

# ESA601

## Electrical Safety Analyzer

### Technical Data



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

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

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

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

### Key Features

- Selectable AAMI or IEC test loads
- Ten applied parts-lead connectors
- 90 V (min) to 264 V (max) autoswitching power supply
- Includes IEC 60601, AAMI, and some VDE tests
- Dual-lead leakage and dual-lead voltage tests
- Easy-to-read display
- Compact and portable
- Ansur plug-in software available to automate testing and document results
- Multiple outlets and power cords for compatibility in multiple countries
- Overlays in English, German, French, and Italian
- Overlay for USA version with either IEC or AAMI nomenclature
- RS232 serial port for PC control and printing

## Technical Specifications

### Power

Mains Power Operating Range: 90 min to 264 max VAC (47 Hz to 63 Hz), autoswitching  
Power Ratings: 16 A at 264 V max

### Mains Inlet

The instrument uses a standard IEC 60320-1/C20 mains inlet rated at 16 A and 250 V for class-1 equipment in cold conditions.

### Equipment Outlet

(See Models.)

### Voltage Measurements

Autoranging: Yes  
Display Units: V  
Display Resolution: 1 V  
Range (Mains Voltage): 90 V to 264 V true RMS  
Range (Accessible Voltage): 0 V to 264 V true RMS  
Accuracy:  $\pm 2\%$  of reading  $\pm 2$  VDC  
Frequency Response: DC to 1000 Hz (-3 dB point)  
Crest Factor:  $< 3$   
DC Input Impedance: 1 M $\Omega$

### Earth-Resistance Measurements

Autoranging: Yes  
Display Units:  $\Omega$   
Display Resolution: 0.001  $\Omega$   
Range: 0  $\Omega$  to 1.999  $\Omega$   
Accuracy:  $\pm 2\%$  of reading  $\pm 5$  m $\Omega$   
Current Source Amplitude: 1 A DC ( $\pm 10\%$ )

### Insulation Measurements

Autoranging: Yes  
Display Units: M $\Omega$   
Display resolution: 0.1 M $\Omega$   
Range: 0.5 M to 100 M $\Omega$   
Accuracy: 0.5 M $\Omega$  to 20 M $\Omega$ ,  $\pm 2\%$  of reading,  $\pm 200$  k $\Omega$ ; above  
20 M $\Omega$ ,  $\pm 5\%$  of reading,  $\pm 200$  k $\Omega$   
Voltage Source Amplitude: 500 VDC ( $\pm 10\%$ )

### VDE Differential Current

Autoranging: Yes  
Display Units:  $\mu$ A  
Display resolution: 10  $\mu$ A  
Range: 10  $\mu$ A to 10000  $\mu$ A  
Accuracy:  $\pm 2\%$  of full scale

### About Fluke Biomedical

Fluke Biomedical is the world's leading manufacturer of quality biomedical test and simulation products. In addition, Fluke Biomedical provides the latest medical imaging and oncology quality-assurance solutions for regulatory compliance.

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

### Fluke Biomedical Regulatory Commitment

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

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

### Leakage-Current Measurements

Autoranging: Yes  
Display Units:  $\mu$ A  
Display Resolution: 1  $\mu$ A  
Configuration: RMS current flowing through the ANSI/AAMI ES1 1993 or IEC60601-1 test load  
Measurement Range: 0  $\mu$ A to 8000  $\mu$ A true RMS  
Accuracy:  $\pm 1\%$  of reading ( $\pm 2$   $\mu$ A) @ DC and 25 Hz to 1000 Hz; \*  $\pm 2.5\%$  of reading ( $\pm 2$   $\mu$ A) 1 kHz to 200 kHz (full-scale input)\*  
Measuring Instrument Frequency  
Response: DC to 1 MHz (-3 dB)  
Crest Factor:  $< 3$   
Input Impedance: Per figure 15 of IEC601-1 - 1995  
\* Accuracy of mains-on-applied-part leakage currents:  $\pm 2\%$  of reading  $\pm 6$   $\mu$ A

### Applied-Part Connections

The instrument contains ten banana jacks that serve as the applied-part connectors: RA (or R and AP1), RL (or N and AP2), LA (or L and AP3), LL (or F and AP4), and V1-V6 (or C1-C6 and AP5-AP10)

### RS232 Serial Port

The ESA601 utilizes a null modem serial cable connection to its RS232 port. This port is used to:

- Provide test-result outputs (sent in ASCII format when the PRINT pushbutton is pressed) to a computer or serial ASCII printer
- Download processor firmware
- Provide an interface for remote operation of the ESA601

### Protection Circuitry

- All signal I/O connections, excluding the RS232 port and earth connections, withstand a continuous input of 264 VAC, 47 Hz to 63 Hz, or  $\pm 264$  VDC without causing permanent damage. (Blowing a fuse does not cause permanent damage.)
- The mains input is protected by a double-pole circuit breaker.

### Temperature

Operating: 50 °F to 104 °F (10 °C to 40 °C)  
Storage: -13 °F to 122 °F (-25 °C to 50 °C)

### Maximum Humidity

80 % relative humidity up to 88 °F (31 °C), decreasing linearly to 50 % relative humidity at 104 °F (40 °C)

### Dimensions

9.8 in L x 8.2 in W x 3.0 in H  
(24.0 cm x 21.1 cm x 7.6 cm)

### Weight

5.2 lb (2.4 kg)

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### Ordering Information

#### Model

**Note:** All ESA601 models have the same testing abilities.

- 2249883:** ESA601-AUS (ESA601 Electrical Safety Analyzer with Australian outlet, Australian line cord, and English 1 overlay)  
**2249909:** ESA601-DEU (ESA601 Electrical Safety Analyzer with Schuko outlet, Schuko line cord, and German overlay)  
**2249927:** ESA601-FRA (ESA601 Electrical Safety Analyzer with Schuko outlet, Schuko line cord, and French overlay)  
**2249948:** ESA601-ITAL (ESA601 Electrical Safety Analyzer with Schuko outlet, Schuko line cord, and Italian overlay)  
**2434154:** ESA601-ISR (ESA601 Electrical Safety Analyzer with Israeli outlet, Israeli line cord, and English 1 overlay)  
**2404834:** ESA601-SHK (ESA601 Electrical Safety Analyzer with Schuko outlet, Schuko line cord, and English 1 overlay)  
**2249966:** ESA601-UK (ESA601 Electrical Safety Analyzer with UK outlet, UK line cord, and English 1 overlay)  
**2249982:** ESA601-USA/IEC (ESA601 Electrical Safety Analyzer with US outlet, US line cord, and English 1 overlay utilizing IEC nomenclature)  
**2404852:** ESA601-USA (ESA601 Electrical Safety Analyzer with US outlet, US line cord, English 2 overlay utilizing AAMI [NFPA99] nomenclature)

#### Standard Accessories

- 2388919:** User/service manual and Ansur ESA601 plug-in demo software on a CD  
**2243822:** Getting started guide  
**2248650:** Soft-sided carrying case  
**2391738:** Red lead  
**2391723:** Black lead  
**2391714:** Alligator/banana plug adapters (five each)  
**2238626:** Null serial cable for PC

#### Optional Accessories

- 2004175:** Alligator clamp  
**2391669:** Banana/ECG adapter  
**2248899:** Printer, Seiko DPU-414-30B (with choice of 120 V power supply, p/n 2235375; or 220 V power supply, p/n 2235382)  
**2185787:** North American 220 V adapter kit  
**2238659:** Interface cable (RS232; male DB9 to female DB9)

### Fluke Biomedical.

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