



COMBI521

Rel. 1.01 of 06/09/22

Multifunctional instrument for safety measurements

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1. TECHNICAL SPECIFICATIONS

Accuracy is calculated as: $\pm[\% \text{reading} + (\text{no. of digits}) * \text{resolution}]$ at 23°C, <80%RH

AC TRMS VOLTAGE

| Range (V) | Resolution (V) | Accuracy |
|-----------|----------------|---------------------------------------|
| 15 ÷ 460 | 1 | $\pm(3.0\% \text{rdg} + 2\text{dgt})$ |

FREQUENCY

| Range (Hz) | Resolution (Hz) | Accuracy |
|-------------------------------|-----------------|---------------------------------------|
| 47.50 ÷ 52.50 / 57.00 ÷ 63.00 | 1 | $\pm(0.1\% \text{rdg} + 1\text{dgt})$ |

CONTINUITY OF PROTECTION CONDUCTORS WITH 200mA

| Range (Ω) | Resolution (Ω) | Accuracy |
|--------------------|-------------------------|---------------------------------------|
| 0.00 ÷ 9.99 | 0.01 | $\pm(5.0\% \text{rdg} + 3\text{dgt})$ |
| 10.0 ÷ 99.9 | 0.1 | |
| 100 ÷ 1999 | 1 | |

Test current: >200mA DC up to 5 Ω (test leads included)

Test current generated: 1mA resolution, range 0 ÷ 250mA

Open-circuit voltage: 4 < V_0 < 24VDC

Safety protection: error message for input voltage >10V

INSULATION RESISTANCE

| DC test voltage (V) | Range (M Ω) | Resolution (M Ω) | Accuracy |
|---------------------|---------------------|--------------------------|---------------------------------------|
| 50 | 0.01 ÷ 9.99 | 0.01 | $\pm(2.0\% \text{rdg} + 2\text{dgt})$ |
| | 10.0 ÷ 49.9 | 0.1 | |
| | 50.0 ÷ 99.9 | 1 | |
| 100 | 0.01 ÷ 9.99 | 0.01 | $\pm(2.0\% \text{rdg} + 2\text{dgt})$ |
| | 10.0 ÷ 99.9 | 0.1 | |
| | 100 ÷ 199 | 1 | |
| 250 | 0.01 ÷ 9.99 | 0.01 | $\pm(2.0\% \text{rdg} + 2\text{dgt})$ |
| | 10.0 ÷ 99.9 | 0.1 | |
| | 100 ÷ 249 | 1 | |
| 500 | 0.01 ÷ 9.99 | 0.01 | $\pm(2.0\% \text{rdg} + 2\text{dgt})$ |
| | 10.0 ÷ 199.9 | 0.1 | |
| | 200 ÷ 499 | 1 | |
| 1000 | 0.01 ÷ 9.99 | 0.01 | $\pm(2.0\% \text{rdg} + 2\text{dgt})$ |
| | 10.0 ÷ 199.9 | 0.1 | |
| | 200 ÷ 999 | 1 | |
| 1000 | 1000 ÷ 1999 | 1 | $\pm(5.0\% \text{rdg} + 2\text{dgt})$ |

Open-circuit voltage rated test voltage -0% +10%

Rated measuring current: >1mA with 1k Ω x Vnom (50V, 100V, 250V, 1000V), >2.2mA with 230k Ω @ 500V

Short-circuit current <6.0mA for each test voltage

Safety protection: error message for input voltage >30V

LINE/LOOP IMPEDANCE P-P, P-N, P-PE – TT/TN SYSTEMS

| Range (Ω) | Resolution (Ω) (*) | Accuracy |
|--------------------|-----------------------------|---------------------------------------|
| 0.01 ÷ 19.99 | 0.01 | $\pm(5.0\% \text{rdg} + 3\text{dgt})$ |
| 20.0 ÷ 199.9 | 0.1 | |

(*) 0.1m Ω in range 0.1 ÷ 199.9 m Ω (by using the optional accessory IMP57)

Maximum test current: 3.31A (at 265V); 5.71A (at 457V)

P-N/P-P Test voltage: (100V ÷ 265V) / (100V ÷ 460V); 50/60Hz ±5%

Protection types: MCB (B, C, D, K), Fuse (aM, gG, BS882-2, BS88-3, BS3036, BS1362)



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TEST ON RCD PROTECTION (MOLDED-CASE TYPE)

Differential protection type (RCD): AC(\sim), A/F($\Delta\Delta$), B/B+ $(\square\square)$, CCID ($\sim\sim$ - USA country), General (G), Selective (S)

Single-phase systems (L-N-P)

Voltage range L-PE, L-N: 100V \pm 265V RCD type AC, A/F, B/B+ and CCID ($I_{\Delta N} \leq 100mA$)190V \pm 265V RCD type B/B+ ($I_{\Delta N} = 300mA$)

<10V

Voltage range N-PE:

Split-phase systems (phase delay VL1-PE, VL2-PE = 180° or phase delay VL1-PE, VL2-PE = 120°)

Voltage range L1-PE, L1-L2: 100V \pm 265V RCD type AC, A/F, B/B+ and CCID ($I_{\Delta N} \leq 100mA$)Voltage range L2-PE: 0V \pm 265V RCD type AC, A/F0V \pm min[(VL1-PE-100V) and (VL1-L2-100V)], RCD type B/B+ ($I_{\Delta N} \leq 100mA$)

5mA, 6mA, 10mA, 20mA, 30mA, 100mA, 300mA, 500mA, 650mA, 1000mA

Rated tripping currents ($I_{\Delta N}$): 50/60Hz \pm 5%

Frequency:

RCD tripping current (for General RCDs only)

| Type RCD | I $_{\Delta N}$ | Range I $_{\Delta N}$ (mA) | Resolution (mA) | Accuracy | |
|---------------|---|----------------------------------|--------------------|----------------------------|--|
| CCID | 5mA, 20mA | (0.2 \div 1.3) I $_{\Delta N}$ | 0.1I $_{\Delta N}$ | - 0%, +10% I $_{\Delta N}$ | |
| AC, A/F, B/B+ | 6mA, 10mA | (0.2 \div 1.1) I $_{\Delta N}$ | | | |
| AC, A/F, B/B+ | 30mA \leq I $_{\Delta N} \leq$ 300mA | - 0%, +5% I $_{\Delta N}$ | | | |
| AC, A/F | 500mA \leq I $_{\Delta N} \leq$ 650mA | | | | |

Measurement RCD tripping time – TT/TN systems

| | x 1/2 | | | x 1 | | x 5 | | AUTO | | G | S | G | S | G | S |
|----------------|---------------------------|-----|-----|-----|-----|-----|-----|------|---|-----|---|---|---|-----|---|
| | \ | G | S | G | S | G | S | G | S | | | | | | |
| 5mA | AC A/F B/B+ CCID | | | 999 | | | | | | 310 | | | | | |
| 6mA | AC A/F B/B+ CCID | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | ✓ | | 310 | |
| | | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | ✓ | | 310 | |
| 10mA | AC A/F B/B+ CCID | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | ✓ | | 310 | |
| | | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | ✓ | | 310 | |
| 20mA | AC A/F B/B+ CCID | | | 999 | | | | | | 310 | | | | | |
| | | 999 | | | | | | | | 310 | | | | | |
| 30mA | AC A/F B/B+ CCID | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | ✓ | | 310 | |
| | | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | ✓ | | 310 | |
| 100mA | AC A/F B/B+ CCID | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | | | 310 | |
| | | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | | | 310 | |
| 300mA | AC A/F B/B+ CCID | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | | | 310 | |
| | | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | | | 310 | |
| 500mA 650mA | AC A/F B/B+ CCID | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | | | 310 | |
| | | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | | | 310 | |
| 1000mA | AC A/F B/B+ CCID | 999 | 999 | 999 | 999 | | | | | | | | | | |
| | | 999 | 999 | 999 | 999 | | | | | | | | | | |

Table with duration of tripping time measurement [ms] - Resolution: 1ms, Accuracy: $\pm(2.0\%\text{reading} + 2\text{digits})$



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Measurement RCD tripping time – IT systems

| | x 1/2 | | | x 1 | | x 5 | | AUTO | | G | | AUTO+ G | |
|--------|-------|-----|-----|-----|-----|-----|-----|------|---|-----|---|---------|---|
| | \ | G | S | G | S | G | S | G | S | G | S | G | S |
| 6mA | AC | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | ✓ | |
| 10mA | A/F | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | ✓ | |
| 30mA | B/B+ | 999 | 999 | 999 | 999 | | | | | 310 | | | |
| 100mA | AC | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | | |
| 300mA | A/F | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | ✓ | 310 | | | |
| 500mA | AC | 999 | 999 | 999 | 999 | 50 | 150 | ✓ | | 310 | | | |
| 650mA | A/F | 999 | 999 | 999 | 999 | | | ✓ | | 310 | | | |
| 1000mA | B/B+ | 999 | 999 | 999 | 999 | | | | | | | | |

Table with duration of tripping time measurement [ms] - Resolution: 1ms, Accuracy: $\pm(2.0\% \text{ reading} + 2\text{digits})$

TEST ON RCD TYPE DD PROTECTION

Differential protection type (RCD):

DD type (compliance with IEC62955 guideline), General (G)

Single -phase systems (L-N-PE)

Voltage range L-PE, L-N:

100V \div 265V

Voltage range N-PE:

<10V

Split-phase systems (phase delay VL1-PE, VL2-PE = 180° or phase delay VL1-PE, VL2-PE = 120°)

Voltage range L1-PE, L1-L2:

100V \div 265V

Voltage range L2-PE:

0V \div min[(VL1-PE-100V) and (VL1-L2-100V)]Rated tripping currents ($I_{\Delta N}$):

6mA

Frequency:

50/60Hz \pm 5%

Tripping current – (RCD DD type General)

| RCD type | $I_{\Delta N}$ | Range (mA) | Resolution (mA) | Accuracy |
|----------|----------------|---------------------------------|------------------------|---------------------------|
| DD | 6mA | (0.2 \div 1.1) $I_{\Delta N}$ | $\leq 0.1I_{\Delta N}$ | - 0%, +10% $I_{\Delta N}$ |

Tripping time – (RCD DD type General)

| RCD type | $I_{\Delta N}$ | Range (ms) | Resolution (ms) | Accuracy |
|----------|----------------|------------|-----------------|--|
| DD | 6mA | 10000 | 1 | $\pm(2.0\% \text{ rdg} + 2\text{dgt})$ |

FIRST FAULT CURRENT – IT SYSTEMS

| Range (mA) | Resolution (mA) | Accuracy |
|----------------|-----------------|--|
| 0.1 \div 0.9 | 0.1 | $\pm(5.0\% \text{ rdg} + 1\text{dgt})$ |
| 1 \div 999 | 1 | $\pm(5.0\% \text{ rdg} + 3\text{dgt})$ |

Limit contact voltage (ULIM) : 25V, 50V

OVERALL EARTH RESISTANCE WITHOUT RCD TRIPPING

Voltage range P-PE, P-N:

100V \div 265V

Voltage range N-PE:

<10V

Frequency:

50/60Hz \pm 5%

Overall earth resistance in systems with Neutral (3-wire) – (30mA or higher RCD)

| Range (Ω) | Resolution (Ω) | Accuracy |
|--------------------|-------------------------|--|
| 0.05 \div 9.99 | 0.01 | |
| 10.0 \div 199.9 | 0.1 | $\pm(5.0\% \text{ rdg} + 8\text{dgt})$ |

Overall earth resistance in systems with Neutral (3-wire) – (6mA and 10mA RCD)

| Range (Ω) | Resolution (Ω) | Accuracy |
|--------------------|-------------------------|---|
| 0.05 \div 9.99 | 0.01 | |
| 10.0 \div 199.9 | 0.1 | $\pm(5.0\% \text{ rdg} + 30\text{dgt})$ |



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Overall earth resistance in systems without Neutral (2-wire) – (30mA or higher RCD)

| Range (Ω) | Resolution (Ω) | Accuracy |
|--------------------|-------------------------|---|
| 0.05 ÷ 9.99 | 0.01 | $\pm (5.0\% \text{ rdg} + 8\text{dgt})$ |
| 10.0 ÷ 99.9 | 0.1 | |
| 100 ÷ 1999 | 1 | |

Overall earth resistance in systems without Neutral (2-wire) – (6mA and 10mA RCD)

| Range (Ω) | Resolution (Ω) | Accuracy |
|--------------------|-------------------------|--|
| 0.05 ÷ 9.99 | 0.01 | $\pm (5.0\% \text{ rdg} + 30\text{dgt})$ |
| 10.0 ÷ 99.9 | 0.1 | |
| 100 ÷ 1999 | 1 | |

Contact voltage

| Range [V] | Resolution [V] | Accuracy |
|------------|----------------|----------------------|
| 0 ÷ Ut LIM | 0.1 | -0%, +(5.0%rdg + 3V) |

PHASE ROTATION WITH 1 TEST LEAD

| Voltage range P-N, P-PE[V] | Frequency range |
|----------------------------|---------------------|
| 100 ÷ 265 | 50Hz/60Hz $\pm 5\%$ |

Measurement is only carried out by direct contact with metal live parts (not on insulation sheath)

VOLTAGE DROP ON LINES ($\Delta V\%$)

| Range [%] | Resolution [%] | Accuracy |
|-------------|----------------|---|
| 0.0 ÷ 100.0 | 0.1 | $\pm(10.0\% \text{ rdg} + 4\text{dgt})$ |

ENVIRONMENTAL PARAMETERS (AUX)

| Parameters | Range | Resolution | Accuracy |
|--------------------------|--|------------------------|--|
| $^{\circ}\text{C}$ (Air) | -20.0 $^{\circ}\text{C}$ ÷ 60.0 $^{\circ}\text{C}$ | 0.1 $^{\circ}\text{C}$ | $\pm(2.0\% \text{ rdg} + 2\text{dgt})$ |
| $^{\circ}\text{F}$ (Air) | -4.0 $^{\circ}\text{F}$ ÷ 140.0 $^{\circ}\text{F}$ | 0.1 $^{\circ}\text{F}$ | |
| Relative humidity [%RH] | 0.0% ÷ 100.0%RH | 0.1%RH | |
| DC Voltage | -1999.9mV ÷ -1.0mV 1.0mV ÷ 1999.9mV | 0.1mV | |
| Illuminance [Lux] | 0.01Lux ÷ 20.00 Lux | 0.01Lux | |
| | 1Lux ÷ 2kLux | 1Lux | |
| | 1.00kLux ÷ 20.00kLux | 0.01kLux | |

Values lower to $\pm 1\text{mVDC}$ are zeroed; Values lower to 0.1mVAC are zeroed

DC CURRENT WITH TRANSDUCER CLAMP (In1 input – STD clamp)

| Range [mV] | Resolution [mV] | Accuracy |
|----------------|-----------------|--|
| -1999.9 ÷ -1.0 | 0.1 | $\pm(5.0\% \text{ rdg} + 2\text{dgt})$ |
| 1.0 ÷ 1999.9 | 0.1 | |

Values lower to $\pm 1\text{mVDC}$ are zeroed

AC TRMS CURRENT WITH TRANSDUCER CLAMP (In1 input – STD clamp)

| Range [mV] | Frequenza [Hz] | Resolution [mV] | Accuracy |
|--------------|-------------------|-----------------|--|
| 1.0 ÷ 2999.9 | 50/60Hz $\pm 5\%$ | 0.1 | $\pm(5.0\% \text{ rdg} + 2\text{dgt})$ |

Values lower to 1mVAC are zeroed ; Max crest factor: 3



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DC/AC TRMS CURRENT WITH TRANSDUCER CLAMP (In1 input – STD clamp)

| FS clamp / Output ratio | Measurement range | Resolution |
|-------------------------|-----------------------|--------------|
| 1A/1V AC | 0.1mA ÷ 999.9mA AC | 0.1mA AC |
| 5A/1V AC | 0.001A ÷ 4.999A AC | 0.001A AC |
| 10A/1V AC/DC | 0.001A ÷ 9.999A AC/DC | 0.001A AC/DC |
| 30A/3V AC | 0.01A ÷ 29.99A AC | 0.01A AC |
| 40A/400mV AC/DC | 0.01A ÷ 39.99A AC/DC | 0.01A AC/DC |
| 100A/1V AC/DC | 0.01A ÷ 99.99A AC/DC | 0.01A AC/DC |
| 200A/1V AC | 0.01A ÷ 199.99A AC | 0.01A AC |
| 300A/3V AC | 0.01A ÷ 299.99A AC | 0.01A AC |
| 400A/400mV AC/DC | 0.1A ÷ 399.9A AC/DC | 0.1A AC/DC |
| 1000A/1V AC/DC | 0.1A ÷ 999.9A AC/DC | 0.1A AC/DC |
| 2000A/1V AC | 0.1A ÷ 1999.9A AC | 0.1A AC |
| 3000A/3V AC | 0.1A ÷ 2999.9A AC | 0.1A AC |



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MEASUREMENT OF NETWORK PARAMETERS AND HARMONICS (PQA)

DC Voltage

| Range [V] | Resolution [V] | Accuracy |
|--------------|----------------|-------------------|
| 15.0 ÷ 265.0 | 0.1V | ±(1.0%rdg + 1dgt) |

Values lower 15V are zeroed

AC TRMS Voltage

| Range [V] | Resolution [V] | Accuracy |
|--------------|----------------|-------------------|
| 15.0 ÷ 459.9 | 0.1V | ±(1.0%rdg + 1dgt) |

Values lower 15V are zeroed; Max crest factor: 1.5

Frequency

| Range [Hz] | Resolution [Hz] | Accuracy |
|-------------|-----------------|-------------------|
| 47.5 ÷ 63.0 | 0.01 | ±(2.0%rdg + 2dgt) |

Allowed voltage range: 5.0 ÷ 459.9V ; Allowed current range: ≥5mVAC

DC Current with transducer clamp (in1 input – std clamp)

| Range [mV] | Resolution [mV] | Accuracy |
|----------------|-----------------|--------------------|
| -1999.9 ÷ -1.0 | 0.1 | |
| 1.0 ÷ 1999.9 | 0.1 | ±(5.0%rdg + 2 dgt) |

Values lower to ±1mVDC are zeroed

AC TRMS Current with transducer clamp (in1 input – std clamp)

| Range [mV] | Frequency [Hz] | Resolution [mV] | Accuracy |
|--------------|----------------|-----------------|-------------------|
| 1.0 ÷ 2999.9 | 50/60Hz ±5% | 0.1 | ±(5.0%rdg + 2dgt) |

Values lower to 1mVAC are zeroed ; Max crest factor: 3

DC/AC TRMS current with transducer clamp (In1 input – STD clamp)

| FS clamp / Output ratio | Measurement range | Resolution |
|-------------------------|-----------------------|--------------|
| 1A/1V AC | 0.1mA ÷ 999.9mA AC | 0.1mA AC |
| 5A/1V AC | 0.001A ÷ 4.999A AC | 0.001A AC |
| 10A/1V AC/DC | 0.001A ÷ 9.999A AC/DC | 0.001A AC/DC |
| 30A/3V AC | 0.01A ÷ 29.99A AC | 0.01A AC |
| 40A/400mV AC/DC | 0.01A ÷ 39.99A AC/DC | 0.01A AC/DC |
| 100A/1V AC/DC | 0.01A ÷ 99.99A AC/DC | 0.01A AC/DC |
| 200A/1V AC | 0.01A ÷ 199.99A AC | 0.01A AC |
| 300A/3V AC | 0.01A ÷ 299.99A AC | 0.01A AC |
| 400A/400mV AC/DC | 0.1A ÷ 399.9A AC/DC | 0.1A AC/DC |
| 1000A/1V AC/DC | 0.1A ÷ 999.9A AC/DC | 0.1A AC/DC |
| 2000A/1V AC | 0.1A ÷ 1999.9A AC | 0.1A AC |
| 3000A/3V AC | 0.1A ÷ 2999.9A AC | 0.1A AC |

DC Power

| FS clamp | Range [kW] | Resolution [kW] | Accuracy |
|------------------|----------------|-----------------|--------------------|
| ≤ 10A | 0.015 ÷ 2.650k | 0.001 | ±(2.0%rdg + 5 dgt) |
| 10A ≤ FS ≤ 40 | 0.15 ÷ 10.60k | 0.01 | |
| 40A ≤ FS ≤ 100 | 0.15 ÷ 26.50k | 0.1 | |
| 100A ≤ FS ≤ 1000 | 1.5 ÷ 265.0k | 1 | |



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Active Power (@ 230V 1Ph systems, $\cos\phi=1$, f=50/60Hz)

| FS clamp | Range [kW] | Resolution [kW] | Accuracy |
|---------------------------|---------------|-----------------|-------------------------|
| $\leq 10A$ | 0.000 ÷ 9.999 | 0.001 | $\pm(2.0\%rdg + 5 dgt)$ |
| $10A \leq FS \leq 200$ | 0.00 ÷ 999.99 | 0.01 | |
| $200A \leq FS \leq 1000$ | 0.0 ÷ 999.9 | 0.1 | |
| $1000A \leq FS \leq 3000$ | 0 ÷ 9999 | 1 | |

Reactive Power (@ 230V 1Ph systems, $\cos\phi=0$, f=50/60Hz)

| FS clamp | Range [kVar] | Resolution [kVar] | Accuracy |
|---------------------------|---------------|-------------------|-------------------------|
| $\leq 10A$ | 0.000 ÷ 9.999 | 0.001 | $\pm(2.0\%rdg + 5 dgt)$ |
| $10A \leq FS \leq 200$ | 0.00 ÷ 999.99 | 0.01 | |
| $200A \leq FS \leq 1000$ | 0.0 ÷ 999.9 | 0.1 | |
| $1000A \leq FS \leq 3000$ | 0 ÷ 9999 | 1 | |

Apparent Power (@ 230V 1Ph systems, $\cos\phi=0$, f=50/60Hz)

| FS clamp | Range [kVA] | Resolution [kVA] | Accuracy |
|---------------------------|---------------|------------------|-------------------------|
| $\leq 10A$ | 0.000 ÷ 9.999 | 0.001 | $\pm(2.0\%rdg + 5 dgt)$ |
| $10A \leq FS \leq 200$ | 0.00 ÷ 999.99 | 0.01 | |
| $200A \leq FS \leq 1000$ | 0.0 ÷ 999.9 | 0.1 | |
| $1000A \leq FS \leq 3000$ | 0 ÷ 9999 | 1 | |

Power factor (@ 230V 1Ph systems, f=50.0Hz, current $\geq FS$)

| Range | Resolution | Accuracy |
|------------------------------|------------|------------------------|
| $0.70c \div 1.00 \div 0.70i$ | 0.01 | $\pm(2.0\%rdg + 3dgt)$ |

$\cos\phi$ (@ 230V 1Ph systems, f=50.0Hz, current $\geq FS$)

| Range | Resolution | Accuracy |
|------------------------------|------------|------------------------|
| $0.70c \div 1.00 \div 0.70i$ | 0.01 | $\pm(2.0\%rdg + 3dgt)$ |

Voltage harmonics (@ 230V 1Ph systems, f=50.0Hz)

| Range [%] | Resolution [%] | Order | Accuracy |
|------------------|----------------|-------------|------------------------|
| $0.1 \div 100.0$ | 0.1 | 00, 02 ÷ 25 | $\pm(5.0\%rdg + 5dgt)$ |

Fundamental frequency: 50/60Hz $\pm 5\%$

Harmonics are zeroed in the followed conditions:

- DC : if the DC value <0.5% fundamental value or if the DC value < 1.0V
- 1° harmonic: if the value of 1°harmonic <15V (not displayed)
- 2nd ÷ 25th harmonics: if harmonic value <0.5% fundamental value or if the value < 1.0V

Current harmonics (f=50/60Hz)

| Range [%] | Resolution [%] | Order | Accuracy |
|------------------|----------------|-------------|------------------------|
| $0.1 \div 100.0$ | 0.1 | 00, 02 ÷ 25 | $\pm(5.0\%rdg + 5dgt)$ |

Harmonics are zeroed in the followed conditions:

- DC : if the DC value <0.5% fundamental value or if the DC value < 5mV
- 1° harmonic: if the value of 1°harmonic <5mV (not displayed)
- 2nd ÷ 25th harmonics: if harmonic value <0.5% fundamental value or if the value <5mV



2. GENERAL SPECIFICATIONS

MECHANICAL CHARACTERISTICS

| | |
|------------------------------|--------------------------------|
| Dimensions (L x W x H): | 225 x 165 x 75mm (9 x 6 x 3in) |
| Weight (batteries included): | 1.2kg (42 ounces) |
| Mechanical protection: | IP40 |

MEMORY AND PC CONNECTIONS

| | |
|----------------|------------------------------|
| Memory: | 999 locations, 3 mark levels |
| PC connection: | optical/USB port |

DISPLAY

| | |
|------------------|---|
| Characteristics: | COG Black/white graphic LCD, 320x240pxl |
|------------------|---|

POWER SUPPLY

| | |
|-----------------|--|
| Battery type: | 6x1.5V alkaline batteries type AA IEC LR06 or 6 x1.2V rechargeable NiMH type AA |
| Battery life: | > 500 tests for each function |
| Auto Power OFF: | after 5 minutes' idling (if activated) |

ENVIRONMENTAL CONDITIONS FOR USE

| | |
|------------------------------|-----------------------------|
| Reference temperature: | 23°C ± 5°C (73°F ± 41°F) |
| Operating temperature: | 0°C ÷ 40°C (32°F ÷ 104°F) |
| Allowable relative humidity: | <80%RH |
| Storage temperature: | -10°C ÷ 60°C (14°F ÷ 140°F) |
| Storage humidity: | <80%RH |
| Max. operating altitude: | 2000m (6562ft) |

REFERENCE GUIDELINES

| | |
|--------------------------|---|
| Safety: | IEC/EN61010-1, IEC/EN61010-2-030, IEC/EN61010-2-033 IEC/EN61010-2-034, IEC/EN61557-1 |
| EMC : | IEC/EN61326-1 |
| Technical documentation: | IEC/EN61187 |
| Safety of accessories: | IEC/EN61010-031 |
| Insulation: | double insulation |
| Pollution level: | 2 |
| Measurement category: | CAT IV 300V to earth, maximum 415V between inputs |
| RPE: | IEC/EN61557-4, BS7671 17th ed., AS/NZS3000/3017 |
| MΩ: | IEC/EN61557-2, BS7671 17th ed., AS/NZS3000/3017 |
| RCD: | IEC/EN61557-6 (only on Phase-Neutral-Earth systems) |
| RCD-DD: | IEC62955 |
| RCD CCID: | UL2231-2 |
| LOOP P-P, P-N, P-PE: | IEC/EN61557-3, BS7671 17th ed., AS/NZS3000/3017 |
| Multifunction: | IEC/EN61557-10, BS7671 17th ed., AS/NZS3000/3017 |
| Short-circuit current: | EN60909-0 |

This instrument satisfies the requirements of Low Voltage Directive 2014/35/EU (LVD) and of EMC Directive 2014/30/EU

This instrument satisfies the requirements of European Directive 2011/65/EU (RoHS) and 2012/19/EU (WEEE)

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