

Application Catalogue 2015

Measuring instruments and testers



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💐 🕻 METREL Application & Technical Guideline/ Certified Training Modules/ Key Product Solutions by Metrel

Metrel has introduced a range of Certified Training Modules based on, and adjusted to comply with, the **EU-countries industry standards**

The necessary equipment

Metrel's Safety and Quality Tester Instruments cover the needs of installers, constructors, planners and inspectors. Each tester supports test procedures and measuring methods according to the main standards and other regulation. The Test instruments represent a strong tool for troubleshooting, testing, diagnosing and reporting.

Advanced Features and several key solutions are specifically highlighted with regard to the competitors' solutions.

Applications and Solutions can be found in a number of additional operation and Good to Know documents related to the relevant industry sectors.

Certified Training Modules and Seminars are supported by the Metrel Academy. Within the Knowledge section we make recommendations and suggestions in support of national vocational qualification schemes. We can also offer training with completely new Training Modules for new application areas.

SOLID KNOWLEDGE BASE

Page **2**

Metrel is continuously investing in developing the R&D working groups, which leads to new product solutions and improved technical and application knowledge. We are pleased to say that a number of our design

engineers and product managers have thoroughly developed their technical knowledge and application experience about different markets for our products, so we can proudly state that we are Experts in our Field. Metrel work in co-operation with important external organizations and institutions like:

- IEC Technical Committees and their Working Groups
- Faculties of Electrotechnics at different Universities
- Electrotechnical Associations
- Engineers Associations
- Electrical Safety Boards
- Chambers of Engineers
- Chambers of Commerce and Industry
- Chambers of Craft and Small Business

PARTNERSHIP

Metrel is cooperating closely with important associations and committees related to its industry sectors, and is a member of the Slovenian Institute for Standardization. We have individuals who participate in several technical committees, as well as internationally in one of the IEC Technical Committees Metrel is also involved in the Committee for the Electrotechnical Safety and Low-voltage electrical installations (NNELI) as a partner company through »eTest scheme« in Slovenia, it is a member company at GAMBICA, the Trade Association for Instrumentation, Control, Automation and Laboratory Technol-

ogy in the UK in the sector of Test and Measurement Equipment, it is a member company at E-Check Association of electrical installers in Germany, and cooperates with NICEIC, the UK's leading voluntary regulatory body for the electrical contracting industry, then with NAPIT, the UK National Association for Professional Inspectors and Testers, as well as other similar institutions in other countries.





REFERENCES

Through our own participation in providing and supporting national vocational gualification programs in the field of electrical safety during past decades, and through our close collaboration with professionals from various industries, at Metrel Academy we are aware of the importance to continuously develop knowledge and new skills through various levels of training and gualification programs. This ensures self-confidence of the workforce in companies involved with Electrical Safety, it boosts their competitiveness, and

enables safe and profitable working processes of their customers.

Metrel's participation in preparation of curricula for electrical engineering in Slovenia includes the following:

- Preparation of the Knowledge and Skills catalogue
- Giving assistance in defining qualification requirements list for the candidates in the vocational qualification program
- Preparation of the Assessment Exams catalogue

Metrel also assists experts working on the vocational qualification programs through its distribution - partners' network worldwide This has been mostly related to the application of Metrel test and measurement instruments

CERTIFIED TRAINING MODULES

Certified Training Modules and Seminars are supported with packages of printed Handbooks, White paper, Exercises, Quick Guide Charts, and Posters together with other elements of Application and Technical Support.

MODULE PACKAGES

E-HANDBOOKS. QUICK GUIDE CHARTS and EXERCISES about measuring and testing based on the International / European Standardization for every participant.

Key Solutions and Advantages of Metrel Products against the competition



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Electrical Installation Safety 4 - 9

- PV Systems, Inverters, Panels, Modules Testing, Maintenance, Troubleshooting • LV Installation Safety & Operation Condition Qual-
- ity & Switchboards & Circuit Protection Parts
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 General / basic testing up to high level in-dustrial testing, electronic fault finding, field servicing and heavy duty electrical testing

Wall Posters

 Wall posters represent in a visual way, typical testing and measurement procedures and / or troubleshooting tasks, or a list of required customized tests in certain areas of application.





Scope of Application & Technical Support

- Demonstration Equipment
- Testing instruments
- Power Point Presentations on product solutions
- On-line Technical Support: any inquires related to Metrel products can be sent on the following addresses:
- help@metrel.si
- info@metrel.co.uk
- metrel@metrel.de
- · Bespoke product training for an individual customer or a bigger group of larger end-users
- · Complete distributor set-up training (product, repair, and calibration training)
- B2B web support provides specific technical information for Metrel partners
- · Download centre enables you to download files with technical product information

OUALIFICATION CERTIFICATE

European Qualification Certificate adjusted to the EU-countries industry standards ensures the competency of individual participants

South Textury and Verticals of Loss Millings Installations

who pass the final Exam on Theoretical and

Practical knowledge for the specific locally

Know-How Package - for a Transparent

Knowledge Catalogue - for the specific

Training Module for modification to a local

Exam's Catalogue - with the definition of the

minimum level of the Entry conditions for a

Approved Certificate - approval of the

obtained gualification when signed by a local

· Electrical Safety Board Organization, as for ex-

Metrel Academy has put out a comprehen-

sive list of training sessions in order to help

you master the latest measurement and test-

ample NNELI etest / local - National AIE partner

approved Training Module.

Localization Process

National regulation.

authorized organization like:

Training organization

ing technologies.

participant.

Page 3



Photovoltaic Modules, Panels, Strings, Inverters...



GENERAL FEATURES:

• Automatic measurements on PV Systems. Combined photovoltaic tester and electrical installation safety tester. Environment measurements and calculation

energised PV system. Large PV module Data Base:

- PASS/FAIL evaluation of electrical safety test results;
- Report Creator with powerful two way communication PC SW Tool EuroLink PRO.

ADVANTAGES:

PV installation testing:

- Uoc, Isc, Irradiance and Temperature measurements;
- I U curve of modules and strings on PV systems;
- MPP determination and STC calculations;
- Irradiance and Temperature Logger;
- Insulation under Voltage of PV panels and strings;

Power measurements on AC and DC:

• DC / AC TRMS Clamp-on Current testing; • Efficiency of Solar Panels and Inverters:

Electrical Safety testing:

- Zloop L-N and L-L, RCD protection;
- Continuity and Earth Bond test;
- Insulation testing through Switchboard, at Circuits;
- Over voltage protection testing;
- Earth / Ground resistance testing.
- TRMS Clamp-on Leakage Current testing.

APPLICATIONS:

- Safety testing of PV and electrical installations.
- Measuring and Testing the Efficiency of the whole System.
- MPP check, Inverter check, Working point of Inverter Testing.
- Maintenance and troubleshooting based on I-V characteristic checking for possible deviations from the standard shape.



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PV Systems, Inverters, Panels, Modules Testing, Maintenance, Troubleshooting



Selection Guide

rt No.		MI 3108 EurotestPV	MI 3109 EurotestPV Lite	A 1378 EurotestPV Remote
tures	Description			
	Insulation resistance up to 1000 V	✓	✓	
-	Continuity 200 mA	✓	✓	_
TRICAL	Line / Loop Impedance	✓	_	-
ALLATION	RCD A, AC, B	√	_	_
ТҮ	Earth resistance	✓	_	_
	Rotary field	✓	_	_
	lsc, Uoc	1000 V / 15 A	1000 V / 15 A	-
	Automatic test sequence	_	\checkmark	_
ENERATOR	I-V curve	✓	✓	_
	Umpp, Impp, Pmax	✓	✓	_
	Extrapolation to STC	✓	√*	_
	Rs (calculated in PC SW)	✓	✓	_
ONMENT	Irradiance	✓	✓*	✓
	Module temperature	✓	✓*	✓
UREIVIENIS	Logger	_	-	✓
	DC side measurements U, I, P	✓	✓	-
STEM POWER	AC side measurements (single phase) U, I, P	✓	✓	-
UREMENTS	Single phase PV and inverter energy conversion efficiency	✓	✓	-
	Three phase PV and inverter energy conversion efficiency	Option**	Option**	-
	P, Q, S, THDU, PF/cos φ	✓	-	-
DED POWER	AC/DC current	✓	-	_
TIONALITY	Scope function	✓	-	-
	Energy	✓	-	_
	Harmonics (up to 11 th)	✓	-	_
	Tip Commander	Option	_	-
	Remote unit (logger)	Option	Option	✓
NDARD/ IONAL	PV safety probe	✓	Option	-
	MC3 and MC4 adaptors	✓	✓	-
SSORIES	AC/DC current clamp	✓	✓	-
	PV reference cell	✓	Option	_
	Temperature probe	✓	Option	-
V	PC SW EuroLink PRO Plus	\checkmark	\checkmark	_

* Environment data can be entered manually or measured with optional accessory.

** Three phase PV efficiency can be measured by synchronisation with any Metrel Power Analyser.



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Memory Organizer

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General Settings

EurotestXC

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Low Voltage Installation Safety & Operation Condition Quality & Switchboards & Circuit **Protection Parts**

Selection Guide

- CO RPE
- ZLI
- ZLC
- RC

- BLU MC PC CO PO

 Report Creator with powerful two way communication PC SW Tool EuroLink PRO; • Up to 5 times faster than any existing

ADVANTAGES:

• TN / TT / IT and other earthing systems support:

equivalent Safety testing procedure;

- Zloop L-PE, L-N and L-L impedances at the entry and at the end of circuits, comparison of both results and ΔU calculation in %, Ipsc and Ipfc calculation, Fuse protection evaluation:
- Test of RCD protection at AC / A or B current shape on **G** or **S** type;
- Continuity of PE evaluation, two polarities automatic;
- Insulation testing through Switchboard, at Circuits, Insulation of Walls and Floors, Antistatic Floors testing, automatic insulation testing;
- TRMS Clamp-on Leakage Current testing;
- Over voltage protection with ramp;
- IMD and ISFL testing on IT systems, Medical site testing, Mobile Installations;
- Earth / Ground resistance testing 2-wire,

Other tools for Three Phase Systems,

3-wire, 4-wire, 1 clamp, 2 clamps;

Locating fuses and cables, Illumination measuring, high resolution Z impedance for power lines.

APPLICATIONS:

- Low Voltage Electrical Installation Safety.
- Low Voltage Electrical Installation Designers needs
- Facility Management, maintenance and care of commercial or institutional buildings, such as hospitals.
- Hotels, office complexes, arenas, schools or convention centres.
- Low voltage installations maintenance, Preventive and Predictive maintenance, Corrective maintenance / Reactive repairs.
- Periodic Statutory Testing and Inspections.
- Fire Safety and Hazards, Troubleshooting of Overloaded electrical systems, hot wiring or connections, failed components
- Electrical Safety in Working places.
- Electrical Safety in Public Areas.





Continuity, Insulation, Z Loop impedance, RCD, Earth ...

GENERAL FEATURES:

simply as PASS / FAIL;

• AUTOSEQUENCE automatic LIVE and

DEAD tests, programmable, no lost or for-

gotten results / parameters, worst case

point, up to 50 parameters, Fuse and RCD

characteristics, adjusted limits and tested

results combined together and evaluated

HANDBOOK

Guide for Testing and Verification of Low Voltage Installations

evaluated, human error factor minimized; • Automatic evaluation of safety at test

Low Voltage Installation Safety & Operation Condition Quality & Switchboards & Circuit **Protection Parts**



Part No.		NEW MI 3152 EurotestXC	MI 3105 (EU) EurotestXA	MI 3101 EurotestAT	MI 3102H BT EurotestXE	MI 3102 BT EurotestXE	MI 3100 SE EurotestEASI	MI 3100 s EurotestEASI	MI 3125 BT EurotestCOMBO	MI 3125 EurotestCOMBO
eatures	Description		Ô	Ò	(P	2
	AUTOSEQUENCE Programmable	- ✓	√ √	√ √	-	-	-	_	_	_
	Auto TT (U, ZIn, Zs, Uc)	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	_	_	-
AUTOSEQUENCES	Auto TN/RCD (U, ZIn, Zs, Rpe)	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓			_
	Auto TN (U, ZIn, ZIp, Rpe)	▼ ✓	• -	• -	v	✓ ✓	• -		_	-
	Auto IT (U, ZI, Is, Im) Voltage TRMS, Frequency Phase SEQUENCE L1-L2-L3	•	-	-	_					_
/OLTAGE	Phase SEQUENCE L1-L2-L3	\checkmark	\checkmark	\checkmark	✓	✓	✓	✓	✓	\checkmark
NSULATION	50 V - 1 kV / 2,5 kV PI DAR	√/-	√/-	√/-	✓	 ✓ / – 	✓/-	✓ / -	√/-	✓ / -
NJOLATION	Auto L-PE, N-PE, L-N	-	✓	✓	-	-	_	-	-	-
ONTINUITY	Rlow (200mA)	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Continuity (7 mA)	✓	\checkmark	✓	✓	✓	✓	✓	✓	-
RPE	RPE / RPE(rcd)	✓	_	_	✓	✓	✓	-	-	-
LINE	Zline, Ipsc, ΔU% / FUSE tables	✓	✓	√	✓	✓	✓	✓	✓	✓
	A 1143 Euro Z adapter support	✓	√	√	-	-	_	-	_	-
LOOP	Zloop, Ipfc / FUSE tables Zs(rcd)	√	√	√	✓	✓	✓	✓	✓	✓
RCD	RCD t, Uc RCD I ramp, Uc Auto	AC/A/B/ F/B+	AC/A/B/ F/B+	AC/A/B/ F/B+	AC / A / F	AC/A/B/ F/B+	AC / A / F	AC / A / F	AC/A/B/ F/B+	AC/A/F
	PRCD-S, PRCD-K	✓	-	-	-	✓	_	-	-	-
	Earth 3W	✓	✓	✓	✓	✓	✓	✓	✓	-
ARTH	Earth 2 Clamps	Optional	Optional	-	Optional	Optional	_	-	-	-
	RO adapter	Optional	Optional	Optional	Optional	Optional	-	-	-	-
	Power (S, Q, PF, THDU)	√	-	-	✓ ✓	1	_	-	-	-
	Harmonics (U, I)	✓ ✓	-	-	✓ ✓	✓ ✓	_	-	-	-
	Current Leakage / Load		√	_	•		_	_	_	_
	IT support / IMD, ISFL	$\checkmark \checkmark$	$\checkmark \checkmark$	$\checkmark \checkmark$	✓ / - ✓	$\checkmark \checkmark$	√/-	✓/-	√/-	✓/-
DTHER	Commanders	v	•	•	V	•	Optional	Optional	Optional	Optional
	Locator	- Ontional	Optional	Optional	- Ontional	Optional	-	-	-	-
	LUX Sensor Varistor	Optional	Optional ✓		Optional	Optional		_	_	_
	Ring (UK installations)	- ✓	✓ ✓	 ✓	-	-	-	_		-
BLUETOOTH	Built in	✓ ✓	-	• _	✓ ✓	✓ ✓	-	_	↓	-
MODULE	External (dongle)	• _	-	-		·	-	_	•	_
C SW	PC SW Professional / Advanced	✓ / Optional	✓ / Optional	✓ / Optional	✓ / Optional	✓ / Optional	✓ / Optional	_	✓ / Optional	_
	RS232 / USB							_		_
ORTS	Bluetooth	•	Optional	Optional		✓ ✓	Optional+	_	· •	
Chij	שועפונטטנוו	•	Optional	Optional	•	•	Ομισιαι+	_	•	-



METREL

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Special Installations Testing, Ground and Lightning Systems Maintenance, Troubleshooting & Integrated IT Systems

Z Line impedance, RCD, RCM, ELM, IMD, Earth...

MEM

HELP

GENERAL FEATURES:

- AUTOSEQUENCE automatic tests, worst case evaluated, human error factor minimized; • Automatic evaluation of safety for Med-
- ical Locations, Integrated IT systems and Installations on Vehicles, Fuse characteristics, supported IMD, ELM, RCM devices, adjusted limits and tested results combined together and evaluated simply as PASS / FĂIL;

HANDBOOK

Guide for Testing and Verification of Low Violtage Installations

METREL

- Insulation and Earth Bonding Continuity for industrial environment and Special installations and Locations;
- Earth / Ground Resistance / Soil Resistivity in-line, triangle or mirror connection for close overlapped funnels on earthing systems, urban environment, also for industrial and noisy environment:
- Report Creator with powerful two way communication PC SW Tool EuroLink PRO.

ADVANTAGES:

- Test of IMD, ELM and RCM devices with ISFL pre-test and Voltage balance evaluation;
- Zloop L-N and L-L impedances at the entry and at the end of circuits, comparison of
- Earth Bond testing with minimum 200 mA, 2 A, 10 A, both polarities, Inductive mode supported;
- Insulation testing through Switchboard, at Circuits, Insulation of Walls and Floors, Antistatic Floors testing;
- PI and DAR factor Insulation testing on cables, transformers, motors;
- Overvoltage varistors and Surge arresters testing with up to 2.5 kV voltage ramp;
- TRMS Clamp-on Leakage Current testing;

- Lightning systems and PE Conductive loops testing with Two Clamps method;
- Earth / Ground resistance testing 2 wire, 3 wire, 4 wire, 1 clamp, 2 clamps,

APPLICATIONS:

- Medical Sites and Specific Medical Units Surgery Rooms, Ambulance Vehicles and Emergency Cars, Helicopters, Boats.
- Mobile Video / Audio / Concert Halls / Fair playground, Satellite / Video Broadcast Vehicles.
- Military and Police Portable Stations and Units, Vehicles, Helicopters, Airports, Mobile Units, Mobile Restaurant Units.
- Racing Team Mobile Units, Restaurant Units • Fire Brigade Engines and Vehicles. Fire
- Boats, Emergency Vehicles and Cars. · Working Ships and Boats Generators, Fish-
- ing Boats and Ships, Transport Ships, Tourist Cruisers Ships, Marina places, Mobile Units with Integrated IT Generators / Transformers / LV Electrical Installations
- Gas stations, Pipes, Ground metal plates and covers, Oil tanks.
- Earth, Ground and Lightning protection Systems of Buildings and Industrial Halls, from single earthing points to complex systems.



- both results and **dU calculation in %**;

Special Installations Testing, Ground and Lightning Systems Maintenance, Troubleshooting & Integrated IT Systems



Selection Guide

Part No.		MI 3110 EurotestIM	MD 9272 Leakage / Power Clamp	MI 3123 Earth / Clamp	MI 3122 Z Line-Loop / RCD	MI 3121 Insulation / Continuity	MI 3121H Insulation/ Continuity	MI 3242 MicroOhm 2A	MI 3309 BT DeltaGT
Features	Description		E	P.			P	9	8
	AUTOSEQUENCE Programmable		_	_	_	_	_	_	✓
AUTOSEQUENCES	Auto IT (U, ZI, Is, Im) Auto VDE	✓	_	-	_	_	_	-	-
ACTOR COLUCES	Auto VDE	_	_	-	_		_	_	<u>√</u>
	Auto Custom	-	_	_	_	_	_	_	✓
	IMD insulation monitor	✓	-	-		-	-	_	_
INSULATION	50 V - 1 kV 250 V, 500 V					✓ ✓	∨		-
	2,5 kV PI DAR			-		_	√		-
	ISEL 1 1 2 first Fault leakage	- -	_	_		_	-	_	_
	ISFL L1, L2 first Fault leakage Differential leakage current	_	✓	_	_	_	_	_	✓
LEAKAGE CURRENT	Touch leakage current	_	_	_	_		_	_	√
	Substitute leakage current	-	_	_	_	_	_	_	√
	Leakage current with clamp	-	✓	_	_	_	_	_	√
CONTINUITY	Current 200 mA Current 2 A, 4-wire	_	-	_	—	√	√	✓	✓
EARTH BOND	Current 2 A, 4-wire	_	-	_	—	—	_	✓	_
ZLINE	Zline, Ipsc, ΔU% / FUSE tables Zloop, Ipfc / FUSE tables Zs(rcd)	✓	_	—	✓	_		_	
ZLOOP	Zloop, lpfc / FUSE tables Zs(rcd)	_	_	—	✓	_	_	-	_
RCD	RCD t, Uc RCD I ramp, Uc Auto	_	_	_	AC/A	_		_	AC/A*
	PRCD-S, PRCD-K	_	-	—	-	_		-	✓
	Earth 3W	-	-	√	-	_	_	-	_
EARTH	Earth 2 Clamps	-	-	✓	_	_	_	-	_
	RO adapter		-	√			_	-	_
VOLTAGE	RO adapter Voltage TRMS, Frequency Phase SEQUENCE L1-L2-L3	✓	✓	-	✓	✓	✓	-	✓
POLARITY	IEC lead test	-	-	-	_	_	_	-	√
	Active polarity Power (S, Q, PF, THDU)	_	_	_	_	_	—	_	<u>√</u>
	Power (S, Q, PF, THDU)		✓	—	—		_	_	√ **
OTUER	Functional test		-	-	—	_		_	✓
OTHER	Harmonics (U, I)	_	✓		—	_			
	Barcode	-	_	-					✓ ✓
BLUETOOTH MODULE	Printer External (dongle)				_				✓ ✓
PC SW	PC SW	✓		✓	✓	✓	✓	✓	✓
COMMUNICATION PORTS	RS232 and USB	✓ ✓	_	✓ ✓	✓ ✓	✓ ✓	 ✓	✓ ✓	✓ ✓

* RCD t, only ** S, only



Portable Appliances Safety Testing, CE Marking & Machines Electrical Safety & Switchboards Safety

Earth bond, Insulation, Differential / Touch / Substitute Leakage...

GENERAL FEATURES:

- AUTOSEQUENCE automatic testing programmable or standardized shortcuts of any kind of Machines, Switchboards, Controlgear, Portable Appliances, Fixed Appliances, IT equipment, IEC cords, portable RCD devices and extension leads;
- Automatic evaluation of safety with simple PASS / FAIL information but supported with all subresults for detailed report;

lerification of safety of machine

METRE

wording to IEC/EN 66264 Ed

• 3-phase appliance testing;

- PATLink Android scanning of the QR codes, containing information of the previous results, the test status, and the previously used test sequence;
- Scan, test and print barcoding system, and PASS / FAIL barcode label printing make retesting guick and simple;
- Active polarity for P/RCD protected extension leads testing;
- Report Creator with powerful two way communication PC SW Tool PATLink PRO;

ADVANTAGES:

- HV Withstanding dielectric test with programmable voltage ramp AC, **500 VA**, up to **5 kV**, fixed voltage levels **1 kV**, **1,89 kV**, **2.5 kV** and limited power Flash tests on 1.5 kV / 3 kV; • Earth bond / continuity resistance test with
- test currents 200 mA and powerful 10 A / 25 A;
- Insulation resistance, Touch leakage current and Substitute leakage current on inner and exposed isolated accessible conductive parts for class I / class II appliances;
- Differential Leakage, Touch Leakage and Substitute Leakage test;
- Functional test and TRMS load currents testing;
- Innovative Active Polarity function for test-

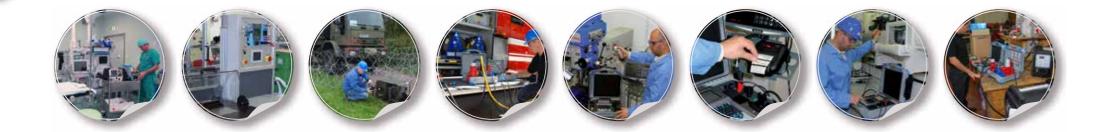
ing RCD / PRCD protected cords while voltage is applied to tested item;

"EIREL"

- Trend function showing comparison of old and new test results on large graphic LCD display;
- Instrument can be powered from both mains supply and internal battery;
- Results can be read / written / sent via USB, Bluetooth, External Printer, Barcoding, QR Coding and RFID system.

APPLICATIONS:

- Type testing of Appliances, Machines and Switchgears / Controlgears after production in producer's R&D phases and Laboratories.
- CE marking and Routine testing after production.
 Testing of Power Tools, Extension Leads and Appliances on Construction sites.
- Testing of Appliances protected with RCDs (type AC, A, and B), portable PRCDs (type K, S).
- Service departments (after repair testing) Hire and Rental Industry (before hire and after return testing).
- Periodic testing of Portable Appliances for Hotels, Schools, Kindergardens, Public places, Restaurants, Kitchens, Shopping Centers, Stores, Fire Brigades, Military, Expo Centers, Concert Halls, Events.
- Testing of Hard-wired Appliances.



Portable Appliances Safety Testing, CE Marking & Machines Electrical Safety & Switchboards Safety

METREL®

Selection Guide

Part No.:		NEW MI 3394 CE MultiTesterXA	MI 2094 CE MultiTester	MI 3321 MultiServicerXA	MI 3310 25A Sign	MI 3310 naGT	MI 3309 BT DeltaGT	MI 3311 GammaGT
Features	Description						8	-
AUTOSEQUENCES	CE marking / PAT / MACHINE / SWITCHBOARD AUTOSEQUENCE Programmable Auto VDE Auto CUSTOM	$\begin{array}{c} \checkmark \checkmark \checkmark \checkmark \checkmark \\ \checkmark \\ \hline \\ \hline \\ \hline \\ \checkmark \\ \hline \\ \checkmark \end{array}$	$\begin{array}{c} \checkmark \checkmark \checkmark \checkmark \checkmark \\ \checkmark \\ \hline \\ \hline \\ \checkmark \\ \hline \\ \checkmark \end{array}$	$- \checkmark \checkmark \checkmark$	-/ ✓ / - / - ✓ ✓	-/ ✓ / - / - ✓ ✓	-/ ✓ / -/ - ✓ ✓	-/ ✓ /-/- ✓ ✓
WITHSTANDING	Ramp test 100 5000 Vac (500 VA) Ramp test 600 600 Vpc Test voltage 1000 Vac (1890 Vac (2500 Vac (500 VA)	$\begin{array}{c} \checkmark \\ \checkmark \\ \checkmark \\ \checkmark / \checkmark / \checkmark \\ \end{array}$	$\sqrt{\frac{1}{\sqrt{1}}}$	- - - -				_ _ _
CONTINUITY EARTH BOND INSULATION	Current 200 mA Current 4 A / 10 A / 25 A 50 Vpc / 100 Vpc / 250 Vpc / 500 Vpc / 1000 Vpc Differential leakage current	$\begin{array}{c} \checkmark \\ \checkmark \checkmark \checkmark \\ \checkmark \checkmark \checkmark \\ \checkmark \checkmark \lor \checkmark \checkmark \\ \checkmark $	$\begin{array}{c} \checkmark \\ \checkmark \checkmark \checkmark \\ \checkmark \checkmark \checkmark \\ \checkmark \lor \lor \lor \checkmark \\ \hline \end{array}$	$\begin{array}{c} \checkmark \\ - \checkmark \checkmark \\ - - \checkmark \checkmark - \\ \checkmark \end{array}$	$ \begin{array}{c c} \checkmark \\ - / \checkmark / \checkmark \\ - / - / \checkmark \\ \checkmark \end{array} $	✓ -/-/- //√/-	✓ _/_/_ _/_/√/√/_	✓ -/-/- -/-/√/√/-
LEAKAGE CURRENT	Touch leakage current PE leakage current Substitute leakage current Leakage current measurement with optional clamp	✓ ✓ ✓	✓ ✓ ✓	- - - -		✓ - ✓	· · · · · · · · · · · · · · · · · · ·	- - - -
DISCHARGE TIME	60 V (1 5 s)			✓ ✓ ✓	- -			
RCD	RCD t, Uc RCD I ramp, Uc Auto PRCD-S PRCD-K	-	-	AC / A / B	AC / A / B	AC / A / B	AC / A*	AC / A*
ZLINE	Zline, Ipsc, ΔU% / FUSE tables A 1143 Euro Z adapter support Zloop, Ipfc / FUSE tables Zs(rcd)			\checkmark				
ZLOOP THREE PHASE APPLIANCES	Zloop, lpfc / FUSE tables Zs(rcd) A 1322 Active 3-phase Adapter A 1422 Active 3-phase Adapter Plus			✓ Optional Optional	– Optional Optional	_ Optional Optional		_
VOLTAGE	A 1322 Active 3-phase Adapter A 1422 Active 3-phase Adapter Voltage TRMS, Frequency Phase SEQUENCE L1-L2-L3	✓/- -	✓ / ✓ _				✓ / - -	✓/- -
POLARITY	Active polarity			✓ ✓ ✓		✓ ✓	✓ 	✓ _
OTHER	Functional test Power Barcode Printer	✓ ✓ Optional	✓ ✓ Optional	✓ ✓ Optional Optional	✓ ✓ Optional Optional	✓ ✓ Optional Optional	✓ ✓ Optional Optional	 Optional Optional
BLUETOOTH MODULE PC SW	Built in External (dongle) PC SW PATLink PRO Plus (CE Link*) PC SW Metrel ES Manager	✓ - ✓	_ 	- - -				
	PC SW Metrel ES Manager RS232 / USB / Ethernet Remote	$\begin{array}{c} \checkmark \\ \checkmark $						

* RCD t, only

Power, Harmonics, THD, Phase diagram, Flicker, Transient, Waveform...



- Automatic Voltage and Power Quality Analysis according to EN 50160 with PASS / FAIL limit evaluation, including flickers and harmonics. Compliance with power quality standard IEC 61000-4-30 Class A/S. Predefined recorder profile for EN 50160 survey;
- Troubleshooting and Maintenance Tool to discover voltage sags and swells, resonant states, high neutral conductor currents in 3-phase systems, asymmetry, transients;
- **Designing Tool** of filtering systems, power correction equipment, over voltage protection and UPS systems;
- Power Quality Negotiating background Tool; • Download, view and analyse with Power-
- View PC SW platform that contains a package of functionalities needed for evaluation of power quality phenomena and creation of complex reports.

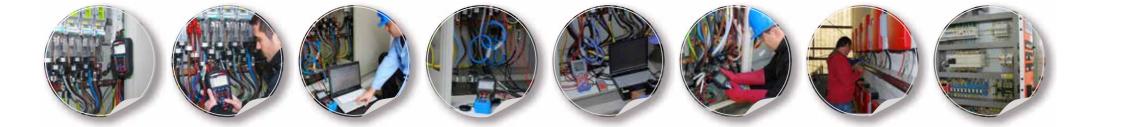
ADVANTAGES:

- Voltage TRMS, peak, crest factor (4-channel), 0 ... 1000 Vrms;
- Current TRMS, peak, crest factor (4-channel), automatic clamp recognition;
- Power (active, reactive, apparent), Power factor, $\cos \varphi$, Unbalance;
- Energy (active, reactive, generated, consumed);
 Harmonic analysis up to 50th harmonic,
- THD measurement;
- Flicker measurement:
- Waveform displaying and Transient snapshooting:
- Fast logging and Inrush Current recording;
- Faster troubleshooting due to on-screen
- displaying of trends and captured events;
- Voltage events and user defined alarms capture:
- **GPS** time synchronization;

- Internal memory allows recording over one month period;
- Instrument, or a group of them, can be remotely controlled and programmed via GPRS modem.

APPLICATIONS:

- Power Quality, Maintenance, Compensation PF, Filters, Start up machines.
- Power quality assessment and troubleshooting in low and middle voltage electrical systems.
- Energy assessment to quantify the before and after installation improvements in energy consumption in order to justify energy saving devices,
- Checking power correction equipment performance
- Long-term analysis, to uncover hard-to-find or intermittent issues.
- Predictive maintenance, to detect and prevent power quality issues before they cause downtime.
- Load studies, to verify electrical system capacity before adding loads;
- Start up current, unbalance/asymmetry recording to optimize systems efficiency.Electrical Safety in Public Areas.



CL

OT

PC CO PO

* Class A in range 49-51 Hz, see Instruction manuals for details.

Power and Voltage Quality & Consumption and Disturbances



Part No.		MI 2892 Power Master	MI 2792A PowerQ4 Plus	MI 2792 PowerQ4 Plus	MI 2592 PowerQ4	MI 2392 PowerQ ^{Plus}	MI 2492 PowerQ
eatures	Description						
CLASS	IEC 61000-4-30 Class A / Class S / Class B	Class A	Class A*	Class S	Class S	Class B	Class B
	Number of current measuring inputs	4	4	4	4	3	3
NPUTS	Number of voltage measuring inputs	4	4	4	4	3	3
	TRMS Voltage measurement (Min., Max., Avg.)	\checkmark	✓	\checkmark	√	✓	√
	TRMS Current measurement (Min., Max., Avg.)	✓	✓	✓	√	✓	√
	Current in neutral conductor	✓	✓	✓	✓	calculated	calculated
	Power Factor and $\cos \varphi$	√	✓	✓	✓	✓	✓
	Power measurement (W, VA, VAr)	√	√	✓	✓	✓	✓
	Energy measurement	√	√	✓	✓	✓	✓
ERIODICS	THD and harmonics analysis	√	√	✓	✓	✓	✓
	Frequency measurement	✓	√	✓	✓	✓	✓
	Flicker measurement	√	√	✓	✓	 ✓ (without flicker) 	✓ (without flicker)
	Voltage events (sags, swells, interruptions)	✓	✓	✓	✓	✓	✓
	Unbalance	√	√	✓	✓	✓	✓
	EN 50160 Analysis	√	✓	✓	✓	_	_
	Scope function	✓	✓	✓	✓	✓	✓
N LINE	Phase diagram	√	✓	✓	✓	✓	✓
	Harmonics measurement	✓	✓	✓	✓	✓	✓
	Transients measurement	√	√	✓	_	_	_
PECIAL TOOLS	Waveform recording	✓	✓	✓	✓ (snapshot)	✓ (snapshot)	✓ (snapshot)
	Inrush currents	√	✓	✓	✓	(child) = 0.000 (_
	Interharmonics analysis	√	√	✓	_	_	_
THER	Signalling	✓	✓	✓	_	_	_
	Temperature measurement	✓	✓	✓	_	_	_
C SW	PC SW PowerView	√	√	√	✓	✓	✓
	MicroSD memory card	✓	_	_	_	-	-
OMMUNICATION	RS232 and USB / Ethernet	\checkmark / \checkmark	√/-	√/-	√/-	√/-	√/-
ORTS	GPS time synchronisation	✓	\checkmark	Option	_	_	_
	Remote instruments control (GPRS)	_	Option	Option	_	_	_



HV Safety and Quality in Industrial Systems & Power Generation and Distribution Systems & **Construction Sites**

Equipotential Bonding, Insulation Analysis, Step / Contact, Z impedance...

GENERAL FEATURES:

- Equipotential Bonding and Connectivity Testing with MicroOhm meter is just what needed to show reliable and stable results.
- HV Insulation Analysis with high EMC immunity, three wire connection with Guarded test leads in the set. Powerful generator with fast charging and discharging of Capacitive loads;
 Voltage Funnel during Fault Simulation in case of ground fault or lightning strike around objects, analysing with Step Volt-



age and Contact Voltage measuring, Earth / Ground Resistance and Soil Resistivity measuring with Step / Contact System; • Live Impedance and Fault Current Test-

- ing, Conditions for Automatic Disconnection Evaluation with accurate results on Industrial Power Transformers and Generators;
- Report Creator with powerful PC SW Tool HVLink PRO.

ADVANTAGES:

- Equipotential Bonding with 4 wire MicroOhm meter with 2A, 10A or 100A battery operated generator with results in fine resolution up to 1 nanoOhm;
- HV Insulation Analysis up to 10 kV, 3 wire connection with +, - and Guard, with PI, DAR, DD, Ramp test, Withstanding programmable procedure and Step Volt-
- age. Graphical presentation of results R(t);
 Smallest Step / Contact Voltage System with wireless synchronized Voltmeters all in one solution, with powerful generator of up to 55 A, eliminating earth current noise even in low power operating mode. It is extremely safe operating on 50 V only which is important for testing in public area surrounding;
 Live Impedance 4 wire testing with test

current of up to 290 A, Built-in Fuse Characteristics, automatically calculated lsc max, Isc standard and Hot factor for Isc Min.

APPLICATIONS:

- Equipotential Bonding and Connectivity of
- Equipotential bonding and connectivity of bigger crossection conductors, bars and metal stripes, connected in paralel.
 Testing of Automatic Disconnection Ability in case of Fault in Power Transformer, Fuse characteristics evaluation with 4-wire 300 A High-Current Testing.
- Insulation Characteristics of Charging and Discharging, Influence of temperature, dirt, humidity, mechanical and electrical stresses, high-energy radiation, Testing on Capac-itive loads, Long Cables and Transformers.
- Insulation testing on separated systems of gas stations, pipes, ground metal plates and covers of oil tanks.
- Overvoltage and Surge Protection Periodical
- Earth and Ground systems, Soil resistivity, Lightning protection of Power Generators, In-
- Ground Networks Analysing of Antenna Towers, HV Power Distribution towers, Industrial Platforms, Power Transformers, Generators, PV systems etc, research on Earthing and Spreading of Voltage Funnels.



HV Safety and Quality in Industrial Systems & Power Generation and Distribution Systems & **Construction Sites**



Selection Guide

MC PC

art No.		MI 3252	MI 3250	MI 3210	MI 3200	MI 3201	MI 3202	MI 3295	A 1143
		MicroOhm 100A	MicroOhm 10A	TeraOhm 10 kV	TeraOhm 10 kV	TeraOhm 5 kV Plus	GigaOhm 5 kV	Step Contact Voltage	Euro Z 290 A
eatures	Description		E						
	Test current range	100 A	10 A	_	_	_	_	_	_
	Resolution	1 nΩ	0.1 μΩ	_	_	_	_	_	_
ARTH BOND	Single / Continuous mode	\checkmark	V	_	_	_	_	_	_
	Inductive mode	_	√	_	_	_	_	_	_
	Custom test shortcut	_	_	√	_	_	_	_	_
	Test voltage range	_	_		500 Vpc 10 kVpc		250 Vpc . 5 kVpc	_	_
	Insulation resistance measuring range	_	_	20 ΤΩ	10 ΤΩ	10 ΤΩ	5 TΩ	_	_
	Calculation of DD, DAR, PI, R(t)		_	∠0152	√	√			
ANALYSING	Ramp voltage test			· · · · · · · · · · · · · · · · · · ·	√ 	 ✓			
	Step voltage test			· · · · · · · · · · · · · · · · · · ·	· ✓	, ✓			
	Bar graph	_		· · · · · · · · · · · · · · · · · · ·	· ✓	· · · · · · · · · · · · · · · · · · ·		_	
	Leakage current			· · · · · · · · · · · · · · · · · · ·	 ✓	· · · · · · · · · · · · · · · · · · ·			
	Automatic discharge	_		√	√	√			
	Test current up to 55 A		_	-		_	-	-	
	Autonomous step voltage meter							v	
	Step voltage	_						v	
ARTH SYSTEMS	Contact voltage							v	—
		_	_	—		-	_	V 	—
	Earth resistance 2W, 3W	_	-	_	-	-		✓ ✓	—
	Specific earth resistance 4W	-	-	—	-	-	-	~	
	High precision 1 mΩ resolution	-	-	—	-	-	-	-	✓
MPEDANCE	Test current 290 A	-	-	_	—	-	-	-	<u>√</u>
	Line / Loop impedance	-	-	—	-	-	—	-	V
	lpcs / lpfc calculated up to 400 kA	—	-	—	-	-	—	-	V
	Voltage TRMS, Frequency	_	-	-	-	-	-	-	<u>√</u>
OLTAGE	3-phase system 440 V	-	-	-	-	_	-	-	✓
	Voltage DC 600 V	-	_	✓	✓	✓	√	-	-
	Robust AC current rejection 4 mA	_	_	✓	-	-		-	-
	Noise immunity filter	✓	✓	✓	√	✓	√	✓	-
THER	3-wire / 4-wire connection	-/ ✓	-/ ✓	 ✓ / – 	 ✓ / – 	 ✓ / – 	✓/-	-/ ✓	/ <
	PASS / FAIL evaluation	✓	✓	✓	✓	✓	✓	✓	✓
	Temperature compensation	-	√		_	-		-	✓
	Dual powered	NiMH	Lead / Li-Ion	Li-Ion	NiMH	NiMH	NiMH	-	-
LUETOOTH	Built in		_	✓	_	_	_	_	_
IODULE		-					-	_	-
C SW	PC SW	\checkmark	\checkmark	✓	✓	√	-	✓	✓
OMMUNICATION PORTS	RS232 and USB	\checkmark	\checkmark	√	✓	✓	-	✓	✓

METREL[®] **Telecommunication & Local Area Network Quality**

LAN, UTP, ScTP, FTP, NEXT, ACR, Length, Scope, TDR, TDNEXT...



GENERAL FEATURES:

- AUTOSEQUENCE automatic LAN testing with extensive database of Autotests incorporated into the instrument's memory allows quick LAN cabling verification up to CAT6 (ClassE) in accordance with international standards EN50173, TIA/EIA 658B, ISO/IEC 11801 or similar;
- Troubleshooting Tool with Single tests functionality enabled independently from Remote unit can show the connector / socket problems and faults in a fast and easy way;
- Report Creator with powerful communication PC SW Tool LANlink PRO.

ADVANTAGES:

- Connectivity with UTP, STP, ScTP, FTP cables is further enhanced with a complete selection of adapters for Channel Link and Permanent Link measurements;
- Complete selection of test functions

combined with easy to understand user interface makes Multi LAN 350 a good choice for LAN cabling companies and subcontractors as well as for IT administrators for troubleshooting purposes;

- Pinpoint distance to the fault determination with integrated professional TDR and TDNEXT functionality;
- Tabular or graphic presentation of test results;
- Set MI 2016 PS comprises of two Multi LAN 350 instruments that enable fast execution of measurements and double memory space for storing test results.

APPLICATIONS:

• Telecommunication cables, LAN UTP; ScTP, IT Tool, etc.



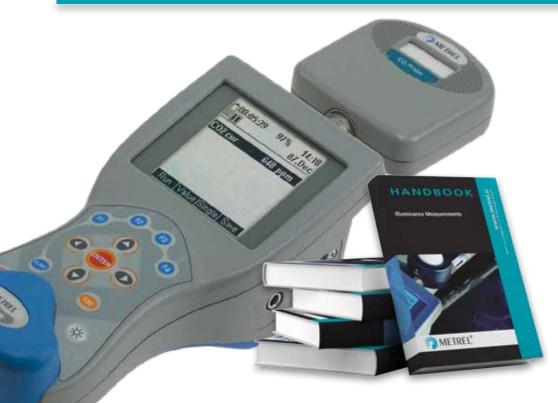
Telecommunication & Local Area Network Quality



Part No.:		MI 2016 Multi LAN 350	MI 2014 Cable Scanner
Features	Description		
CLASS	TIA/EIA 568B Cat 3, Cat 5, Cat 5E, Cat 6	√	_
	Wiremap	√	✓
	NEXT / Remote NEXT	✓ / ✓	_
	PSNEXT / Remote PSNEXT	\checkmark / \checkmark	_
	ELFEXT / PSELFEXT	✓ / ✓	_
	Return Loss / Remote Return Loss	√ / √	_
	ACR / Remote ACR	√ / √	_
MEASUREMENTS	PSACR / Remote PSACR	✓ / ✓	_
	Length	✓	\checkmark
	Propagation delay	✓	_
	Delay skew	\checkmark	_
	Impedance	√	_
	DC resistance	√	_
	Attenuation	√	_
SCOPE	TDR	\checkmark	\checkmark
SCOPE	TDnext	\checkmark	\checkmark
	Frequency range	0 350 MHz	_
	Coax cable	-	\checkmark
	Cable tracer option	√	-
OTHER	Talk over copper (Talk set)	√	\checkmark
	Cable identifiers	√	\checkmark
	Analysis of RJ 45 output	\checkmark	✓
	BNC output	-	\checkmark
PC SW	LANLink	\checkmark	_
COMMUNICATION PORTS	RS232 and USB	✓	-

METREL Indoor Environment Quality & Noise Analysing, Light Conditions & Emergency lights

Sound, Air velocity, Relative humidity, Illuminance, Temperature...



GENERAL FEATURES:

- Environment Conditions in buildings, working places and public places, Logging, Analysing and Testing;
- IAQ inspectors, HVAC engineers, safety officers, building managers, industrial hygienists and lab managers can now find a complete solution in measuring and analysing temperature (air, black globe and contact), air velocity, relative humidity, illuminance, luminance, including a sound level meter and noise frequency analyser. All in one single unique and universal
- professional testing set;
- Powerful logging PC SW Tools SensorLink PRO and SoundLink PRO are used for data downloads to a computer, simplifying the creation of test reports and enabling full data analysis and charting of sound measurements.

ADVANTAGES:

- Complies with all major international standards such as EN ISO 7726, ISO 7730, ISO 7243 for IAQ, DIN 5032 (Part 1 – Part 7) for Luminance and illuminance, EN 12599 for HVAC, IEC 61672 and IEC 61260 Class 1 and Class 2 for Sound.
- Provides a dew point, mass flow, PMV (predicted mean vote), PPD (predicted percentage of dissatisfied), WBGT (wet bulb globe temperature), luminance contrast calculations, as well as the real-time octave and one third octave sound frequency analyses.
- Provision of air temperature, air velocity, relative humidity measurement with allin-one microclimatic probe.

APPLICATIONS:

• Ventilation Systems, Cooling Systems, Working Places, Noise Analysing, Luminance and Illuminance.





Indoor Environment Quality & Noise Analysing, Light Conditions & Emergency lights



Part No.:		MI 6201PR	MI 6201EU Multinorm	MI 6201ST	MI 6301PR Fo	MI 6301EU nS	MI 6401EU Po	MI 6401ST bly
Features	Description				The second		- Contraction	
CERTIFICATES	ISO calibration certificate for complete system	\checkmark	✓	_	√	√	√	_
CENTIFICATES	Calibration certificate	-	-	✓	-	-	-	✓
	Sound level, class 1 (IEC 1672)	√	-	-	√	_	-	-
SOUND	Sound level, class 2 (IEC 1672)	-	✓	√	-	✓	-	-
JOOND	Real time 1/1 octave analysis	✓	✓	✓	✓	✓	-	-
	Real time 1/3 octave analysis	√	✓	√	√	✓	-	-
	Air Velocity	√	\checkmark	√	_	-	✓	✓
	Air Flow	√	\checkmark	\checkmark	_	-	√	√
	Relative Humidity	\checkmark	\checkmark	\checkmark	_	_	\checkmark	\checkmark
	Dew point	\checkmark	\checkmark	\checkmark	_	-	\checkmark	\checkmark
	Air temperature	√	\checkmark	\checkmark	_	_	✓	✓
	Temperature difference	Option	Option	Option	_	-	Option	Option
MEASUREMENTS	K Thermocouple temperature	Option	Option	Option	_	-	Option	Option
	Illuminance	\checkmark	\checkmark	\checkmark	_	_	\checkmark	\checkmark
	Luminance	Option	Option	Option	_	-	Option	Option
	Contrast	Option	Option	Option	_	-	Option	Option
	Black globe radiant temperature	Option	Option	Option	_	_	Option	Option
	CO concentration	Option	Option	Option	_	-	Option	Option
	CO ₂ concentration	Option	Option	Option	_	-	Option	Option
	A 1091 Microclimatic probe	√	✓	√	_	-	✓	√
	A 1127 Humidity and temperature probe	Option	Option	Option	_	-	Option	Option
	A 1092 Illuminance probe, type B	√	✓	√	_	_	✓	√
	A 1132 Luminance probe	Option	Option	Option	_	_	Option	Option
	A 1128 Thermocouple probe, type K	Option	Option	Option	_	_	Option	Option
TEST PROBES	A 1146 Sound probe, class 1	√	_	_	✓	_	_	_
	A 1151 Sound probe, class 2	-	✓	✓	_	✓	-	_
	A 1131 Black globe thermometer	Option	Option	Option	_	_	Option	Option
	A 1180 CO, probe	Option	Option	Option	_	_	Option	Option
	A 1181 CO probe	Option	Option	Option	_	_	Option	Option
	A 1143 SensorLink PRO	√	√ v	√	_	_	√ v	√ v
PC SW	A 1167 SoundLink LITE	√	✓	√	✓	√	_	_
	A 1162 SoundLink PRO	Option	Option	Option	Option	Option	_	_
	RS232 and USB	Option	Option	✓	✓	✓	✓	 ✓

METREL[®] General / basic testing up to high level industrial testing, electronic fault finding, field servicing and heavy duty electrical testing

TRMS AC, DC voltage / current; Capacitance; Resistance; Diode test...



GENERAL FEATURES:

0000

- PC Link software enables to download the test results to the computer; Lead alert indicates incorrect lead connection;
- ากกเ 11 11 11

- Temperature measurement measures T1, T2 and T1 + T2 temperature in Celsius and in Fahrenheit;
- MAX/MIN/HOLD mode, displays maximum, minimum or average measured value;
- Non-contact and probe contact electric field detection;
- Inductive pickup clip accessory for IP-RPM Function;
- 4 Selectable Trigger-Levels for IPRPM, IG-RPM, Dwell, %-Duty and ms Functions;
- Selectable Cylinders 1, 2, 3, 4, 5, 6, 8, 10 or 12 Cylinders for Dwell and IGRPM functions;
- Selectable Trigger positive (+) or Negative (-) Trigger for %-Duty and ms Functions.

ADVANTAGES:

- Relative zero mode function for comparing the difference between signals or removing background noise;
- 100 kHz Voltage Bandwidth;

- Large 2-line 500.000 counts LCD display;
- Automatic detection of AC voltage, DC voltage or resistance;
- Frequency measurement up to 1 MHz.

APPLICATIONS:

- High, Mid and Low level industrial testing.
- High, Mid and Low level electronic fault finding.
- HVAC (heating, ventilation and air conditioning) troubleshooting.
- Demanding measurement tasks in the laboratories.
- Everyday repair and maintenance practice.
- Heavy duty electrical testing.
- Field servicing.
- Automotive industry.
- Hobby work.
- Working in small enclosures.
- General purpose.



M

AC

DC

ΑU M

OT MF

OT FUI

TEC CO

OV CAT



				MD 9040	MD 9035	MD 9030	MD 9020		MD 9015	MD 9010
eatures	Description		P	P						
IEASURING IETHOD	True RMS	✓	✓	✓	-	1	_	-	-	_
AC - MEASUREMENTS	Frequency Frequency of digital signals	0.01 mV 999.9 Vi	0.01 mV 999.9 V ✓ ✓	0.01 mV 999.9 V ~ -	0.01 mV 999.9 V ✓ – –	′0.01 mV 999.9 V ✓ — —	0.01 mV 999.9 V - -	0.1 uA 8 A ′0.01 mV 999.9 V ~ _ _	0.1 mV 750 V	1 mV 600 V ✓ –
C - MEASUREMENTS	Current	0.1 uA 10 A 0.1 mV 999.9 V	0.1 uA 10 A 0.01 mV 999.9 V	0.1 uA 10 A 0.01 mV 999.9 V	0.1 uA 10 A 0.01 mV 999.9 V	0.1 uA 10 A (0.01 mV 999.9 V	0.1 uA 10 A 0.01 mV 999.9 V	0.1 uA 8 A 0.01 mV 999.9 V	0.1 uA 10 A 0.1 mV 999.9 V	0.1 uA 2 mA 1 mV 600 V
AUTOMOTIVE MEASUREMENTS	Voltage IP-RPM (Inductive pickup type) IG-RPM (Contact signal type) Line-Level Hz (ACV, DCV) Inductive pickup clip for IP-RPM Dwell – Angle function Selectable Cylinders (1 12) % - Duty Cycle Function Fuel injection – ms detector	- - - - - - - -	- - - - - - -	- - - - - - - -	* * * * * * * * * * * * * * * * * * *	- - - - - - - - -	- - - - - - - - -	- - - - - - - -	- - - - - - -	
DTHER MEASUREMENTS	Resistance Acoustic continuity Capacitance Diode Temperature T1 / T1 &T2 EF (Electric field detection) Conductance			✓ ✓ ✓ −/- −	✓ ✓ ✓ ✓/- –	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓/- –	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ − / −
OTHER UNCTIONS	VFD (Variable frequency drive) Autocheck (VAC-DC; Ω) / (VAC-DC; AAC) Data hold MAX hold MAX/MIN/AVG (recording) Auto ranging Relative zero mode Analogue bargraph Lead aleart Count		✓ ✓ ✓ ✓ ✓ ✓ 6000 / 9999	- - - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - -	- - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - -	~ - - - - - 2500	- - - - - - 6000
ECHNICAL DATA	Backlight IP protection	54	54	- 54	40	40	40	40	40	40
OMMUNICATION	PC Link	✓ ✓	✓ ✓	✓ ✓	-	-	-	+0 ✓	+0 ✓	-
OVERVOLTAGE CATEGORY	CAT IV / 1000 V CAT IV / 300 V CAT III / 600 V CAT III / 600 V CAT II / 600 V CAT II / 1000 V				- - - - - - - - - - - - - - - - - - -				$ \begin{array}{c} -\\ \checkmark\\ \checkmark\\ \checkmark\\ \checkmark\\ \checkmark\\ \checkmark\\ \checkmark\\ \checkmark \end{array} $	

General / basic testing up to high level industrial testing, electronic fault finding, field **METREL**[®] servicing and heavy duty electrical testing

TRMS AC, DC current, Leakage current, Single/3-Phase Power, Voltage...



GENERAL FEATURES:

- PC Link software enables to download the test results to the computer;
- Different Jaw size, to cover different applications;
- Shielded jaws allowing the clamp meter to be used in the noisiest environments;
- MAX/MIN/HOLD mode, displays maximum, minimum or average measured value;
- Kilo-Watt-Hour recording function (with memory recall).

ADVANTAGES:

- Intelligent loss analysis: complex algorithms detect loss and allow determining possible reasons for current loss;
- Accurate: readings of AC current with an accuracy of 0.8 % and a base resolution of 0.01 mA and voltage with an accuracy of 0.5 % and a base resolution of 0.1 V;

- Lo-Z: AutoCheckR mode provides low (ramp-up) input impedance to drain ghost voltages;
- High current, up to 2000 A DC & AC clamp on measurement;
- In-rush, fast 30 ms Crest-MAX mode to capture in-rush currents.

APPLICATIONS:

- Load and leakage current measurement.
- RCD fault finding.
- UPS system testing.
- Solar and wind power system testing.
- High powered 3-phase machinery testing.
- High current electrical testing.
- Utility scale battery system testing.
- High level industrial testing.
- Power system checking.
- System maintenance.
- Process engineering.
- Working in small enclosures.
- General purpose.





Selection Guide

Part No.:	
Features	Description
MEASURING METHOD	True RMS
AC - MEASUREMENTS	Current Voltage Frequency
DC - MEASUREMENTS	Current Voltage
POWER MEASUREMENTS	Active Reactive Apparent Power factor Crest factor kWHr recording Creast peak value 3-phase power Benietenen
OTHER MEASUREMENTS	Resistance Acoustic continuity Capacitance Diode Temperature EF (Electric field detection) Phase (-180° +180°) Harmonics THD In-rush VFD (Variable frequency drive) Lo-Z (low input impedance) Leakage current
OTHER FUNCTIONS	Autocheck Data hold MAX hold MAX/MIN/AVG Auto ranging Relative zero mode Transient protection Count
TECHNICAL DATA	Backlight IP (40)
COMMUNICATION OVERVOLTAGE CATEGORY	Jaw opening PC Link CAT IV / 1000 V CAT IV / 300 V CAT III / 600 V



1D 9210	Part No.:		MD 1155	MD 1055
6	Features	Description		
	AC - MEASUREMENTS	Voltage	3 V 1000 V 0 Hz 1000 Hz	6 V 1000 V
-	DC - MEASUREMENTS	Frequency	0 HZ 1000 HZ	V CV/ 1400.V/
nA 600 A	DC - IVIEASUREIVIENTS	Voltage Resistance	4 V 1400 V	6 V 1400 V
V 600 V ✓ nV 600 V	OTHER	Acoustic and LED continuity indication Single-Pole Phase Two-Pole Phase		
_ _ _	MEASUREMENTS	Phase indication >100 V AC RCD fault test for	✓ ✓	✓ ✓
-		tripping 30 mA RCD	-	·
_ _ _	OTHER FUNCTIONS	Data hold Automatic AC/DC recognation	√ √	 ✓
	TECHNICAL DATA	Backlight LED torch lamp Display	✓ ✓ LCD	- ✓ LED
_	OVERVOLTAGE CAT	IP protection CAT IV / 1000 V	65	65
_	OVERVOLIAGE CAI	CALIV / 1000 V	V	v
- - -				
-	De la Dia			

Part No.:		MD 115	MD 105	
Features	Description			
AC-MEASUREMENTS	Voltage	12 V 1000 V	110 V 1000 V	
OTHER FUNCTIONS	Optical indication Vibrating indication	✓ ✓	✓ _	
TECHNICAL DATA	LED torch lamp IP protection	✓ 44	- 40	
OVERVOLTAGE CAT	•		\checkmark	

MD 9272	MD 9250	MD 9240	MD 9235	MD 9230	MD 9225	MD 9220	MD 9210
E	8	8		8		8	1
\checkmark	✓	\checkmark	✓	\checkmark	1	✓	-
10 uA 150 A 0.01 V 600 V	0.1 A 2000 A 1 mV 999.9 V	10 mA 1000 A 0.1 V 600 V	10 mA 600 A 0.1 V 600 V	0.1 A 800 A 0.1 mV 600 V	0.1 A 400 A 1 mV 600 V	0.1 A 2000 A 1 mV 600 V	10 mA 600 A 1 mV 600 V
- - -	0.1 A 2000 A 1 mV 999.9 V	0.1 V 600 V	0.1 V 600 V	0.1 A 1000 A 0.1 mV 600 V –	0.1 A 400 A 0.1 mV 600 V	 1 mV 600 V	0.1 mV 600 V
✓ ✓	-	-	×	-	_	_	-
✓ ✓	_		✓ ✓	_	_	_	_
√	-	-	-	-	-	-	-
~	-	-	✓ _	-	-	-	-
_	-	-	\checkmark	-	-	-	-
-	✓ ✓	\checkmark	\checkmark	\checkmark	✓ ✓	✓ ✓	✓ ✓
	✓ ✓	v –	v _	✓ ✓	✓ ✓	✓ ✓	✓ ✓
_	✓	_	_	√	√	√	✓
_	✓	√	_	_	√	-	_
~	\checkmark		-	-	-	V	-
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-		- /~	- /~	-	-	 ✓/ – 	_
✓ ✓	v √	• -	• -	✓ ✓	✓ ✓	-	✓ ✓
✓	_	-	-	_	_	-	-
✓	√	✓	√	√	✓ ✓	\checkmark	1
-	✓ ✓	-	-	✓ _	✓ ✓	-	✓ _
4000	6000	4000 / 9999	6000	4000	4000	6000	4000
\checkmark	✓	\checkmark	\checkmark	\checkmark	✓	\checkmark	~
✓ 31 mm	✓ 55 mm	√ 45 mm	√ 26 mm	√ 50 mm	✓ 26 mm	✓ 45 mm	✓ 26 mm
_	55 mm	45 11111	2011111	-	_	43 11111	-
-	√	-	-	-	_	-,	-
\checkmark	\checkmark	\checkmark	✓ ✓	\checkmark	✓ ✓	✓ ✓	✓ ✓
v	v	v	v	v	v	v	v

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GammaGT



Note! Photographs in this catalogue may slightly differ from the instruments at the time of delivery. Subject to technical change without notice.

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