



# Rigel 288+ Series

Accurate and fast electrical safety tester



**The Rigel 288+ series electrical safety analyzer offers battery-powered insulation and earth/ground bond testing, as well as touch and point-to-point leakage testing. This allows users to move around in crowded rooms during installation, eliminating the inconvenience of trailing mains cables. Its up to 10000 record memory and Bluetooth® connectivity make it an effective mobile unit.**

The electrical safety analyzer ensures compliance with international and

local safety standards, including IEC/EN 62353, AAMI/IEC/EN 60601-1, IEC 61010, NFPA-99, and AS/NZ 3551.

## Why buy the Rigel 288+ series?

- The Rigel 288+ series is available with several different plug and socket types for different regions.
- Its light, handheld design and battery operation give you the freedom to move around.
- Predefined and custom test routines make testing efficient and dependable.

## Key Features:

- Automatic warning of secondary earth/ground paths
- Battery powered earth/ground bond, insulation and leakage testing
- Accurate high current, low energy earth bond testing
- Bluetooth® communication

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### Technical Specification:

#### Earth Continuity

|                              |                                                                                                    |
|------------------------------|----------------------------------------------------------------------------------------------------|
| Pre-pulse                    | 65 ... 25 A peak current<br>(0.1 $\Omega$ ... 0.8 $\Omega$ respectively)                           |
| Pulse shape                  | Exponential decay                                                                                  |
| Decay time                   | 200 $\mu$ s ... 550 $\mu$ s to 5 % of peak current<br>(0.1 $\Omega$ ... 0.8 $\Omega$ respectively) |
| Method 2-wire technique      | using 'zero' lead function                                                                         |
| Test current                 | $> \pm 200 \text{ mA}_{\text{DC}}$ into 2 $\Omega$                                                 |
| Max test voltage             | 4 $V_{\text{rms}}$ ... 24 $V_{\text{rms}}$ o/c (6 V for IEC 60601)                                 |
| Measuring range (low range)  | 0.001 $\Omega$ ... 0.999 $\Omega$ at 0.001 $\Omega$ resolution                                     |
| Measuring range (mid range)  | 1.00 $\Omega$ ... 9.99 $\Omega$ at 0.01 $\Omega$ resolution                                        |
| Measuring range (high range) | 10.0 $\Omega$ ... 19.9 $\Omega$ at 0.1 $\Omega$ resolution                                         |
| Accuracy                     | $\pm 3 \%$ of reading + 10 m $\Omega$                                                              |

#### Insulation Resistance

|                                               |                                                                                              |
|-----------------------------------------------|----------------------------------------------------------------------------------------------|
| Measurement                                   | EUT to Earth / Ground, EUT to AP, AP to Ground                                               |
| Voltage                                       | 50 $V_{\text{DC}}$ , 100 $V_{\text{DC}}$ , 250 $V_{\text{DC}}$ , 500 $V_{\text{DC}}$ at 1 mA |
| Range (low range) at 50 $V_{\text{DC}}$       | 0.01 M $\Omega$ ... 10 M $\Omega$                                                            |
| Range (low range) at above 50 $V_{\text{DC}}$ | 0.01 M $\Omega$ ... 20 M $\Omega$                                                            |
| Accuracy (low range)                          | $\pm 5 \%$ of reading + 2 counts                                                             |
| Range (high range) at 500 $V_{\text{DC}}$     | 20 M $\Omega$ ... 100 M $\Omega$                                                             |
| Range (high range) at 250 $V_{\text{DC}}$     | 20 M $\Omega$ ... 50 M $\Omega$                                                              |
| Accuracy (high range)                         | $\pm 10 \%$ + 2 counts                                                                       |
| Resolution                                    | 0.01 M $\Omega$                                                                              |

#### Direct Leakage Measurement

|                       |                                                                                                         |
|-----------------------|---------------------------------------------------------------------------------------------------------|
| Measuring range       | 4 $\mu$ A ... 9999 $\mu$ A                                                                              |
| Accuracy              | $\pm 5 \%$ or reading + 2 counts                                                                        |
| Mains on A.P. voltage | F-type only at 110 % of mains                                                                           |
| Measuring device      | As per IEC 60601-1 requirements                                                                         |
| Measurement type      | Separate AC & DC for patient (auxiliary) leakage to IEC 60601, true RMS for all remaining leakage tests |

#### Differential Leakage Measurement

|                                  |                                                   |
|----------------------------------|---------------------------------------------------|
| Measuring range                  | 75 $\mu$ A ... 9999 $\mu$ A                       |
| Accuracy                         | $\pm 5 \%$ of reading + 5 counts                  |
| Measurement / display resolution | 1 $\mu$ A                                         |
| Measurement type                 | True RMS                                          |
| Measuring device                 | Frequency response characteristics to IEC 60601-1 |

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### Technical Specification (Continued):

#### Alternative Leakage Measurement

|                        |                                 |
|------------------------|---------------------------------|
| Test voltage           | 250 V at mains frequency        |
| Test current           | 3.5 mA current limited          |
| Measurement range      | 4 $\mu$ A ... 9999 $\mu$ A      |
| Measurement resolution | 1 $\mu$ A                       |
| Measurement accuracy   | $\pm 5\%$ of reading + 2 counts |
| Measurement type       | True RMS                        |
| Measuring device       | As per IEC 60601-1              |

#### Power Measurement

|          |                       |
|----------|-----------------------|
| Method   | VA rating             |
| Range    | 0.1 kVA ... 4 kVA     |
| Accuracy | $\pm 10\%$ + 2 counts |

#### Mains Outlet Test

|                     |                                           |
|---------------------|-------------------------------------------|
| Input voltage range | 0 V <sub>AC</sub> ... 300 V <sub>AC</sub> |
| Max current         | 16 A                                      |
| Measures            | L - E, N - E                              |
| Accuracy            | $\pm 5\%$ of reading + 2 counts           |

#### IEC Mains Lead Test

|               |                                                          |
|---------------|----------------------------------------------------------|
| Test duration | 2 s                                                      |
| Test          | Continuity of all EB conductors, insulation and polarity |

### General Specifications:

|                                |                                                                                                                    |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Mains power                    | 230 V <sub>AC</sub> $\pm 10\%$ , 50 Hz $\pm 1$ Hz<br>120 V <sub>AC</sub> $\pm 10\%$ , 60 Hz $\pm 1$ Hz (USA model) |
| Battery                        | 6 $\times$ 1.5 V Alkaline AA                                                                                       |
| Environment                    | Dry, without moisture condensation, indoor use                                                                     |
| Operating conditions           | 0 $^{\circ}$ C ... +40 $^{\circ}$ C / +32 $^{\circ}$ F ... +104 $^{\circ}$ F<br>0 ... 90 % RH - NC                 |
| Storage environment            | -15 $^{\circ}$ C ... +60 $^{\circ}$ C / +5 $^{\circ}$ F ... +140 $^{\circ}$ F                                      |
| Elevation                      | Max. 2000 m / 6562 ft.                                                                                             |
| Environmental protection       | IP 40                                                                                                              |
| Weight                         | 1.6 kg / 3.53 lb including batteries                                                                               |
| Size (L $\times$ W $\times$ D) | 270 mm $\times$ 110 mm $\times$ 75 mm /<br>10.5" $\times$ 4" $\times$ 3"                                           |
| Pollution degree               | 2                                                                                                                  |
| Overvoltage category           | CAT II 300 V                                                                                                       |
| <b>Data Interfaces</b>         |                                                                                                                    |
| Bluetooth®                     | Frequency range:<br>2.400 GHz ... 2.4835 GHz<br>Transmission intensity:<br>~+5 dBm conducted                       |

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#### Order Information:

##### Available Instruments

##### Part Number

|                                                               |         |
|---------------------------------------------------------------|---------|
| Rigel 288+ series (United Kingdom, 230 V / 50/60 Hz)          | 406A910 |
| Rigel 288+ series (United States, 120 V / 50/60 Hz)           | 406A914 |
| Rigel 288+ series (Germany, 230 V / 50/60 Hz)                 | 406A916 |
| Rigel 288+ series (EU/SCHUKO, 230 V / 50/60 Hz)               | 406A913 |
| Rigel 288+ series (France, 230 V / 50/60 Hz)                  | 406A917 |
| Rigel 288+ series (Czech Republic / Poland, 230 V / 50/60 Hz) | 406A918 |
| Rigel 288+ series (Switzerland, 230 V / 50/60 Hz)             | 406A923 |
| Rigel 288+ series (Australia, 230 V / 50/60 Hz)               | 406A912 |
| Rigel 288+ series (New Zealand, 230 V / 50/60 Hz)             | 406A926 |
| Rigel 288+ series (China, 220 V / 50/60 Hz)                   | 406A921 |
| Rigel 288+ series (Japan, 100 V / 50/60 Hz)                   | 406A924 |
| Rigel 288+ series (Philippines, 220 V / 50/60 Hz)             | 406A928 |
| Rigel 288+ series (India, 230 V / 50/60 Hz)                   | 406A925 |
| Rigel 288+ series (Brazil, 220 V / 50/60 Hz)                  | 406A927 |

##### Standard Scope of Delivery:

- 1 × Rigel 288+ instrument
- 1 × Patient applied part module
- 1 × 10-way patient applied part adaptor
- 1 × Detachable 2 meter mains cable
- 1 × Earth/ground bond test probe with clip and clip lead
- 1 × Earth bond clip lead
- 1 × Quick Start Guide
- 1 × Calibration certificate
- 1 × Carrying case
- 6 × AA Alkaline batteries

##### Optional Accessories:

|                                                                  |         |
|------------------------------------------------------------------|---------|
| Med-eBase test solution software                                 | 383A910 |
| RS-232 download cable                                            | 331A952 |
| USB/Serial Adaptor (RS-232 to USB)                               | 356A950 |
| Single applied part leakage lead                                 | 331A953 |
| Scanner (Bluetooth®)                                             | 339A923 |
| Test 'n Tag Elite 2 (Bluetooth® Printer)                         | 339A970 |
| Patient applied part module<br>(10-way applied part adaptor box) | 331A680 |

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