010-0610 Transvenous Pacer Test Leads (2 sets, black)

3010-0602FG SigmaPace 9 V dc Load Test Cable

3010-0585FG Serial PC Interface Cable

POWER SUPPLY Universal-input Battery Charger

LINE CORD Power cord set USA 120 V ac

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

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	± 5 % of reading for loads from 100 to 2000 ohms
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

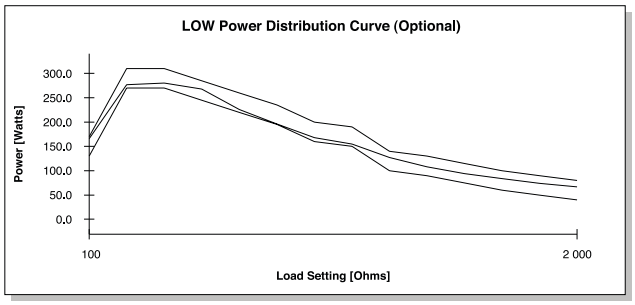
QA-ES Series II
Electrosurgery Analyzer

FLUKE® Biomedical

Specifications

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

14100 Carrying Case
ANSUR QA-ES Ansur Test Software, QA-ES plug-in license
15703 Data Transfer Cable, RS-232
11471 Clamp, crocodile style, grip C, black
11472 Clamp, crocodile style, grip C, red
11451 E-input meas. Cable 2M, black
ESU ACTIVE LEAD ESU Active Safety Lead
ESU DISPURSIVE LEAD ESU Dispersive Safety Lead (output test)
ESU CQM LEAD ESU CQM safety lead
ESU JUMPER LEAD ESU Jumper Safety Lead
ESU CABLE ESU Cable, Plug Lead, Safety Retractable Lead, 40 inch, Black
ESU CABLE ESU Cable, Plug Lead, Safety Retractable Lead, 40 inch, Red
ESU RECM BOX ESU RECM Test Box
ESU CABL BCK RET ESU Cable, 20 inch, Black Safety Retractable
ESU CABL RED RET ESU Cable, 20 inch, Red Safety Retractable

Ordering information

QA-ES II 115V United States, 115 V
QA-ES II 230V Schuko, 230 V
QA-ES II 230V UK United Kingdom, 230 V
QA-ES II 230V AUS Australia, 230 V
QA-ES II 100V Japan Japan, 100 V
TA-QAES-US QA-ES, United States 115 V w/Test Automation
TA-QAES-SHK QA-ES, Schuko 230 V w/Test Automation
TA-QAES-UK QA-ES, United Kingdom 230 V w/Test Automation
TA-QAES-AUS QA-ES, Australia 230 V w/Test Automation
TA-QAES-JPN QA-ES, Japan 100 V w/Test Automation

Included accessories
CD-ROM QA-ES Series II Users Manual (electronic, CD)
MANUAL QA-ES Series II Users Manual (printed)
ESU DISPERSIVE LD ESU-Dispersive Safety Lead
ESU CQM LEAD ESU-CQM Safety Lead
ESU JUMPER LEAD ESU-Jumper Safety Lead
4MM TL BLACK Test Lead with stackable plugs
ESU CABLE Test Lead Set 2 with retractable sheaths
AC285 Sure-Grip Large Alligator Clip Set
Power Cord (country specific)

Included accessories for QA-ES with test automation
ANSUR QA-ES Ansur Test Software QA-ES plug-in license
15703 Data Transfer Cable, RS-232

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: 25 % @ 400 W (max 30 sec ON during any 2 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

RF303$_{RS}$
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	RF303$_{RS}$	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

9530-0066 Multipurpose Hard-Sided, Watertight Carrying Case

3370512 Serial Cable for D9F-D9F

75034 Interface Cable, medTester to RF303$_{RS}$ (RS-232; male DB9 to female DB9; adapter required, p/n 49755FG)

49755FG Adapter for Interface Cable, medTester to RF303$_{RS}$ (male DB9 to female DB25; used with interface cable, 49755FG)

Ordering information

RF-303$_{RS}$ Electrosurgery Analyzer

ESU303RS-US120V United States, 120 V

ESU303RS-AUS250V Australia, 250 V

ESU303RS-DEN250V Denmark, 250 V

ESU303RS-SHK250V Schuko, 250 V

ESU303RS-ISR205V Israel, 250 V

EDU303RS-ITAL250V Italy, 250 V

ESU303RS-IND250V India, 250 V

ESU303RS-SWZ250V Switzerland, 250 V

ESU303RS-UK250V United Kingdom, 250 V

ESU303RS-BRAZ250V Brazil, 250 V

Included accessories

3031000 Users Manual

3030002 Accessory Kit

Accessory kit includes the following:

TEST LEAD Active Safety Lead

3010-0576 ESU Dispersive Safety Lead

3010-0575 ESU RECQM Safety Lead

TEST LEAD ESU Case Safety Lead

3010-0578 ESU Jumper Safety Leads (2)

2720-0005 Active Safety Clip, yellow

2720-0006 Case Safety Clip, green

1005-1094 Fuses (2) 5X20 F3.15A 250V CE

9503-0004 Ground Pin Adapter

Detachable Power Cord (country specific)

IDA 4 Plus
Multi-Channel Infusion Device Analyzer

FLUKE® Biomedical

N10140

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).

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

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

Optional accessories

9513-0212 External mini-keyboard, 83-key with PS/2 connector and AT adapter

71072 Parallel Printer Cable (D25M-36M)

44277 PCA Trigger/Nurse Call Box

PRINTR/414-US120V Printer, Seiko DPU-414-30B (120 V power supply) (additional purchase required: parallel printer cable, p/n 71072)

PRINTR414-SHK220V Printer, Seiko DPU-414-30B (220 V power supply) (additional purchase required: parallel printer cable, p/n 71072)

61096 Printer (120 V power supply)

61097 Printer (220 V power supply)

3010-0441 Interface Cable, medTester to IDA 4 Plus (without wedge adapter) (RS-232; female DB25 to female DB9)

3010-0598 Interface Cable, medTester to IDA 4 Plus (with or without wedge adapter) (RS-232; female DB9 to female DB25)

9513-0221 Barcode Scanner (with long-reach coil cable with Y connector for keyboard attachment)

75029 Null Modem Cable (female DB9 to female DB9)

IDA 4 Plus
Multi-Channel Infusion Device Analyzer

FLUKE® Biomedical

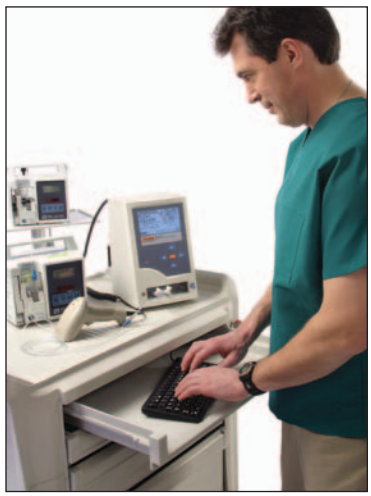
Specifications

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 PCA Trigger Box



Ordering information

IDA 4 Plus One-Channel Infusion Device Analyzer
IDA-4P/1-US120V United States, 120 V
IDA-4P/1-AUS250V Australia, 250 V
IDA-4P/1-DEN250V Denmark, 250 V
IDA-4P/1-SHK250V Schuko, 250 V
IDA-4P/1-ISR250V Israel, 250 V
IDA-4P/1-ITAL250V Italy, 250 V
IDA-4P/1-IND250V India, 250 V
IDA-4P/1-SWZ250V Switzerland, 250 V
IDA-4P/1-UK250V United Kingdom, 250 V
IDA-4P/1-BRAZ Brazil

IDA 4 Plus Two-Channel Infusion Device Analyzer
Full testing for up to two infusion pumps simultaneously
IDA-4P/2-US120V United States, 120 V
IDA-4P/2-AUS250V Australia, 250 V
IDA-4P/2-DEN250V Denmark, 250 V
IDA-4P/2-SHK250V Schuko, 250 V
IDA-4P/2-ISR250V Israel, 250 V
IDA-4P/2-ITAL250V Italy, 250 V
IDA-4P/2-IND250V India, 250 V
IDA-4P/2-SWZ250V Switzerland, 250 V
IDA-4P/2-UK250V United Kingdom, 250 V
IDA-4P/2-BRAZ Brazil

IDA 4 Plus Three-Channel Infusion Device Analyzer
Full testing capability for up to three infusion pumps simultaneously
IDA-4P/3-US120V United States, 120 V
IDA-4P/3-AUS250V Australia, 250 V
IDA-4P/3-DEN250V Denmark, 250 V
IDA-4P/3-SHK250V Schuko, 250 V
IDA-4P/3-ISR250V Israel, 250 V
IDA-4P/3-ITAL250V Italy, 250 V
IDA-4P/3-IND250V India, 250 V
IDA-4P/3-SWZ250V Switzerland, 250 V
IDA-4P/3-UK250V United Kingdom, 250 V
IDA-4P/3-BRAZ Brazil

IDA 4 Plus Four-Channel Infusion Device Analyzer
Full testing capability for up to four infusion pumps simultaneously
IDA-4P/4-US120V United States, 120 V
IDA-4P/4-AUS250V Australia, 250 V
IDA-4P/4-DEN250V Denmark, 250 V
IDA-4P/4-SHK250V Schuko, 250 V
IDA-4P/4-ISR250V Israel, 250 V
IDA-4P/4-ITAL250V Italy, 250 V
IDA-4P/4-IND250V India, 250 V
IDA-4P/4-SWZ250V Switzerland, 250 V
IDA-4P/4-UK250V United Kingdom, 250 V
IDA-4P/4-BRAZ Brazil

Included accessories
48456 Electronic Users Manual and HydroGraph software
49964 20 ml Priming Syringe
48457FG Luerlock–3 way (one for each channel)
76044 5–foot Plastic Drain Line
75029 Null Modem Cable (female DB9 to female DB9)
Detachable Power Cord (country specific)

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, 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.

Specifications

Voltage	
Range (mains voltage)	120 V model: 90 V ac to 132 V ac rms 230 V model: 180 V ac to 264 V ac rms
Accuracy	± (2 % of reading + 1 V)
Range (accessible voltage)	0 V ac to 300 V ac rms
Accuracy	± (2 % of reading + 2 LSD)
Voltage tests	Mains, Accessible, and Point to Point
Earth resistance	
Modes	Two terminal or four terminal
Test current	> 200 mA ac or 10 A ac to 25 A ac
Ranges	0 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 or 1 LSD, whichever is greater) ± (2 % of reading + 1 µA or 1 LSD, whichever is greater) ± (5 % of reading + 1 µA or 1 LSD, whichever is greater)

Key features

- Superior compliance with multiple standards: IEC60601-1(partial), IEC62353, VDE 751, ANSI/AAMI ES1:1993, NFPA-99, AN/NZS 3551, IEC61010
- 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
- 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 **Note:** For Alternative and Direct applied parts leakage tests, the leakage values are compensated for nominal mains as per 62353. Thus, the accuracy specified for other leakages is not applicable. The actual leakage readings given during these tests will be higher
Differential leakage	
Ranges	50 µA to 199 µA 200 µA to 1999 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 + 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

ANSUR ESA620 Ansur ESA620 Plug-In

Ordering information

ESA620 United States, 115 V, 20 A
ESA620-02 Europe, 230 V
ESA620-01 France, 230 V
ESA620-03 Israel, 230 V
ESA620-05 Australia, 230 V
ESA620-06 United Kingdom, 230 V
ESA620-07 Switzerland, 230 V
ESA620-08 Thailand, 230 V
ESA620-10 230VBRAZ Brazil, 230 V
TA-ESA620-USA ESA620, United States 115V 20A w/Test Automation
TA-ESA620-EUR ESA620, Europe 230V w/Test Automation
TA-ESA620-FR ESA620, France 230V w/Test Automation
TA-ESA620-ISR ESA620, Israel 230V w/Test Automation
TA-ESA620-AUS ESA620, Australia 230V w/Test Automation
TA-ESA620-SWI ESA620, Switzerland 230V w/Test Automation
TA-ESA620-UK ESA620, United Kingdom 230V w/Test Automation

Included accessories
CD-ROM Operator's Manual CD
MANUAL Multilingual Getting Started Guide
ESA620 Accessory Kit (country specific)
2719-0154 15 A to 20 A adapter (US only)
SOFT CASE Carry case
Detachable Power Cord (country specific)

Included accessories for ESA620 with test automation
All of the above, plus:
ANSUR ESA620 Ansur Test-Automation Software ESA620 plug-in
CABLE ASSEMBLY Data Transfer Cable

ESA612
Electrical Safety Analyzer

FLUKE® Biomedical

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
Ranges	0 µA to 199.9 µA 200 µA to 1999 µA 2 mA to 10 mA

ESA612
Electrical Safety Analyzer

FLUKE® Biomedical

Specifications

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 equip-ment, Alternative applied part, Point to point	
Mains on applied part test voltage	100 % of mains	
Differential leakage		
Ranges	75 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)	

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

Ordering information

ESA612 United States, 115 V 20 A
ESA612-02 Europe, 230 V
ESA612-01 France, 230 V
ESA612-03 Israel, 230 V
ESA612-05 Australia, 230 V
ESA612-06 United Kingdom, 230 V
ESA612-07 Switzerland, 230 V
ESA612-08 Thailand, 230 V
ESA612-09 Japan, 100 V
ESA612-10 North America, 220 V
TA-ESA612-US United States, 115 V 20 A w/Test Automation
TA-ESA612-EUR Europe, 230 V w/Test Automation
TA-ESA612-FR France, 230 V w/Test Automation
TA-ESA612-ISR Israel, 230 V w/Test Automation
TA-ESA612-AUS Australia, 230 V w/Test Automation
TA-ESA612-UK United Kingdom, 230 V w/Test Automation
TA-ESA612-SWI Switzerland, 230 V w/Test Automation
TA-ESA612-THAI Thailand, 230 V w/Test Automation
TA-ESA612-JAPAN Japan, 100 V w/Test Automation
TA-ESA612-NA220V North America, 220 V, w/ Test Automation

Included accessories
CD-ROM Operator's Manual (multilingual CD)
MANUAL Getting-Started Guide (hard copy, multilingual)
CABLE ASSEMBLY Data Transfer Cable
ESA612 Accessory Kit (country specific)
2719-0154 15 A to 20 A Adapter (US only)
esa620-npa Null Post Adapter
esa612-2016 5-to-5 Banana Jack to ECG (BJ2ECG) Adapter
9530-0075 Carry Case
Detachable Power Cord (country specific)

Included accessories for ESA612 with test automation
All of the above, plus:
ANSUR ESA612 Ansur Test-Automation Software ESA612 plug-in

601 Pro Series$_{XL}$
Electrical Safety Analyzer

FLUKE®
Biomedical

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.

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

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

20200 Ansur Test Software, ESA601 Plug-In
48052FG Banana/ECG adapter
PRINTR/414-US120V Printer, Seiko DPU-414-30B, with 120 V (2235375) power supply
(Note: requires additional purchase of serial printer cable 2461993)
PRINTR414-SHK220V Printer, Seiko DPU-414-30B, with 220 V (2235382) power supply
(Note: requires additional purchase of serial printer cable 2461993)
61096 Printer 120 V power supply
61097 Printer 220 V power supply
97116 DPU-414 and DPU-411 Printer paper (minimum 7 rolls - price is per roll)
1800001 North American 220 V adapter kit
48383FG Lead set, red
48382FG Lead set, black
48201FG Adapter, banana-alligator
75057 Detachable cord set, 240 V/10 A - USA
75033 Detachable cord set, 120 V/15 A - USA
15703 Data transfer cable, RS-232

Ordering information

ISA601PROXL-SHK-P Schuko receptacle, english overlay, with internal printer
ISA601PROXL-SHK Schuko receptacle, english overlay, without internal printer
ISA601PROXL-UK-P UK receptacle, english overlay, with internal printer
ISA601PROXL-UK UK receptacle, english overlay, without internal printer
ISA601PROXL-AUS-P Australian receptacle, english overlay, with internal printer
ISA601PROXL-AUS Australian receptacle,english overlay, without internal printer
ISA601PROXL-US-P 601 Pro Series$_{XL}$—USP: US receptacle, english overlay, with internal printer
ISA601PROXL-US US receptacle, english overlay, without internal printer
ISA601PROLX-BRAZ-P Brazil receptacle, english overlay, with internal printer
ISA601PROXL-BRAZ Brazil receptacle, english overlay, without internal printer

Included accessories
MANUAL Operator's Manual
48382FG Black Test-Lead Set
48383FG Red Test-Lead Set
48201FG 5 Banana/Alligator Adapters Test Receptacle and Cordset

180
Electrical Safety Analyzer

FLUKE® Biomedical

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

Optional accessories

97148 Soft-sided Vinyl Carrying Case
600/100FG Chassis Cable, coil cord, 8-foot extended
600/101FG Chassis Cable, coil cord, 16 foot extended
600/200FG External Leakage Cable, coil cord, 8 foot extended
600/201 External Leakage Cable, coil cord, 16 foot extended
1800001 North American 220 V adapter kit

Ordering information

ESA180-US 90-265V 180 Electrical Safety Analyzer

Included accessories
1751000 Users Manual
600/100FG Chassis Cable, 8 foot

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)

175
Electrical Safety Analyzer

FLUKE® Biomedical

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 brief-case, 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

Optional accessories

97148 Soft-sided Vinyl Carrying Case
600/100FG Chassis Cable, coil cord, 8-foot extended
600/101FG Chassis Cable, coil cord, 16 foot extended
600/200FG External Leakage Cable, coil cord, 8 foot extended
600/201 External Leakage Cable, coil cord, 16 foot extended
1800001 North American 220 V adapter kit

Ordering information

ESA175-US 90-265V 175 Electrical Safety Analyzer

Included accessories
1751000 Operators Manual
600/100FG Chassis cable, coil cord, 8 ft extended

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)

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.

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)

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

Ordering information

LT544DLITE United States, 85 V ac to 265 V ac, 50/60 Hz

LT544DLITE-EUR Europe, 85 V ac to 265 V ac, 50/60 Hz

LT544DLITE-AUS Australia, 85 V ac to 265 V ac, 50/60 Hz

LT544DLITE-ISR Israel, 85 V ac to 265 V ac, 50/60 Hz

LT544DLITE-ITL Italy, 85 V ac to 265 V ac, 50/60 Hz

LT544DLITE-SWS Switzerland, 85 V ac to 265 V ac, 50/60 Hz

LT544DLITE-1520 United Kingdom, 85 V ac to 265 V ac, 50/60 Hz ,15-Amp NEMA power plug with 20-Amp female power connector

LT544DLITE-2020 85 V ac to 265 V ac, 50/60Hz, 20-Amp NEMA power plug with 20-Amp female power connector

LT544DLITE-230V 85 V ac to 265 V ac, 50/60 Hz, with 230 V ac North America power plug and female power connector

Included accessories

600/100FG Chassis Cable, coil cord, 8 ft extended

600/101FG Chassis Cable, coil cord, 16 ft extended

600/102FG Chassis Ground Probe, 8 ft coil cord

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

600/200FG External Leakage Cable, coil cord, 8 ft extended

600/201 External Leakage Cable, coil cord, 16 ft extended

600/206 Universal Ultrasound Probe Tester

LT544DPLUS
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: 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.

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)

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

Ordering information

LT544DPLUS United States, 85 V ac to 265 V ac, 50/60 Hz

LT544DPLUS-AUS Australia, 85 V ac to 265 V ac, 50/60 Hz

LT544DPLUS-ISR Israel, 85 V ac to 265 V ac, 50/60 Hz

LT544DPLUS-ITL Italy, 85 V ac to 265 V ac, 50/60 Hz

LT544DPLUS-SWS Switzerland, 85 V ac to 265 V ac, 50/60 Hz

LT544DPLUS-UK United Kingdom, 85 V ac to 265 V ac, 50/60 Hz

LT544DPLUS-2020 85 V ac to 265 V ac, 50/60 Hz, 20-Amp NEMA power plug with 20-Amp female power connector

LT544DPLUS-230V 85 V ac to 265 V ac, 50/60 Hz, 230 V ac North America power plug and female power connector

Included accessories

600/100FG Chassis Cable, coil cord, 8 ft extended

600/101FG Chassis Cable, coil cord, 16 ft extended

600/102FG Chassis Ground Probe, 8 ft coil cord

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

600/200FG External Leakage Cable, coil cord, 8 ft extended

600/201 External Leakage Cable, coil cord, 16 ft extended

600/206 Universal Ultrasound Probe Tester

ULT800
Ultrasound Transducer Leakage Tester

FLUKE® Biomedical

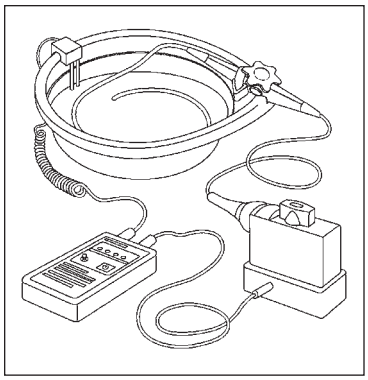
ULT800 tests the electrical safety of ultrasound transducers independent of their ultrasound machines. A variety of adapters allow for testing of many different makes and models, including transesophageal echocardiography (TEE) transducers.

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.

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



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

Ordering information

ULT800 ULT800 Ultrasound Transducer Leakage Tester Kits
ULT800K-CUST1 Cust1 Ultrasound Transducer Leakage Tester Kit

Included accessories
ULT800 (ULT800K-CUST1), dual-conductivity electrode (600/212FG), and hard-sided carrying case (600/214FG)

ULT800K-CUST2 Cust2 Ultrasound Transducer Leakage Tester Kit

Included accessories
ULT800 (ULT800K-CUST2), Dual-Conductivity Electrode for 800 Cleaning tub (600/220FG), and 800 Cleaning tub and Storeage Foam Kit

Key features

- 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

Optional accessories

600/214FG Hard-sided Carrying Case
600/220FG Dual Conductivity Electrode—for use with Cidex 2032 Tray
600/220PLUS Dual Conductivity Electrode for use with 800-Cleaning Tub
600/215FG Conductivity Adapter Cable for PCI GUS cleaning
600/206 Universal Ultrasound Probe for DALE601 and DALE601E
600/102FG Chassis Ground Probe for DALE601/DALE601E
800-CLEANING TUB Cleaning Tub/Lid with foam and box
600/212FG Dual Conductivity Electrode
600/220B Conductive Probe for Deep Tub

Transducer adapters
600/156FG Acuson/Siemens ultrasound transducer adapter for Acuson 156 and V510B Transducers
600/260FG Acuson/Siemens Ultrasound Transducer Adapter for Acuson 260 Transducers
600/MPFG Acuson/Siemens Ultrasound Transducer Adapter for Acuson MP, 8V5, 15L8w, V5M and 3V2c Transducers
600/213FG 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
600/210FG HP/Agilent Ultrasound Transducer Adapter (600/210)
600/211FG HP/Agilent Ultrasound Transducer Adapter (600/211)
600/240FG GE LogiQ Ultrasound Transducer Adapter (600/204)
600/205 GE LogiQ Ultrasound Transducer Adapter (600/205)
600/202FG GE YMS/RT Ultrasound Transducer Adapter for GE YMS/RT Transducers
600/218FG Philips Ultrasound Transducer Adapter (ATL/600/218)
800-PHILIPS-04 Ultrasound Transducer Adapter (for use with Philips iE33 and iU22 diagnostic ultrasound TEE transducers)
800/TEE SonoSite TEE Ultrasound Transducer Adapter (for use with all SonoSite Transducers-including TEE)
600/260 Siemens Probe Adapter MPT7-4
600/216A Ultrasound Transducer Adapter (Aloka) English
600/216G Ultrasound Transducer Adapter (Aloka)

BP Pump 2
Non-Invasive Blood Pressure Simulator

FLUKE® Biomedical

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
- Physiological waveform
- Internal pump for high- and low-pressure release verification, leak testing, and pressure sourcing
- Preset mode for simulation of most patient conditions
- Five-leads synchronized ECG simulation
- 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: 50 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: 0.1 cc Cuff #2: Blood pressure: 60/30 Heart rate: 120 BPM Pulse volume: 0.1 cc Cuff #3: Blood pressure: 80/50 Heart rate: 120 BPM Pulse volume: 0.1 cc Cuff #4: Blood pressure: 100/70 Heart rate: 120 BPM Pulse volume: 0.1 cc
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**: 20 mmHG to 250 mmHG **Diastolic pressure range**: 10 mmHG to 200 mmHG **Heart rate**: 30 BPM to 250 BPM **Pulse volume**: 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

Optional accessories

ANSUR BP PUMP 2 Ansur BP Pump 2 Plug-in
75034 Data Transfer Cable
5022010 Soft-sided Vinyl Carrying Case
2780512FG ECG Adapter Block (allows simulation of 5-lead ECG waveforms)
PRINTR/414-US120V Printer, Seiko DPU-414-30 B, 120 V power supply
PRINTR414-SHK220V Printer, Seiko DPU-414-30B, 200 V power supply
61096 Printer, 120 V power supply
61097 Printer, 220 V power supply
75034 Serial Cable, D9M-D9F
71072 Parallel Printer Cable, D25M-C36M
5027-0203FG Neonatal/external cuff mandrel (truncated plastic cylinder diameters: 7.6, 10, and 14 cm)
98175FG Wrist cuff mandrel (adult)
5215-0269FG Adult Cuff Mandrel Spacer Block (three required)
5215-0268FG Adult Cuff Mandrel End Block (two required)
BPPM2M-2001 500 ML Rigid Aluminum Chamber for NIBP Testing
BPPM2M-2002 100 ML Rigid Aluminum Chamver for NIBP Testing
700PMP External Pressure Pump

Quick NIBP monitor testing bundles
PS420/DPM1B Bundle PS420/DPM1B Bundle Kit (includes PS420, DPM1B, all accessories, and a custom carrying case)
PS410/DPM1B Bundle PS410/DPM1B Bundle Kit (includes PS410, DPM1B, all accessories, and a custom carrying case)

BP Pump 2
Non-Invasive Blood Pressure Simulator

FLUKE® Biomedical

Specifications

Heart rate for NIBP simulations	Heart rate accuracy: + 1 BPM Except for the following: Patient condition weak pulse, tachycardia, obese, geriatric: + 1 % + 1 BPM Patient condition mild exercise: + 1.5 % + 1 BPM Patient condition strenuous exercise: + 3 % + 1 BPM
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, cmH_20, cmH_20 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): ± 0.7 mmHg (0.09 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)

Ordering information

BP Pump 2_L (standard pressure transducer)
BPPUMP2L-US120V United States, 120 V
BPPUMP2L-AUS250V Australia, 250 V
BPPUMP2L-DEN250V Denmark, 250 V
BPPUMP2L-SHK250V Schuko, 250 V
BPPUMP2L-ISR250V Israel, 250 V
BPPUMP2L-ITAL250V Italy, 250 V
BPPUMP2L-IND250V India, 250 V
BPPUMP2L-SWZ250V Switzerland, 250 V
BPPUMP2L-UK250V United Kingdom, 250 V
BPPUMP2L-BRAZ250V Brazil, 250 V
TA-BPPMP2L-US United States 120V w/Test Automation
TA-BPPMP2L-AUS Australia w/Test Automation
TA-BPPMP2L-DEN Denmark w/Test Automation
TA-BPPMP2L-SHK Schuko w/Test Automation
TA-BPPMP2L-ISR Israel w/Test Automation
TA-BPPMP2L-ITAL Italy w/Test Automation
TA-BPPMP2L-IND India w/Test Automation
TA-BPPMP2L-SWZ Switzerland w/Test Automation
TA-BPPMP2L-UK United Kingdom w/Test Automation
TA-BPPMP2L-BRAZ Brazil, 250 V

BP Pump 2_M (high-accuracy pressure transducer)
BPPUMP2M-US120V United States, 120 V
BPPUMP2M-AUS250V Australia, 250 V
BPPUMP2M-DEN250V Denmark, 250 V
BPPUMP2M-SHK250V Schuko, 250 V
BPPUMP2M-ISR250V Israel, 250 V
BPPUMP2M-ITAL250V Italy, 250 V
BPPUMP2M-IND250V India, 250 V
BPPUMP2M-SWZ250V Switzerland, 250 V
BPPUMP2M-UK250V United Kingdom, 250 V
BPPUMP2M-BRAZ250V Brazil, 250 V
BPPM2M/ECG-NIM Includes a $BPPUMP2_M$-AUS250V, a ECG Adapter Block, 100 ml and 500 ml Ridid Aluminum Chambers and a Manual Pressure Pump (700PMP)
BPPM2M-NIM Includes a $BPPUMP2_M$-AUS250V, 100 ml and 500 ml Rigid Aluminum Chambers and a Manual Pressure Pump (700PMP)
TA-BPPMP2M-US United States w/Test Automation
TA-BPPMP2M-AUS Australia w/Test Automation
TA-BPPMP2M-DEN Denmark w/Test Automation
TA-BPPMP2M-SHK Schuko w/Test Automation
TA-BPPMP2M-ISR Israel w/Test Automation
TA-BPPMP2M-ITAL Italy w/Test Automation
TA-BPPMP2M-IND India w/Test Automation
TA-BPPMP2M-SWZ Switzerland w/Test Automation
TA-BPPMP2M-UK United Kingdom w/ Test Automation
TA-BPPMP2M-BRAZ Brazil, 250 V

BP Pump 2L Non-Invasive Blood Pressure Testing Bundles (with 5 leads ECG Block)
BPPM2L/ECG-US United States, 120 V
BPPM2L/ECG-AUS Australia, 250 V
BPPM2L/ECG-DEN Denmark, 250 V
BPPM2L/ECG-SHK Shuko, 250 V
BPPM2L/ECG-ISR Israel, 250 V
BPPM2L/ECG-ITAL Italy, 250 V
BPPM2L/ECG-IND India, 250 V
BPPM2L/ECG-SWZ Switzerland, 250 V
BPPM2L/ECG-UK United Kingdom, 250 V

Included accessories
2780003FG Accessory Kit (tubings and fittings)
Users Manual
Power Cord (country specific)

Included accessories with Ansur Test-Automation versions
ANSUR BP PUMP 2 Ansur BP Pump 2 Plug-in
75034 Data Transfer Cable

ProSim 8
Vital Signs Simulator

FLUKE® Biomedical

The 8-in-1 ProSim 8 Vital Signs Simulator offers fast and comprehensive preventative maintenance (PM) testing for your entire patient monitor fleet. Designed to get you in and out of most PM locations in minutes, this multifunction simulator tests ECG (including fetal ECG and arrhythmias), respiration, temperature, IBP, cardiac output/cardiac catheterization, NIBP, SpO_2, and is capable of testing Rainbow multi-wavelength waveforms. Featuring specialized stay-connected ECG posts for secure lead connections, physiologically-synchronized pulses across all parameters, and customizable patient presets and autosequences, the ProSim 8 patient simulator provides unbeatably fast and easy complete monitor testing. Barcode-scanner compatibility and wireless PC interface, direct printing, data transfer and reporting, along with advanced and integrated technologies allow top confidence in patient monitor fleet performance and supports passing regulatory audits with ease.

Specifications

Normal-sinus-rhythm waveform		
ECG reference	The ECG amplitudes specified are for Lead II (calibration), from the baseline to the peak of the R wave. All other leads are proportional	
Normal sinus rhythm	12-lead configuration with independent outputs referenced to right leg (RL). Output to 10 universal ECG jacks, color-coded to AHA and IEC standards	
High-level output	0.5 V/mV ± 5 % of the ECG amplitude setting available on a BNC connector	
Amplitude	0.05 mV to 0.5 mV (0.05 mV steps); 0.5 mV to 5 mV (0.25 mV steps)	
Amplitude accuracy	± (2 % of setting + 0.05 mV)	
ECG rate	10 BPM to 360 BPM in 1 BPM steps	
Rate accuracy	± 1 % of setting	
ECG waveform selection	Adult (80 ms) or pediatric (40 ms) QRS duration	
ST-segment elevation	Adult mode only. -0.8 mV to +0.8 mV (0.1 mV steps). Additional steps: + 0.05 mV and - 0.05 mV	
Power-on default	60 BPM, 1.0 mV, adult QRS and ST-segment elevation of 0 mV	
Pacemaker waveform		
Pacer pulse	Amplitude	0 (off), ± 2, ± 4, ± 6, ± 8, ± 10, ± 12, ± 14, ± 16, ± 18, ± 20, ± 50, ± 100, ± 200, ± 500, and ± 700 mV for lead II (reference lead)
	Accuracy	Reference lead II: ± (5 % setting + 0.2 mV)
		All other leads: ± (10 % setting + 0.4 mV)
Pacer pulse width	0.1 ms, 0.2 ms, 0.5 ms, 1 ms, and 2 ms ± 5 %	
Paced arrhythmias	Atrial 80 BPM	
	Asynchronous 75 BPM	
	Demand with frequent sinus beats	
	Demand with occasional sinus beats	
	Atrio-ventricular sequential	
	Noncapture (one time)	
	Nonfunction	
Power-on default	Amplitude 5 mV, width 1 ms, atrial waveform	

Key features

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

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

Arrhythmia		
Baseline NSR	80 BPM	
PVC focus	Left focus, standard timing (except where specified)	
Supraventricular arrhythmia	Atrial fibrillation (coarse or fine); atrial flutter; sinus arrhythmia; missed beat (one time); atrial tachycardia; paroxysmal atrial tachcardia; nodal rhythm; and supraventricular tachycardia	
Premature arrhythmia	Premature atrial contraction (PAC); premature nodal contraction (PNC); PVC1 left ventricular; PVC1 left ventricular, early; PVC1 left ventricular, R on T; PVC2 right ventricular; PVC2 right ventricular, early; PVC2 right ventricular, R on T; and multifocal PVCs	
Ventricular arrhythmia	PVCs 6, 12, or 24 per minute; frequent multifocal PVCs; bigeminy; trigeminy; multiple PVCs (one-time run of 2, 5, or 11 PVCs); mono-ventricular tachycardia (120 to 300 BPM in 5 BPM steps); poly-ventricular tachycardia (5 types); ventricular fibrillation (coarse or fine); and asystole	
Conduction defect	First-, second-, or third-degree heart block; and right- or left-bundle-branch block	
Advanced cardiac life support	Shockable pulseless arrest rhythms	Ventricular fibrillation (coarse), ventricular fibrillation (fine), unstable polymorphic ventricular tachycardia
	Non-shockable pulseless arrest rhythms	Asystole
	Symptomatic bradycardia	Sinus bradycardia (< 60 BPM)
		2nd degree AV block, mobitz type I
		2nd degree AV block, mobitz type II
		Complete/3rd degree AV block
		Right bundle branch block
		Left bundle branch block
Advanced cardiac life support cont.	Symptomatic tachycardia: regular narrow-complex tachycardia (QRS < 0.12 seconds)	Sinus tachycardia > 150 BPM
		Supraventricular Tachycardia
	Symptomatic tachycardia: regular wide-complex tachycardias (QRS ≥ 0.12 seconds)	Sinus tachycardia > 150 BPM
		Supraventricular tachycardia SVT with aberrancy
	Irregular tachycardia	Atrial fibrillation (coarse and fine), atrial flutter, unstable monomorphic ventricular tachycardia (120 BPM to 300 BPM), torsade de pointes/polymorphic ventricular tachycardia (long QT interval)
ECG Performance testing		
Amplitude	0.05 mV to 0.5 mV (0.05 mV steps)	
	0.5 mV to 5 mV (0.25 mV steps)	
Pulse wave	30 BPM, 60 BPM, with 60 ms pulse width	
Square wave	0.125 Hz, 2 Hz, 2.5 Hz	
Triangle wave	0.125 Hz, 2 Hz, 2.5 Hz	
Sine wave	0.05 Hz, 0.5 Hz, 1, 2 Hz, 5 Hz, 10 Hz, 25 Hz, 30 Hz, 40 Hz, 50 Hz, 60 Hz, 100 Hz, and 150 Hz	
R-wave detection	Waveform	Triangular pulse
	Rate	30 BPM, 60 BPM, 80 BPM, 120 BPM, 200 BPM, and 250 BPM
	Width	8 ms to 20 ms in 2 ms steps, and 20 ms to 200 ms in 10 ms steps
	Width accuracy	± (1 % of setting + 1 ms)
QRS detection	Widths	8 ms to 20 ms in 2 ms steps, and 20 ms to 200 ms in 10 ms steps
	Width accuracy	± (1 % of setting + 1 ms)
	Rate	30 BPM, 60 BPM, 80 BPM, 120 BPM, 200 BPM, and 250 BPM
	R-Wave up slope	0.875 amplitude, 0.4375 x width
	R-Wave down slope	Full amplitude, 0.5 x width
	S-Wave up slope	0.125 amplitude, 0.0625 x width
Tall T-wave rejection	Waveform	QT Interval 350 ms
		T-Wave width 180 ms
		T-Wave shape ½ sinewave
	Amplitude	0 % to 150 % reference lead amplitude in 10 % steps
	Rate	80 BPM
Rate accuracy	± 1 % of setting	
Amplitute accuracy	± (2 % of setting + 0.05 mV)	

ProSim 8
Vital Signs Simulator

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ECG artifact		
Type	50 Hz, 60 Hz, muscular, baseline wander, respiration	
Size	25 %, 50 %, 100 % of the normal sinus R-Wave for each lead	
Lead select	All, RA, LL, LA, V1, V2, V3, V4, V5, V6	
Fetal/Maternal ECG		
Fetal heart rate (fixed)	60 BPM to 240 BPM in 1 BPM steps	
Fetal heart rate (IUP)	140 BPM at beginning, then varies with pressure	
Intrauterine-pressure waveforms	Early deceleration, late deceleration, and acceleration	
Wave duration	90 seconds, bell-shaped pressure curve, from 0 mmHg to 90 mmHg and returning to 0	
IUP period	2 min, 3 min, or 5 minutes; and manual	
Default settings	FHR 120 BPM, early deceleration wave, manual	
Invasive blood pressure		
Channels	2, each independently settable with identical parameters and are individually electrically isolated from all other signals	
Input/output impedance	300 Ω ± 10 %	
Exciter input range	2 to 16 V peak	
Exciter-input frequency range	DC to 5000 Hz	
Transducer sensitivity	5 (default) or 40 µV/V/mmHg	
Pressure accuracy	± (1 % of setting + 1 mmHg) accuracy guaranteed for dc excitation only	
Static pressure	- 10 to + 300 mmHg in 1 mmHg steps	
Pressure units	mmHg or Kpa	
Dynamic waveforms	Types (default pressures	Arterial (120/80)
		Radial artery (120/80)
		Left ventricle (120/00)
		Right ventricle (25/00)
		Pulmonary artery (25/10)
		Pulmonary-artery wedge (10/2)
		Right atrium (central venous or CVP) (15/10)
	Pressure variability	Systolic and diastolic pressures are independently variable in 1 mmHg steps
Swan-Ganz sequence	Right atrium, right ventrical (RV), pulmonary artery (PA), pulmonary artery wedge (PAW)	
Cardiac catheterization	Chambers	Aortic, pulmonary valve, and mitral valve
Respiration artifact	Arterial, radial artery, and left ventricle	5 % to 10 % multiplication
	Other	5 mmHg or 10 mmHg
BP output	Circular DIN 5-Pin	
Power-on default	0 mmHg	
Respiration		
Rate	0 (OFF), 15 BrPM to 150 BrPM in 1 BrPM steps	
Waves	Normal or ventilated	
Ratio (inspiration:expiration)	Normal	1:1, 1:2, 1:3, 1:4, 1:5
	Ventilated	1:1
Impedance variations (Δ Ω)	0.00 Ω to 1.00 Ω in 0.05 Ω steps and 1 Ω to 5 Ω in 0.25 Ω steps	
Accuracy delta	± (3 % of setting + 0.05 Ω)	
Baseline	500 Ω, 1000 Ω (default), 1500 Ω, 2000 Ω, Leads I, II, III	
Accuracy baseline	± 5 %	
Respiration lead	LA or LL (default)	
Apnea selection	12 sec, 22 sec, or 32 seconds (one-time events), or continuous (Apnea ON = respiration OFF)	
Power-on default	20 BrPM, delta 1.0 Ω	
Temperature		
Temperature	30 °C to 42.0 °C in 0.5 °C steps	
Accuracy	± 0.4 °C	
Compatibility	Yellow Springs, Inc. (YSI) Series 400 and 700	
Output	Circular DIN 4-Pin	

ProSim 8
Vital Signs Simulator

FLUKE® Biomedical

Cardiac output		
Catheter type	Baxter Edwards, 93a-131-7f	
Calibration coeffecient	0.542 (0 °C injectate), 0.595 (24 °C injectate)	
Blood temperature	36 °C (98.6 °F) to 38 °C (100.4 °F) ± 0.2 °C in 1 °C steps	
Injectate volume	10 cc	
Injectate temperature	0 °C or 24 °C	
Cardiac output	2.5, 5, 10 liters per minute ± 5 %	
Faulty-injectate curve	Waveform for simulation available	
Left-to-right-shunt curve	Waveform for simulation available	
Calibrated pulse	1.5 ° for 1 second	
Connector	Circular DIN 7 pin	
Power-on default	5 liters per minute, 0 °C injectate, 37 °C blood temperature	
Non-invasive blood pressure		
Pressure units	mmHg or kPa	
Manometer (pressure meter)	Range	10 mmHg to 400 mmHg
	Resolution	0.1 mmHg
	Accuracy	± (0.5 % reading + 0.5 mmHg)
Pressure source	Target pressure range	20 mmHg to 400 mmHg
	Resolution	1 mmHg
NIBP simulations	Pulse	2 mmHg max into 500 ml NIBP system
	Volume of air moved	1.25 ml max
	Simulations (systolic/diastolic [MAP])	Adult: 60/30 (40), 80/50 (60); 100/65 (77); 120/80 (93); 150/100 (117); and 200/150 (167) and 255/195 (215)
		Neonatal: 35/15 (22); 60/30 (40); 80/50 (60); 100/65 (77); 120/80 (93) and 150/100
		Pressure variability: systolic and diastolic pressures are variable by 1 mmHg
NIBP simulations cont.	Repeatability	Within ± 2 mmHg (at maximum pulse size independent of device under test)
	Synchronization: normal Sinus heart rates: 30 BPM to 240 BPM	Maximum rate at 1 ml: 240 BPM achievable with pulses up to 1 ml
		Maximum rate at 1.25 ml: 180 BPM
	Synchronization: arrhythmias	Premature atrial contraction (PAC), premature ventricular contraction (PVC), atrial fibrillation, and missed beat
Leak test	Target pressure	20 mmHg to 400 mmHg
	Elapse time	0:30 min to 5:00 minutes: seconds in 30 second steps
	Leakage rate	0 mmHg/minute to 200 mmHg/minute
Pressure relief test range	100 to 400 mmHg	

Oximeter SpO_2 optical emitter and detector (optional)		
% O_2	Range	30 % to 100 %
	Resolution	1 %
% O_2 accuracy	With oximeter manufacturer's R-curve	Saturation within UUT specific range: ± (1 count + specified accuracy of the UUT)
		Saturation outside UUT specific range: monotonic with unspecified accuracy
	With Fluke Biomedical R-curves	91 % to 100 % ± (3 counts + specified accuracy of the UUT)
		81 % to 90 % ± (5 counts + specified accuracy of the UUT)
		71 % to 80 % ± (7 counts + specified accuracy of the UUT)
		Below 71 % monotonic with unspecified accuracy
Heart rate	30 BPM to 300 BPM in 1 BPM steps. Oximeter SpO_2 optical emitter and detector is synchronized with ECG rate delayed by 150 ms.	
Transmission: ratio of detector current to LED current, expressed in parts per million (ppm)	Range	0 ppm to 300.00 ppm
	Resolution	0.01 ppm
	Accuracy	+ 50 %/– 30 % for compatible monitors, unspecified for others. Selected by finger size and color: dark, thick finger, medium finger, light, thin finger, neonatal foot.
Pulse amplitude	Range	0 % to 20.00 %
	Resolution	0.01 %
Artifact	Respiration	Range: 0 % to 5 % of transmission
		Resolution: 1 %
		Rate: all ProSim respiration simulation settings
	Ambient light	Range: 0 to 5X transmitted light
		Resolution: 1X
		Frequency: DC, 50 Hz, 60 Hz, and 1 kHz to 10 kHz in 1 kHz steps
Masimo Rainbow technology	Masimo Rainbow technology with an optional adapter supplied by Masimo that allows the ProSim two wavelength to test the Rainbow multiple wavelength system	
Compatible manufacturer products	With manufacturer R-curve	Nellcor, Masimo, Nonin, and Nihon Kohden
	With Fluke R-curve	Mindray, GE-Ohmeda, Philips/HP, and BCI

Pre-Defined Simulations
Normal
Hypertensive
Hypotensive
Tachycardic
Bradycardic
Ventricular fibrillation
Asystole
Autosequences (default)
Monitor testing sequence
Medical training sequence
Oximeter testing sequence
Cardiac failure sequence
Arrhythmia sequence
Exercise sequence
Respiration sequence
Performance wave test
IBP testing sequence
Temperature sequence

Optional accessories

2392199 CI-3 Cardiac Output Box
3408564 Mini-DIN to DIN IBP Adapter
3890640 NIBP Test Chamber 500ML
4034627 Ansur Test Software ProSim 8 Plug-In

Cable kits
3984910 ProSim 8 Accessory Kit (includes DIN to minDin adapter, HP/Philips Intellivue IBP cable, GE Marquette Eagle/Dash/Solar IBP cable, Welch Allyn Propaq/SpaceLabs Ultraview IBP cable, USB wireless dongle, YSI400 series temperature cable, YSI700 series temperature cable, CI-3 Cardiac Output Box, spare battery pack)
3984922 HP/Philips Intellivue Cable Set
3984968 GE Marquette Eagle/Dash/Solar Cable Set
3984946 ProSim 8 SpaceLabs Ultraview Cable set
3984979 Welch Allyn/Propaq Cable Set

ProSim 8
Vital Signs Simulator

FLUKE® Biomedical

General specifications		
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	
Altitude	3,000 meters (9,843 ft)	
Dimensions (L x W x H)	14.5 cm x 30.2 cm x 8.6 cm (5.7 in x 11.9 in x 3.4 in)	
Display	LCD color display	
Communication	USB device upstream port	Mini-B connector for control by a computer
	USB host controller port	Type A, 5 V output, 0.5 A max load. Connector for keyboard, barcode reader, and printer
	Wireless	IEEE 82.15.4 for control by a computer
Power	Lithium-ion rechargeable battery	
Battery charger	100 V to 240 V input, 15 V/2.0 A output. For best performance, the battery charger should be connected to a properly-grounded ac receptacle	
Battery life	Nine hours (minimum), 100 NIBP cycles typical	
Weight	1.87 kg (4.2 lb)	
Safety standards	EN/IEC 61010-1:2001	
Certifications	CE, CSA, C-TICK N10140 , RoHS	
Electromagnetic compatibility (EMC)	IEC 61326-1:2006	

3984993 Drager Infinity Cable Set
3985009 ProSim 8 Nihon Kohden Cable Set

Blood pressure cables
2198879 BCI International TK-1 (6M)
2198879 Criticare Systems Inc. (1100) TK-1 (6M)
2198879 Critikon (Dinamap Plus) TK-1 (6M)
2198887 Datascope DS-1 (6F)
2200955 Datex (AS/3, CS/3, Compact, Cardio Cap II, Critical Care, Light) DX-1 (10F)
2199387 Fakuda Denshi (DS3300 series) FD-2 (12M)
2199682 GE Marquette Medical Corametrics (115, 116, 142, 145, 556) CM-3 (Nicolet round – 12M)
2198893 GE Marquette Medical (PPG/E for M DR) EM-1 (6F)
2198978 GE Marquette Medical (7000 and TRAM-AR series only) MQ-2 (8M round)
2199627 GE Marquette Medical (Dash, Eagle, Solar, Tram, and MacLab) MQ-3 (rectangular – 11M)
2198902 Hewlett Packard/Philips (78-300, 78-500, 78-800, Merlin/ Viridia/ Omnicare (HP/Philips M1006B iBP module has a sensitivity of 5 uV/V/ mmHg only. The HP-3 cable should be selected for this application.) HP-3 (12M 5 µV)
2198916 Hewlett Packard/Philips (78-300, 78-500, 78-800, Merlin/Viridia/ Omnicare) HP-4 (12M 40 µV)
2199694 Hewlett Packard/Philips (8040A, M1350A) HP-8 (intrauterine pressure only – 12M 40 µV)
2198879 Invivo Research TK-1 (6M)
2198879 Ivy Biomedical (400 and 700 series) TK-1 (6M)
2198940 Medical Data Electronics (Escort series) PC-1 (6M)
2198933 Mennen Medical (Horizon series) MM-1 (6M)
2198879 North American Drager (Vitalert 2000) TK-1 (6M)
2198940 Physio Control (VSM series) PC-1(6M)
2198879 Protocol System (Propaq series) TK-1 (6M)
2190955 Puritan Bennett PB 240 DX-1 (10F)
2199176 Quinton (Q Cath series) QM-1 (6M)
2198925 Siemens (SIRECUST series) [SM-1 and Siemens Medical Transducer Adapter (3368-383-E530U) used to run a single invasive BP channel on the Siemens Medical SC6000 and SC9000 series monitors] SM-1 (10M)
2199666 Siemens (Micor/Mingo) SM-3 (15M)
2198879 SpaceLabs (1050, 1700, PCMS series) (SpaceLabs adapters 700-0028-00 and 0120- 0551-00 with TK-1 used when testing the new UltraView Command Module) TK-1 (6M)
2392173 Universal unterminated UU-1 (5-Pin DIN one end only)
2198893 Witt Biomedical EM-1 (6F)
DIN PB IBP,Schiller PB Series IBP Cable (5M DIN)

Temperature cables
2199019 UT-2 standard 1/4 in phone plug (compatible with YSI 700 series – 3 conductor)
2199291 UT-3 unterminated cable (DIN plug on one end only)
2523334 UT-4 Low profile, 1/4 in phone plug, YSI 400 series compatible, two conductor
2199257 HPT-2 temperature adapter (Hewlett Packard) (2 pin, used with UT-1 for HP monitors)

Cardiac output bath/injectate adapters
2392199 CI-3 cable assembly
2392158 General purpose connector
2199240 COA-1 Cardiac output adapter (Hewlett Packard) (HPT-2 also required for cardiac output simulation on HP patient-monitoring systems)
2199257 HPT-2 Temperature adapter (Hewlett Packard) (2 pin) (COA-1 also required for cardiac output simulation on HP patient-monitoring systems)

Ordering information

ProSim 8 ProSim 8 Vital Signs Simulator
ProSim SPOT ProSim SpO_2 Test Module
ProSim RAINBOW ProSim Rainbow Sensor

Included accessories
3980671 ProSim 6/8 Users Manual
3980667 ProSim 6/8 Getting start manual
3938110 ProSim 6/8 Battery Pack
1626219 USB Cable
2392173 IBP Cable, unterminated
3987170 ProSim 6/8 Carrying Case
2392370 Adult Cuff Mandrel End Blocks
2392381 Adult Cuff Mandrel Spacer Blocks
2392328 Neonatal Cuff Mandrel
2391882 Set of NIBP Cuff Adapters
2184298 AC/DC Power Supply
Power cord (country-specific)

AC Power cords
2201437 ProSim 8 AC power cord Schuko
2201455 ProSim 8 AC power cord USA
2201428 ProSim 8 AC power cord UK
2201419 ProSim 8 AC power cord Japan
2201443 ProSim 8 AC power cord Australia
3930831 ProSim 8 AC power cord Brazil

ProSim 4
Vital Signs Simulator

FLUKE® Biomedical

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

test automation software
Ansur plug-in

Key features

- Portable multifunction tester offers 12-lead ECG, respiration, IBP and NIBP simulation
- 90 % smaller and lighter than combined technology of legacy products
- Breakthrough touchscreen technology
- One-tap testing for most performance tests and checks
- Easy quick-check patient monitor testing in one minute or less with onboard, customizable patient pre-sets and autosequences
- Integrated, easily-replaceable battery capable of running quick checks all day
- Stay-connected ECG posts for secure lead connections
- Repeatable NIBP testing within 2 mmHg independent of device under test
- Multi-language user interface offers choice of language selection
- Tilt stand design for operation in tight spaces and better viewing angle

Specifications

Normal-sinus-rhythm waveform	
ECG reference	The ECG amplitudes specified are for Lead II (calibration), from the baseline to the peak of the R wave. All other leads are proportional
Normal sinus rhythm	12-lead configuration with independent outputs referenced to right leg (RL). Output to 10 universal ECG Jacks, color-coded to AHA and IEC standards
Amplitude	1 mV
Amplitude accuracy	± 5 % of setting Lead II
ECG rate	30 BPM, 60 BPM, 80 BPM, 90 BPM, 120 BPM, 150 BPM, 180 BPM, 210 BPM, 240 BPM, 270 BPM, 300 BPM, and 320 BPM. Preset and monitor testing sequence hypotensive condition is at 40 BPM
Rate accuracy	± 1 % of setting
ECG waveform selection	Adult (80 ms) or neonatal (40 ms) QRS duration
Power-on default	60 BPM, 1.0 mV, adult QRS

Arrhythmia		
Atrial fibrillation	Coarse or fine	
Premature ventricular contraction	Left ventricular	
Ventricular tachycardia	160 BPM or 200 BPM	
Ventricular fibrillation	Coarse or fine	
Transvenous pacer pulse	75 BPM, left arterial, 3 mV amplitude on lead II, accuracy ± 10 %, 1.0 ms width	
2nd degree AV block	Type 1	
3rd degree AV block	3rd degree AV block	
Asystole	Asystole	
ECG performance testing		
Amplitude	1 mV	
Square wave	60 ms at 2 Hz	
Respiration		
Rate	0 (OFF), 10 BrPM to 100 BrPM in 10 BrPM steps	
Impedance variations (Δ Ω)	1 Ω	
Accuracy delta	± (10 % + 0.05 ohm)	
Baseline	500 Ω to circuit common, giving 1000 Ω between any two leads	
Accuracy baseline	± 5 %	
Respiration lead	LA or LL (default)	
Invasive blood pressure		
Channels	1 electrically isolated from all other signals	
BP output	Circular DIN 5-pin	
Input/output impedance	300 Ω ± 10 %	
Exciter input range	2 to 16 V peak	
Exciter-input frequency range	DC to 5000 Hz	
Transducer sensitivity	5 µV/V/mmHg	
Pressure accuracy	± (1 % of setting + 1 mmHg) Accuracy guaranteed for dc excitation only	
Static pressure	0 mmHg, 80 mmHg, 160 mmHg, and 250 mmHg	
Dynamic waveforms	Synchronization	To ECG heartrate
	Chambers simulated and systolic/diastolic pressure:	
Type	**IBP (arterial)**	**IBP (left ventrical)**
Adult	60/30	60/0
Adult	120/80	120/0
Adult	150/100	150/0
Adult	200/150	200/0
Neonatal	35/15	35/0
Neonatal	70/40	70/0
Non-invasive blood pressure		
Pressure units	mmHg	
Manometer (pressure meter)	Range	10 mmHg to 400 mmHg
	Resolution	0.1 mmHg (for display purposes)
	Accuracy	± (1 % reading + 1 mmHg)
Pressure source	Inflation bulb or device under test	

NIBP simulations	Pulse	2 mmHg max into 500 ml NIBP system
	Volume of air moved	1 ml max
	Simulations	Adult: 60/30 (40), 120/80 (93); 150/100 (117); and 200/150 (167)
		Neonatal: 35/15 (22) and 70/40 (50)
	Repeatability	Within ± 2 mmHg (at maximal pulse size independent of device under test)
	Synchronization	To ECG heartrate (maximal rate 120 BPM)
Leak test	Target pressure	20 mmHg to 400 mmHg
	Elapse time	0:30 minutes to 5:00 minutes: seconds in 30 second steps
	Leakage rate	1 mmHg/minute to 200 mmHg/minute
Pressure relief test range	100 mmHg to 400 mmHg	
Presets and autosequences		
Presets	Normal	
	Hypertensive	
	Hypotensive	
Autosequences	Cardiac failure sequence	
	Exercise sequence	
	Respiration sequence	
	Monitor testing sequence	

General specifications		
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	
Altitude	3,000 meters (9,843 ft)	
Dimensions (L x W x H)	18 cm x 9.3 cm x 5.5 cm (7.1 in x 3.7 in x 2.2 in)	
Display	LCD touch-screen color display	
Communication	USB port (for calibration and firmware updates only)	
Power	Lithium-ion rechargeable battery	
Battery charger	TBD	
Battery life	Four hours (minimum), 40 NIBP cycles typical	
Weight	0.88 kg (1.93 lb)	
Safety standards	IEC 61010-1:2001	
Certifications	CE, CSA, C-TICK N10140, RoHs	
Electromagnetic compatibility (EMC)	IEC 61326-1:2006	

ProSim 4
Vital Signs Simulator

FLUKE® Biomedical

Optional accessories

3984878 ProSim 4 Accessory Kit, includes: Unterminated IBP cable, HP-3 IBP cable, MQ-3 IBP cable, TK-1 IBP cable, Adult cuff Mandrel spacer block (3), Adult cuff Mandrel end block (2), Neonatal Mandrel, USB cable, Spare Battery pack, ECG Snap/banana adapter
2392328 Neonatal Cuff Mandrel
2392370 Adult Cuff Mandrel End Blocks (2 needed)
2392381 Adult Cuff Mandrel Spacer Blocks
(3 needed)
4026551 ECG Snap Adapter 4 mm and 3.2 mm ECG Banana Adapter Converter Modules (international only)

Line cords
284174 ProSim 4 line cord US
769422 ProSim 4 line cord Schuko
769455 ProSim 4 line cord UK
284174 ProSim 4 line cord Japan
658641 ProSim 4 line cord Australia
284174 ProSim 4 line cord Brazil

Blood pressure cables
2198879 BCI International TK-1 (6M)
2198879 Criticare Systems Inc. (1100) TK-1 (6M)
2198879 Critikon (Dinamap Plus) TK-1 (6M)
2198887 Datascope DS-1 (6F)
2200955 Datex (AS/3, CS/3, Compact, Cardio Cap II, Critical Care, Light) DX-1 (10F)
2199387 Fakuda Denshi (DS3300 series) FD-2 (12M)
2199682 GE Marquette Medical Corametrics (115, 116, 142, 145, 556) CM-3 (Nicolet round – 12M)
2198893 GE Marquette Medical (PPG/E for M DR) EM-1 (6F)
2198978 GE Marquette Medical (7000 and TRAM-AR series only) MQ-2 (8M round)
2199627 GE Marquette Medical (Dash, Eagle, Solar, Tram, and MacLab) MQ-3 (rectangular – 11M)
2198902 Hewlett Packard/Philips (78-300, 78-500, 78-800, Merlin/Viridia/ Omnicare (HP/Philips M1006B iBP module has a sensitivity of 5 uV/V/mmHg only. The HP-3 cable should be selected for this application.) HP-3 (12M 5 µV)
2198916 Hewlett Packard/Philips (78-300, 78-500, 78-800, Merlin/Viridia/ Omnicare) HP-4 (12M 40 µV)
2199694 Hewlett Packard/Philips (8040A, M1350A) HP-8 (intrauterine pressure only – 12M 40 µV)
2198879 Invivo Research TK-1 (6M)
2198879 Ivy Biomedical (400 and 700 series) TK-1 (6M)
2198940 Medical Data Electronics (Escort series) PC-1 (6M)
2198933 Mennen Medical (Horizon series) MM-1 (6M)
2198879 North American Drager (Vitalert 2000) TK-1 (6M)
2198940 Physio Control (VSM series) PC-1(6M)
2198879 Protocol System (Propaq series) TK-1 (6M)
2190955 Puritan Bennett PB 240 DX-1 (10F)
2199176 Quinton (Q Cath series) QM-1 (6M)
2198925 Siemens (SIRECUST series) [SM-1 and Siemens Medical Transducer Adapter (3368-383-E530U) used to run a single invasive BP channel on the Siemens Medical SC6000 and SC9000 series monitors] SM-1 (10M)
2199666 Siemens (Micor/Mingo) SM-3 (15M)
2198879 SpaceLabs (1050, 1700, PCMS series) (SpaceLabs adapters 700-0028-00 and 0120- 0551-00 with TK-1 used when testing the new UltraView Command Module) TK-1 (6M)
2392173 Universal unterminated UU-1 (5-Pin DIN one end only)
2198893 Witt Biomedical EM-1 (6F)
3799486 PB Series IBP Cable (5M DIN)

Ordering information

ProSim 4 Prosim 4 Vital Signs Simulator

Included accessories
3931478 ProSim 4 Getting Started Manual
3931519 ProSim 4 Users Manual CD
2461946 Manual Inflation Bulb
2391882 Set of NIBP Cuff Adapters
3986253 ProSim 4 Battery Pack
4026773 ProSim 4 Power Supply
Line Cord ProSim 4 Line Cord (country-specific)
4026799 ProSim 4 Carrying Case

MPS450
Patient Simulator

FLUKE® Biomedical

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 performing 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

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	PS410	DataSim 6100
Arrhythmia selections	43	32	35	35	34
Respiration	Yes	Yes	Yes	No	Yes
BP channels	Yes, four	Yes, four	Yes, two	No	Yes, three
Swan-Ganz procedure	Yes	Yes	Yes	No	Yes
Temperature channels	Yes, one	Yes, two	Yes, one	No	No
User-programmable auto-sequences	Yes (with HHC3)	Yes, internal feature plus HHC3 capability	No	No	Yes
Cardiac output	Optional	Optional	Standard	No	Optional

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 Thermodilution method, (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: 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)

Ordering information

MPS450 MPS450 Patient Simulator
MPS450-01 Australia
MPS450-02 Denmark
MPS450-03 India
MPS450-04 Israel
MPS450-05 Italy
MPS450-06 Schuko
MPS450-07 Switzerland
MPS450-08 United Kingdom
MPS450-09 Brazil
MPS450-CO MPS450-CO (base model plus cardiac-output simulation)
MPS450-CO-01 Australia
MPS450-CO-02 Denmark
MPS450-CO-03 India
MPS450-CO-04 Israel
MPS450-CO-05 Italy
MPS450-CO-06 Schuko
MPS450-CO-07 Switzerland
MPS450-CO-08 United Kingdom
MPS450-CO-09 Brazil
MPS450-FET MPS450-FET (base model plus direct fetal/maternal ECG simulations
MPS450-FET-01 Australia
MPS450-FET-02 Denmark
MPS450-FET-03 India
MPS450-FET-04 Israel
MPS450-FET-05 Italy
MPS450-FET-06 Schuko
MPS450-FET-07 Switzerland
MPS450-FET-08 United Kingdom
MPS450-FET-09 Brazil
MPS450-CO/FET MPS450-CO/FET (base model plus cardiac-output and direct fetal/maternal ECG simulations
MPS450-CO/FET-01 Australia
MPS450-CO/FET-02 Denmark
MPS450-CO/FET-03 India
MPS450-CO/FET-04 Israel
MPS450-CO/FET-05 Italy
MPS450-CO/FET-06 Schuko
MPS450-CO/FET-07 Switzerland
MPS450-CO/FET-08 United Kingdom
MPS450-CO/FET-09 Brazil

Included accessories
BEUNVSL IEC320C14P AC Battery Eliminator
9508-0301 Users Manual

Optional accessories

9530-0072 Soft-Sided Carrying Case
75034 Serial Cable D9M-D9F
5180500 Cardiac-Output Adapter Box
HHC3 Handheld Controller

Cardiac output adapters
3010-0650FG GE Medical/Marquette Cardiac Output Cable (interface cable for GE Medical/Marquette plus monitors, including in-line switch box to select injectate temperature)
3010-0285 HPT-2 Temperature adapter (Hewlett Packard/Philips) (2 pin)
3010-0284 COA-1 Cardiac Output adapter (HPT-2 also required for cardiac output simulation on patient-monitoring systems)
5183004FG Universal Injectate Temperature Adapter Pigtail (unterminated)

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

MPS450 optional accessories

HHC3 with MPS450

This device is not to replace clinical testing of waveform detecting devices such as patient monitors. The MPS450 Multiparameter Simulator does not provide simulations for all types of fetal heart rate tracings and contraction patterns, including the following:

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

PS420
Patient Simulator

FLUKE® Biomedical

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 simulation
- Respiration and temperature simulation
- Two-channel invasive blood pressure simulation
- Cardiac output simulation
- 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
- PS420/DPM1B Bundle Kit with custom carrying case for quick ECG/NIBP patient monitoring testing

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	
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, and 6 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 in lead II 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 2651740)	
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 (WxDxH)	9.4 cm x 15.6 cm x 3.4 xm (3.7 in x 6.1 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

17024 Universal Banana Adapter
17191 Carrying Case, single pocket, soft
17192 Carrying Case, double pocket, soft
37290 Cardiac Output Adapter Box PS420
17440 BP Cable, unterminated PS420
17445 Temperature Cable, unterminated PS420
17291 RS-232 Cable

Ordering information

PS420 Patient Simulator
PS420/DPM1B Bundle Kit (includes PS420, DPM1B, all accessories, and a custom carrying case

Included accessories
MANUAL PS420 Users Manual (printed)
CD-ROM PS420 Users Manual (electronic, CD)
BE-UNVSL-IEC320C14 Battery Eliminator 100 V ac to 240 V ac
9 V Battery

PS420/DPM1B Bundle Kit

PS410
Patient Simulator

FLUKE® Biomedical

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
- PS410/DPM1B Bundle Kit with custom carrying case for quick ECG/NIBP patient monitor testing

Optional accessories

17191 Carrying Case, single pocket
17192 Carrying Case, double pocket
17024 Universal Banana Adapters

Ordering information

PS410 Patient Simulator
PS410/DPM1B Bundle Kit (includes PS410, DPM1B, all accessories, and custom carrying case)

Included accessories
CD-ROM PS410 Users Manual (electronic, CD)
MANUAL PS410 Users Manual (printed)
BE-UNVSL-IEC320C14 Battery Eliminator 100 V ac to 240 V ac
9 V battery

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

*Event occurs once. To repeat, enter the selection again.

HHC3
Hand Held Controller

FLUKE® Biomedical

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)

Optional accessories

BEUNVSL IEC320C14P Battery Eliminator

Ordering information

HHC3 Hand Held Controller

Included accessories
MANUAL Users Manual
CABLE ASSEMBLY medSim 300B Serial Interface Cable
CABLE ASSEMBLY MPS450 and Marq III Serial Interface Cable
2702287 Serial Interface Cable HHC3 to Computer
CD Utility Software
CARD medSim 300B Instruction Card
CARD MPS450 and Marq III Instruction Card
9503-0081 4-way Stop Cock Adapter
AA alkaline batteries (4)

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)

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

Optional accessories

BE-UNVSL-IEC320C14 Battery Eliminator 100 V ac to 240 V ac
17192 Carrying Case, Double Pocket
17482 Philips 50 Series—Ultrasound Cable
17484 Agilent 50 Series TOCO—External Cable
17487 Agilent 50 and 8040 Series TOCO—IUP Cable
17481 Corometrics TOCO—External Cable
17483 Corometrics—Ultrasound Cable
17486 Corometrics TOCO—IUP Cable
17487 HP/AG/PHILIPS IUP TOCO Simulation Cable
17488 HP (8040 Series) Ultrasound Simulation Cable
17489 HP (8040 Series) Ext TOCO Simulation Cable
17491 Oxford Ultrasound Simulation Cable 2.0 MHz (blue)
17492 Oxford IUP Simulation Cable
17291 RS-232 Cable
MFH-1 Mechanical Fetal Heart Probe
17156 Mechanical Fetal Heart Cable

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

PS320
Fetal Simulator

FLUKE® Biomedical

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

PS320 Fetal Simulator
MFH-1 Mechanical Fetal Heart Probe (includes fetal heart cable 17156)

Kit #1: GE Corometrics
PS320 KIT GE CORO PS320 Fetal Monitoring Kit, GE Corometrics, includes:
PS320 Fetal Simulator (includes Operator Manual (MANUAL), Battery Eliminator (BE-UNVSL-IEC320C14), 9 V Battery)
MFH-1 Mechanical Fetal Heart Probe [includes Fetal Heart Cable (17156)]
ACCU LUNG CASE Soft-Sided Carrying Case
17291 RS-232 Cable, PS320/420
17483 Corometrics Ultrasound Simulation Cable
17481 Corometrics IUP Cable
17486 Corometrics TOCO Simulation Cable
4021537 Corometrics 120 Ultrasound Cable

Kit #2: Hewlett-Packard, Agilent, Philips Medical
PS320 KIT PHILIPS PS320 Fetal Monitoring Kit, Series 50/8040 Philips Medical, Hewlett-Packard, Agilent, includes:
PS320 Fetal Simulator (includes Operator Manual (MANUAL), Battery Eliminator (BE-UNVSL-IEC320C14), 9 V Battery)
MFH-1 Mechanical Fetal Heart Probe [includes Fetal Heart Cable (17156)]
ACCU LUNG CASE Soft-Sided Carrying Case
17291 RS-232 Cable, PS320/420
17482 HP/AG/PHILIPS (50 Series) Ultrasound Simulation Cable PS320
17484 HP/AG/PHILIPS (50 Series) EXT TOCO Simulation Cable PS320
2462528 Agilent 50/8040 Series IUP
17488 HP (8040 Series) Ultrasound Simulation Cable PS320
17489 HP (8040 Series) EXT TOCO Simulation Cable PS320

Kit #3: Oxford Medical
PS320 KIT OXFORD PS320 Fetal Monitoring Kit, Oxford Medical, includes:
PS320 Fetal Simulator (includes Operator Manual (MANUAL), Battery Eliminator (BE-UNVSL-IEC320C14), 9 V Battery)
MFH-1 Mechanical Fetal Heart Probe [includes Fetal Heart Cable (17156)]
ACCU LUNG CASE Soft-Sided Carrying Case
17291 RS-232 Cable, PS320/420
17492 Oxford IUP Cable PS320
17491 Oxford Ultrasound Simulation Cable 2 MHz (blue) PS320
17490 Oxford Ultrasound Simulation Cable 1.5 MHz (yellow) PS320

ACCU LUNG
Portable Precision Test Lung

FLUKE® Biomedical

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

Ordering information

ACCU LUNG Precision Test Lung

Included accessories
Operator's/Service Manual
ACCU LUNG CASE Soft-sided Carrying Case

Specifications

Environmental parameters	
Operating temperature	10 °C to 40 °C
Storage temperature	0 °C to 50 °C
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
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)

VT MOBILE
Portable Gas-Flow Analyzer

FLUKE® Biomedical

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.

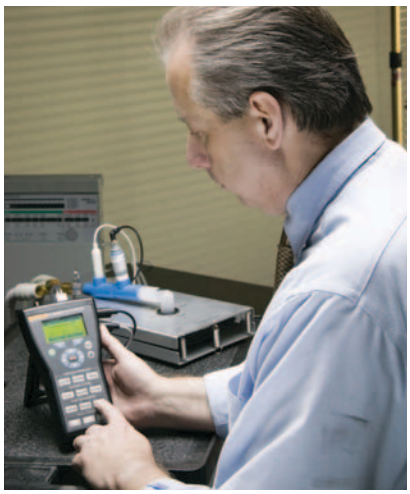
Key features

- 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

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, Heliox, He bal O_2, User
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 ± 2 cmH_2O, whichever is greater	+2 % of reading or +0.2 psig	+2 % of reading or ± 2 cmH_2O, whichever is greater



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 Tilt Stand in low-tilt position

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, whichever is greater

	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 lpm to 60 lpm	± 3 %
Breath rate	0.1 bpm	2 bpm to 150 bpm	± 1 %
Inspiratory, expiratory time	0.01 s	0.25 s to 9.99 s	± 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 1 cmH_2O
Positive-end expiratory pressure (PEEP)	0.1 cmH_2O	–5 cmH_2O to 40 cmH_2O	± 3 % or 1 cmH_2O
Peak expiratory flow	0.01 lpm	0 lpm to 150 lpm	± 3 % of reading or 2 % of range
Peak inspiratory flow	0.01 lpm	0 lpm to 150 lpm	± 3 % of reading or 2 % of range
Temperature	0.1 °C	0 °C to 50 °C	± 1 °C
	Units: °C, °F, °K		
Humidity	0.1 %	10 % to 95 %	± 10 % RH
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

VTMOB High-pressure Adapter, male to male
VTMOB-4405 Temperature and RH Sensor, Cable and T Adapter, 6 ft
VTMOB-OWR ADAPTER Power adapter, universal (USA and international)
ACCU LUNG ACCU Lung Portable Precision Test Lung

Ordering information

VTMOB/ENG United States, English overlay
VTMOB/FRA France, French overlay
VTMOB-8002-02 Denmark, German overlay
VTMOB-8002-03 Italy, Italian overlay
VTMOB-8002-04 Spanish, Spanish overlay
VTMOB/JPN Japan, Japanese overlay
VTMOB/CHI Chinese, Chinese overlay
VTMOB/BRAZ Brazil, Brazil overlay

Included accessories
VTMOB-7002 Accessory Kit
VTPLUS-WIN CD, includes: quick-reference card, operators manual, getting-started manual, other matter
MANUAL Getting Started Manual
QUICK REF CARD Quick Reference Card
VTMOB/HIGH SENSOR High-flow Sensor
VTMOB/LOW SENSOR Low-flow Sensor
VTMOB/ADAPT FEMALE High-pressure Adapter, Male to Female
VTMOB-4402 Low-pressure Adapter
FITTING Oxygen-sensor Cable, 6 ft
VTMOB-4401 T Adapter for Oxygen Sensor
97132 Oxygen Sensor
BATTERY 9 V dc Battery (alkaline)
CABLE ASSEMBLY Serial Communications Cable (RS-232), 6 ft
CD ROM VT for Windows® PC Software
VTMOB/SOFTCASE Soft Carrying Case

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.

Specifications

	Low-pressure	High-pressure	Airway-pressure
Range	± 500 mmHg (10 psi)	± 100 psi	± 120 cmH_2O
Accuracy	± 0.80 % of reading or ± 1.5 mmHg, whichever is greater	± 1 % of reading or ± 0.3 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	± 1 % of range	± 2 % of range
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)

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

Optional accessories

5022010 Soft Vinyl Carrying Case for VT PLUS HF

9530-0066 Hard-sided Protective Carrying Case for VT PLUS HF (limited to stock on hand)

Test Lungs

ACCU LUNG ACCU LUNG Portable Precision Test Lung (with soft-sided carrying case

MI-14900 Michigan Instruments Non-instrumented Single-adult Test Lung

MI-11000 Michigan Instruments Non-instrumented Dual-adult Test Lung

MI-12952 Michigan Instruments Non-instrumented Adult/Infant Test Lung

48499 Siemens 190 Test Lung

48129 Parabolic Airway Resistor ring

Printers

PRINTR/CTZ-UA120V Printer 110 V, Citizen IDP 3110

PRINTR/CTZ-US220V Printer 220 V, Citizen IDP 3110

71072 Parallel Printer Cable, D25M-C36M

61096 Printer 120 V Power Supply

61097 Printer 220 V Power Supply

97116 DPU-414 and DPU-411 Printer Paper (minimum 7 rolls - price is per roll)

VT PLUS HF
Gas Flow Analyzer

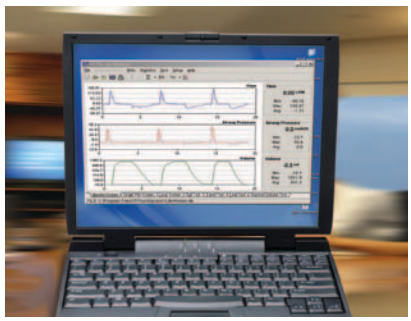
FLUKE® Biomedical

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	± 0.5 % or ± 0.02 s
Expiratory time	0.01 s	0 s to 90 s	± 0.5 % 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[1]	0.1 ml/ cmH_2O	0 ml/cmH_2O to 150 ml/ cmH_2O	± 5 % or ± 5 ml/cmH_2O
Flow bias[2]	0.01 lpm	0 lpm to 30 lpm	± 2 % or ± 0.5 lpm

[1]Inspiratory pause time: > 0.5 s
[2]Expiratory pause time: > 0.5 s

VT PLUS HF standard accessories



VT for Windows PC Software (PC not included)

Optional accessories
continued

Accessory Kit Parts
1XX0015 Filter, External (bacterial), 1 each
4934FG Adapter, DISS 02 nut and nipple with 1/4 in I.D. hose barb, 1 each
1FT0050 Tubing Adapter, Directional (15 mm OD x 15 mm OD), 2 each
1FT0049 Tubing Adapter (22 mm OD x 22 mm ID), 2 each
1FT0048 Tubing Adapter (22 mm OD x 22 mm OD), 2 each
1FT0045 Tubing Adapter (15 mm OD x 22 mm OD), 2 each
1FT0046 Tubing Adapter (15 mm OD x 15 mm OD), 2 each
1FT0047 Tubing Adapter (15 mm ID x 15 mm OD), 2 each
1FT0051 Tubing Adapter, Narrow Bore, 2 each
48478 Barb (luer lock – male to 1/89 in ID tubing), 2 each
1FT0043 Tubing Adapter (1/4 in NPT male to 1/8 in ID tubing barb fitting), 2 each
1FT0005 Tubing Adapter (luer lock 1/16 in to bulkhead connection), 2 each
2FU0005 Fuse (500 mA)
67535 Tubing 1/8 in 4 ft long, 2 each

Ordering information

VT PLUS HF Gas Flow Analyzer
VT+HF-US120 United States, 120 V
VT+HF-AUS250V Australia, 250 V
VT+HF-SHK250V Schuko, 250 V
VT+HF-UK250V United Kingdom, 250 V
VT+HF-BRAZ250 Brazil, 250V

Premium Precision Ventilator Test Kit Includes: VT PLUS HF Gas Flow Analyzer; and ACCU LUNG Portable Precision Test Lung
VT+HG/ACCULUNG-US United States, 120 V
VT+HF/ACCULUNG-AUS Australia, 250 V
VT+HF/ACCULUNG-SHK Schuko, 250 V
VT+HF/ACCULUNG-UK United Kingdom, 250 V
VT+HF/ACCULUNG-BRAZ Brazil, 250 V

VT-Plus Upgrades
(adds HF capability and RT-200 mode)
8831007 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)

Included accessories
9VT0015 Operator's Manual
8830200FG VT for Windows® PC Software
75034 Serial Cable
1HD0011 Tilt Stand
Power cord (country specific)
VT-PLUS-7001 Accessory Kit (includes 16 accessories)

DPM4
Parameter Tester

FLUKE® Biomedical

N10140

CE

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.

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

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

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

17192 Soft-Sided Carrying Case
14611 PT-100 Temperature Probe
14612 PT-1000 Temperature Probe
14610 Expansion Chamber
14622 Tubing Kit with Inflation Bulb
17449 RS-232 Cable

Ordering information

DPM4-1H Model 1H (± 350 mmHg)
DPM4-1G Model 1G (-700 to 5000 mmHg)
DPM4-2H Model 2H (± 350 mmHg, Press, Temp, Flow, RH)
DPM4-2G Model 2G (-700 to 5000 mmHg, Press, Temp, Flow, RH)

Included accessories
MANUAL Users Manual
BE-UNVSL-IEC320C14 Battery Eliminator Power Cord (country specific)
9 Volt Alkaline Battery

DPM1B
Pneumatic Transducer Tester

FLUKE® Biomedical

CE

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

Ordering information
DPM1B Pneumatic Transducer Tester

Included accessories
MANUAL Users Manual
9503-0081 4-Way Stop Cock Adapter
BATTERY 9 V alkaline battery

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	0.1 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)

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	–	–	–

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 testophthalmology 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

DALE22 Parabolic Flow Adapter
3010-0442 Phone to BNC Cable

Ordering information

DPM2PLUS Pressure Meter

Included accessories
MANUAL Operator's Manual
ADAPTER Catheter Adapter
9 V Alkaline Battery

Specifications

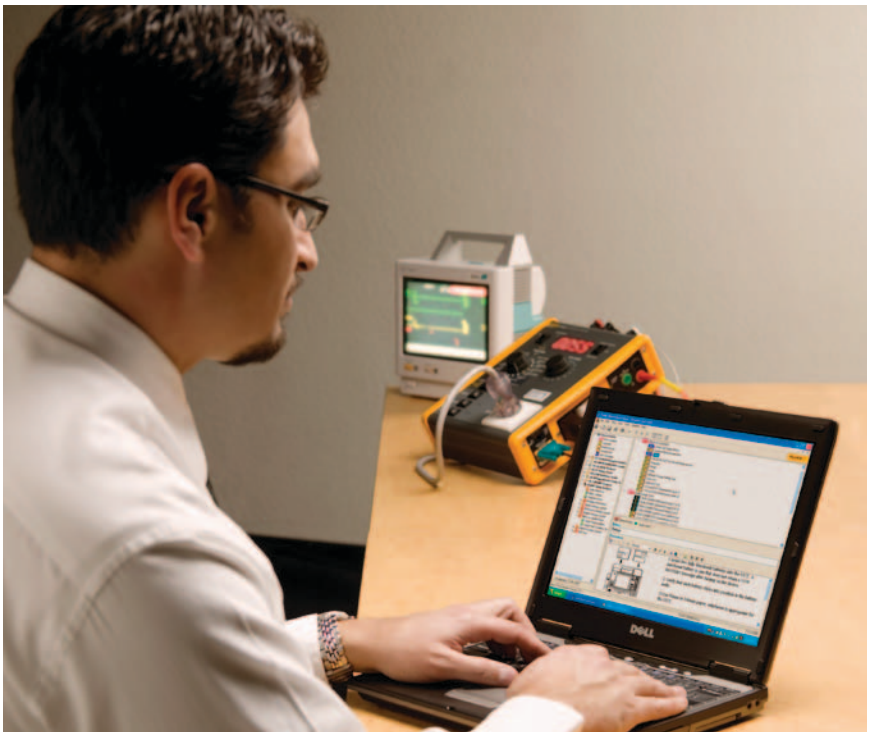
Operating range	-698 mmHg to 802 mmHg -949 cmH_2O to 1090 cmH_2O -374 inH_2O to 429 inH_2O -13.50 PSI to 15.50 PSI -13.5 PSI to 100 PSI
Accuracy	± 1 % of full scale
Units of measure	mmHg, cmH_2O, PSI, inH_2O
Temperature operating requirements	0 °C to 30 °C (32 °F to 86 °F)
Display/control	0.5 in LCD 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)

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

Ansur
Test Automation Software

FLUKE® Biomedical



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 would document 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 amount of 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/Vista®)
	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

FLUKE® Biomedical

"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

11000 Ansur Test Executive

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

ANSUR BP PUMP 2 BP Pump 2
ANSUR ESA612 ESA612
ANSUR ESA620 ESA620
ANSUR IMPULSE 4000 Impulse 4000
ANSUR IMPULSE 7000 Impulse 6000D/7000DP
XXXXXXX Impulse 7000DP with Impulse 7010
13600 QA-40M/45
17520 QA-1290
ANSUR QA-ES QA-ES
11050 QA-ST
16220 QA-VTM
ANSUR QED 6 QED 6
ANSUR TNT 12000 TNT 12000
ANSUR INDEX 2 Index 2 Plug-In
ANSUR PROSIM 6/8 ProSim Plug-In

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

TA-BPPMP2L-US BP Pump 2L NIBP, United States 120 V
TA-BPPMP2L-AUS BP Pump 2l NIBP, Australia 250 V
TA-BPPMP2L-DEN BP Pump 2L NIBP, Denmark 250 V
TA-BPPMP2L-SHK BP Pump 2L NIBP, Schuko 250 V
TA-BPPMP2L-ISR BP Pump 2L NIBP, Israel 250 V
TA-BPPMP2L-ITAL BP Pump 2L NIBP, Italy 250 V
TA-BPPMP2L-IND BP Pump 2L NIBP, India 250 V
TA-BPPMP2L-SWZ BP Pump 2L NIBP, Switzerland 250 V
TA-BPPMP2L-UK BP Pump 2L NIBP, United Kingdom 250 V
BPPUMP2L-BRAZ250V BP Pump 2L, Brazil, 250 V
TA-BPPMP2M-US BP Pump 2M NIBP, United States 120 V
TA-BPPMP2M-AUS BP Pump 2M NIBP, Australia 250 V
TA-BPPMP2M-DEN BP Pump 2M NIBP, Denmark 250 V
TA-BPPMP2M-SHK BP Pump 2M NIBP, Schuko 250 V
TA-BPPMP2M-ISR BP Pump 2M NIBP, Israel 250 V
TA-BPPMP2M-ITAL BP Pump 2M NIBP, Italy 250 V
TA-BPPMP2M-IND BP Pump 2M NIBP, India 250 V
TA-BPPMP2M-SWZ BP Pump 2M NIBP, Switzerland 250 V
TA-BPPMP2M-UK BP Pump 2M NIBP, United Kingdom 250 V
BPPUMP2M-BRAZ250V BP Pump 2M, Brazil, 250 V
TA-ESA612-USA ESA612, United States 115 V
TA-ESA612-EUR ESA612, Europe 230 V
TA-ESA612-FR ESA612, France 230 V
TA-ESA612-ISR ESA612, Israel 230 V
TA-ESA612-AUS ESA612, Australia 230 V
TA-ESA612-UK ESA612, United Kingdom 230 V
TA-ESA612-SWI ESA612, Switzerland 230 V
TA-ESA612-THAI ESA612, Thailand 230 V
TA-ESA612-JPN ESA612, Japan 230 V
ESA612-10 ESA612, NA 220 V
TA-ESA620-USA ESA620, United States 115 V 20 A
TA-ESA620-EUR ESA620, Europe 230 V
TA-ESA620-FR ESA620, France 230 V
TA-ESA620-ISR ESA620, Israel 230 V
TA-ESA620-AUS ESA620, Australia 230 V
TA-ESA620-SWI ESA620, Switzerland 230 V
TA-ESA620-UK ESA620, United Kingdom 230 V
TA-ESA620-THAI ESA620 Thailand, 230 V
TA-IMP7KDP Impulse 7000DP, United States 120 V
TA-IMP7KDP-01 Impulse 7000DP, Schuko
TA-IMP7KDP-02 Impulse 7000DP, United Kingdom
TA-IMP7KDP-03 Impulse 7000DP, Japan
TA-IMP7KDP-04 Impulse 7000DP, Australia
TA-IMP7KDP-05 Impulse 7000DP, India
TA-IMP7KDP-06 Impulse 7000DP Brazil
TA-IMP7K/7010 US Impulse 7000DP with Impulse 7010, United States, 120 V
TA-IMP7K/7010 SHK Impulse 7000DP with Impulse 7010, Schuko
TA-IMP7K/7010 UK Impulse 7000DP with Impulse 7010, United Kingdom
TA-IMP7K/7010 JPN Impulse 7000DP with Impulse 7010, Japan
TA-IMP7K/7010 AUS Impulse 7000DP with Impulse 7010, Australia
TA-IMP7K/7010 BRA Impulse 7000DP with Impulse 7010, Brazil
TA-QAES-US QA-ES, United States 115 V
TA-QAES-SHK QA-ES, Schuko 230 V
TA-QAES-UK QA-ES, United Kingdom 230 V
TA-QAES-AUS QA-ES, Australia 230 V
TA-QAES-JPN QA-ES, Japan 100 V
TA-TNT12K TNT 12000
TA-TNT12KWD TNT 12000WD

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.

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-terminal technique
Test leads	Kelvin (2) insulated clip
Leakage-current/voltage gradient	
Ranges (full scale)	200 µA and 2000 µA or mV
Accuracy	± 1 % of reading DC + 3 LSD from 48 Hz to 1 kHz ± 2.5 % of reading + 3 LSD from 1 KHz to 100 KHz ± 5 % + 3 LSD from 100 KHz to 1Hz
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

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

Optional accessories

5000C-02 Performance Enhancement Module 2: RS-232/printer
5000C-03 Performance Enhancement Module 3: 100 records
5000C-04 Performance Enhancement Module 4: Expanded memory
5000C-05 Performance Enhancement Module 5: Waves/extended test
5000C-06 Performance Enhancement Module 6: Data transfer
5000C-07 Performance Enhancement Module 7: medCheck
5000C-08 Performance Enhancement Module 8: Defibrillator
5000C-09 Performance Enhancement Module 9: IV pump
5000C-10 Performance Enhancement Module 10: CMMS interface
5000C-11 Performance Enhancement Module 11: ESU
5000C-12 Performance Enhancement Module 12: SpO_2
5000C-13 Performance Enhancement Module 13: Pacer
5000C-14 Performance Enhancement Module 14: NIBP
5000C-WEDGE Wedge Adapter (eight 25 in serial ports, as well as AT or PS/2 keyboard port)
9513-0212 Mini PC-style External Keyboard (83 keys, AT or PS/2, wedge adapter required

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
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 SpO_2 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

9513-0221 Laser Barcode Gun (wedge adapter required)
5000C-PRINTER Brady TLS Test Label Printer Kit medTester 5000C V 5.10 or greater and 115 V ac only
9530-0066 Multi-purpose Hard-sided Carrying Case for medTester 5000C without wedge adapter
Interface cables: Call for specific test-device connection cables

Ordering information

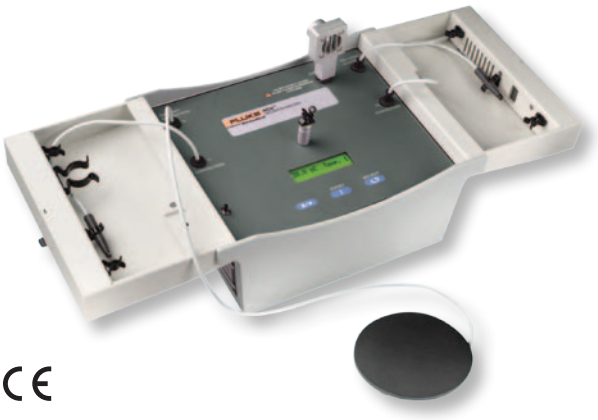
5000C medTester 5000C (20 A, 115 V ac)
5000C/B medTester 5000C/B, CMMS Connectivity Bundle

Included accessories
medTester 5000C
9508-0272 Users Manual
9530-0045FG Soft Vinyl Accessory Pouch
9501-00032FG Two Kelvin Cables
9503-0004FG Two Ground-pin Adapters

medTester 5000C/B
5000C medTester 5000C
5000C-02 RS-232/Printer Module
5000C-03 100 Record Storage Module
5000C-04 Expanded Record Storage Module
5000C-06 Data-Transfer Module Med
5000C-07 Check Module
5000C-10 CMMS Interface Module

INCU™
Incubator Analyzer

FLUKE® Biomedical



Faulty incubator controls lengthen hospital stays, and increase health-care 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)

Ordering information

INCU-UNIPOWER Incubator Analyzer

Included accessories
3901000 Users Manual
97156 Soft-Sided Carrying Case
76060 Airflow Sensor
48583FG Universal AC Battery Charger with Worldwide Mains Adapter Set
75101FG Serial Cable DB9F to DB9F
48582 Outside Temperature probe holder
76058 Adapter for Radiant Infant Warmer Assembly
48581 INCU PC Software (one CD)

$MAXO_2$+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

Ordering information

MAX02+AE Oxygen Analyzer

Included accessories
Users Manual
MAX-250 External Oxygen Sensor
Oxygen Sensor Cable
VTMOB-4401 Breathing Circuit "tee"

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)

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

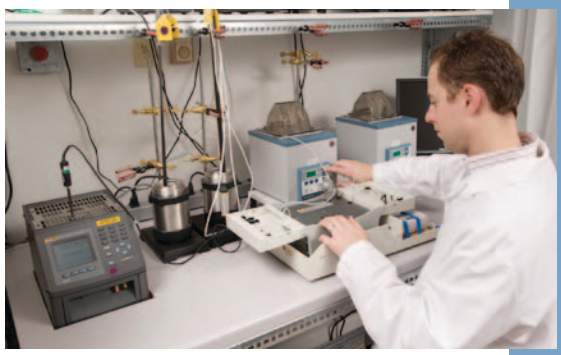
PTB-Traceable Techinques					
Equivalent Beam Code	Potential (kV)	Filtration			HVL mm Al
		mm Mo	mm Rh	mm Al	
MV20	20	0.030			0.223
MV25	25	0.030			0.282
MV30	30	0.030			0.337
MV35	35	0.030			0.374
MV40	40	0.030			0.402
MV50	50	0.030			0.440
MV20	20	0.030		2	0.450
MV25	25	0.030		2	0.580
MV30	30	0.030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

Locations

Service Center/Repair/ Calibration US
Fluke Biomedical
6045 Cochran Road
Cleveland OH 44139-3303
Tel: 440-498-2560
Toll free: 800-850-4608
ext 2564
Email: globalcal@flukebiomedical.com

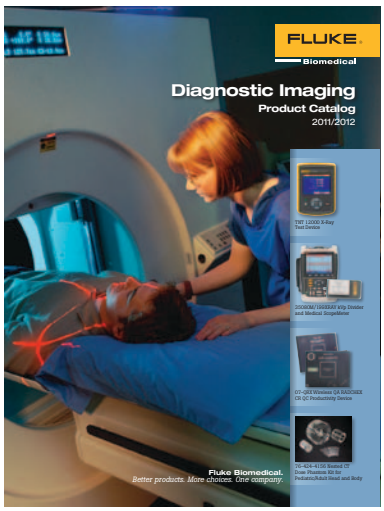
Service Center/Repair/ Calibration Europe
Fluke Biomedical Europe
Science Park Eindhoven 5110
5692EC Son, The Netherlands
Tel: +31 (40) 267 5435
Fax: +31 (40) 267 5436
Email: servicedesk@fluke.nl

www.flukebiomedical.com/service



Publications

The following Fluke Biomedical catalogs are also available



Fluke Biomedical Imaging and Therapy QA

The Imaging and Therapy QA catalog is a comprehensive source book of solutions for the Imaging QA Technologist, Physicist, Biomedical/ Clinical Engineer, or Service Engineer, and Radiation Oncology Physicist, Therapist, and Dosimetrist. The catalog contains information about the test devices, phantoms, and accessories, and linear accelerator instruments and radiation oncology chambers needed to manage imaging and therapy QA and maintain regulatory-compliance.

For more information, contact sales@flukebiomedical.com

Fluke Biomedical Radiation Safety

The Radiation Safety catalog highlights devices used to measure radiation levels, manage regulatory QA requirements, and aide in radiation emergencies. These devices are intended for Radiation Safety Officers (RSOs), Health Physicists, Emergency Responders and other radiation-minded professionals. The catalog contains information about a variety of survey meters and probes, area monitors, and other radiation-monitoring accessories.

For more information, contact sales@flukebiomedical.com

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Fluke Biomedical
6045 Cochran Road
Cleveland, OH 44139-3303 U.S.A.

Fluke Biomedical Europe
Science Park Eindhoven 5110
5692EC Son, The Netherlands

For more information, contact us:
In the U.S.A. (800) 850-4608 or
Fax (440) 349-2307
In Europe/M-East/Africa +31 40 267 5435 or
Fax +31 40 267 5436
From other countries +1 (440) 248-9300 or
Fax +1 (440) 349-2307
Email: sales@flukebiomedical.com
Web access: www.flukebiomedical.com