

## AMPI-520

Multifunction electrical installations meter



Diagnostic testing of electrical installations in accordance with IEC 61557

## AMPI-520

Loop, RCD, insulation and earth testing in a single instrument

amperis

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Measures short-circuit loop impedance, RCD tripping current and time, insulation and earth resistance, continuity and phase sequence.

## Overview



Rotary selector, function keys and graphic display

### Short-circuit loop measurement

Impedance is measured with a 23 A (44 A phase-to-phase) short-circuit resistor, in the 95...440 V range at 45...65 Hz, with automatic short-circuit calculation and detection of the phase-to-neutral and phase-to-phase voltage. A UNI-Schuko plug allows automatic measurement, and an adapter extends the test to three-phase networks.

- Loop measurement with 0.01  $\Omega$  resolution, without tripping RCDs of 30 mA or above.
- Testing of general and selective RCDs for a rated differential current of 10, 30, 100, 300, 500 and 1000 mA, types AC, A and B.
- Trip and response time test (mode tA) and RCD tripping current test (IA) with sine-wave, unidirectional half-period and DC test currents.

### Insulation, earth and continuity

Insulation resistance is measured with 250 V, 500 V or 1000 V test voltage up to 3 G $\Omega$ , with automatic discharge after the measurement and acoustic signals at 5 s intervals to obtain the characteristic curve. Earth resistance and bidirectional continuity of protective (PE) conductors are measured with self-calibration of the test leads, and phase sequence is checked and displayed.

- Automatic measurement of all resistances on 3, 4 or 5-wire cables with the optional AUTO-ISO adapter.
- Overvoltage protection, battery-charge indicator, auto shut-off and USB interface.
- Memory divided into 10 banks of 99 records each.



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The meter also measures alternating voltage, current, frequency, active, reactive and apparent power and power factor, and lets the stored records be transferred to a PC.

## Network measurement and software



Test leads, clamps and probes supplied with the instrument

### Voltage, frequency and power factor

- Phase-to-neutral voltage U L-N: 100...440 V.
- Phase-to-phase voltage U L-L: 100...440 V, at 45...65 Hz, with display of phase-to-phase voltages and phase sequence (forward, reverse).
- Frequency: 45.0...65.0 Hz for voltages in the 50...440 V range, accuracy  $\pm 0.1\%$  of the measured value + 1 digit.
- Power factor  $\cos\phi$ : 0.00...1.00, resolution 0.01.

Active (P), reactive (Q) and apparent (S) power are measured and displayed together with  $\cos\phi$ ; the manufacturer does not publish a separate numeric range, resolution or accuracy for the current or power channels.

### Treatment of the records on a PC

The measurements stored in the instrument's 10 memory banks can be downloaded to a PC over the USB interface. Dedicated software transfers the stored records and lets them be organised into documentation of the electrical measurements, and a second program is available to create the corresponding drawings and diagrams for the report.

### Practical use

- Periodic diagnostic testing of electrical installations under IEC 61557.
- Certification records for electrical installers, with the calibration certificate supplied.
- Auto shut-off and continuous battery-charge indication for extended field use.



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### Short-circuit loop impedance Z L-PE, Z L-N, Z L-L

Measured with the 23/40 A current range in accordance with IEC 61557: 0.13...1999.9  $\Omega$  (for 1.2 m leads).

| Range                 | Resolution    | Accuracy                                   |
|-----------------------|---------------|--------------------------------------------|
| 0.00...19.99 $\Omega$ | 0.01 $\Omega$ | $\pm(5\% \text{ m.v.} + 3 \text{ digits})$ |
| 20.0...199.9 $\Omega$ | 0.1 $\Omega$  | $\pm(5\% \text{ m.v.} + 3 \text{ digits})$ |
| 200...1999 $\Omega$   | 1 $\Omega$    | $\pm(5\% \text{ m.v.} + 3 \text{ digits})$ |

### Short-circuit loop impedance Z L-PE RCD (RCD range, 15 mA)

| Range                 | Resolution    | Accuracy                                    |
|-----------------------|---------------|---------------------------------------------|
| 0.00...19.99 $\Omega$ | 0.01 $\Omega$ | $\pm(6\% \text{ m.v.} + 10 \text{ digits})$ |
| 20.0...199.9 $\Omega$ | 0.1 $\Omega$  | $\pm(6\% \text{ m.v.} + 5 \text{ digits})$  |
| 200...1999 $\Omega$   | 1 $\Omega$    | $\pm(6\% \text{ m.v.} + 5 \text{ digits})$  |

Without RCD tripping ( $I_{\Delta n} \geq 30 \text{ mA}$ ): voltage range 95...270 V (for Z L-PE and Z L-N) and 95...440 V (for Z L-L); frequency 45...65 Hz.  
RCD range (15 mA): voltage range 95...270 V; frequency 45...65 Hz.

### RCD trip and response time test (mode tA)

Measurement range in accordance with IEC 61557: 0 ms up to the upper limit of the displayed value.

| Breaker type | Multiplication factor     | Measuring range | Resolution | Accuracy                                    |
|--------------|---------------------------|-----------------|------------|---------------------------------------------|
| General      | $0.5 \times I_{\Delta n}$ | 0...300 ms      | 1 ms       | $\pm(2 \% \text{ m.v.} + 2 \text{ digits})$ |
| General      | $1 \times I_{\Delta n}$   | 0...300 ms      | 1 ms       | $\pm(2 \% \text{ m.v.} + 2 \text{ digits})$ |
| General      | $2 \times I_{\Delta n}$   | 0...150 ms      | 1 ms       | $\pm(2 \% \text{ m.v.} + 2 \text{ digits})$ |
| General      | $5 \times I_{\Delta n}$   | 0...40 ms       | 1 ms       | $\pm(2 \% \text{ m.v.} + 2 \text{ digits})$ |
| Selective    | $0.5 \times I_{\Delta n}$ | 0...500 ms      | 1 ms       | $\pm(2 \% \text{ m.v.} + 2 \text{ digits})$ |
| Selective    | $1 \times I_{\Delta n}$   | 0...500 ms      | 1 ms       | $\pm(2 \% \text{ m.v.} + 2 \text{ digits})$ |
| Selective    | $2 \times I_{\Delta n}$   | 0...200 ms      | 1 ms       | $\pm(2 \% \text{ m.v.} + 2 \text{ digits})$ |
| Selective    | $5 \times I_{\Delta n}$   | 0...150 ms      | 1 ms       | $\pm(2 \% \text{ m.v.} + 2 \text{ digits})$ |

Accuracy of the differential current: for  $0.5 \times I_{\Delta n}$ , -8...0 %; for  $1 \times I_{\Delta n}$ ,  $2 \times I_{\Delta n}$  and  $5 \times I_{\Delta n}$ , 0...8 %.



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### RCD tripping current (I<sub>A</sub>) with sine-wave test current

| Selected rated current | Range         | Resolution | Test current                                          | Accuracy                |
|------------------------|---------------|------------|-------------------------------------------------------|-------------------------|
| 10 mA                  | 3.3...10.0 mA | 0.1 mA     | $0.3 \times I_{\Delta n} \dots 1 \times I_{\Delta n}$ | $\pm 5 \% I_{\Delta n}$ |
| 30 mA                  | 9.0...30.0 mA | 0.1 mA     | $0.3 \times I_{\Delta n} \dots 1 \times I_{\Delta n}$ | $\pm 5 \% I_{\Delta n}$ |
| 100 mA                 | 33...100 mA   | 1 mA       | $0.3 \times I_{\Delta n} \dots 1 \times I_{\Delta n}$ | $\pm 5 \% I_{\Delta n}$ |
| 300 mA                 | 90...300 mA   | 1 mA       | $0.3 \times I_{\Delta n} \dots 1 \times I_{\Delta n}$ | $\pm 5 \% I_{\Delta n}$ |
| 500 mA                 | 150...500 mA  | 1 mA       | $0.3 \times I_{\Delta n} \dots 1 \times I_{\Delta n}$ | $\pm 5 \% I_{\Delta n}$ |
| 1000 mA                | 330...1000 mA | 1 mA       | $0.3 \times I_{\Delta n} \dots 1 \times I_{\Delta n}$ | $\pm 5 \% I_{\Delta n}$ |

### I<sub>A</sub> with unidirectional half-period sine wave, 6 mA DC offset

| Selected rated current | Range          | Resolution | Test current                                            | Accuracy                 |
|------------------------|----------------|------------|---------------------------------------------------------|--------------------------|
| 10 mA                  | 4.0...20.0 mA  | 0.1 mA     | $0.4 \times I_{\Delta n} \dots 2 \times I_{\Delta n}$   | $\pm 10 \% I_{\Delta n}$ |
| 30 mA                  | 12.0...42.0 mA | 0.1 mA     | $0.4 \times I_{\Delta n} \dots 2 \times I_{\Delta n}$   | $\pm 10 \% I_{\Delta n}$ |
| 100 mA                 | 40...140 mA    | 1 mA       | $0.4 \times I_{\Delta n} \dots 1.4 \times I_{\Delta n}$ | $\pm 10 \% I_{\Delta n}$ |
| 300 mA                 | 120...420 mA   | 1 mA       | $0.4 \times I_{\Delta n} \dots 1.4 \times I_{\Delta n}$ | $\pm 10 \% I_{\Delta n}$ |
| 500 mA                 | 200...700 mA   | 1 mA       | $0.4 \times I_{\Delta n} \dots 1.4 \times I_{\Delta n}$ | $\pm 10 \% I_{\Delta n}$ |

The measurement can start from the positive or negative half of the leakage current.



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### RCD tripping current (I<sub>A</sub>) with DC test current

| Selected rated current | Range          | Resolution | Test current                                          | Accuracy                 |
|------------------------|----------------|------------|-------------------------------------------------------|--------------------------|
| 10 mA                  | 4.0...20.0 mA  | 0.1 mA     | $0.4 \times I_{\Delta n} \dots 2 \times I_{\Delta n}$ | $\pm 10 \% I_{\Delta n}$ |
| 30 mA                  | 12.0...60.0 mA | 1 mA       | $0.4 \times I_{\Delta n} \dots 2 \times I_{\Delta n}$ | $\pm 10 \% I_{\Delta n}$ |
| 100 mA                 | 40...200 mA    | 1 mA       | $0.4 \times I_{\Delta n} \dots 2 \times I_{\Delta n}$ | $\pm 10 \% I_{\Delta n}$ |
| 300 mA                 | 120...600 mA   | 1 mA       | $0.4 \times I_{\Delta n} \dots 2 \times I_{\Delta n}$ | $\pm 10 \% I_{\Delta n}$ |
| 500 mA                 | 200...1000 mA  | 1 mA       | $0.4 \times I_{\Delta n} \dots 2 \times I_{\Delta n}$ | $\pm 10 \% I_{\Delta n}$ |

### Low-voltage test and continuity of the protective (PE) conductor

| Range                 | Resolution    | Accuracy                                     |
|-----------------------|---------------|----------------------------------------------|
| 0.00...19.99 $\Omega$ | 0.01 $\Omega$ | $\pm (2 \% \text{ m.v.} + 3 \text{ digits})$ |
| 20.0...199.9 $\Omega$ | 0.1 $\Omega$  | $\pm (2 \% \text{ m.v.} + 3 \text{ digits})$ |
| 200...400 $\Omega$    | 1 $\Omega$    | $\pm (2 \% \text{ m.v.} + 3 \text{ digits})$ |

The measurement is possible for a positive or negative leakage current. "m.v." = measured value.



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## Earthing resistance measurement RE

Voltage range in accordance with IEC 61557-5: 0.5...1999  $\Omega$ .

| Range                  | Resolution    | Accuracy                                   |
|------------------------|---------------|--------------------------------------------|
| 0.00...9.99 $\Omega$   | 0.01 $\Omega$ | $\pm(2\% \text{ m.v.} + 4 \text{ digits})$ |
| 10.0...99.9 $\Omega$   | 0.1 $\Omega$  | $\pm(2\% \text{ m.v.} + 3 \text{ digits})$ |
| 100...999 $\Omega$     | 1 $\Omega$    | $\pm(2\% \text{ m.v.} + 3 \text{ digits})$ |
| 1.00...1.99 k $\Omega$ | 10 $\Omega$   | $\pm(2\% \text{ m.v.} + 3 \text{ digits})$ |

## Insulation resistance measurement

| Range                   | Resolution      | Accuracy                                   |
|-------------------------|-----------------|--------------------------------------------|
| 0...1999 k $\Omega$     | 1 k $\Omega$    | $\pm(3\% \text{ m.v.} + 8 \text{ digits})$ |
| 2.00...19.99 M $\Omega$ | 0.01 M $\Omega$ | $\pm(3\% \text{ m.v.} + 8 \text{ digits})$ |
| 20.0...199.9 M $\Omega$ | 0.1 M $\Omega$  | $\pm(3\% \text{ m.v.} + 8 \text{ digits})$ |
| 200...999 M $\Omega$    | 1 M $\Omega$    | $\pm(3\% \text{ m.v.} + 8 \text{ digits})$ |
| 1.00...3.00 G $\Omega$  | 0.01 G $\Omega$ | $\pm(4\% \text{ m.v.} + 6 \text{ digits})$ |

Measured in accordance with IEC 61557-2, depending on the applied test voltage: 50 V  $\rightarrow$  50 k $\Omega$ ...250 M $\Omega$ ; 100 V  $\rightarrow$  100 k $\Omega$ ...500 M $\Omega$ ; 250 V  $\rightarrow$  250 k $\Omega$ ...1 G $\Omega$ ; 500 V  $\rightarrow$  500 k $\Omega$ ...2 G $\Omega$ ; 1000 V  $\rightarrow$  1 M $\Omega$ ...3 G $\Omega$ .  
With UNI-Schuko connection, additional error of  $\pm 2\%$ .



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### Voltage, frequency and power factor measurement

|                                        |                                                      |
|----------------------------------------|------------------------------------------------------|
| Phase-to-neutral voltage U L-N (range) | 100...440 V                                          |
| Phase-to-phase voltage U L-L (range)   | 100...440 V (45...65 Hz)                             |
| Frequency (range)                      | 45.0...65.0 Hz, for voltages in the 50...440 V range |
| Frequency (accuracy)                   | $\pm 0.1$ % of the measured value + 1 digit          |
| Power factor $\cos\phi$ (range)        | 0.00...1.00                                          |
| Power factor $\cos\phi$ (resolution)   | 0.01                                                 |

Active (P), reactive (Q) and apparent (S) power are measured and shown together with  $\cos\phi$ . The manufacturer does not publish a numeric range, resolution or accuracy of its own for the current channel or for P, Q and S; this data is not included, in line with the rule of not adding data that is not published.

## Electrical safety, power supply and standards

|                             |                                                                                                                |
|-----------------------------|----------------------------------------------------------------------------------------------------------------|
| Type of insulation          | Double, in accordance with EN 61010-1 and IEC 61557, EMC                                                       |
| Measurement category        | CAT IV 300 V in accordance with EN 61010-1                                                                     |
| Protection class (EN 60529) | IP54                                                                                                           |
| Power supply                | LR14 alkaline batteries (5 units) or Ni-MH battery pack (optional)                                             |
| Operating temperature       | 0...+50 °C                                                                                                     |
| Standards                   | IEC 61557 (general), IEC 61557-2 (insulation resistance), IEC 61557-5 (earth resistance); EN 61010-1; EN 60529 |

## Contents of supply

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standard | UNI-Schuko probe with start button (WS-03); 1.2 m test leads with banana plug (red, blue and yellow); test-lead reels with banana plug, 30 m red and 15 m blue; USB cable; pointed probes with banana connector (red, blue and yellow); alligator clips K02 (red and yellow); 0.3 m earth contact probe; L1 carrying case; carrying straps; LR14 (size C) battery holder and batteries; calibration certificate.                                                                                                                                                                                           |
| Optional | Test leads with banana plug, 5, 10 and 20 m (red); battery charger cable, also compatible with car lighter (12 V); AGT-16P, AGT-32P and AGT-63P three-phase plug adapters; AUTO-ISO-1000C adapter; TWR-1 universal-connection adapter for RCD testing; UNI-Schuko probe (WS-04); 0.8 m earth contact probe; L3 carrying case; C3 current clamp (Ø 52 mm); Ni-MH battery pack, 4.8 V 4.2 Ah; alligator clip K02 blue; cable clamp; test-lead reel; Z7 socket adapter; software for creating documentation of the electrical measurements and software for creating the corresponding drawings and diagrams. |



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