Multifunction Tester
PRO MFT-9101

PRODUCT INTRODUCTION

The Metravi Pro MFT-9101 Multifunction Tester is used for the verification of electrical safety of installations according to DIN VDE 0100 and EN 61557.

It is a versatile electrical testing device designed to ensure the safety, functionality, and compliance of electrical installations. It is commonly used by electricians and professionals to perform various tests required by standards.

The Metravi Pro MFT-9101 Multifunction Tester is manufactured in Germany and combines several electrical testing capabilities into one device, eliminating the need for separate tools.

It is an all-in-one instrument featuring a 3.5 inch TFT colour display and rotary switch, covering the measurements you need. Fast. Safe.

FEATURES

Measurement of:

- Loop Resistance
- Internal Network Resistance
- Short Circuit Current
- Low Resistance and Continuity
- Insulation
- RCD/FI for types A, AC, B, B +, F (refer to model overview)
- RCD/FI for Electric Vehicles Charging Stations (6 mA DC)
- T-RMS Voltage, Rotary Field and Frequency
- Earth Resistance
- Memory for 1000 measurement readings
- PC software to create a test certificate
- Charging of batteries inside tester

Benefits:

- Efficiency: Combines multiple tests in one device, saving time and effort.
- Compliance: Ensures adherence to safety standards and regulatory requirements.
- Safety: Identifies potential electrical hazards before they lead to accidents.
- Portability: Easy to carry and use in various environments.

APPLICATIONS

- **New Installations:** Verify that new electrical installations comply with safety regulations.
- **Periodic Testing:** Ensure existing installations remain safe and operational over time.
- **Troubleshooting:** Diagnose issues in circuits, such as high impedance, poor insulation, or faulty RCDs.
- **Industrial and Commercial Use:** Test complex systems like three-phase circuits or high-voltage networks.

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TECHNICAL SPECIFICATIONS

Specification	Measurements / Testing	Range
Insulation Resistance	Nominal voltages	50/100/250/500/1000V DC
Continuity Resistance	Low R (200mA)	
	Continuity (low current)	
RCD Testing	Nominal residual currents (mA)	6/10/30/100/300/ 500/650/1000
	Test current shape	A, AC, B, B+, F
	RCD Type	G, S
	Contact voltage	
	Trip-out time	
	Trip-out current	
Fault Loop Impedance and Prospective Fault Current	Zloop L-PE, Ipfc	
	Zloop L-PE RCD, Ipfc, non trip subfunction	
	Loop-Rs	
Line Impedance and Prospective Short-circuit Current	Line Impedance	
	Prospective Short Circuit Current	
	Voltage drop detection	
Voltage	0-500V	
Frequency	10-499Hz	
Earth Resistance	Re (3-wire and 4-wire)	
	Ro	
Memory and Reporting (Excel-Export)	Available	
Rechargable batteries & charging "on-board"	Available	
Special Functions	Automatic Polarity Change	
	Calibration Date Reminder	(hidden function CAL-LAB)
	FW update per USB	
	API enabled	(extra configuration service required)
Networks	TT, TN, IT, LV (2 x 55 V)	
External probe with button	Ready	
Standard Accessories	3 pcs Test Leads Stackable (1m), Schuko-plug Test Cable, 3 pcs Test Probes, 3 pcs Alligator Clips, User Manual, Shoulder Strap, Carrying Case, USB Cable, Power Adapter (for charging), 6 pcs Rechargable Batteries	
Optional Accessories	External Probe with Button 40m Extension Test Lead US-plug Test Cable, UK-plug Test Cable Earth Kit (3 x Cables 20m/20m/5m + 2 x Earth Stakes) EVSE Adapter	

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Continuity	Test current 7 mA (2-wire)	0.0 Ω - 1999 Ω
	Test current 200 mA (2-wire)	0.00 Ω - 1999 Ω
Insulation resistance (RISO)	Test voltage 50/100/250 V	0.000 MΩ - 199.9 MΩ
	Test voltage 500/1000 V	0.000 MΩ - 999 MΩ
RCD	I (Ramp)	0.2xIΔN - 1.1xIΔN (AC)
		0.2xIΔN - 1.5xIΔN (A)
		(IΔN ≥30 mA)
		0.2xIΔN - 2.2xIΔN (A)
		(IΔN <30 mA)
		0.2xIΔN - 2.xIΔN (B)
Impedance (ZL)	Z line L-L, L-N, Ipsc	0.00 Ω - 9999 Ω
	Z loop L-PE, Ipfc	
	Z loop L-PE, Ipfc, non trip	
Voltage (V)	T-RMS	0 - 550V
	Frequency	10.0 Hz - 499.9 Hz
Phase Rotation	T-RMS	50 - 550V AC
		45 Hz - 400 Hz
Earth Resistance (RE)	3-wire	0.00 Ω - 9999 Ω
	4-wire	
	Specific Earth Resistance	0.0 Ω - 9999 kΩ
Power Supply	9 V DC (6 x 1.5 V battery or NiMH batteries, size AA)	
Over Voltage Category	600V CAT III, 300V CAT IV	
COM - port	USB	

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DETAILED TECHNICAL SPECIFICATIONS

A. INSULATION RESISTANCE

Insulation resistance (nominal voltages 50V_{DC})
Measurement range according to 61557 from 50kΩ-80MΩ

Measuring range (MΩ)	Resolution (MΩ)	Accuracy
0.1 ~ 80.0	(0.100 ~ 1.999) 0.001 (2.00 ~ 80.00) 0.01	±(5 % of reading + 3 digits)

Insulation resistance (nominal voltages 100 V_{DC} and 250 V_{DC})
Measurement range according to 61557 from 100kΩ-199.9MΩ

Measuring range (MΩ)	Resolution (MΩ)	Accuracy
0.1 ~ 199.9	(0.100 ~ 1.999) 0.001 (2.00 ~ 99.99) 0.01 (100.0 ~199.9) 0.1	±(5 % of reading + 3 digits)

Insulation resistance (nominal voltages 500 V_{DC} and 1000 V_{DC})
Measurement range according to 61557 from 500kΩ-199.9MΩ

Measuring range (MΩ)	Resolution (MΩ)	Accuracy
0.1 ~ 199.9	(0.100 ~ 1.999) 0.001 (2.00 ~ 99.99) 0.01 (100.0 ~199.9) 0.1	±(2 % of reading + 3 digits)
200 ~ 999	(200 ~ 999) 1	±(10 % of reading)

Voltage

Measuring range (V)	Resolution (V)	Accuracy
0 ~ 1200	1	±(3 % of reading + 3 digits)

Nominal voltages..... 50V_{DC}, 100 V_{DC}, 250 V_{DC}, 500 V_{DC}, 1000 V_{DC}
Open circuit voltage..... .. -0 % / +20 % of nominal voltage
Measuring current ..... min. 1 mA at $R_N=U_N \times 1$ kΩ/V
Short circuit current ..... max. 15 mA
The number of possible tests
with a new set of batteries ..... up to 1000 (with 2300mAh battery cells)
Auto discharge after test.

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DETAILED TECHNICAL SPECIFICATIONS

B. CONTINUITY RESISTANCE
B.1. LOW RESISTANCE

Measuring range according to EN61557-4 is 0.1 Ω ÷ 1999 Ω.

Measuring range (Ω)	Resolution (Ω)	Accuracy
0.1 ~ 20.0	(0.10 Ω ~19.99 Ω) 0.01 Ω	±(3 % of reading + 3 digits)
20.0 ~ 1999	(20.0 Ω ~ 99.9 Ω) 0.1 Ω (100 Ω ~ 1999 Ω) 1 Ω	±(5% of reading)

Open-circuit voltage ..... 5 V_{DC}
Measuring current ..... min. 200 mA into load resistance of 2 Ω
Test lead compensation .....up to 5 Ω
The number of possible tests
with a new set of batteries..... up to 1400 (with 2300mAh battery cells)
Automatic polarity reversal of the test voltage.

B.2. LOW CURRENT CONTINUITY

Measuring range (Ω)	Resolution (Ω)	Accuracy
0.1 ~ 1999	(0.1 Ω ~ 99.9 Ω) 0.1 Ω (100.0 Ω ~ 1999 Ω) 1 Ω	±(5 % of reading + 3 digits)

Open-circuit voltage ..... 5 V_{DC}
Short-circuit current ..... max. 7 mA
Test lead compensation ..... up to 5 Ω

C. RCD
C.1. TESTING

Nominal residual current ..... 6mA (*), 10 mA, 30 mA, 100 mA, 300 mA, 500 mA, 650mA (*), 1000 mA (*)
Nominal residual current accuracy.... -0 / +0.1·I_Δ; $I_\Delta = I_{\Delta N}$, 2×$I_{\Delta N}$, 5×$I_{\Delta N}$
-0.1·I_Δ / +0; I_Δ = ½×$I_{\Delta N}$
Test current shape ..... Sine-wave (AC), DC (B), pulsed (A) (*)
RCD type..... general (G, non-delayed), selective (S, time-delayed), EVSE (*)
Test current starting polarity..... 0^0 or 180^0
Voltage range..... 93V-134V; 185V-266V; 45Hz-65Hz
(*) depends on model

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C.2. CONTACT VOLTAGE

Measuring range according to EN61557-6 is 3.0 V ÷ 49.0 V f. limit contact voltage 25 V.
Measuring range according to EN61557-6 is 3.0 V ÷ 99.0 V for limit contact voltage 50 V.

Measuring range (V)	Resolution (V)	Accuracy
3.0 ~ 9.9	0.1	(-0%/+10%) of reading + 5 digits
10.0 ~ 99.9	0.1	(-0%/+10%) of reading + 5 digits

C.3. TRIP TIME OUT

Complete measurement range corresponds to EN61557-6 requirements. Specified accuracies are valid for complete operating range.

Measuring range (ms)	Resolution (ms)	Accuracy
0.0 ~ 500.0	0.1	±3 ms

C.4. TRIP OUT CURRENT

Measurement range corresponds to EN61557-6 for $I_{\Delta N}$ ≥10mA. Specified accuracies are valid for complete operating range.

Measuring range I_{Δ}	Resolution I_{Δ}	Accuracy
$0.2\times I_{\Delta N}$ ÷ $1.1\times I_{\Delta N}$ (AC type)	$0.05\times I_{\Delta N}$	$\pm 0.1\times I_{\Delta N}$
$0.2\times I_{\Delta N}$ ÷ $1.5\times I_{\Delta N}$ (A type, $I_{\Delta N}$≥30 mA)	$0.05\times I_{\Delta N}$	$\pm 0.1\times I_{\Delta N}$
$0.2\times I_{\Delta N}$ ÷ $2.2\times I_{\Delta N}$ (A type,$I_{\Delta N}$=10 mA)	$0.05\times I_{\Delta N}$	$\pm 0.1\times I_{\Delta N}$
$0.2\times I_{\Delta N}$ ÷ $2.2\times I_{\Delta N}$ (B type)	$0.05\times I_{\Delta N}$	$\pm 0.1\times I_{\Delta N}$

Trip-out time

Measuring range (ms)	Resolution (ms)	Accuracy
0 ÷ 300	1	±3 **ms**

Contact voltage

Measuring range (V)	Resolution (V)	Accuracy
3.0 ÷ 9.9	0.1	(-0%/+10%) of reading + 5 digits
10.0 ÷ 99.9	0.1	(-0%/+10%) of reading + 5 digits

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DETAILED TECHNICAL SPECIFICATIONS

D. FAULT LOOP IMPEDANCE & PROSPECTIVE FAULT CURRENT

Zloop L-PE, I_{pfc} sub-function

Measuring range according to EN61557-3 is 0.25 Ω ÷ 1999 Ω.

Measuring range (Ω)	Resolution (Ω) (*)	Accuracy
0.2 ~ 9999	(0.20 ~19.99) 0.01 (20.0 ~ 99.9)0.1 (100 ~ 9999)1	±(5 % of reading + 5 digits)

(*) depends on model

Prospective fault current (calculated value)

Measuring range (A)	Resolution (A)	Accuracy
0.00 ~ 19.99	0.01	Consider accuracy of fault loop resistance measurement
20.0 ~ 99.9	0.1	
100 ~ 999	1	
1.00k ~ 9.99k	10	
10.0 ~ 100.0k	100	

Test current (at 230 V)..... 3.4 A, 50Hz Sine wave (10 ms ≤ t_{LOAD} ≤ 15 ms)
Nominal voltage range..... 93 V ÷ 134 V; 185 V ÷ 266 V (45 Hz ÷ 65 Hz)

Zloop L-PE RCD and Rs, I_{pfc}, non trip subfunction

Measuring range according to EN61557 is 0.75 Ω ÷ 1999 Ω.

Measuring range (Ω)	Resolution (Ω) (*)	Accuracy *)
0.4 ~ 19.99	(0.40 ~ 19.99) 0.01	±(5 % of reading + 10 digits)
20.0 ~ 9999	(20.0 ~ 99.9) 0.1 (100 ~ 9999) 1	± 10 % of reading

(*) depends on model
*) Acccuracy may be impaired in case of heavy noise on mains voltage.

Prospective fault current (calculated value)

Measuring range (A)	Resolution (A)	Accuracy
0.00 ~ 19.99	0.01	Consider accuracy of fault loop resistance measurement
20.0 ~ 99.9	0.1	
100 ~ 999	1	
1.00k ~ 9.99k	10	
10.0 ~ 100.0k	100	

No trip out of RCD.

Nominal voltage range..... 93 V ÷ 134 V; 185 V ÷ 266 V (45 Hz ÷ 65 Hz)

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E. LINE IMPEDANCE & PROSPECTIVE SHORT CIRCUIT CURRENT

Line impedance

Measuring range according to EN61557-3 is 0.25Ω ÷ 1999Ω.

Zline L-L, L-N, I_{psc} subfunction

Measuring range (Ω)	Resolution (Ω) (*)	Accuracy
0.2 ~ 9999	(0.20 ~ 19.99) 0.01 (20.0 ~ 99.9)0.1 (100 ~ 9999)1	±(5 % of reading + 5 digits)

(*) depends on model

Prospective short-circuit current (calculated value)

Measuring range (A)	Resolution (A)	Accuracy
0.00 ~ 19.99	0.01	Consider accuracy of line resistance measurement
20.0 ~ 99.9	0.1	
100 ~ 999	1	
1.00k ~ 9.99k	10	
10.0 ~ 100.0	100	

Test current (at 230 V)..... 3.4 A, 50Hz Sine wave (10 ms ≤ t_{LOAD} ≤ 15 ms)

Nominal voltage range..... 93V÷134V; 185V÷266V; 321V÷485V (45Hz ÷ 65Hz)

Voltage drop:

Measuring range (%)	Resolution (%)	Accuracy
0.0 ~ 9.9	0.1	Consider accuracy of the line measurement (only calculated value)

F. PHASE ROTATION

Measuring according to EN61557-7

Nominal mains voltage range..... 50 V_{AC} ÷ 550 V_{AC}
Nominal frequency range ..... 45 Hz ÷ 400 Hz
Result displayed ..... Right:1-2-3 ; Left: 3-2-1

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G. VOLTAGE

Measuring range (V)	Resolution (V)	Accuracy
0 ~ 550	1	±(2 % of reading + 2 digits)

Frequency range ..... 0 Hz, 45 Hz ÷ 400 Hz

H. FREQUENCY

Measuring range (Hz)	Resolution (Hz)	Accuracy
10 ~ 499	0.1	± 0.2% + 1 digit

Nominal voltage range..... 10V ~ 500V

I. EARTH RESISTANCE

Re – Earth resistance, 3-wire, 4-wire

Measuring range (Ω)	Resolution (Ω)		Accuracy
1.0 ~ 9999	(1.00 ~ 19.99)	0.01	±(5 % of reading + 5 digits)
	(20.0 ~ 199.9)	0.1	
	(200.0 ~ 9999)	1	

Max. auxiliary earth electrode resistance Rh.....100×RE or 50 kΩ (whichever is lower)
Max. probe resistance Rs .....100×RE or 50 kΩ (whichever is lower)
Rh and Rs values are indicative.

Additional probe resistance error at Rhmax or Rsmax...±(10 % of reading + 10 digits)
Additional error at 3 V voltage noise (50 Hz).....±(5 % of reading + 10 digits)

Open circuit voltage.....< 30 VAC
Short circuit current .....< 30 mA
Test voltage frequency .....126.9 Hz
Test voltage shape .....sine wave

Automatic measurement of auxiliary electrode resistance and probe resistance.

Ro - Specific earth resistance

Measuring range	Resolution (Ωm)	Accuracy
6.0 Ωm ~ 99.9 Ωm	0.1 Ωm	± (5 % of reading + 5 digits)
100 Ωm ~ 999 Ωm	1 Ωm	± (5 % of reading + 5 digits)
1.00 kΩm ~ 9.99 kΩm	0.01 kΩm	±(10% of read.)for Re 2kΩ...19.99kΩ
10.0 kΩm ~ 99.9 kΩm	0.1 kΩm	±(10% of read.)for Re 2kΩ...19.99kΩ
100 kΩm ~ 9999 kΩm	1 kΩm	±(20% of read.) for Re > 20 kΩ

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Multifunction Installation Tester

GENERAL SPECIFICATIONS

SPECIFICATION	PARTICULARS
Power Supply	9 VDC (6x1.5 V battery cells, size AA) / 12V DC Mains Adaptor
Battery Charging Current	< 600 mA (internally regulated)
Charging Duration	6h typically
Operation	15h typically
Safety	CAT III / 600 V; CAT IV / 300 V, Double Insulation, IP42, Pollution Degree 2
Display	480X320 TFT Colour LCD
Communications Interface	USB
Dimensions	25 cm x 10.7 cm x 13.5 cm
Weight	1.30 kg
Operations Environment	0° to 40°C, ≤95% RH Non-condensing
Storage Environment	10° to 70°C, ≤90%RH (10-40°C), ≤80%RH (40-60°C)

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