

Installation Tester

UNILAP 100 E

- Multi-functional installation tester according to DIN VDE 0100
- All test functions in one device
- Automatic test sequences
- Protection against incorrect operation
- Standard internal memory and IrDa[®] interface
- Many accessories
- Application software for protocol creation and device configuration

Description

Everybody, who nowadays installs and operates electrical systems, must comply with extensive regulations. The main objective of these regulations and their safety measures is our protection, but also reliable system operation. Therefore, it is paramount to check the perfect functionality of the safety measures within the system continuously and with appropriate measuring instruments.

Necessary test performances after the installation of electrical systems, prior to their start-up, or subsequent to any maintenance and/or upgrades are specified in DIN VDE 0100, Section 610.

Since LEM NORMA is constantly analyzing the needs of measurement technicians, combined with accurate consideration of the latest regulations, we are able to offer a complete, efficient solution to problems related to installation and system testing.

The **UNILAP 100 E** is the answer to all questions concerning the science of measurement with respect to installation and system testing. It offers all measurement functions according to DIN VDE 0100, and many more.

The multi-functionality of the **UNILAP 100 E** and its properties with regard to matching all limit values and settings to any application purpose, enables the set-up of any device as required by both the system, and the regionally applicable regulations.

Despite a variety of measurement functions, and comprehensive, individual set-up features, we were able to provide easy and clear operation. Short instructions located directly on the device, right in the user's field of view, provide optimum support when performing measurements. And if forbidden connection conditions or errors



occur within the system, the user is prompted by means of symbols appearing on the display.

To follow the latest trends, the most recent technologies were incorporated in the design and development of the device. SMD technology, an internal memory for more than 250 data records, as well as a standard infrared interface (optional: RS232) for automatic logging, just to name a few, are now integral parts of the device. For professional users, LEM NORMA additionally also offers **WINSAT100**, a device-related user software. Client data bases, project management, measurement data management, and automatic creation of the latest, internationally recognized measurement protocols are only a few facts describing **WINSAT100**.

The most important features and properties of **UNILAP 100E**:

FI safety measures test according to IEC 61557-6:

- Testing special configurations like G, S, FIK
- Varied test currents $ID_n \times 1, x2, x5, S, 150mA, 250mA$, etc.
- AC/DC, pos., or neg. full- & half-waves, pulse, ramp
- with/without FI tripping

Insulation tests according to IEC 61557-2:

- Measurement voltages: 100/250/500V DC
- Range up to 300 MOhm
- AUTO: freely programmable test sequence

Line/Loop resistance & impedance according to IEC 61557-3:

- Zs: Line/Loop resistance or impedance
- Ik: Short-circuit current, display range up to 40 kA


Earth measurements according to IEC 61557-5:

- with line voltage and probe

Low-resistance measurements according to IEC 61557-4

Direction of rotating field according to IEC 61557-7

Technical Data

Display:	3-1/2 digit (1999), 7-Segment-Liquid-Crystal-Display, 17 mm high, with illumination
Operating temperature range:	0° C ... + 35° C
Working temperature range:	- 10° C ... + 50° C
Storage temperature range:	- 20° C ... + 60° C
Reference temperature range:	23° C ±2° C
Intrinsic error:	Refers to the reference temperature
Temperature coefficient:	± 0.1 % of m.v. / K
Operating error:	Refers to the operating temperature range IEC 61557-1
Climatic class:	JWG as per DIN 40040 and IEC 654-1; Relative humidity 65 % annual mean, 85 % max., no damp.
Protection:	IP 40 as per DIN 40050 and IEC 529-2
Safety class:	class II () 300 V, install. category III as per IEC 1010-1 / EN 61010-1, pollution degree 2.
Test voltage:	3700 V as per IEC 1010-1 / EN 61010-1
Input protection:	By software and varistors against voltages $U_{eff} > 600$ V and quick-acting fuses (6.3 A / 500 V)
Max. voltage to earth:	$U_{eff} = 300$ V
Clearance / creepage distances:	Correspond to IEC 1010-1 / EN 61010-1
Emission:	Class B as per EN 50081-1 and IEC 61326-1
Immunity:	Class A as per EN 50082-1 and IEC 61326-1
Quality standard:	as per DIN ISO 9001
Auxiliary power:	6 pcs. 1.5 V alkaline manganese batteries (IEC LR 6) or accu 7.2V / 1500 mAh (option). Internal battery for date / time - life 5 years.
Dimensions:	265 x 265 x 90 mm (L x W x H) incl. lid and compartment for accessories
Weight:	approx. 2.3 kg w/o batteries and w/o accessories approx. 5.7 kg in carrying case

IrDA[®] Interface (Infrared Data Association) as standard. For easy PC-communication (remote control, data acquisition, reading of stored data). RS 232 interface possible as option.
Integrated data memory for 255 data records (approx. 6000 measurement values).
Integrated real time clock with date. Barcode-reader for up to 18 characters useable (option RS 232 interface necessary).
The limits prescribed by the standards can be adapted individually. A limit infringement is indicated by audible and optical warnings.
Automatic compensation for standard accessories.
Compensation for line extensions up to 5 Ω possible.

Protective conductor check

Nominal voltage:	50 V ... 300 V AC / 15.3 ... 100 Hz between contact electrode and PE-line
Internal resistance:	Approx. 1.5 MΩ

Phase indication

Nominal voltage:	20 V ... 300 V AC / 15.3...420 Hz
Internal resistance:	Approx. 400 kΩ
Admiss. overload:	Max. $U_{eff} = 600$ V
Note:	The voltage of the "L" and "N" wire is measured to "PE", evaluated and a symbol indicates the live contact.

Voltage (DC/ AC), Frequency

Range	Resolution	Frequency Range	Operating error
0.50..440...550V	1V	DC, 15.3...420Hz	±(1% of mv+1dig)
15.3..99.9..420Hz	0.1...1Hz	5...440V	±(0.1% of mv+1dig)

Internal resistance: 300...400 kΩ (L – N – PE)

Residual current operated device check (FI-RCD / IEC 61557-6)

Measuring functions:	RCD-test without tripping Tripping test with pulses or ramp (tripping time, tripping current) Fault voltage Loop impedance, short-circuit current (without tripping) Earth resistance (with probe) Standard/ selective RCDs
Test currents:	$I_{ΔN}$ x1, x2, x5 positive, negative phase position positive, negative pulsating DC current pulses, current steps
Voltage range:	95 ... 145 V, 175 ... 300 V Frequency range: 15.3...17.5 Hz, 45...65 Hz
Admissible overload:	Max. $U_{eff} = 600$ V

Function	Intrinsic error of test current	Remark*)
Ramp	+/- 10 %	18 steps, 28...125 of $I_{ΔN}$
Pulse, tripping test	0...+10 %	x1/x2/x5 $I_{ΔN}$, 150 mA, 250 mA
Pulse, non tripping test	-10 ... 0 %	0.3 (0.5) $I_{ΔN}$

*) Rated residual current $I_{ΔN} = 10, 30, 100, 300, 500$ or var 6 ... 1000 mA. For function "halfwave/DC" and / or x1/x2/x5 there are some restrictions due to the increased peak current for higher rated residual currents.

Fault voltage range (U_F)	Resolution	Operating error
0.5 ... 99.9 V	0.1 V	0...± 8 % of m.v. + 2 digit)

Automatic test stop: $U_F > 50$ V complies with IEC 1010

Tripping time (t_A)	Resolution	Operating error
0 ... 500 ms (300 ms)	1 ms	± 2 ms

Loop-impedance Z_S resp. earth resistance R_A	Resolution (Ω)	Operating error
0.2 Ω...9.99 kΩ	0.01 Ω...10 Ω	± (10% of m.v. + 4 digit)

Test current period as per IEC 1010-1. Limitation of duration period taking into account the fault voltage as per IEC 61557-6 and IEC 1010-1.

Positive or negative pulsating direct current:

Tripping test - corresponding to the applicable standards which admit 0.35 ... 1.4 $I_{ΔN}$ as tripping current. For ramp function the tripping current is displayed as TRMS of the half-wave current.

Earthing resistance (RA) IEC 61557-5

Measuring method:	Current / voltage measurement with probe
Voltage ranges:	95 ... 145 V, 175 ... 300 V, outside these ranges will not be started.
Frequency ranges:	15.3 ... 17.5 Hz, 45 ... 65 Hz
Admiss. overload:	Max. $U_{eff} = 600$ V before start, (for > 5 V no start), termination of measurement for $U_{eff} > 50$ V
Measuring time:	max. as per IEC 1010, 2 ... 26 periods

Automatic compensation for standard accessories.

Compensation for line extensions up to 5 Ω possible.

Probe voltage	Resolution	Operating error
1 ... 70 V	1 V	± (2 % of m.v. + 1 digit)

Measuring range	Resolution	Operating error
0.01 Ω...0,15 Ω...10 kΩ	0.1 Ω ... 10 Ω	± (10% of m.v. + 3 digit)

Test current:	1 A for < 20 Ω
Max. interference voltage:	When $U_{S-PE} > 20$ V no measurement
Max. probe resistance:	10 kΩ, for (RA + Rprobe) > 20 kΩ no start
Programmable limits:	0.01 Ω ... 9.99 kΩ

Insulation resistance (RISO) IEC 61557-2

Measuring method:	Current / voltage measurement
Nominal output voltage:	100 / 250 / 500 V DC
Open-circuit voltage:	Approx. 105 / 260 / 520 V DC
Nominal current:	> 1 mA DC (>2.5 mA DC at 250 V)
Short-circuit current:	< 7 mA DC
Admiss. overload:	Max. $U_{eff} = 600$ V AC; (test is locked)

Measuring range	Resolution	Operating error
man: 3 k Ω ...300 M Ω	1 k Ω ... 1 M Ω	± (8% of m.v. + 1 digit)
auto: 3 k Ω ... 10 M Ω	1 k Ω ... 100 k Ω	

Measuring time: As long as the "START" button is pressed; Subsequent automatic discharge of the test piece via 400 k Ω

Programmable limit: RISO Limit: 1 k Ω ... 299 M Ω (**man**)
1 k Ω ... 9.9 MW (**auto**)

AUTO: Test sequence N - PE, L - PE, L - N, programmable

Display of the actual measuring voltage:

Measuring range	Resolution	Operating error
1 ... 520 V DC	1 V	± (8 % of m.v. + 5 Digit)

Internal resistance: Approx. 400 k Ω (L/N-PE); serves as discharge resistance for any capacitors in the measuring circuit.

Max. interference voltage: $U_{eff} = 1/10$ of nominal output.
No measurement is started at higher voltages.

Loop impedance (ZS/R) L-PE or L-N (L) IEC 61557-3

Measuring method: Voltage drop

Nominal voltage: 95...145V, 175...300V, 330...440V (only L-N (L))

Reference voltage: 110/230/400 V or 127/220/380 V AC or measured voltage

Frequency range: 15.3 ... 17.5 Hz, 45 ... 65 Hz

Test current:

L-PE	L-N(L)	Voltage range	Test current	
			Zs = 0 Ω	Zs = 200 Ω
X	X	55...145 V	1.4...3.61 A	0.4...0.61 A
X	X	175...300 V	1.75...3.0 A	0.58...1 A
	X	330...440 V	2.75...3.67 A	1...1.4 A

Measuring range	Resolution	Operating error
0.07 ... 199 Ω	0.01 Ω ... 1 Ω	± (5% of m.v. + 3 digit)

Measuring time: Approx. 4 - 50 periods; Duration as per IEC 1010

Mains imped. angle: $\cos \varphi > 0.5$

Max. inductance: 5 mH in voltage range > 175 V

Programmable limit: Zs LIMIT: 0.01 ... 199 Ω

Admiss overload: Max. $U_{eff} = 600$ V AC
(measurement is not started outside the admissible voltage and frequency ranges)

Short-circuit current

Range	Display	Resolution	Operating error
1 A...10 kA	1...40kA	1...10...100A	results from $I_k = \frac{U_N}{Z_s}$

U_N as selected: **1:** 110V, 230V, 400V. **2:** 127V, 220V, 380V resp. **3:** measured voltage

Valid ranges for U_N : 95...145V, 175...300V, 330...440V (only at Zs L-N)

Valid ranges for frequency: 15.3Hz...17.5Hz, 45Hz ... 65Hz

Earthelectrode fault voltage (SEV 3569)

Earthelectrode voltage, with probe only

Range	Resolution	Measuring method
0...UN	0.1 V	$U_F = R_A \cdot I_K$

Detection of rotary field direction IEC 61557-7

Voltage range: 20 ... 440 V AC, 15.3 ... 65 Hz

Admiss. overload: Max. $U_{eff} = 600$ V AC

Max. current to earth: < 3.5 mA

Rotary direction display: Symbol for right- / left-handed

Internal resistance: 200 k Ω ... 400 k Ω

"Elliptic rotary fields" with two L-conductors and the neutral conductor can also be tested.

Low resistance measurements (R1k Ω) IEC 61557-4

Measuring method: Current / voltage measurement with automatic pole reversal.

Open-circuit voltage: Approx. 20 V DC

Short-circuit current: > 200 mA DC

Admiss. overload: Max. $U_{eff} = 600$ V (before START), no START for > 5 V

Measuring range	Resolution	Operating error
0.12 ... 2.99...19.9 Ω ...1 k Ω	0.01...0.1...1 Ω	± (5 % of m.v. + 3 digits)

Measuring time: Approx. 2 s incl. voltage polarity reversal.

Continuous measurement: With depressed START button

Admissible inductance: Max. 5 H

Programmable limit: $R_{LIMIT} = 0.01 \Omega$... 999 Ω

Series-mode

interference voltage: Max. 40 V_{eff} AC, in case of higher voltage measurement is terminated.

Measuring protocol-print in format A4:

Firma ELECTRO TEST			
Installations Prüfung 1998			
Instr-Nr 0002AB			

09-01-98	10:23:06	DS-Nr 12	Obj-Nr Dose 25

FI/RCD	I _{dn} 30 mA	RAMP AC 0	

U _n 230 V	U _{F-LIM} 50 V	Conf 00	
R _k A 0.00 Ohm	R _k S 0.00 Ohm		

U L-N ~227 V	U L-PE ~227 V	U N-PE 0 V	
U S-PE 0 V	f 50.0 Hz	I 2 mA	

U _F 0.1 V	t _a 93 ms	I _a 23 mA	
Z _s 4.4 Ohm	R _a 1.05 Ohm	R 4.4 Ohm	
I _k 52 A			

WinSAT 100

the complete system for measured data archiving and protocol tool for professional electricians.

Application software for UNILAP 100 E and UNILAP 100 XE. Multilingual, integrated project management and data export. Can run under Microsoft Windows® 98 and Windows® NT.

Functions

- Code-programming of the UNILAP 100 (X)E
Using tabs, WINSAT100 provides for easy and clear set-up of all limit values and settings stored inside the device, as well as the device's individual configuration with regard to any application purpose, and to applicable regional regulations.



- Installation descriptions in a tree structure with additional information can be printed out together with bar codes and used as a check plan. Same manipulation as Windows® explorer,



- Transfer of measured data from the test instrument to the PC via RS232 or IrDA® (Important: At the moment, Windows® NT 4.0 does not support, IrDA® communications! For Windows® NT PCs, UNILAP 100 XE an RS 232 interface is required)



- Archiving of the measured data – Maintenance management
- Data administration via SQL data base, Installation data, measured data, customers, customer orders
- Test protocols with measured values and information on the installation
The user can select between a standard test protocol, a new internationally recognized form with inspection results, or export of all data. The respective template is automatically loaded and linked to the data contained in the tree structure.
The inspection results form was created in Microsoft Word, providing for unlimited editing possibilities. Only the measurement values entered by the user are write-protected.



- Very simple attribution of measured values to the measuring objects by using a bar-code reader

- Strictly hierarchic structure:
 - Project
 - Customer (name)
 - Order number
 - Description of the installation (tree, unlimited number of sub-levels)
 - Measuring objects with measured values
- Compatible with Microsoft® Office 97
 - User-defined logging via MS-Word®.
 - Direct access to WIN SAT data base via MS-ACCESS®.

Order Code	
Description	Order no.
UNILAP 100 E incl. carrying case Contents: 1 cable (3-pole plug/3 safety plugs), 1 cable (3-pole plug/mains plug country specific), 3 alligator clips, 3 test tips, 1 cable (plug / test tip), 1 carrying belt, 2 belt securing devices, 1 earth stakes, 1 cable reel (50 m wire), 6 batteries, 1 battery compartment Operating instructions in E, G or F	A 1855 06111 AT, CH, GB
UNILAP 100 E as above incl. RS 232 interface*)	A 1855 06113 AT, CH, GB
Accessories Barcode-reader Test probe with START and illumination function Accuset with quick-charging (1.5 Ah) PC software WinSAT 100 IrDA® adapter for PCs IrDA® printer HP Deskjet 340 CBi 3 alligator clips 3 test tips Earth stake Cable reel with 25 m wire Cable reel with 50 m wire Measuring cable with mains plug Measuring cable with 3 safety plugs Demo case protective measures Carrying case Adapter RS 232-Centronics Mains plug adapter F (NFC61303) - AT (Schuko) Adapter for 3-phase outlets, 3 pcs.	A 6914 40300 A 6914 06110 A 6403 04111 A 6899 00182 A 6412 07000 A 6413 06211 AT A 6009 17103 A 6009 54300 A 6045 10350 A 6045 05102 A 6045 05103 A 6002 89136 A 6002 09017 A 1899 06211 A 6030 10101 A 6045 00600 A 6045 06112 A 6009 17200

*) Option RS 232 interface can only be installed at one of our service partners.

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