

# Contractor and service technician insulation tester and multimeter *ISO plus*

Areas of application:

- Inspection of new electrical installations
- Maintenance of electrical equipment and installations
- Troubleshooting and repair of electrical equipment
- Measurement of insulation quality
- Documentation and test results
- Detection of intermittent faults and monitoring of insulation resistance through data logging capabilities

## General

### Description:

The *ISO plus* has been designed specially for contractor and service technician applications. In addition to insulation testing up to 1 kV the *ISO plus* incorporates low resistance and continuity testing as well as leakage current measurement directly or with LEM current probes (CT's). Selectable scaling factors provide current ranges from 200 $\mu$ A to 200 A. Furthermore the *ISO plus* offers all the functionality of industry standard multimeters including TRMS voltage and frequency measurement in a true hand held design.

This unique combination satisfies universal applications in:

**Insulation measurement** up to 20G $\Omega$  with test voltages of 100V, 250V, 500V and 1000V.

**Low-resistance measurement** according to EN 61557-4 with a short-circuit current of >200mA, (50mA can be selected to extend battery life) for applications with non-fused earth conductor connections and equipotential bus bars.

**Fast continuity testing** with selectable buzzer threshold between 0.2  $\Omega$  and 50  $\Omega$  and a maximum response time of 100ms meeting all test standards.

**Leakage Current measurement** through an external current transformer with selectable transformer ratio from 1:1 up to 1:1000 and ranges from 200 $\mu$ A to 200A.

**Voltage measurement** with display of AC and DC values up to 600V with an 800V overrange feature.

With additional functions including ZERO (test lead null / relative), REC (Min, Max, Avg) and LIMIT (Alarm), the *ISO plus* provides a complete measurement solution in one compact handheld instrument.



### Main features:

- Easy to use handheld design measuring V,  $\Omega$ , M $\Omega$ , Hz, A (mA)
- Large dual display with bright EL backlight and bargraph
- Advanced safety features including live circuit protection without fuse damage, test lock out and auto discharge after test
- Insulation measurements up to 20 G $\Omega$  with 100, 250, 500 and 1000V test voltages and display of test current
- On screen display of Polarisation Index and Dielectric Absorption Ratio for insulation quality
- Auto ranging resistance measurement to 200k $\Omega$  with a selectable 200mA or 50mA low resistance testlead compensation
- Continuity test with adjustable thresholds, fast-responding buzzer and visual indicator (buzzer can also be de-activated)
- True RMS voltage measurement with display of AC, DC and AC+DC values and mV resolution
- Leakage current measurement directly or with LEM current probes in current ranges from 200  $\mu$ A to 200A
- LIMIT (adjustable alarm) to quickly and reliably identify fault conditions
- REC function for MIN, MAX, AVG values


### Additional features *ISO plus M*

- Simple storage of up to 350 insulation test results to internal memory with on screen viewing or PC download
- Internal datalogging of current, voltage and insulation (upto 1000 rdgs) for trend and intermittent fault analysis
- WinLog PC software and interface included for data analysis and reporting (also compatible with HEME power clamps)

# LEM

## Technical Specifications

### General

Display:	1999 digit dual LCD with special symbols, digit height 17 mm, 30 segment analogue bar with over/ underflow and special display symbols, EL backlight
Temperature ranges:	
Working temp.:	-10° C ... +50° C (+14° F...+122° F)
Operating temp.:	0° C ... +35° C (+32° F...+95° F)
Storage temp.:	-20° C ... +60° C (-4° F...+140° F)
Reference temp.:	+23° C ± 2° C (+73° F ± 4° F)
Temperature coefficient:	0.1 x operating error/K
Intrinsic Error refers to the reference temperature range	
Climatic class:	B2 (IEC 654-1), -5° C...+45° C, 5%...85% RH, no dew
Maximum operating altitude:	2000m
Protective type:	IP40 according to EN 60529
Safety:	 Protection by reinforced insulation 600V CATIII pollution degree 2
Test voltage:	5550 V AC, measuring circuit to enclosure
Emission:	IEC/EN 61326-1:1997 +A1:1998 class B
Immunity:	EN 61000-4-2:1995 - B, EN 61000-4-3:1996 EN 61000-4-4:1995 - B, EN 61000-4-5:1995 EN 61000-4-6:1996 - B, EN 61000-4-8:1993
Intrinsic error:	Refers to the reference temperature range and is guaranteed for 2 years.
Operating error:	Refers to the operating temperature range and is guaranteed for 2 years.
Quality system:	Developed, designed and manufactured according to DIN ISO 9001
External voltage:	Measurement inhibited for external voltage $U_x > 10\%$ of $U_N$ for $M\Omega$ and $>3V$ for R
Max. overload:	800 Veff RMS or RMS x frequency $< 5 \times 10^4$ VHz
Auxiliary power:	4 x 1.5 V mignon cells alkali-manganese (IEC LR6)
Battery life span:	Typical (no backlight) $> 2000$ measurements in $M\Omega$ . 100 hours continuous operation for resistance, voltage measurements and mA measurements.
Fuse	630mA quick acting 600V 10kA/32x6.3mm
Dimensions:	220 x 98 x 52 mm (12 x 3.75 x 2 inches)
Weight:	0.8 kg / 1.8 lbs (including batteries)
Warranty:	2 years
Calibration interval:	2 years recommended

### $M\Omega - R_{ISO}$ Insulation Resistance

Method:	Voltage/current measurement as per EN 61557-2
Nominal test voltage:	$U_N = 100V, 250V, 500V, 1000V$ DC
Open circuit voltage:	$U_0 < 1.1 \times U_N$
Nominal current:	$I_N \geq 1mA$ DC at $U_N$ $I_N \geq 2.5mA$ DC at $100k\Omega$ at 250V
Short circuit current:	$< 10mA$ DC

Measuring range	Resolution	Operating error
1.8k $\Omega$ ...2 G $\Omega$	0.1k $\Omega$ ...1M $\Omega$	$\pm(2\%$ of rdg+4D)
2G $\Omega$ ...20G $\Omega$	10M $\Omega$	$\pm(4\%$ of rdg+4D)

Display of the measuring current  $I_{ISO}$ .

Calculation of Polarisation Index  $I_P$  and Dielectric Absorption Ratio:

$R_{ab}$  after pre-defined time interval:

$$I_P = R_{ISO}(10min) / R_{ISO}(1min)$$

$$R_{ab} = R_{ISO}(1min) / R_{ISO}(30sec)$$

In case of external voltage of  $>10\%$  of  $U_N$  the measurement is not started (safety interlock).

### R – Low Resistance Measurement

Method: Voltage/current measurement as per EN 61557-4

Open circuit voltage:  $U_0 \geq 4V$

Short circuit current:  $I_k \geq 200mA$  DC up to 2 $\Omega$  as per EN61557 (excludes  $I_k : 50mA$ )

Measuring range	Resolution	Intrinsic error
0.2 $\Omega$ ...20 $\Omega$	0.01 $\Omega$	$\pm(1\%$ of rdg+3D)*
20 $\Omega$ ...200 $\Omega$	0.1 $\Omega$	$\pm(1\%$ of rdg+2D)
200 $\Omega$ ...2k $\Omega$	1 $\Omega$	
2k $\Omega$ ...20k $\Omega$	10 $\Omega$	
20k $\Omega$ ...200k $\Omega$	100 $\Omega$	

\* (1% of rdg +6D) for  $I_k = 50mA$

In case of external voltages of  $>3V$  the measurement with 200mA/50mA is not started.

SMR Serial mode rejection approx. 60dB at 50 and 60Hz

CMR Common mode rejection approx. 80dB at 50 and 60Hz

#### Continuity check:

Buzzer activated for external resistance within 100ms

Buzzer level adjustable with LIMIT function from 0.2...50 $\Omega$ .

Test lead compensation (ZERO) from 0.01...5 $\Omega$ .

### V – TRMS Voltage Measurement

DC: Input resistance: 1M $\Omega$  / 100pF


Measuring range	Resolution	Intrinsic error VDC
2V	1mV	$\pm(2\%$ of rdg+5D)
20V	10mV	$\pm(2\%$ of rdg+2D)
200V	100mV	
600V	1V	

SMR Serial mode rejection approx. 60dB at 50 and 60Hz for DC (influence of AC signals to DCV-display)

CMR Common mode rejection approx. 80dB at 50 and 60Hz

Auto range set up time: 1.5s

Max. voltage frequency product:  $5 \times 10^4$  VHz

Over-range up to 1000V with flashing  symbol

#### AC: Specifications valid for AC RMS $>5\%$ of range

Measuring range	Resolution	Intrinsic error VAC 15Hz – 1kHz
2V	1mV	$\pm(2\%$ of rdg+5D)
20V	10mV	$\pm(2\%$ of rdg+5D)
200V	100mV	$\pm(2\%$ of rdg+3D)
600V	1V	$\pm(2\%$ of rdg+2D)

Displayed values for voltage measurements: AC, DC and AC+DC+F. Crest factor 3 for values at the end of the ranges

$V_{peak} : 1200V_P$ .

Over-range up to 800V with flashing  symbol.

Frequency range: DC, 15Hz...1kHz at ACRMS

## F - Frequency Measurement (at V>0,5V)

Measuring range	Resolution	Intrinsic error
200Hz	0.1Hz	±(0.2% of rdg +3D)
1kHz	1Hz	

Method: Evaluation of zero crossings in signal  
 Temperature coefficient < 50ppm, sensitivity > 10% of voltage and current range end value

## mA – RMS (Leakage) Current Measurement

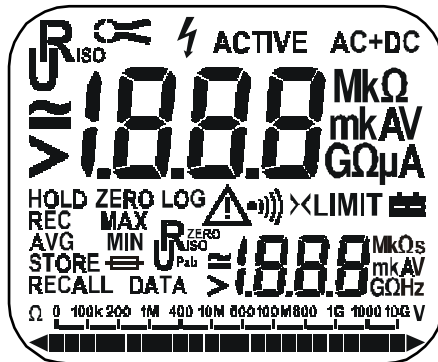
Direct current measurement within the following ranges:

Measuring range	Resolution	Intrinsic error
20...199.9 µA	100 nA	±(3% of rdg+5digit)
0.2...1,999 mA	1 µA	±(3% of rdg+5digit)
2...19.99 mA	10 µA	±(3% of rdg+5digit)
20...199.9 mA	100 µA	±(3% of rdg+5digit)

Specifications valid for AC RMS >5% of range

Displayed values: AC  
 Frequency range: 15Hz...1kHz  
 Max. overload: 630mA (Fuse)  
 Auto range setting time: 2s  
 Current compensation (ZERO) possible.

Direct current measurement (1:1) or measurement through an external current transformer with **current or voltage output** (integrated load) and transformer ratios of 1:1, 1:10, 1:100, 1:500 or 1:1000.  
 Clamp symbol in LCD at 1:10, 1:100, 1:500 and 1:1000.



Scope of Delivery, Accessories, Service	
Instrument	Order-No.
<b>ISO plus</b> incl. 2 safety measuring leads with test prods, 1 crocodile clip, 4 batteries 1.5V, operating instructions, 1 pouch with belt loop	SI1310Z
<b>ISO plus M</b> incl. 2 safety measuring leads with test prods, 1 crocodile clip, 4 batteries 1.5V, operating instructions, 1 pouch with belt loop. WinLog software including custom RS232 interface cable	SI1311Z

Distributor:



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