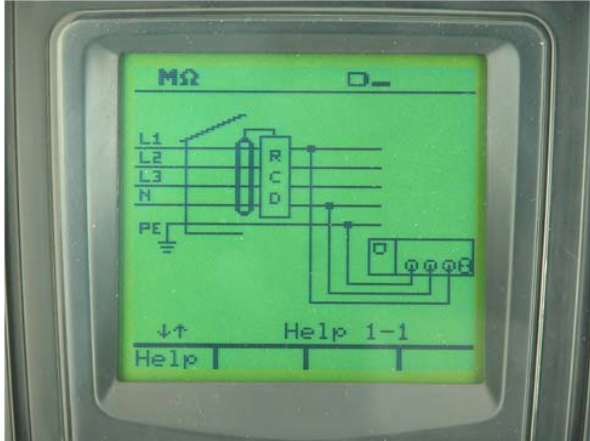
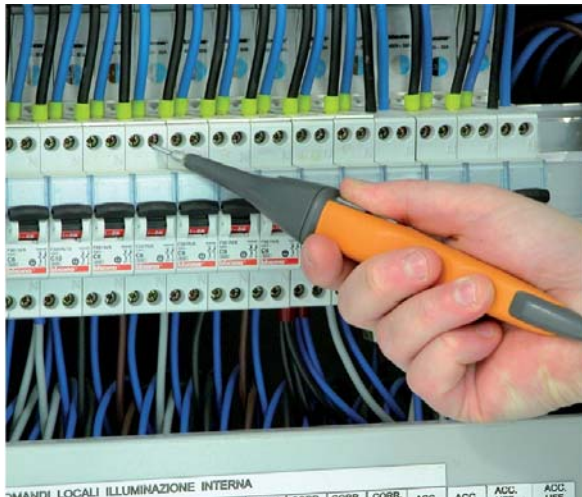


1. MAIN FEATURES OF FAMILY 400 METERS



Help on line (available on each function) to support the user while connecting the instrument to the installation under measurement



Each model permits the Start of measurements with remote probe (PR400 optional accessory)



General menu to quickly selection of available test performed by meter
(COMBI419 and COMBI420 models only)



1. MODELS AND FEATURES

Measurements	ISO410	SPEED418	COMBI419	COMBI420
Continuity test on protective conductor with 200mA	✓		✓	✓
Insulation resistance 50-100-250-500-1000VDC	✓		✓	✓
RCDs tripping time and current (general and selective, AC and A types) 10-30-100-300-500-650mA		✓	✓	✓
Contact voltage U_t		✓	✓	✓
Loop impedance P-N, P-P, P-PE		✓	✓	✓
Loop impedance P-N, P-P, P-PE with high resolution (0.1m Ω) with IMP57 optional accessory		✓	✓	✓
Prospective short circuit current		✓	✓	✓
Global earth resistance R_a without RCDs tripping		✓	✓	✓
Phase sequence		✓	✓	✓
Leakage current (with HT96U optional accessory)			✓	✓
AUTOMATIC test (R_a , RCD time, Insulation) directly on outlet			✓	✓
ACTRMS voltage and current in Single phase system				✓
Active, reactive, apparent powers and power factor in Single phase system				✓
Harmonic analysis U, I, up to 49 th order and THD%				✓
Environmental parameters ($^{\circ}$ C, %HR, Lux,)				✓
Using optional remote probe for activation of tests	✓	✓	✓	✓
Contextual help at display	✓	✓	✓	✓
Memory and PC interface	✓	✓	✓	✓



2. ELECTRICAL SPECIFICATIONS

Continuity test on protective conductors

Range (Ω)	Resolution (Ω)	Uncertainty (*)	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: $4 < V_0 < 24V$

RCDs tripping time

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

Nominal tripping current: 10mA, 30mA, 100mA, 300mA, 500mA, 650mA

RCD type: AC, A, general and selective

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

 Frequency: 50Hz ± 0.5 Hz, 60Hz ± 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)	Uncertainty	Category of measure
AC	$I_{\Delta N} \leq 10mA$	$(0.5 \div 1.4) I_{\Delta N}$	0.1 $I_{\Delta N}$	0%,+10%rdg	CAT III 240V to Ground CAT III 415V between inputs
A		$(0.5 \div 2) I_{\Delta N}$			
AC	$I_{\Delta N} > 10mA$	$(0.5 \div 1.4) I_{\Delta N}$			
A		$(0.5 \div 2) I_{\Delta N}$			

Insulation resistance (DC voltage) (COMBI419-COMBI420)

Test voltage (V)	Range (M Ω)	Resolution (M Ω)	Uncertainty	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		
	100 ÷ 249	1	$\pm(5.0\%rdg + 2dgt)$	
	250 ÷ 499			
500	0.01 ÷ 9.99	0.01	$\pm(2.0\%rdg + 2dgt)$	
	10.0 ÷ 99.9	0.1		
	100 ÷ 499	1	$\pm(5.0\%rdg + 2dgt)$	
	500 ÷ 999			
1000	0.01 ÷ 9.99	0.01	$\pm(2.0\%rdg + 2dgt)$	
	10.0 ÷ 99.9	0.1		
	100 ÷ 999	1	$\pm(5.0\%rdg + 2dgt)$	
	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 Ω @, 500V; 1mA with 1M Ω @ other test voltage

**Contact voltage U_t**

Range (V)	Resolution (V)	Uncertainty	Category of measure
0 ÷ 2U _{lim}	0.1	-0%, +(2.0%rdg + 2dgt)	CAT III 240V to Ground CAT III 415V between inputs

U_{lim} (UI): 25V , 50V**Loop impedance P-P, P-N, P-PE TT/TN systems**

Range (Ω)	Resolution (Ω) (*)	Uncertainty	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 Ω in 0.0 ÷ 199.9 m Ω 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 ± 0.5 Hz, 60Hz ± 0.5 Hz(110÷415V) $\pm 10\%$ (P-P); 50Hz ± 0.5 Hz, 60Hz ± 0.5 Hz**Loop impedance P-P, P-N, P-PE IT systems**

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

U_{lim} (UI): 25V , 50V**Global Earth Resistance R_A without tripping the RCD**

Range (Ω)	Resolution (Ω)	Uncertainty	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: <15mA

Test voltage: (110÷240V) $\pm 10\%$ (phase-neutral/PE); 50Hz ± 0.5 Hz, 60Hz ± 0.5 HzU_{lim} (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 ± 0.5 Hz, 60Hz ± 0.5 Hz**Leakage current AC TRMS (I_{n1} input)**

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

Frequency range: 50Hz ÷ 60Hz



3. GENERAL SPECIFICATIONS

MECHANICAL FEATURES

Dimensions:	235 (L)x165(La)x75(H)mm
Weight (batteries included):	about 1.2kg
Protection degree:	IP50

MEMORY AND SERIAL INTERFACE

Each measurement can be stored

Memory:	>600 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 Ω (200mA):	IEC/EN61557-4
M Ω :	IEC/EN61557-2
RCD:	IEC/EN61557-6
LOOP P-P, P-N, P-PE:	IEC/EN61557-3
Ra 15 _{mA}	IEC/EN61557-3
123:	IEC 61557-7
Insulation:	double insulation
Pollution degree:	2
Max altitude:	2000m
Overvoltage category:	CAT III 240V to ground, max 415V among inputs

This instrument complies with the requirements of the European Low Voltage Directives 2006/95/EEC (LVD) and EMC 2004/108/EEC