



# Combi 420 Multifunction Installation Tester

## Three Year Warranty

### FEATURES

- Continuity test with 200mA
- Insulation with 50, 100, 250, 500, 1000VDC
- Trip out time of RCDs type AC, A Standard and Selective
- Trip out current of RCDs type AC, A Standard and Selective (up to 1A)
- Loop Impedance P-P, P-N, P-PE
- Loop Impedance with high accuracy (with IMP57 optional accessory)
- Prospective short circuit current
- Contact voltage
- Global Earth Resistance without RCD tripping
- Phase sequence indication
- AUTO function (Ra + RCDtest + Insulation) on plug
- AC TRMS voltage and current
- Active, Reactive, Apparent power and power factor on single phase system
- Harmonics voltage/current up the 49th and THD% on single phase system
- Environmental parameters measure (°C, °F, %RH, Lux, sound level)
- Measure with remote probe (PR400 optional accessory)
- Leakage current
- Data HOLD
- Contextual help at display
- Optical-USB interface with PC connection
- Internal memory



### STANDARD ACCESSORIES

- C2033X : Cable 3 wires with Shuko plug
- UNIVERSALKIT : Set 3 cables + 3 alligator clips + 1 test lead
- BORSA75N : Soft carrying bag
- ISO9000 calibration certificate
- User manual on CD-ROM



**RAPID-TECH EQUIPMENT**

For all your Test Equipment Requirements

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# 1. ELECTRICAL SPECIFICATIONS

## Continuity test on protective conductors

Range ( $\Omega$ )	Resolution ( $\Omega$ )	Accuracy	Category of measure
0.00 ÷ 9.99	0.01	$\pm(2.0\%rdg + 2dgt)$	CAT III 240V to Ground CAT III 415V between inputs
10.0 ÷ 99.9	0.1		

(\*) after cable calibration which eliminates the cable resistance

Test current: >200mA DC per  $R \leq 5\Omega$  (calibration included) ; Current measurement resolution: 1mA

Open leads voltage:  $4 < V_o < 24V$

## Insulation resistance

Test voltage (V)	Range (M $\Omega$ )	Resolution (M $\Omega$ )	Accuracy	Category of measure
50	0.01 ÷ 9.99	0.01	$\pm(2.0\%rdg + 2dgt)$	CAT III 240V to Ground CAT III 415V between inputs
	10.0 ÷ 49.9	0.1	$\pm(5.0\%rdg + 2dgt)$	
	50.0 ÷ 99.9			
100	0.01 ÷ 9.99	0.01	$\pm(2.0\%rdg + 2dgt)$	
	10.0 ÷ 99.9	0.1	$\pm(5.0\%rdg + 2dgt)$	
	100 ÷ 199	1		
250	0.01 ÷ 9.99	0.01	$\pm(2.0\%rdg + 2dgt)$	
	10.0 ÷ 99.9	0.1	$\pm(5.0\%rdg + 2dgt)$	
	100 ÷ 249	1		
	250 ÷ 499			
500	0.01 ÷ 9.99	0.01	$\pm(2.0\%rdg + 2dgt)$	
	10.0 ÷ 99.9	0.1	$\pm(5.0\%rdg + 2dgt)$	
	100 ÷ 499	1		
	500 ÷ 999			
1000	0.01 ÷ 9.99	0.01	$\pm(2.0\%rdg + 2dgt)$	
	10.0 ÷ 99.9	0.1	$\pm(5.0\%rdg + 2dgt)$	
	100 ÷ 999	1		
	1000 ÷ 1999			

Open leads voltage: 1.25 x nominal test voltage ; Voltage measurement resolution: 1V

Short circuit current: <15mA (peak) for each test voltage

Nominal current: >2.2mA with 230k $\Omega$  @, 500V; 1mA with 1M $\Omega$  @ other test voltage

## RCDs tripping time

Range (ms)	Resolution (ms)	Accuracy	Category of measure
$\frac{1}{2} I_{\Delta N}, I_{\Delta N}$	1 ÷ 999	$\pm(2.0\%rdg + 2dgt)$	CAT III 240V to Ground CAT III 415V between inputs
2 $I_{\Delta N}$	1 ÷ 200 general		
	1 ÷ 250 selective		
5 $I_{\Delta N}$	1 ÷ 50 general		
	1 ÷ 160 selective		

Nominal trip-out current: 10mA, 30mA, 100mA, 300mA, 500mA, 650mA, 1000mA

RCD type: AC, A, general and selective

Phase-ground voltage: (110V ÷ 240V)  $\pm 10\%$

Frequency: 50Hz  $\pm 0.5$ Hz, 60Hz  $\pm 0.5$ Hz

Voltage contact limits: 25V or 50V

## RCDs tripping current (general, AC and A types)

RCD's type	$I_{\Delta N}$	Range $I_{\Delta N}$ (mA)	Resolution (mA)	Accuracy	Category of measure
AC	$I_{\Delta N} \leq 10mA$	(0.5 ÷ 1.1) $I_{\Delta N}$	0.1 $I_{\Delta N}$	0%, +10%rdg	CAT III 240V to Ground CAT III 415V between inputs
A		(0.3 ÷ 1.1) $I_{\Delta N}$			
AC	$I_{\Delta N} > 10mA$	(0.5 ÷ 1.1) $I_{\Delta N}$			
A		(0.3 ÷ 1.1) $I_{\Delta N}$			

### Global Earth Resistance $R_A$ without RCD's tripping

Range ( $\Omega$ )	Resolution (V)	Accuracy	Category of measure
1 ÷ 1999	1	$\pm (5.0\%rdg + 3dgt)$	CAT III 240V to Ground CAT III 415V between inputs

RCD type: AC, A, general and selective  
 Range contact voltage Ut: 0 ÷ 2U<sub>lim</sub>, resolution: 0.1V, accuracy: -0%, +(5%rdg + 3dgt)  
 Test current: < ½ I<sub>dn</sub>, accuracy: -10%, +0% I<sub>dn</sub>

### Loop impedance P-P, P-N, P-PE TT/TN systems

Range ( $\Omega$ )	Resolution ( $\Omega$ ) (*)	Accuracy	Category of measure
0.01 ÷ 9.99	0.01	$\pm(5.0\%rdg + 3dgt)$	CAT III 240V to Ground CAT III 415V between inputs
10.0 ÷ 199.9	0.1		
200 ÷ 1999 (only P-PE)	1		

(\*) 0.1m $\Omega$  in 0.0 ÷ 199.9 m $\Omega$  range (with option accessory IMP57)  
 Maximum peak current: 3A @ 127V, 6A @ 230V, 10A @ 400V  
 Test voltage: (110÷240V)  $\pm 10\%$  (P-N, P-PE); 50Hz  $\pm 0.5$ Hz, 60Hz  $\pm 0.5$ Hz  
 (110÷415V)  $\pm 10\%$  (P-P); 50Hz  $\pm 0.5$ Hz, 60Hz  $\pm 0.5$ Hz

### Loop impedance P-P, P-N, P-PE - First fault current IT systems

Range (mA)	Resolution (mA)	Accuracy	Category of measure
5 ÷ 999	1	$\pm(5.0\%rdg + 3dgt)$	CAT III 240V to Ground CAT III 415V between inputs

U<sub>lim</sub> (UI): 25V , 50V

### Global Earth Resistance $R_A$

Range ( $\Omega$ )	Resolution ( $\Omega$ )	Accuracy	Category of measure
0.01 ÷ 9.99	0.01	$\pm(5.0\%rdg + 1.0\Omega)$	CAT III 240V to Ground CAT III 415V between inputs
10.0 ÷ 199.9	0.1		
200 ÷ 1999 (solo F-PE)	1		

Test current @ 265V: <15 mA  
 Test voltage: (110÷240V)  $\pm 10\%$  (phase-neutral/PE); 50Hz  $\pm 0.5$ Hz, 60Hz  $\pm 0.5$ Hz  
 U<sub>lim</sub> (UI): 25V , 50V

### Phase sequence with 1 or 2 wires

Range (V)	Results displayed	Category of measure
(100 ÷ 240) $\pm 10\%$	"123" → correct phase sequence "132" → wrong phase sequence "11-" → phase coincidence	CAT III 240V to Ground CAT III 415V between inputs

The instrument detects the phase sequence by touching the hot wire. The detection is not performed on insulated cables.  
 Frequency: 50Hz  $\pm 0.5$ Hz, 60Hz  $\pm 0.5$ Hz

### AC TRMS Voltage

Range (V)	Frequency (Hz)	Resolution (V)	Accuracy	Category of measure
5.0 ÷ 265.0	47 ÷ 63	0.1	$\pm(0.5\%rdg + 2dgt)$	CAT III 240V to Ground CAT III 415V between inputs

Max crest factor: <1.5 ; Voltage indicated it's the Max TRMS value considered between any couple of inputs

### Frequency

Range (Hz)	Resolution (Hz)	Accuracy	Category of measure
47.0 ÷ 63.0	0.1	$\pm (2\%rdg + 2dgt)$	CAT III 240V to Ground CAT III 415V between inputs

Voltage range: 15V ÷ 460Vrms

### Voltage harmonics

Range	Resolution (V)	Accuracy	Category of measure
2a ÷ 15a	0.1	$\pm (2\%rdg + 5dgt)$	CAT III 240V to Ground
16a ÷ 49a		$\pm (5\%rdg + 10dgt)$	CAT III 415V between inputs

Voltage range: 0.0V ÷ 265Vrms  
 Fundamental frequency range : 47 ÷ 63Hz

**AC TRMS Current (In1 input)**

Range (A)	Resolution (A)	Accuracy	Category of measure
0.005 ÷ 1.2 x FS	See table	±(1.0%rdg + 2dgt)	CAT I 30V to Ground and between inputs

Frequency range : 47Hz ÷ 63Hz

**Current harmonics (In1 input)**

Range	Resolution (A)	Accuracy	Category of measure
2a ÷ 15a	See table	± (2% rdg + 5dgt)	CAT I 30V to Ground and between inputs
16a ÷ 49a		± (5%rdg + 10dgt)	

Frequency range: 47Hz ÷ 63Hz ; Current range: ≥ 0.020 x FS

Full scale FS [A]	Resolution [A]	Full scale FS [A]	Resolution [A]
1	0.001	300	0.1
10	0.01	400	0.1
30	0.01	1000	1
100	0.1	2000	1
200	0.1	3000	1

**Active, Reactive, Apparent power @ V<sub>mis</sub>>60V, cosφ=1, f=50.0Hz**

Range (W, VAR, VA)	Resolution (W,VAR, VA)	FS Clamp (A)	Accuracy
0.0 ÷ 999.9	0.1	FS ≤ 1	± (1.0%rdg + 6dgt)
1.000 ÷ 9.999 k	0.001 k		
0.000 ÷ 9.999 k	0.001 k	1 < FS ≤ 10	
10.00 ÷ 99.99 k	0.01 k		
0.00 ÷ 99.99 k	0.01 k	10 < FS ≤ 100	
100.0 ÷ 999.9 k	0.1 k		
0.0 ÷ 999.9 k	0.1 k	100 < FS ≤ 3000	
1000 ÷ 9999 k	1 k		

**Power factor (cosφ) @ V<sub>mis</sub>>60V, f=50.0Hz**

Current range (A)	Range	Resolution	Accuracy
0.005 ÷ 0.1 x FS	0.80c ÷ 1.00 ÷ 0.80i	0.01	± 2°
0.1 ÷ 1.2 x FS			± 1°

**Leakage current AC TRMS (In1 input)**

Range (mV)	Resolution (mV)	Accuracy	Category of measure
1 ÷ 1200	0.1	±(1.0%rdg + 2dgt)	CAT I 30V to Ground and between inputs

Frequency range: 50Hz ÷ 60Hz

**Environmental parameters**

Feature	Range	Resolution	Transduced signal	Accuracy
Temperature	-20.0 ÷ 80.0°C	0.1°C	-20 ÷ +80mV	±(2.0%rdg + 2dgt)
	-4.0 ÷ 176.0°F	0.1°F	-4 ÷ +176mV	
Humidity	0.0 ÷ 100.0% RH	0.1% RH	0 ÷ +100mV	
DC Voltage	±(0.0 ÷ 999.9mV)	0.1mV	±(0.2 ÷ 999.9mV)	
Illuminance	0.001 ÷ 20.00Lux	0.001 ÷ 0.02Lux	0 ÷ +100mV	
	0.1 ÷ 2000Lux	0.1 ÷ 2Lux		
	1 ÷ 20000Lux	0.1 ÷ 2Lux		

## 2. GENERAL SPECIFICATIONS

### MECHANICAL FEATURES

Dimensions (L x W x H):	235 x 165 x 75mm
Weight (batteries included):	1.2kg

### MEMORY AND SERIAL INTERFACE

Each measurement can be stored	
Memory:	500 locations
PC communication port:	optical / USB

### DISPLAY:

Features:	graphic LCD with backlight
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### POWER SUPPLY:

Batteries:	6x 1.5V type LR6, AA, AM3, MN 1500
Battery life:	> 600 measurements (without using the timer)

### ENVIRONMENTAL CONDITIONS:

Reference temperature of calibration:	23°C ± 5°C
Working temperature:	0° ÷ 40°C
Working humidity:	< 80%HR
Storage temperature (batteries not included):	-10 ÷ 60°C
Storage humidity:	< 80%HR

### GENERAL REFERENCE STANDARDS:

Safety:	IEC/EN61010-1, IEC/EN61557-1, -2, -3, -4, -6, -7
Technical literature:	IEC/EN61187
Safety of accessories:	IEC/EN61010-031, IEC/EN61010-2-032
LOW $\Omega$ (200mA):	IEC/EN61557-4
M $\Omega$ :	IEC/EN61557-2
RCD:	IEC/EN61557-6
LOOP P-P, P-N, P-PE:	IEC/EN61557-3
Ra 15 <sub>mA</sub>	IEC/EN61557-3
123:	IEC/EN61557-7
Insulation:	double insulation
Pollution degree:	2
Max altitude:	2000m
Overvoltage category:	CAT III 240V to ground, max 415V among inputs



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