

1. ELECTRICAL SPECIFICATIONS – SAFETY SECTION (*)

Accuracy is indicated as $\pm$ (% readings + no. of digits*resolution) at 23 °C $\pm$ 5 °C, <80%HR

Voltage (RCD, LOOP, Phase sequence)

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

Frequency

Range [Hz]	Resolution [Hz]	Accuracy
47.0 ÷ 63.6	0.1	$\pm(0.1\% \text{ rdg} + 1\text{dgt})$

Continuity test on protective and equalizing conductors

Range [Ω]	Resolution [Ω]	Accuracy (*)
0.01 ÷ 19.99	0.01	$\pm(5.0\% \text{ rdg} + 3\text{dgt})$
20.0 ÷ 99.9	0.1	

(*) calibrate the cables to null their resistance

Test current: > 200mA DC for $R \leq 5\Omega$ (calibration included) ; Resolution for DC current :1mA

Open-circuit voltage: $4V \leq V_0 \leq 12V$

Safety protection: the display shows an error message for input voltage > approx. 10V

Insulation resistance (DC voltage)

Test voltage[V]	Range [$M\Omega$]	Resolution [$M\Omega$]	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	0.1	$\pm(5.0\% \text{ rdg} + 2\text{dgt})$
100	0.01 ÷ 9.99	0.01	$\pm(2.0\% \text{ rdg} + 2\text{dgt})$
	10.0 ÷ 99.9	0.1	
	100.0 ÷ 199.9	0.1	$\pm(5.0\% \text{ rdg} + 2\text{dgt})$
250	0.01 ÷ 9.99	0.01	$\pm(2.0\% \text{ rdg} + 2\text{dgt})$
	10.0 ÷ 99.9	0.1	
	100 ÷ 499	1	$\pm(5.0\% \text{ rdg} + 2\text{dgt})$
500	0.01 ÷ 9.99	0.01	$\pm(2.0\% \text{ rdg} + 2\text{dgt})$
	10.0 ÷ 199.9	0.1	
	200 ÷ 499	1	$\pm(5.0\% \text{ rdg} + 2\text{dgt})$
	500 ÷ 999	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	$\pm(5.0\% \text{ rdg} + 2\text{dgt})$
	1000 ÷ 1999	1	

Open-circuit voltage: nominal test voltage $-0\% + 10\%$

Short circuit current: <6.0mA at 500V test voltage

Nominal test current: >1mA if load= $1k\Omega \cdot V_{nom}$ ($V_{nom}=50V, 100V, 250V, 500V, 1000V$)

Safety protection: the display shows an error message for input voltage > approx.10V

Z Line (Line-Line, Line-Neutral, Line-PE)

Range [Ω]	Resolution [Ω]	Accuracy
0.00 ÷ 199.9 $m\Omega$ (*)	0.1 $m\Omega$ (*)	$\pm(5.0\% \text{ rdg} + 1\text{m}\Omega)$ (*)
200 ÷ 1999 $m\Omega$ (*)	1 $m\Omega$ (*)	
0.01 ÷ 9.99 Ω	0.01 Ω	$\pm(5.0\% \text{ rdg} + 3\text{dgt})$
10.0 ÷ 199.9 Ω	0.1 Ω	

(*) By means of IMP57 optional accessory

Maximum test current: 5.81A (at 265V); 10.10A (at 457V)

Test voltage ranges: 100÷265V (Line-Neutral) / 173÷460V (Line-Line); 50/60Hz $\pm$ 5%

Protection type: MCB (B, C, D, K), Fuse (gG, aM)

Insulation materials: PVC, Rubber butyl, EPR, XLPE

First fault current (IT systems)

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

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

RCD test (Molded case type)

RCD type: AC (⌚), A (⌚), B (⌚) – General (G), Selective (S) and Delayed (⌚)
Rated tripping currents (I_{ΔN}): 10mA, 30mA, 100mA, 300mA, 500mA, 650mA, 1000mA
Line-PE, Line-N voltage: 100V ÷265V RCD type AC and A, 190V ÷265V RCD type B
Frequency: 50/60Hz ± 5%

RCD tripping current (Molded case type – RCD General)

RCD type	I _{ΔN}	Range I _{ΔN} [mA]	Resolution [mA]	Accuracy I _{ΔN}
AC, A	I _{ΔN} = 10mA	(0.3 ÷ 1.1) I _{ΔN}	≤ 0.1 I _{ΔN}	- 0%, +10%I _{ΔN}
	10mA < I _{ΔN} ≤ 650mA			- 0%, +5%I _{ΔN}
B	30mA ≤ I _{ΔN} ≤ 100mA			

RCD Molded type tripping time range [ms] (TT/TN system)

	\	x 1/2			x 1			x 2			x 5			AUTO					
		G	S	⌚	G	S	⌚	G	S	⌚	G	S	⌚	G	S	⌚	G	S	⌚
10mA	AC	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	A	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	B																		
30mA 100mA	AC	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	A	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	B	999	999	999	999	999	999										310		
300mA	AC	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	A	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	B	999	999	999	999	999	999												
500mA 650mA	AC	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	A	999	999	999	999	999	999	200	250								310		
	B																		
1000mA	AC	999	999	999	999	999	999	200	250										
	A	999	999	999	999	999	999												
	B																		

Resolution: 1ms, Accuracy: ±(2.0%rdg + 2dgt)

RCD Molded type tripping time range [ms] (IT system)

	\	x 1/2			x 1			x 2			x 5			AUTO					
		G	S	⌚	G	S	⌚	G	S	⌚	G	S	⌚	G	S	⌚	G	S	⌚
10mA	AC	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	A																		
	B																		
30mA 100mA 300mA	AC	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	A																		
	B																		
500mA 650mA	AC	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	A																		
	B																		
1000mA	AC	999	999	999	999	999	999	200	250										
	A																		
	B																		

Resolution: 1ms, Accuracy: ±(2.0%rdg + 2dgt)

Test on earth leakage delay tester RCDs (with RCDX10 optional accessory)

RCD type: AC () , A () , B () – General (G), Selective (S) and Delayed ()
Rated tripping currents ($I_{\Delta N}$): 0.3A ÷ 10A
Line-PE, Line-N voltage: 100V ÷ 265V RCD type AC and A, 190V ÷ 265V RCD type B
Frequency: 50/60Hz ± 5%

Earth leakage delay tester RCDs tripping current (RCD General)

RCD type	$I_{\Delta N}$	Range $I_{\Delta N}$ [mA]	Resolution [mA]	Accuracy $I_{\Delta N}$
AC, A	$300\text{mA} \leq I_{\Delta N} \leq 6.5\text{A}$	$(0.3 \div 1.1) I_{\Delta N}$	$\leq 0.1 I_{\Delta N}$	- 0%, +5% $I_{\Delta N}$
B	$300\text{mA} \leq I_{\Delta N} \leq 1\text{A}$			

Earth leakage delay tester RCDs trip out time range [ms] (TT/TN system)

	\	x 1/2			x 1			x 2			x 5			AUTO					
		G	S		G	S		G	S		G	S		G	S		G	S	
0.3A ÷ 1.0A	AC	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	A	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	B	999	999	999	999	999	999										310		
1.1A ÷ 3.0A	AC	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	A	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	B	999	999	999	999	999	999												
3.1A ÷ 6.5A	AC	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	A	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	B	999	999	999	999	999	999												
6.6A ÷ 10.0A	AC	999	999	999	999	999	999	200	250										
	A	999	999	999	999	999	999												
	B																		

Resolution: 1ms, Accuracy: $\pm(2.0\% \text{rdg} + 2\text{dgt})$

Earth leakage delay tester RCDs trip out time range [ms] (IT system)

	\	x 1/2			x 1			x 2			x 5			AUTO					
		G	S		G	S		G	S		G	S		G	S		G	S	
0.3A ÷ 3.0A	AC	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	A																		
	B																		
3.1A ÷ 6.5A	AC	999	999	999	999	999	999	200	250		50	150		✓	✓		310		
	A																		
	B																		
6.6A ÷ 10.0A	AC	999	999	999	999	999	999	200	250										
	A																		
	B																		

Resolution: 1ms, Accuracy: $\pm(2.0\% \text{rdg} + 2\text{dgt})$

R_A – Non-trip earth loop impedance

Test voltage: 100÷265V (Line-PE), 50/60Hz ± 5%

R_A – Systems with Neutral wire

Range [Ω]	Resolution [Ω]	Accuracy
0.01 ÷ 9.99	0.01	-0%, +(5.0% rdg + 0.1 Ω)
10.0 ÷ 199.9	0.1	-0%, +(5.0% rdg + 1 Ω)
200 ÷ 1999	1	-0%, +(5.0% rdg + 3 Ω)

Test current: ~10mA

R_A – Systems without Neutral wire

Range [Ω]	Resolution [Ω]	Accuracy
1 ÷ 1999	1	-0%, +(5.0% rdg + 3dgt)

Test current: $< \frac{1}{2} I_{\Delta N} \text{ set}$

Contact voltage (RCD and Ra test)

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

Contact voltage (EARTH test – TT system)

Range [V]	Resolution [V]	Accuracy
0 ÷ 99.9	0.1	-0%, +(5.0% rdg + 3V)

Contact voltage (EARTH test – TN system)

Range [V]	Resolution [V]	Accuracy
0 ÷ 99.9	0.1	-0%, +(5.0% rdg + 3V)
100 ÷ 999	1	

Ground resistance with 3-wire method

Range [Ω]	Resolution [Ω]	Accuracy (*)
0.01 ÷ 9.99	0.01	$\pm(5.0\% \text{ rdg} + 3\text{dgt})$
10.0 ÷ 99.9	0.1	
100 ÷ 999	1	
1.00k ÷ 49.99k	0.01k	

Test current: <10mA – 77.5Hz, Open-circuit voltage: < 20Vrms

(*) Add 5% to the accuracy if the probe resistances (R_s or R_h) > 100 x R_{meas}

Soil resistivity with 4-wire Wenner method

Range [Ωm]	Resolution [Ωm]	Accuracy (*)
0.06 ÷ 9.99	0.01	$\pm(5.0\% \text{ rdg} + 3\text{dgt})$
10.0 ÷ 99.9	0.1	
100 ÷ 999	1	
1.00k ÷ 9.99k	0.01k	
10.0k ÷ 99.9k	0.1k	
100k ÷ 999k (*)	1k	
1.00M ÷ 3.14M (*)	0.01M	

(*) with distance $d=10\text{m}$, Distance "d" range: 1 ÷ 10m

Test current: <10mA – 77.5Hz, Open-circuit voltage: < 20Vrms

Phase sequence rotation with 1-wire method

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 main power lines ($\Delta V\%$)

Range (%)	Resolution (%)	Accuracy
0 ÷ 100	0.1	$\pm(10.0\% \text{ rdg} + 4\text{dgt})$

Voltage range Phase-PE, Phase-Neutral: 100 ÷ 265V, Frequency: 50/60Hz $\pm 5\%$

Leakage current (by HT96U optional clamp transducer)

FS clamp AC (A)	Resolution	Accuracy
1	0.1mA	$\pm(1.0\% \text{ rdg} + 20\text{dgt})$
1 < FS < 10	0.01A	
10 $\leq$ FS < 300	0.1A	
300 $\leq$ FS < 3000	1A	

Environmental parameters (AUX function)

Parameter	Range	Resolution	Accuracy
Temperature [$^{\circ}\text{C}$]	-20 $^{\circ}\text{C}$ ÷ 80 $^{\circ}\text{C}$	0.1 $^{\circ}\text{C}$	$\pm(2.0\% \text{ rdg} + 2\text{dgt})$
Temperature [$^{\circ}\text{F}$]	-4 $^{\circ}\text{F}$ ÷ 176 $^{\circ}\text{F}$	0.1 $^{\circ}\text{F}$	
Relative humidity [%HR]	0 ÷ 100%HR	0.1% UR	
DC output voltage	0.1mV ÷ 1.0V	0.1mV	
Illuminance [Lux] (*) Accuracy of HT53 lux probe is according to Class AA	0.001Lux ÷ 20.00 Lux (*)	0.001 ÷ 0.02 Lux	
	0.1 Lux ÷ 2000 Lux (*)	0.1 ÷ 2 Lux	
	1 Lux ÷ 20 kLux (*)	1 ÷ 20 Lux	

2. ELECTRICAL SPECIFICATIONS – PQA SECTION

AC TRMS Voltage (Phase-Neutral)

Range [V]	Resolution [V]	Accuracy
15.0 ÷ 380.0	0.1V	$\pm(1.0\%rdg + 1dgt)$

Allowed crest factor: $\leq 1,5$; Frequency: 42 ÷ 69.0 Hz

AC TRMS Voltage (Phase-Phase)

Range [V]	Resolution [V]	Accuracy
15.0 ÷ 660.0	0.1V	$\pm(1.0\%rdg + 1dgt)$

Allowed crest factor: $\leq 1,5$; Frequency: 42 ÷ 69.0 Hz

Frequency

Range [Hz]	Resolution [Hz]	Accuracy
DC, 42 ÷ 69.0	0.01	$\pm(2.0\%rdg + 2dgt)$

Allowed voltage: 15.0 ÷ 660V ; Allowed current: 5%FS clamp ÷ FS clamp

DC/ AC TRMS Current (STD clamp)

FS clamp	Range [A]	Resolution [A]	Accuracy
$\leq 10A$	5% FS ÷ 9.99	0.01	$\pm(1.0\%rdg + 3 dgt)$
$10A \leq FS \leq 300$	5% FS ÷ 299.9	0.1	
$300A \leq FS \leq 3000$	5% FS ÷ 2999	1	

Range: 5 ÷ 999.9 mV; Values under 5mV are zeroed

Allowed crest factor: ≤ 3 ; Frequency: 42 ÷ 69.0 Hz

AC TRMS Current (FLEX clamp – 300A AC)

Range [mV]	Frequency [Hz]	Resolution	Accuracy	Overload protection
0.085 ÷ 85.0	42 ÷ 69.0	8.5 μ V	$\pm(0.5\%rdg+0.17\%FS)$	10V

Allowed crest factor ≤ 3 , Values under 1A are zeroed

AC TRMS Current (FLEX clamp – 3000A AC)

Range [mV]	Frequency [Hz]	Resolution	Accuracy	Overload protection
0.425 ÷ 255.0	42 ÷ 69.0	85 μ V	$\pm(0.5\%rdg+0.17\%FS)$	10V

Allowed crest factor ≤ 3 , Values under 5A are zeroed

DC Power

FS clamp	Range [kW]	Resolution [kW]	Accuracy
$\leq 10A$	0.000 ÷ 9.999	0.001	$\pm(2.0\%rdg + 7dgt)$
	10.00 ÷ 99.99	0.01	
$10A \leq FS \leq 200$	0.00 ÷ 99.99	0.01	
	100.0 ÷ 999.9	0.1	
$200A \leq FS \leq 1000$	0.0 ÷ 999.9	0.1	
	1000 ÷ 9999	1	
$1000A \leq FS \leq 3000$	0 ÷ 9999	1	

Active power (@ 230V, $I > 5\%FS$, $\cos\phi \geq 0.5$, $f=50.0Hz$)

FS clamp	Range [kW]	Resolution [kW]	Accuracy
$\leq 10A$	0.000 ÷ 9.999	0.001	$\pm(2.0\%rdg + 7dgt)$
	10.00 ÷ 99.99	0.01	
$10A \leq FS \leq 200$	0.00 ÷ 99.99	0.01	
	100.0 ÷ 999.9	0.1	
$200A \leq FS \leq 1000$	0.0 ÷ 999.9	0.1	
	1000 ÷ 9999	1	
$1000A \leq FS \leq 3000$	0 ÷ 9999	1	

Reactive power (@ 230V, I >5%FS, cosφ<0.9, f=50.0Hz)

FS clamp	Range [kVAr]	Resolution [kVAr]	Accuracy
≤ 10A	0.000 ÷ 9.999 10.00 ÷ 99.99	0.001 0.01	±(2.0%rdg + 7dgt)
10A ≤ FS ≤ 200	0.00 ÷ 99.99 100.0 ÷ 999.9	0.01 0.1	
200A ≤ FS ≤ 1000	0.0 ÷ 999.9 1000 ÷ 9999	0.1 1	
1000A ≤ FS ≤ 3000	0 ÷ 9999	1	

Power factor / cosφ (@ 230V, I >5%FS)

Range	Resolution	Accuracy
0.70c ÷ 1.00 ÷ 0.70i	0.01	±(2.0%rdg + 3dgt)

Voltage harmonics (@ 230V in 1Ph systems, 400V in 3Ph systems)

Range [%]	Resolution [%]	Order	Accuracy
0.1 ÷ 100.0	0.1	DC, 01 ÷ 49	±(5.0%rdg + 5dgt)

Frequency of fundamental: 42 ÷ 69.0 Hz

Harmonics are zeroed at the below conditions:

- DC : DC value <0.5% fundamental value or DC value < 1.0V
- 1° Harmonic: value of 1° Harmonic < 15V
- 2nd ÷ 49th Harmonics: harmonic value <0.5% fundamental value or if value < 1.0V

Current harmonics

Range [%]	Resolution [%]	Order	Accuracy
0.1 ÷ 100.0	0.1	DC, 01 ÷ 49	±(5.0%rdg + 5dgt)

Frequency of fundamental: 42 ÷ 69.0 Hz

Harmonics are zeroed at the below conditions:

- DC : DC value <0.5% fundamental value or DC value < 0.5%FS clamp
- 1° Harmonic: value of 1° Harmonic < 0.5%FS clamp
- 2nd ÷ 49th Harmonics: harmonic value <0.5% fundamental value or if value < 0.5%FS clamp

Voltage anomalies (Phase-Neutral, Phase-PE)

Range [V]	Resolution [V]	Resolution [ms]	Accuracy [V]	Accuracy [ms]
15.0 ÷ 380	0.2	20ms	±(1.0%rdg + 2dgt)	± 1cycle

Voltage anomalies (Phase- Phase)

Range [V]	Resolution [V]	Resolution [ms]	Accuracy [V]	Accuracy [ms]
15.0 ÷ 660	0.2	20ms	±(1.0%rdg + 2dgt)	± 1cycle

3. GENERAL SPECIFICATIONS

DISPLAY AND MEMORY:

Features:	TFT, touch screen, color graphic LCD, 320x240mm
Memory safety section:	999 locations, 3 marker levels
Memory PQA section:	8MB (not expanded)
Communication:	Optical-USB and built-in WiFi

POWER SUPPLY:

Batteries:	6 x 1.2V(rechargeable) type AA or 6 x 1.5V type AA
Battery life:	> 500 test for each safety functions > 6 hours in recording
Recharging time:	approx. 12 hours
External charger:	100-240VAC, 50/60Hz / 15VDC, CAT IV 300V
Auto Power OFF:	after 5 min of idleness (disabled)

MECHANICAL FEATURES:

Dimensions (L x W x H):	225 x 165 x 75mm
Weight (included batteries):	1.2kg

WORKING ENVIRONMENTAL CONDITIONS:

Reference temperature:	23°C ± 5°C
Working temperature:	0° ÷ 40°C
Allowed relative humidity:	<80%HR
Storage temperature:	-10 ÷ 60°C
Storage humidity:	<80%HR

GENERAL REFERENCE STANDARDS:

Safety of measuring instruments:	IEC/EN61010-1, IEC/EN61010-031, IEC/EN61010-2-032
Product type standard:	IEC/EN61557-1-2-3-4-5-6-7-10
EMC :	IEC/EN61326-1
Technical documentation :	IEC/EN61187
Insulation:	double insulation
Pollution degree:	2
Encapsulation :	IP40
Measurement category:	CAT IV 300V to ground, CAT III 350V to ground max 600V among inputs
Max height of use:	2000m

TEST VERIFIES REFERENCE STANDARDS:

Continuity test with 200mA:	IEC/EN61557-4
Insulation resistance:	IEC/EN61557-2
Earth resistance:	IEC/EN61557-5
Fault loop impedance:	IEC/EN61557-3
RCD test:	IEC/EN61557-6 (only Phase-Neutral-Ground systems)
Phase sequence:	IEC/EN61557-7
Multifunction:	IEC/EN61557-10
Prospective short circuit current:	EN60909-0
Earth resistance on TN systems:	EN61936-1 + EN50522
Power quality:	EN50160

This instrument complies with the requirements of the European Low Voltage Directives 2014/35/EU (LVD) and EMC 2014/30/EU

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