

Catalogue 2018

Measuring instruments and testers



Measuring and Regulation Equipment Manufacturer

Metrel is an international Group and an expert in the research, development and production of test and measurement equipment. Metrel brand name is worldwide recognized and associated with high quality test and measurement products.

Metrel's instruments provide test and measurement solutions in different maintenance areas including the safety testing of electrical installations and appliances, power quality analysis, local area network analysis and the measurement of indoor environmental conditions. In short, our products help to provide information about the safety and functionality of different installations and environments. Through innovative design, electronics and software solutions we provide accurate, reliable and safe to use products.

The company strives to be the leader in advanced technological solutions and therefore invests over 10 % of the yearly turnover into the R&D department.

Our wide range of products is backed up with a complete support package including repair and calibration, technical support and customer training programs. A detailed calibration certificate is supplied as standard with all Metrel products.

SALES NETWORK

Metrel's products are sold and serviced in over 80 countries by local agents and distributors. Our associated companies are managed by local people who know the special needs of their markets. Sales engineers and specially trained technicians staff give excellent service to our customers.

The GERMAN market is supported by Metrel GmbH based in Eckental (www. metrel.de) and the UK market is supported by Metrel UK based in Normanton (www.metrel.co.uk). Inquiries for other countries please direct to Metrel d.d., the headquarters based in SLOVENIA (www. metrel.si).

COMMITMENT TO QUALITY

Metrel's quality assurance system is based on BS EN ISO 9001. Through permanent training and education of our employees we strive to increase the efficiency and quality of all our processes. Our commitment to quality is recognized by our customers and is ensured by continuous and extensive research and development of new, accurate, reliable and safe to use products.



ECOLOGY

Metrel test and measurement equipment complies with the RoHS and WEEE directives. Metrel strives to meet its goals with the most efficient use of resources and the least possible impact on the environment.

RESEARCH, DEVELOPMENT AND PRODUCTION

The research, development and production of Metrel's products are based in Europe (Slovenia) at Metrel d.d. The company strives for total quality control. A dedicated quality assurance department ensures strict adherence to customer specifications. Highly competent R&D engineers provide advanced solutions for our customers.

TEST LABORATORY

The highly professional test laboratory based in Metrel d.d. provides internal services including the testing of components, subassemblies and prototypes of products. This enables Metrel to launch safe and reliable new products into the market. The laboratory provides testing according to the Low Voltage Directive (2006/95/EC) and the EMC Directive (2004/108/EC). The main standards that Metrel also complies to include IEC/EN 61010 and IEC/EN 61326.

PRODUCTS

Metrel is producing test and measurement equipment that is covering the following fields:

- Electrical Installations Safety Testing (IEC/EN 61557, VDE 0413, VDE 0100, BS 7671, HD 60364, CEI 64.8, AS/NZS 3017, AS/NZS3760).
- Portable Appliances, Machines and Switchgears Safety Testing (IEC/EN 60204-1, IEC/EN 61439-1, IEC/EN 60335-1, VDE 0701-0702).
- Testing of Power Distribution Systems and Power Quality Analysis (EN 50160).
- Equipment for Laboratories and Schools: Metrel produces a variety of instruments for electrical testing laboratories and educational purposes. Typical application areas are: electrical workshops, testing labs, research, development and education. The main products Metrel produces include demo boards, power supply units, R-L-C decades.
- Transformers: Metrel produces two kinds of toroidal transformers: variable transformers (according to standard EN60989) and power transformers (according to standard EN 61558).

Besides the test and measurement product portfolio offered by Metrel d.d. Metrel's daughter company Metrel Mehanika d.o.o. also provide a variety of products focusing on metal processing. Their core business is sheet metal production, milled / turned production, manufacturing of tools and surface protection. For more information please visit www.metrel-mehanika.si.

SERVICES

Metrel provides a variety of services relating to training, repair and calibration of test equipment to the highest standards in the industry.

REPAIR

Metrel provides fast and efficient repair services either directly at Metrel's headquarters service centre or through approved business partners.

CALIBRATION

The Calibration Laboratory at Metrel DUS is able to calibrate electronic measuring instruments and devices in compliance with the requirements of the ISO/IEC 17025 standard. The laboratory is accredited by Slovenian Accreditation (SA), a member of European Accreditation (EA), signatory of the Multilateral Agreements for the European Co-operation for Accreditation

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Contact us

(EA) and International Laboratory
Accreditation Co-operation (ILAC) for
calibration and testing. The products
from the calibration can be issued with
an Inspection report and a Calibration
certificate (non accredited). Accredited
calibration certificate can also be issued if it
is required by the customer.

TECHNICAL SUPPORT

Metrel provides the following support to its customers and distributors:

- On-line technical support: any inquires related to Metrel products can be sent onto a designated e-mail address:
 - help@metrel.si GLOBAL market;
 - info@metrel.co.uk UK market:
 - metrel@metrel.de GERMAN market.
- Technical support line: the technical support can be obtained also over the phone:
 - +386 (0)17558 200 GLOBAL market; +44 (0) 1924 245 000 - UK market;
- +44 (U) 1924 245 UUU UK Market; +49 (O) 9126 28996-0 - GERMAN market.
- **B2B web support:** for Metrel partners a B2B zone enables to obtain technical and marketing information.
- Download centre: enables to download files with technical product information. Visit www.metrel.si/support/downloadcentre.html.
- Product finder: makes it easy for you to find the right product for your application from a wide range of Metrels Test & Measurement products. Visit http:// product-finder.metrel.si/

TRAINING CENTER

Metrel d.d. offers to its customers and distributors:

- Training on Metrel's instruments: the product training can be customized on the customer's needs. Metrel can offer training on technical standards, measuring and test methods, use and application of Metrel instruments.
- Complete distributor setup training:
 when establishing a new distributor,
 Metrel can offer a complete "package"
 on product training, repair and calibration
 training and assign in establishing e local
 calibration and repair department.
- Training for calibration and repair
 of Metrel products: this is help for
 Metrel's existing and new distributors to
 enable a high standard of local support
 to customers who purchase a Metrel
 product.
- Bespoke training for larger end users: in case that a larger customer is requesting training, Metrel can organize the training according to their specific needs. This can be carried out on site or at Metrel's premises.

GLOBAL MARKET

Measuring and Regulation Equipment

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GERMAN MARKET

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E-mail: metrel@metrel.de Web: www.metrel.de



UK MARKET

Test and Measuring Equipment

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E-mail: info@metrel.co.uk Web: www.metrel.co.uk



Instruments Designed with Future in Mind

METREL is one of the world leading manufacturers and distributor of high quality electrical measurement and test instruments, providing the market with innovative solutions on the following segments:

ELECTRICAL INSTALLATION SAFETY

Metrel offers single and multifunctional electrical installation testers. The instruments are used for initial and periodic testing of domestic and industrial installations, testing of single and multiphase systems and testing of TT, TN, IT and 115 V systems. Metrel meters offer wide selection of functionalities and measurements (depending on the model), can be downloadable or non-downloadable. All meters comply with the European standard IEC/EN 61557.

HIGH VOLTAGE DIAGNOSTICS

Metrel's high voltage diagnostic equipment (5 ... 10 kV) is used for testing insulation resistance of rotating machinery and cables, production line periodic testing and maintenance, troubleshooting and analysis of all kinds of insulation problems. It gives effective readings in high noise environments such as high voltage substations and switchyards. Some of key features of Metrel's instruments (depends on the model) are PI, DD, DAR testing, R(t) graph plotting, high 5 mA charging current, selectable noise rejection filters, etc.

PORTABLE APPLIANCE / MACHINE / SWITCHBOARD SAFETY

Metrel's testers can be used in professional PAT testing, general PAT testing, factory / warehouse PAT testing, multi-location PAT testing and after repair safety testing. Metrel's instruments offer a selection of key features for example auto sequencing, automatic testing, Pass / Fail evaluation of results, RCD testing, project uploading, bar-coding system and Pass / Fail barcode label printing, flash test, test of both 230 V appliances and 115 V appliances and many more.

POWER QUALITY ANALYSIS

The power quality analysers can be widely used for general power quality assessment in distribution and industrial low and middle voltage electric systems (according to IEC 61000-4-30; Class A, Class S), capturing and recording of power supply events, flicker measurement, power factor correction measurements, harmonics measurements, transients recording and over-voltage protection devices performance testing, assessment of UPS, consumption profile recording, etc.

DIGITAL MULTIMETERS / CLAMP METERS / VOLTAGE AND CONTINUITY TESTERS

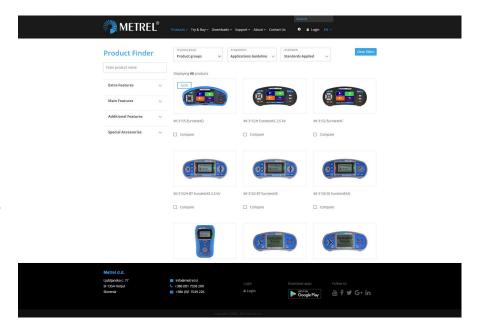
The digital multimeters, clamp meters and voltage continuity testers are used for general / basic testing up to high level industrial testing, electronic fault finding, field servicing and heavy duty electrical testing. Some of the key features (depending on the model) are TRMS testing, high accuracy, temperature measurement, lead alert, conductance, PC communication, autocheck function, recording of data, etc.

Metrel WFR

- General information about our products with quick and practical SEARCH function for product searching.
- Detailed information about our products in extended product specifications.
- Latest information about training and seminars.
- · Service information.
- · Download centre.
- Product finder.
- Helpdesk, improved with ticketing system.
- Answers to common questions related to our products under Frequent Asked Questions (FAQ) rubric.
- News and information about exhibitions, fairs, meetings and conferences.
- Faster and more sufficient activities in relations with our worldwide distributors (B2B).
- Links to other interesting sites that offers information about occupation safety, metrology, technical heritage, standardization, regulations and technical experience.

PRODUCT FINDER

Product finder enables filtering of the products with the main filter selectors oriented to, Product Group, Application and Standard, In addition to the main filter selector you can also add additional criterion such as products' Main Features, Additional Features or Special Accessories.



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Good to know

Testing the Safety of Electrical Installation

Find out more about testing safety of electrical installations

According to European standards requirements electrical installation safety testing includes a combination of following tests:

- Insulation resistance,
- Continuity of protective conductors and equipotential bonding,
- · RCD testing,
- Line and fault loop impedance,
- Earth resistance testing (two-wire method without probes, three / four-wire method with two probes, method with current clamp and two probes, method with two current clamps)
- · Specific earth resistance,
- Phase sequence, voltage and frequency.

These tests are performed in order to ensure that the requirements are met for the protection of persons, livestock and property against the risk of electric shock and to ensure that the automatic disconnection of the supply is performed correctly.

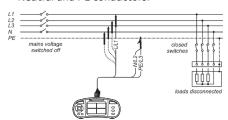
Insulation resistance

The insulation is intended to prevent any contact with live parts and withstanding mechanical, chemical, electrical and thermal stresses. Insulation test discloses insulation faults caused by pollution, moisture, deterioration of insulation materials etc. Insulation resistance measurement is covered by the IEC / EN 61557-2 standard.

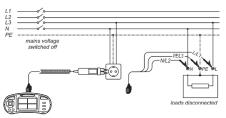
The power must be switched off and the installation must be disconnected before performing this test to ensure that the test voltage will not be applied to other equipment electrically connected to the circuit to be tested, particularly devices sensitive to voltage surges.

Insulation resistance shall be measured between:

- Line conductors.
- Line and PE conductors,
- Line and Neutral conductors,
- Neutral and PE conductors.



Test circuit for insulation resistance measurement



Test circuit for insulation resistance measurement

The insulation resistance test is performed with a DC voltage on a dead system and the resistance must be above the minimum limit set out in the appropriate standards and regulations.

Limit values for electrical installations acc. to IEC 60364-6:

Rated voltage of circuit (V)	DC test voltage (V)	Insulation resistance (MΩ)
LV secondary switchboard or LV main switchboard	250	≥0.5
Less than or equal to 500 V including LV main switchboard	500	≥1.0
Greater	1.000	≥1.0

METREL's hint: EurotestAT and EurotestXA have built-in the "Insulation ALL" function which enables performing of 3-port insulation test (L-N, L-PE, N-PE or L1-L2, L1-L3, L2-L3) in one step. This is a very time saving feature especially if measuring insulation on outlets.

Continuity of protective conductors and equipotential bonding

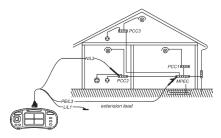
The purpose of continuity measurement is to check the continuity of the protective conductors, the main and supplementary equipotential bonds.

The test is carried out using a measurement instrument capable of generating a no-load voltage of 4 to 24 V (DC or AC) with a minimal current of 200 mA

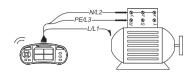
Continuity test is covered by the EN 61557-4 standard

The measured resistance must be lower than a threshold specified by the standard applicable to the installation tested, which is usually 2 Ω . As the resistance value is low, the resistance of the measurement leads must be compensated, particularly if very long leads are used.

METREL's hint: EurotestAT and EurotestXA can perform the N - PE loop test between instrument's N and PE test terminals. This makes testing with the plug test cable on outlets possible.



Test circuit for continuity R200 mA measurement



Test circuit for continuous resistance measurement

RCD testing

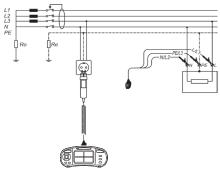
RCD devices are used as protection against dangerous fault voltages and fault currents. Various test and measurements are required for verification of RCDs in RCD protected installations. Measurements are based on the EN 61557-6 standard.

Scope of RCD test is:

- to verify effectiveness and proper operation of the RCDs;
- to verify disconnection times and trip out currents of RCDs;
- to verify that there are no or limited present fault currents in the installation.

The following measurements and tests of RCDs can be performed:

- · Contact voltage,
- Trip-out time,
- Trip-out current,
- RCD autotest.



Circuit for testing RCD

METREL's hint: METREL installation testers have built-in the "RCD AUTO" function which performs RCD testing at x1/2, x1 and x5 current multipliers at both 0° and 180° automatically. With this function all relevant RCD tests can be carried out in one step which is very simple and time saving feature.

1.2 Accessories 1.54 Metrel Catalogue 2018

RCD selection table according to their sensitivity:

	AC type	A type	B type
		\sim	\sim
	\sim	\sim	===
U t	•	•	•
U t	No response	•	•
U	No response	No response	

Line impedance

Line impedance is measured in loop comprising of mains voltage source and line wiring (between the line and neutral conductors or between lines on a 3-phase system). It is covered by requirements of the EN 61557-3 standard.

Scope of line impedance test is:

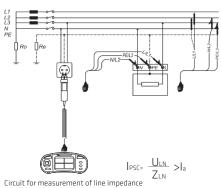
- to verify effectiveness of installed over current devices;
- to verify internal impedance for supplying purpose.

The line-neutral short circuit loop consists of:

- Power transformer secondary impedance Z_T,
- Z_L (phase wiring from source to fault),
- Z_N (neutral wiring from source to fault). The line to neutral impedance is the sum of impedances and resistances that forms the line to neutral loop. In three phase system there are three line-neutral impedances ($Z_{L^{1-N}}$, $Z_{L^{2-N}}$, $Z_{L^{3-N}}$).

$$Z_{LN} = Z_{L} + Z_{N} + Z_{TLN}$$

The prospective short circuit current l_{PSC} is defined as:



IPSC must be higher than current for rated disconnection time of the over current disconnection device. The line – neutral (or line – line) impedance should be low enough e.g. prospective short circuit current high enough that installed protection device will disconnect the short circuit loop within the prescribed time interval.

METREL's hint: METREL installation testers have built-in tables with fuses and RCDs parameters. When line test is performed, the measured value is automatically compared to the maximum values set out in the standard (EN 61557) and either a PASS or FAIL symbol will appear on the screen to inform the user if the result is within the required limits.

Fault loop impedance

Fault loop is a loop comprising mains source, line wiring and PE return path to the mains source. The measurement is covered by requirements of the EN 61557-3 standard.

Scope of loop impedance test is:

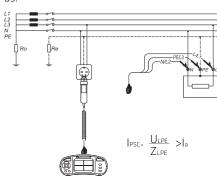
- to verify effectiveness of installed over current and / or residual current disconnection devices;
- to verify fault loop impedances, prospective fault currents and fault voltage values.

In TN systems the fault loop $Z_{L\text{-PE}}$ consists of:

- Z_T (power transformer secondary impedance):
- Z_L (phase wiring from source to fault):
- RPE (PE / PEN wiring from fault to source).

The fault loop impedance is the sum of impedances and resistances that forms the fault loop.

The prospective fault current lesc is defined as:



Circuit for measurement of fault loop impedance

METREL's hint: METREL installation testers have built-in tables with fuses and RCDs parameters. When loop test is performed, the measured value is automatically compared to the maximum values set out in the standard (EN 61557) and either a PASS or FAIL symbol will appear on the screen to inform the user if the result is within the required limits.

Earth resistance

Earth resistance testing is used on TN, TT and IT systems to ensure that the resistance of the earth electrode is sufficiently low so that, in the case of a fault, a dangerous voltage does not appear on any parts of the installation or on any appliances which have a connection to earth.

The measurement conforms to the EN 61557-6 standard.

Scope of earth resistance test is:

 Earthing of exposed conductive parts assures that the voltage on them stays below dangerous level in case of a fault.

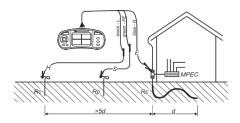
In TN installations the earthing is realized at the source and / or distribution points that's why the earthing resistances are usually very low (below 1Ω).

TT installations have their own main earthing. The resistances are usually higher than in TN systems (from few Ω up to several hundred Ω). Because of this dangerous fault voltages and body currents can occur at relatively low fault currents. Therefore TT systems usually have additional RCD protection.

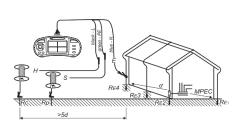
The following earth resistance measuring methods are available:

- Standard 3-wire (4-wire) method for standard resistance to earth measurements;
- 3-wire (4-wire) method with one clamp, for measuring resistance to earth of individual earthing rods;
- Two clamps method for measuring resistance to earth of individual earthing rods (recommended in IEC 60364-6 for urban areas):
- Specific earth resistance (is carried out in order to assure more accurate calculation of earthing systems e.g. for high-voltage distribution columns, large industrial plants, lightning systems etc.).

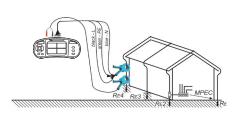
Connection diagrams:



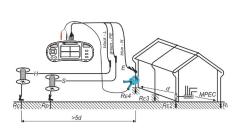
Circuits for three-wire measurement



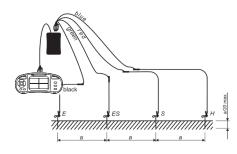
Circuits for three-wire measurement



Circuit for two clamps measurement



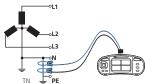
Circuit for one clamp measurement



Circuit for measurement of specific earth resistance

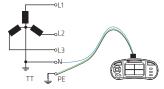
Recommended earth resistance measuring methods:

TN system



Two clamps method (clamps around main N/PE cable).

TT system



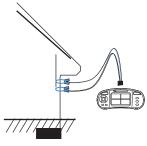
Two-wire method (test from the socket between N and PE)

IT system



Three-wire method (test leads to auxiliary rods in triangle)

Lightning conductor



Two clamps method

Limits:

 2Ω – above ground,

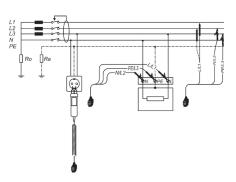
10 Ω – complete system,

 $20~\Omega$ – individual electrode or 8% of specific earth resistance.

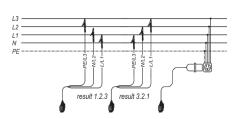
Phase sequence, voltage and frequency

Phase sequence test is used for determining of line voltages order in 3-phase systems. This order defines direction of rotation of motors and generators.

Phase sequence measurement conforms to the EN 61557-7 standard.



Circuit for voltage measurements

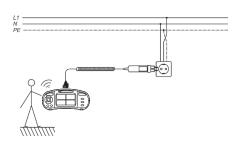


Circuit for voltage measurement, frequency and phase sequence

METREL's hint: METREL installation testers have on-line voltage monitor which in all functions displays on one screen voltages between L to PE, L to N and N to PE (single phase system) or L1 to L2, L2 to L3 and L1 to L3 (3-phase system). This feature allows quickly identify incorrect connections, disconnected wires or incorrect voltages.

PE test terminal

A very dangerous situation can occur in case dangerous voltage is applied to the PE wire or other accessible metal parts. A common reason for this fault is incorrect wiring. Metrel's instruments are equipped with touchable PE electrode (TEST key). When touching TEST key in all functions that require mains supply the user automatically performs test for the presence of phase voltage at the PE protection terminal.



Example for application of PE test terminal

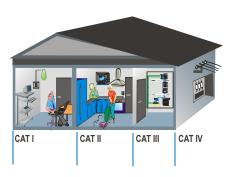
The overvoltage category specifies the highest mains voltage (or lightning strike, short circuit due to incorrect use, etc.) that the instrument can withstand without danger for the tester or for the object being measured. The standard specifies four overvoltage categories. The overvoltage category affects component sizing via the air gap. The higher the category, the bigger is the distance to the power source.

CAT I - electronic devices, signal level.

CAT II - domestic appliances, portable appliances, single-phase loads, sockets, (>10 m from CAT III; >20 m from CAT IV).

CAT III - three-phase distribution systems, lighting systems in large buildings, distribution panels.

CAT IV - three-phase systems on power stations, electricity meters, outdoor installations and supply cable incoming feed.

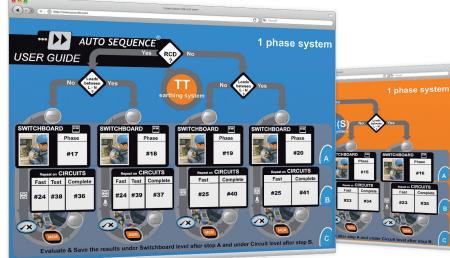


- is the installation single- or three-phase;
- is the RCD present in the installation. To simplify the selection of the appropriate test sequence the detailed flow chart is supplied with the instrument.

After choosing the AUTO SEQUENCE® and setting the limits the user just has to press TEST button and the sequence will automatically perform all predefined tests. When the sequence is finished, the

instrument will display overall PASS / FAIL decision. All the results can be saved to the structured instrument's memory at once for further data verification and automatic generation of test report with the help of the PC SW EuroLink PRO.

The revolutionary AUTO SEQUENCE® procedure allows performing testing up to 5 times faster in comparison with conventional methods.



AUTO SEQUENCE®

is a unique patented by Metrel testing procedure which allows performing of series of requested installation tests with a single press of TEST button. The results of each test are automatically compared to pre-set limits and PASS / FAIL evaluated.

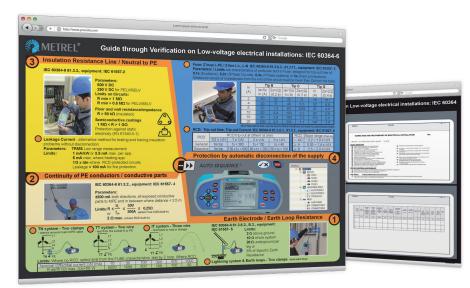
While ensuring efficient, fast and easy way of installation safety testing AUTO SEQUENCE® guarantees absolute safety of operator due to automatic detection of possible irregular installation conditions.

Definite number of test sequences is already stored in the instrument. Besides, user can program and store custom test sequences.

The user can choose appropriate preprogrammed AUTO SEQUENCE® procedure according to following criterions:

- which part of electrical installation will be tested:
- which earthing system is implemented (TN, TT or IT);

Guide through Verification on Low-voltage electrical installations: IEC 60364-6



Multifunctional installation testers Selection Guide for Multifunctional Testers

FEATURES	Description	MI 3155
		EurotestXD
		NEW

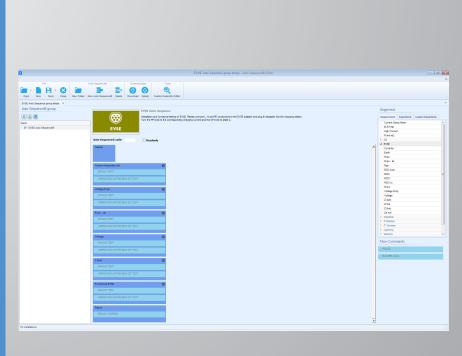


NSULATION	Insulation resistance	•
NSOLATION	Test voltage (VDC)	50 2500
	Autotest insulation L-PE, N-PE, L-N	•
	Diagnostic test (PI, DAR calculation)	•
ONTINUITY AND LOW	Continuity of PE conductors with automatic polarity change, test current 200 mA	•
RESISTANCE MEASUREMENT	Low resistance measurement (continuous measurement), test current 7 mA	•
INE / LOOP IMPEDANCE	Line impedance with lpsc calculation	•
INE / LOOP IMPEDANCE	4 wire Line impedance with lpsc calculation	•
	Loop impedance with lpsc calculation	•
	4 wire Loop impedance with lpsc calculation	•
	RCD Trip Lock loop impedance	•
CD TECTING	Built-in fuse tables for PASS / FAIL evaluation	•
CD TESTING	Contact voltage measurement without RCD tripping	•
	RCD trip-out time	•
	RCD trip-out current with rising test current	•
	Automatic testing of RCDs	•
	RCD type (general and selective)	AC / A / B / F / B+
	MI RCD, EV RCD / PRCD-S, PRCD-K	• / •
OLTAGE, FREQUENCY	AC voltage measurement	•
	Online voltage monitor	•
	Frequency measurement	•
HASE SEQUENCE	L1-L2-L3	•
ARTH MEASUREMENTS	Earth resistance 3-(4-)wire method	•
	Earth resistance 3-(4-)wire method with additional current clamp	Option
	Earth resistance measurement with 2 current clamps	Option
	Specific earth resistance	Option
UTO SEQUENCE	Programmable AUTO SEQUENCEs	•
	Pre-programmed AUTO SEQUENCEs	•
	Predefined mini AUTO TESTs	•
THER MEASUREMENTS	TRMS leakage / load current	Option
	Illuminance measurement	Option
	Varistor test	•
	Fuse / fault locator	•
	High resolution loop impedance (m Ω)	Option
	EVSE adapter	Option
	Insulation Monitoring Devices (IMD) testing (IT systems)	•
	First fault leakage current (ISFL) measurement (IT systems)	•
THER FEATURES	Nominal frequency range	14 500 Hz
	PASS / FAIL evaluation of test results	•
	IT earthing mode systems support	•
	Touch electrode	•
	HELP menu	•
OMMUNICATION PORTS &	RS232 / USB / Bluetooth	• / • / •
C FEATURES		•
CTEATORES	Work space manager	8 GB
	Memory /SD card	
45140DV COSTWARE	Colour touch screen	•
IEMORY SOFTWARE	MESM / EuroLink PRO	• / -
	Professional PC SW	•
	Advanced PC SW	Option
ENERAL DATA	Safety category Safety category	CAT III / 600 V
	19	CAT IV / 300 V
	IP protection	IP 56
	n in t	
	Batteries	4.4 Ah Li-lon
	Batteries Built-in battery charger Weight (kg)	4.4 Ah Li-lon • 1.78

1.6 Accessories 1.54 Metrel Catalogue 2018

MI 3152 EurotestXC	MI 3152H EurotestXC 2,5 kV	MI 3102 BT EurotestXE	MI 3102H BT EurotestXE 2.5kV	MI 3100 SE EurotestEASI	MI 3125 BT EurotestCOMBO
				ON THE PARTY OF TH	8:8
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50 1000	50 2500	50 1000	50 2500	50 1000	50 1000
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	•	•	•	•	•
C / A / B / F / B+	AC / A / F	AC / A / B / F / B+	AC / A / F	AC / A / F	AC / A / B / F / B+
/ •	• / •	• / •		• / -	• / -
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ption	Option	Option	Option	Option	Option
AT III / 600 V	CAT III / 600 V	CAT III / 600 V	CAT III / 600 V	CAT III / 600 V	CAT III / 600 V
AT IV / 300 V	CAT IV / 300 V	CAT IV / 300 V	CAT IV / 300 V	CAT IV / 300 V	CAT IV / 300 V
x AA	IP 40 6 x AA	IP 40 6 x AA	IP 40 6 x AA	IP 40 6 x AA	IP 40 6 x AA
XAA	•	•	• •	•	•
37	1.37	1.31	1.31	1.31	1.0
30 x 103 x 115	230 x 103 x 115	230 x 103 x 115	230 x 103 x 115	230 x 103 x 115	140 x 80 x 230

Multifunctional installation testers AUTO SEQUENCE testing



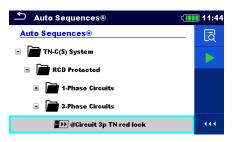
of testing introduced in Metrel's testers over a decade ago and now re-introduced with new generation testers. AUTO SEQUENCEs not only simplify the measuring procedure, but also minimizes human error when preforming measurements. This way a series of user-defined single tests is done with a push of a single button. Depending on the instrument model the user can create AUTO SEQUENCEs in PC SW MESM and upload them from a PC to the device or download them from the device for editing and sharing.

AUTO SEQUENCEs can be prepared and/or edited in PC SW MESM and later uploaded to any device. The device will only perform supported measurements.

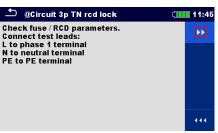
Supported devices are:

- MI 3155 EurotestXD
- MI 3152 EurotestXC (no AUTO SEQUENCE® upload possible)
- MI 3152 H EurotestXC 2.5 kV (no AUTO SEQUENCEs upload possible)
- MI 3280 Digital Transformer Analyser
- MI 3290 Earth Analyser
- MI 3360 OmegaGT XA
- MI 3394 CE MultiTesterXA

AUTO SEQUENCEs may be run independently or through a pre-prepared structure in the memory organizer.

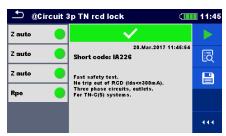














Multifunctional installation testers MI 3155 FurotestXD

MI 3155 EurotestXD is the newest flagship of Metrel's most advanced line of multifunctional measuring instruments and is designed specifically for testing in industry. What differentiates this instrument from the rest is its ergonomic design and an intuitive user interface, encompassing a memory organizer and fully programmable AUTO SEQUENCES, managed through a large colour touch screen display. It is fully compliant with functionality standards (e.g. IEC/EN 61557) and other reference standards for testing (e.g. IEC/EN/HD 60364-4-41,...) as is required for any instrument that performs TRMS current measurements, RCD tests, line and loop impedance tests with 3 (and 4) wires and earth resistance measurements. Besides those, the instrument supports a wide range of tests and measuring functions, including on-line voltage monitoring, phase sequence testing, varistor testing, PI/DAR calculation, luminance measurement, discharge time testing, ISFL measurements, IMD tests as well as functional and visual inspections.





MEASURING FUNCTIONS

- Live Transformer's Impedance Measurement with Four Wire Test;
- Hi-precision Short Circuit Current evaluation with Calculated Hot factor;
- 3-wire test of PE (RPE function) without extension lead conductor;
- Autotest insulation function between
 L-N, N-PE and L-PE (R ISO ALL function);
- 4 wire continuity test;
- Insulation resistance with DC voltage from 50 V to 2500 V and PI, DAR calculation;
- Varistor test:
- Continuity of PE conductors with 200 mA DC test current with polarity change;
- Continuity of PE conductors with 7 mA test current without RCD tripping;
- 3-wire and 4-wire wire loop impedance (LPE) measurement with Trip Lock RCD function
- Touch voltage / Contact voltage measurement with external P/S probe.
- 2-wire and 3-wire line impedance (L-L, L-N) measurement;
- 1-phase / 3-phase TRMS voltage and frequency measurements;
- Line, loop and RCD measurements at frequency range 16 ... 400 Hz;
- Phase sequence;
- Power and THD measurement (up to the 12th harmonic);

- RCD testing (general and selective, type AC, A, F, B, B+, MI RCD, EV RCD, PRCD, PRCD-K, PRCD-S);
- Earth resistance (3-wire and 2-clamps method);
- Specific earth resistance with Ro-adapter (option);
- TRMS leakage and load currents (option);
- First fault leakage current (ISFL);
- Testing of Insulation Monitoring Devices (IMDs);
- Machine mode support with time discharge;
- Illumination (option);
- High resolution Loop impendance (mΩ) (option);
- EVSE (Electrical Vehicle Supply Equipment) support (option);
- Determining location of cables (option);
- QR and/or barcode scanner support (option).

KEY FEATURES

- Programmable AUTO SEQUENCEs.*
- Predefined profile dependent AUTO SEQUENCEs
- Predefined Automatic tests:
 Auto TT (U, Zln, Zs, Uc);
 Auto TN/RCD (U, Zln, Zs, Rpe);
 Auto TN (U, Zln, Zlpe, Rpe);
 Auto IT (U, Zln, Isc, Isfl, IMD).
- Functional inspections
- Visual inspections.

- **Custom inspections** (visual and functional) which may be incorporated into AUTO SEQUENCEs.
- EVSE AUTO SEQUENCEs and function inspections.
- Machine functional and visual inspections.
- Built-in help screens for referencing on
 cite.
- Built-in fuse tables for automatic evaluation of the line / loop impedance result
- Monitoring of all 3 voltages in real-time.
- Automatic polarity reversal on continuity test.
- Automated RCD testing procedure (RCD AUTO).
- Automated Impedance testing procedure (Z AUTO).
- Measurement filtering according to the selected area group.
- Built-in charger and rechargeable batteries as standard accessory.
- BT communication with PC, Android tablets and smart phones via built-in BT.
- PC SW Metrel ES Manager (structure and report creation, data upload/download). *
- * Available with MESM PRO licence
- ** Available with EU Set

Function		Measuring range	Resolution	Accuracy
CONTINUITY	Test Current 7 mA 2-wire	0.00 Ω 19.99 Ω 20.0 Ω 1999 Ω	0.1 Ω 1 Ω	±(5 % of r. + 3 digits)
	Test Current 200 mA 2-wire, 4-wire	0.00 Ω 19.99 Ω 20.0 Ω 199.9 Ω 200.0 Ω 1999 Ω	0.01 Ω 0.1 Ω 1 Ω	±(3 % of r. + 3 digits) ±(5 % of r.) ±(5 % of r.)
NSULATION RESISTANCE	R iso, R iso all ¹ Test Voltage 50/100/250 V	0.00 MΩ 19.99 MΩ 20.0 MΩ 99.9 MΩ 100.0 MΩ 199.9 MΩ	0.01 MΩ 0.1 MΩ 0.1 MΩ	±(5 % of r. + 3 digits) ±(10 % of r.) ±(20 % of r.)
	R iso, R iso all ¹ Test Voltage 500/1000 V	0.00 MΩ 19.99 MΩ 20.0 MΩ 199.9 MΩ 200 MΩ 999 MΩ	0.01 MΩ 0.1 MΩ 1 MΩ	±(5 % of r. + 3 digits) ±(5 % of r.) ±(10 % of r.)
	R iso, R iso all ¹ Test Voltage 2500 V	0.00 MΩ 19.99 MΩ 20.0 MΩ 199.9 MΩ 200 MΩ 999 MΩ 1.00 GΩ 19.99 GΩ	0.01 ΜΩ 0.1 ΜΩ 1 ΜΩ 0.01 GΩ	±(5 % of r. + 3 digits) ±(5 % of r.) ±(10 % of r.) ±(10 % of r.)
	DAR, PI	0.01 9.99 10.0 100.0	0.01	±(5 % of r. + 2 digits) ±(5 % of r.)
	Varistor test AC, DC ²	0 V 1000 V (DC) 0 V 625 V (AC)	1 V	±(3 % of r. + 3 digits)
RCD	RCD Uc	0.00 V 19.99 V 20.0 V 99.9 V	0.1 V	(-0 %/+15 %) of r. ± 10 digits (-0 %/+15 %) of r.
	RCD (t),	0.00 ms 40.0 ms 0.0 ms max. time	0.1 ms	±1 ms ±3 ms
	RCD I Ramp	0.2xI∆N 1.1xI∆N (AC, MI, EV a.c.) 0.2xI∆N 1.5xI∆N (A, I∆N ≥30 mA) 0.2xI∆N 2.2xIvN (A, I∆N <30 mA) 0.2xI∆N 2.2xI∆N (B, MI, EV d.c.)	0.05xl∆N	±0.1xl△N
MPEDANCE	Zline (L-L, L-N), lpsc, Zline 4-wire ³	0.00 Ω 9.99 Ω 10.0 Ω 99.9 Ω 100 Ω 999 Ω	0.01 Ω 0.1 Ω 1 Ω	±(5 % of r. + 5 digits) ±(10 % of r.)
	Zloop (L-PE), lpfc,	1.00 kΩ 9.99 kΩ 0.00 Ω 9.99 Ω	10 Ω 0.01 Ω	±(5 % of r. + 5 digits)
	Zloop 4-wire ³ Zs RCD ⁴	10.0 Ω 99.9 Ω 100 Ω 999 Ω 1.00 kΩ 9.99 kΩ	0.1 Ω 1 Ω 10 Ω	±(10 % of r.)
/OLTAGE	TRMS (0, 14 500 Hz)	0 550 V	1 V	±(2 % of r. + 2 digits)
	Frequency	0.00 Hz 9.99 Hz 10.0 Hz 499.9 Hz	0.01 Hz 0.1 Hz	±(0.2 % of r. + 1 digits)
CURRENT	TRMS, AC with A 1018, range=20 A	0.0 mA 99.9 mA 100 mA 999 mA 1.00 A 19.99 A	0.1 mA 1 mA 0.01 A	±(5 % of r. + 5 digits) ±(3 % of r. + 3 digits) ±(3 % of r.)
	TRMS, AC with A 1019, range=20 A	0.0 mA 99.9 mA 100 mA 999 mA 1.00 A 19.99 A	0.1 mA 1 mA 0.01 A	Indicative ±(5 % of r.) ±(3 % of r.)
	TRMS, AC/DC with A 1391, range=40 A	0.00 A 1.99 A 2.00 A 19.99 A 20.0 A 39.9 A	0.01 A 0.01 A 0.1 A	±(3 % of r. + 3 digits) ±(3 % of r.) ±(3 % of r.)
	TRMS, AC/DC with A 1391, range = 300 A	0.00 A 19.99 A 20.0 A 39.9 A 40.0 A 299.9 A	0.01 A 0.1 A 0.1 A	Indicative Indicative ±(3 % of r. + 5 digits)
EARTH RESISTANCE	3 wire ⁵	0.00 Ω 19.99 Ω 20.0 Ω 199.9 Ω 200.0 Ω 9999 Ω	0.01 Ω 0.1 Ω 1 Ω	±(5 % of r. + 5 digits)
	2 clamp	0.00 Ω 19.99 Ω 20.0 Ω 30.0 Ω 30.1 Ω 39.9 Ω	0.01 Ω 0.1 Ω 0.1 Ω	±(10 % of r. + 10 digits) ±(20 % of r.) ±(30 % of r.)
	Specific earth resistance	0.0 Ωm 99.9 Ωm 100 Ωm 999 Ωm 1.00 kΩm 9.99 kΩm 10.0 kΩm 99.9 kΩm 100 kΩm 9999 kΩm	0.1 Ωm 1 Ωm 0.01 kΩm 0.1 kΩm 1 kΩm	\pm (5 % of r.) for Re 1 Ω 1999kΩ \pm (10 % of r.) for Re 2 kΩ 19.99kΩ \pm (20 % of r.) for Re > 20 kΩ
POWER	Power (P, S, Q)	0.00 W (VA, Var) 99.9 kW (kVA, kVar)		
	Power factor	-1.00 1.00		
	Voltage THD	0.1 % 99.9 %		
HARMONICS	Voltage harmonics	0.1 V 500 V		
	Voltage THD	0.1 % 99.9 %		
	Current harmonics and Current THD	0.00 A 199.9 A		

1.10 Accessories 1.54 Metrel Catalogue 2018

Function		Measuring range	Resolution	Accuracy
FIRST FAULT LEAKAGE CURRENT (ISFL)	Isc 1, Isc 2	0.0 mA 19.9 mA	0.1 mA	±(5 % of r. + 3 digits)
IMD TEST	Threshold indicative insulation resistance	5 640 kΩ	5 kΩ	Indicative values, up to 128 steps
ILLUMINANCE	Туре В	0.01 lux 19.99 lux 20.0 lux 199.9 lux 200 lux 1999 lux 2.00 klux 19.99 klux	0.01 lux 0.1 lux 1 lux 10 lux	±(5 % of r. + 2 digits) ±(5 % of r.)
	Type C	0.01 lux 19.99 lux 20.0 lux 199.9 lux 200 lux 1999 lux 2.00 klux 19.99 klux	0.01 lux 0.1 lux 1 lux 10 lux	±(10 % of r. + 3 digits) ±(10 % of r.)
DISCHARGING TIME	Discharging time	0.0 s 10.0 s	0.1 s	±(5 % of r. + 2 digits)
	Peak voltage	0 V 550 V	1 V	±(5 % of r. + 3 digits)
	Power supply	7.2 V (4400 mAh Li-lon battery pack)		
	Overvoltage category	600 V CAT III; 300 V CAT IV		
	Protection class	double insulation		
GENERAL	COM port	BT, USB, RS232		
	Weight	1.78 kg		
	Size (Ixhxw)	252 x 111 x 165 mm		

¹ Measuring current 1 mA ... 3 mA

STANDARDS

Functionality

- EN 61557:
- DIN 5032

Other reference standards for testing:

- IEC/EN/HD 60364-4-41;
- IEC/EN 61008:
- IEC/EN 61009:
- BS 7671;
- AS/NZ 3017

Electromagnetic compatibility (EMC):

- IEC/EN 61326-1

Safety

- IEC/EN 61010-1;
- IEC/EN 61010-031;
- IEC/EN 61010-2-030;
- IEC/EN 61010-2-032

STANDARD SET

MI 3155 ST

- Instrument MI 3155 EurotestXD
- · 4400 mAh battery pack
- Power supply adapter 12 V / 3 A
- Plug commander, 1.5 m
- Test lead, 4-wire, 1.5 m
- · Test lead, 3-wire, 1.5 m
- Test lead, 2-wire, 2,5 kV, 1.5 m
- Test probe, 4 pcs (black, blue, green, red) • Crocodile clip, 6 pcs (black – 2 pcs, blue – 1 piece,
- green 1 piece, red 2 pcs)
 Earth set 20 m
- USB cable
- Soft carrying bag
- Soft carrying neck belt
- Metrel ES Manager BASIC license*

APPLICATION

- Testing of TT, TN and IT systems;
- Testing of single and multiphase systems;
- Initial and periodic testing of domestic and industrial installations;
- LV Installation safety testing;
- Maintenance;
- Lightning installations;
- Testing on high and low frequency installations (industrial, aircraft, railway, mining, chemistry, ferry boat);
- Construction sites:
- Mobile LV Generator Units;
- · Machine and switchboard testing;
- · Medical installation testing;
- Fire brigades, ambulance, military and police vehicles;
- Mobile Video/Audio, Concert Halls, Fairs, Playgrounds;
- Electrical Vehicle Supply Equipment (EVSE) testing;
- Observation of insulation trends.
- · Short instruction manual
- Instruction manual (CD)
- Guide for testing and verification of Low voltage installations (CD)
- · Calibration certificate
- Metrel ES Manager (program installation) A 1481 (CD)

MI 3155 EU

- 8800 mAh battery pack instead of 4400 mAh battery pack
- Current clamp A 1018 (low range, leakage)
- · Current clamp A 1019
- Metrel ES Manager PRO license*
 Metrel aMESM Android app

^{*}Metrel ES Manager can be downloaded free of charge from Metrel Web server.



 $^{^{2}}$ Threshold current 1 mA

³ Itest = 20 A @ 230 V; 16 ... 400 Hz

⁴ Itest MAX = 0.5 X IΔN

 $^{^{5}}$ Uoc < 30 Vac, Isc < 30 mA, f = 15 Hz

Multifunctional installation testers MI 3152 EurotestXC



MI 3152 EurotestXC is an instrument from the new generation of Metrel's multifunctional measuring instruments. The already well known functions like complete installation safety testing according to IEC/EN 61557 and AUTO SEQUENCE testing of TN, TT and IT earthing systems are managed by a completely new user interface based on large colour touch screen display. A wide range of functions is included: from on-line voltage monitoring, phase sequence testing, varistor testing, earth resistance measurement, illuminance measurement and TRMS current measurement up to RCD tests, line and loop impedance tests, specific earth resistance measurements as well as ISFL measurements and the IMD tests.

MEASURING FUNCTIONS

- Insulation resistance with DC voltage from 50 V to 1000 V;
- Varistor test:
- Continuity of PE conductors with 200 mA DC test current with polarity change;
- Continuity of PE conductors with 7 mA test current without RCD tripping;
- Line/Loop impedance combined also in one function Z AUTO;
- Loop impedance with Trip Lock RCD function;
- TRMS voltage and frequency measurements;
- Phase sequence;
- Power and THD measurement (up to the 12th harmonic);
- RCD testing (general and selective, type AC, A, F, B, B+, MI RCD, EV RCD, PRCD, PRCD-K, PRCD-S);
- Earth resistance (3-wire and 2-clamps method):
- Specific earth resistance with Ro-adapter (option);
- TRMS leakage and load currents (option);
- First fault leakage current (ISFL);
- Testing of Insulation Monitoring Devices (IMDs);
- Illumination (option);
- High resolution Loop impendance $(m\Omega)$ (option);
- EVSE AUTO SEQUENCEs and function inspections;
- Determining location of cables (option);

• QR and/or barcode scanner support (option).

KEY FEATURES

- Predefined profile dependent AUTO SEQUENCEs.
- Predefined Automatic tests:
 Auto TT (U, ZIn, Zs, Uc);
 Auto TN/RCD (U, ZIn, Zs, Rpe);
 Auto TN (U, ZIn, Zlpe, Rpe);
 Auto IT (U, ZIn, Isc, Isfl, IMD).
- Built-in help screens for referencing on site.
- Built-in fuse tables for automatic evaluation of the line / loop impedance result
- Monitoring of all 3 voltages in real-time.
- Automatic polarity reversal on continuity
- test.
 Automated RCD testing procedure.
- Automated Impedance testing procedure (Z AUTO).
- Functional inspections.
- Measurement filtering according to the selected area group.
- Built-in charger and rechargeable batteries as standard accessory.
- BT communication with PC, Android tablets and smart phones via built-in BT.
- PC SW Metrel ES Manager (structure and report creation, data upload/download).
- Optional aMESM Android app (structure and report creation, data upload/ download).

APPLICATION

- Testing of TT, TN and IT systems;
- Testing of single and multiphase systems;
- Initial and periodic testing of domestic installations;
- Maintenance;
- Lightning installations;
- Medical installation testing;
- Fire brigades, military and police vehicles;
- Construction sites;
- Mobile Video/Audio, Concert Halls, Fair, Playground:
- Electrical Vehicle Supply Equipment (EVSE) testing.

STANDARDS

Functionality

• EN 61557; DIN 5032

Other reference standards for testing:

• IEC/EN/HD 60364-4-41; IEC/EN 61008; IEC/EN 61009; BS 7671; AS/NZ 3017

Electromagnetic compatibility (EMC):

• IEC/EN 61326-1

Safety

• IEC/EN 61010-1; IEC/EN 61010-031; IEC/EN 61010-2-032;

1.12 Accessories 1.54 Metrel Catalogue 2018

FUNCTION		Measuring range	Resolution	Accuracy
CONTINUITY	Test Current 7 mA 2-wire	0.00 Ω 19.99 Ω	0.1 Ω	±(5 % of r. + 3 digits)
		20.0 Ω 1999 Ω	1 Ω	
	Test Current 200 mA 2-wire	0.00 Ω 19.99 Ω	0.01 Ω	±(3 % of r. + 3 digits)
		20.0 Ω 199.9 Ω	0.1 Ω	±(5 % of r.)
INICIU ATION	Test Voltage 50/100/250 V	200.0 Ω 1999 Ω	1 Ω 0.01 ΜΩ	±(5 % of r.) ±(5 % of r. + 3 digits)
INSULATION RESISTANCE	rest voitage 50/100/250 v	0.00 ΜΩ 19.99 ΜΩ 20.0 ΜΩ 99.9 ΜΩ	U.UT MILI	±(5 % of r. + 3 digits) ±(10 % of r.)
RESISTANCE		20.0 MΩ 33.3 MΩ 100.0 MΩ 199.9 MΩ	0.1 ΜΩ	±(10 % of r.)
	Test Voltage 500/1000 V	0.00 ΜΩ 19.99 ΜΩ	0.01 ΜΩ	±(5 % of r. + 3 digits)
	1631 Voltage 300/1000 V	20.0 ΜΩ 199.9 ΜΩ	0.1 ΜΩ	±(5 % of r.)
		200 ΜΩ 999 ΜΩ	1 ΜΩ	±(10 % of r.)
RCD	RCD Uc	0.00 V 19.99 V	0.1 V	(-0 % /+15 %) of r. ± 10 digits
		20.0 V 99.9 V		(-0 % /+15 %) of r.
	RCD (t),	0.00 ms 40.0 ms	0.1 ms	±1 ms
		0.0 V max. time		±3 ms
	RCD I Ramp	0.2xIΔN 1.1xIΔN (AC)	0.05xI∆N	±0.1xI∆N
		0.2xI∆N 1.5xI∆N (A), I∆N ≥30 mA)		
		0.2xIΔN 2.2xIΔN (A), IΔN <30 mA)		
IMPEDANCE	Zline L-L, L-N Ipsc	0.2xIΔN 2.2xIΔN (B) 0.00 Ω 9.99 Ω	0.01 Ω	±(5 % of r. + 5 digits)
IMPEDANCE	Ziiile L-L, L-N ipst	10.0 Ω 99.9 Ω	0.01Ω	±(5 % 01 f. + 5 digits)
		10.0 Ω 999 Ω	1Ω	±(10 % of r.)
		1.00 kΩ 9.99 kΩ	10 Ω	±(10 /0 01 1.)
	Zloop L-PE, Ipfc	0.00 Ω 9.99 Ω	0.01 Ω	±(5 % of r. + 5 digits)
		10.0 Ω 99.9 Ω	0.1 Ω	=,= ,0 0, 5 0.5,00/
		100 Ω 999 Ω	1Ω	±(10 % of r.)
		1.00 kΩ 9.99 kΩ	10 Ω	,
VOLTAGE	TRMS	0 550 V	1 V	±(2 % of r. + 2 digits)
	Frequency	0.00 Hz 9.99 Hz	0.01 Hz	±(0.2 % of r. + 1 digits)
		10.0 Hz 499.9 Hz	0.1 Hz	
CURRENT	TRMS, AC with A 1018	0.0 mA 99.9 mA	0.1 mA	±(5 % of r. + 5 digits)
		100 mA 999 mA	1 mA	±(3 % of r. + 3 digits)
	TDMC AC 'II A 1010	1.00 A 19.99 A	0.01 A	±(3 % of r.)
	TRMS, AC with A 1019	0.0 mA 99.9 mA	0.1 mA	Indicative
		100 mA 999 mA 1.00 A 19.99 A	1 mA	±(5 % of r.)
	TRMS, AC/DC with A 1391,	0.00 A 199 A	0.01 A 0.01 A	±(3 % of r.) ±(3 % of r. + 3 digits)
	range = 40 A	2.00 A 19.99 A	0.01 A 0.01 A	±(3 % of r.)
	Turisc = 40 A	20.0 A 39.9 A	0.1 A	±(3 % of r.)
	TRMS, AC/DC with A 1391,	0.00 A 19.99 A	0.01 A	Indicative
	range = 300 A	20.0 A 39.9 A	0.1 A	±(3 % of r. + 5 digits)
		40.0 A 299.9 A	0.1 A	
EARTH	3 wire	0.00 Ω 19.99 Ω	0.01 Ω	±(5 % of r. + 5 digits)
RESISTANCE		20.0 Ω 199.9 Ω	0.1 Ω	
		200.0 Ω 9999 Ω	1Ω	(17.0) 5 17.11.1
	2 clamp	0.00 Ω 19.99 Ω	0.01 Ω	±(10 % of r. + 10 digits)
		20.0 Ω 30.0 Ω 30.1 Ω 39.9 Ω	0.1 Ω 0.1 Ω	±(20 % of r.) ±(30 % of r.)
	Specific earth resistance	0.0 Ωm 99.9 Ωm	0.1 Ωm	±(5 % of r.) for Re 1 Ω 1999kΩ
	Specific earth fesistance	100 Ωm 999 Ωm	1 Ωm	±(10 % of r.) for Re 2 kΩ 19.99kΩ
		1.00 kΩm 9.99 kΩm	0.01 kΩm	$\pm (20 \% \text{ of r.}) \text{ for Re} > 20 \text{ k}\Omega$
		10.0 kΩm 99.9 kΩm	0.1 kΩm	_(20 % of 11) for the y 20 km²
		100 kΩm 9999 kΩm		
FIRST FAULT		0.0 mA 19.9 mA	0.1 mA	±(5 % of r. + 3 digits)
LEAKAGE				-
CURRENT				
IMD TEST	Threshold indicative insulation	5 640 kΩ	5 kΩ	Indicative values, up to 128 steps
II I IIIAIN ANCE	resistance	0.01 hay 10.00 hay	0.011	(C0) of x . 2 digital
ILLUMINANCE	Type B	0.01 lux 19.99 lux 20.0 lux 199.9 lux	0.01 lux 0.1 lux	±(5 % of r. + 2 digits)
		20.0 lux 199.9 lux 200 lux 1999 lux	1 lux	±(5 % of r.)
		2.00 klux 19.99 klux	10 lux	±(J /0 UI 1./
	Type C	0.01 lux 19.99 lux	0.01 lux	±(10 % of r. + 3 digits)
	.,,,,,	20.0 lux 199.9 lux	0.1 lux	_(.5 % 51 1. 1 5 digits)
		200 lux 1999 lux	1 lux	±(10 % of r.)
		2.00 klux 19.99 klux	10 lux	, - ·· · · · · · · · · · · · · · · ·
GENERAL	Power supply	9 VDC (6x1.5 V battery or accu, size AA)		
GENERAL				
GENERAL	Overvoltage category	600 V CAT III; 300 V CAT IV		
GENERAL		600 V CAT III; 300 V CAT IV double insulation		
GENERAL	Overvoltage category			
GENERAL	Overvoltage category Protection class	double insulation		

STANDARD SET

MI 3152 ST

- MI 3152 ST

 Instrument MI 3152 EurotestXC

 Plug commander, 1.5 m

 Test lead, 3 x 1.5 m

 Power supply adapter + 6 NiMH rechargeable batteries, type AA

 Test probe, 3 pcs (blue, black, green)

 Crocodile clip, 3 pcs (blue, black, green)

 Earth set 20 m

 RS232 PS/2 cable

 USB cable

 Soft carrying bag

- Soft carrying neck belt
 Metrel ES Manager BASIC license*
 Short instruction manual

- MI 3152 EU

 MI 3152 ST

 Current clamp A 1018 (low range, leakage)

 Current clamp A 1019

 Metrel ES Manager PRO license*

*Metrel ES Manager can be downloaded free of charge from Metrel Web server.



Multifunctional installation testers MI 3152H EurotestXC 2,5 kV



MI 3152H EurotestXC 2,5 kV is an instrument from the new generation of Metrel's multifunctional measuring instruments. The already well known functions like complete installation safety testing according to IEC/EN 61557 and AUTO SEQUENCE testing of TN and TT earthing systems expanded with insulation resistance measurement with the test voltage up to 2,5 kV are managed by a completely new user interface based on large colour touch screen display. A wide range of functions is included: from on-line voltage monitoring, phase sequence testing, varistor testing, earth resistance measurement with 3 wire and 2 clamps method and illuminance measurement, TRMS current measurement up to RCD tests, line and loop impedance tests as well as diagnostic test enabled by PI and DAR indexes calculation.

MEASURING FUNCTIONS

- Insulation resistance with DC voltage from 50 V to 2500 V and PI, DAR calculation:
- Varistor test;
- Continuity of PE conductors with 200 mA DC test current with polarity change;
- Continuity of PE conductors with 7 mA test current without RCD tripping;
- Line/Loop impedance combined also in one function **Z AUTO**;
- Loop impedance with Trip Lock RCD function;
- TRMS voltage and frequency measurements;
- Phase sequence;
- Power and THD measurement (up to the 12th harmonic):
- RCD testing (general and selective, type AC, A, F, MI RCD, EV RCD, PRCD, PRCD-K, PRCD-S);
- Earth resistance (3-wire and 2-clamps method);
- Specific earth resistance with Ro-adapter (option);
- TRMS leakage and load currents (option);
- Illumination (option);
- High resolution Loop impendance ($m\Omega$) (option);
- EVSE AUTO SEQUENCEs and function inspections:

- Determining location of cables (option);
- QR and/or barcode scanner support (option).

KEY FEATURES

- Predefined profile dependent AUTO SEQUENCEs.
- Predefined Automatic tests:
 Auto TT (U, Zln, Zs, Uc);
 Auto TN/RCD (U, Zln, Zs, Rpe);
 Auto TN (U, Zln, Zlpe, Rpe).
- Built-in help screens for referencing on site
- Built-in fuse tables for automatic evaluation of the line / loop impedance result
- Monitoring of all 3 voltages in real-time.
- Automatic polarity reversal on continuity
- Automated RCD testing procedure.
- Automated Impedance testing procedure (Z AUTO).
- Functional inspections.
- Measurement filtering according to the selected area group.
- Built-in charger and rechargeable batteries as standard accessory.
- BT communication with PC, Android tablets and smart phones via built-in BT.
- PC SW Metrel ES Manager (structure and

report creation, data upload/download).

 Optional aMESM Android app (structure and report creation, data upload/ download).

APPLICATION

- Testing of TT and TN supply systems;
- Testing of single and multiphase systems;
- Initial and periodic testing of domestic and industrial installations;
- Lightning installations;
- Observation of insulation trends;
- Electrical Vehicle Supply Equipment (EVSE) testing.

STANDARDS

Functionality

• EN 61557; DIN 5032

Other reference standards for testing:

• IEC/EN/HD 60364-4-41; IEC/EN 61008; IEC/EN 61009; BS 7671; AS/NZ 3017

Electromagnetic compatibility (EMC):

• IEC/EN 61326-1

Safety

• IEC/EN 61010-1; IEC/EN 61010-031; IEC/EN 61010-2-030; IEC/EN 61010-2-032

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FUNCTION		Measuring range	Resolution	Accuracy
CONTINUITY	Test Current 7 mA 2-wire	0.00 Ω 19.99 Ω	0.1 Ω	±(5 % of r. + 3 digits)
	Test Current 200 mA 2-wire	20.0 Ω 1999 Ω 0.00 Ω 19.99 Ω	1 Ω 0.01 Ω	±(3 % of r. + 3 digits)
		20.0 Ω 199.9 Ω 200.0 Ω 1999 Ω	0.1 Ω 1 Ω	±(5 % of r.) ±(5 % of r.)
INSULATION	Test Voltage 50/100/250 V	0.00 ΜΩ 19.99 ΜΩ	0.01 ΜΩ	±(5 % of r. + 3 digits)
RESISTANCE		20.0 ΜΩ 99.9 ΜΩ 100.0 ΜΩ 199.9 ΜΩ	0.1 ΜΩ	±(10 % of r.) ±(20 % of r.)
	Test Voltage 500/1000 V	0.00 ΜΩ 19.99 ΜΩ	0.01 ΜΩ	±(5 % of r. + 3 digits)
		20.0 MΩ 199.9 MΩ 200 MΩ 999 MΩ	0.1 MΩ 1 MΩ	±(5 % of r.) ±(10 % of r.)
	Test Voltage 2500 V	0.00 ΜΩ 19.99 ΜΩ	0.01 ΜΩ	±(5 % of r. + 3 digits)
		20.0 ΜΩ 199.9 ΜΩ 200 ΜΩ 999 ΜΩ	0.1 ΜΩ 1 ΜΩ	±(5 % of r.) ±(10 % of r.)
INCLU ATION	Calandatian of DL DAD Only factors	1.00 GΩ 19.99 GΩ	0.01 GΩ	±(10 % of r.)
INSULATION ANALAYSING	Calculation of PI, DAR Only for test voltage 500/1000/2500 V	0.01 ΜΩ 9.99 ΜΩ 10.0 ΜΩ 100 ΜΩ	0.01 MΩ 0.1 MΩ	±(5 % of r. + 2 digits) ±(5 % of r.)
RCD	RCD Ūc	0.00 V 19.99 V 20.0 V 99.9 V	0.1 V	(-0 % /+15 %) of r. ± 10 digits (-0 % /+15 %) of r.
	RCD (t),	0.00 ms 40.0 ms	0.1 ms	±1 ms
	RCD I Ramp	0.0 V max.time	0.1 1112	±3 ms
	KCD I Kallih	0.2xIΔN 1.1xIΔN (AC) 0.2xIΔN 1,5xIΔN (A),		
		IΔN ≥30 mA) 0.2xIΔN 2.2xIΔN (A),	0.05xI∆N	±0.1xIΔN
		IΔN <30 mA)		
IMPEDANCE	Zline L-L, L-N Ipsc	0.00 Ω 9.99 Ω 10.0 Ω 99.9 Ω	0.01 Ω 0.1 Ω	±(5 % of r. + 5 digits)
		100 Ω 999 Ω	1 Ω 10.0	±(10 % of r.)
	Zloop L-PE, Ipfc	1.00 kΩ 9.99 kΩ 0.00 Ω 9.99 Ω	0.01 Ω	±(5 % of r. + 5 digits)
		10.0 Ω 99.9 Ω 100 Ω 999 Ω	0.1 Ω 1 Ω	±(10 % of r.)
		1.00 kΩ 9.99 kΩ	10 Ω	
VOLTAGE	TRMS Frequency	0 550 V 0.00 Hz 9.99 Hz	1 V 0.01 Hz	±(2 % of r. + 2 digits)
	. ,	10.0 Hz 499.9 Hz	0.1 Hz	±(0.2 % of r. + 1 digits)
CURRENT	TRMS, AC with A 1018	0.0 mA 99.9 mA 100 mA 999 mA	0.1 mA 1 mA	±(5 % of r. + 5 digits) ±(3 % of r. + 3 digits)
		1.00 A 19.99 A	0.01 A	±(3 % of r.)
	TRMS, AC with A 1019	0.0 mA 99.9 mA 100 mA 999 mA	0.1 mA 1 mA	Indicative ±(5 % of r.)
	TRMS, AC/DC with	1.00 A 19.99 A	0.01 A	±(3 % of r.)
	A 1391, range=40 A	0.00 A 1.99 A 2.00 A 19.99 A	0.01 A 0.01 A	±(3 % of r. + 3 digits) ±(3 % of r.)
	TRMS, AC/DC with	20.0 A 39.9 A 0.00 A 19.99 A	0.1 A 0.01 A	±(3 % of r.) Indicative
	A 1391, range = 300 A	20.0 A 39.9 A	0.1 A	Indicative
EARTH	3 wire	40.0 A 299.9 A 0.00 Ω 19.99 Ω	0.1 A 0.01 Ω	±(3 % of r. + 5 digits)
RESISTANCE	3 Wile	20.0 Ω 199.9 Ω	0.1 Ω	±(5 % of r. + 5 digits)
	2 clamp	200.0 Ω 9999 Ω 0.00 Ω 19.99 Ω	<u>1 Ω</u> 0.01 Ω	±(10 % of r. + 10 digits)
		20.0 Ω 30.0 Ω 30.1 Ω 39.9 Ω	0.1 Ω 0.1 Ω	±(20 % of r.) ±(30 % of r.)
	Specific earth resistance	0.0 Ωm 99.9 Ωm	0.1 Ωm	·
	•	100 Ωm 999 Ωm 1.00 kΩm 9.99 kΩm	1 Ωm 0.01 kΩm	±(5 % of r.) for Re 1 Ω 1999k Ω ±(10 % of r.) for Re 2 k Ω 19.99k Ω
		10.0 kΩm 99.9 kΩm	$0.1 \mathrm{k}\Omega \mathrm{m}$	\pm (20 % of r.) for Re > 20 kΩ
ILLUMINANCE	Tyne B	100 kΩm 9999 kΩm 0.01 lux 19.99 lux	1 kΩm 0.01 lux	±(5 % of r. + 2 digits)
	.,,,,	20.0 lux 199.9 lux	0.1 lux	±(5 % of r.)
		200 lux 1999 lux 2.00 klux 19.99 klux	1 lux 10 lux	±(5 % 01 f.)
	Type C	0.01 lux 19.99 lux 20.0 lux 199.9 lux	0.01 lux 0.1 lux	±(10 % of r. + 3 digits)
		200 lux 1999 lux	1 lux	±(10 % of r.)
	Power supply	2.00 klux 19.99 klux 9 VDC (6x1.5 V battery or accu, size AA)	10 lux	
	Overvoltage category	1000 V DC CAT II; 600 V CAT III; 300 V CAT	IV	
GENERAL	Protection class COM port	double insulation BT, USB, RS232		
	Weight	1.3 kg		
	Size (Ixhxw)	230 x 103 x 115 mm		

STANDARD SET

MI 3152H

- Instrument MI 3152H EurotestXC
 Plug commander, 1.5 m
- 2.5 kV test lead, 2 x 1.5 m
- Test lead, 3 x 1.5 m
- Power supply adapter + 6 NiMH rechargeable batteries, type AA
- Test probe, 4 pcs (blue, black, green, red)
- Crocodile clip, 4 pcs (blue, black, green, red)
- Earth set 20 m
- RS232 PS/2 cable

- USB cable

- Soft carrying bag
 Soft carrying neck belt
 Metrel ES Manager BASIC license*
 Short instruction manual

*Metrel ES Manager can be downloaded free of charge from Metrel Web server.



Multifunctional installation testers MI 3102 BT FurntestXF



quickly saved and referenced on the instrument and then downloaded via

MEASURING FUNCTIONS

- Insulation resistance with DC voltage from 50 V to 1000 V;
- Continuity of PE conductors with 200 mA DC test current with polarity change;
- Continuity of PE conductors with 7 mA test current without RCD tripping;
- Line/Loop impedance;
- · Loop impedance with Trip Lock RCD function:
- TRMS voltage and frequency;
- · Phase sequence;
- Power and harmonics;
- RCD testing (general and selective, type AC, A, F, B, B+);
- Earth resistance (3-wire and 2-clamps method):
- · Specific earth resistance with Ro-adapter (option):
- TRMS leakage and load currents (option);
- First fault leakage current (ISFL);
- Testing of Insulation Monitoring Devices (IMDs):
- Illumination (option).

KEY FEATURES

- Predefined mini AUTO SEQUENCE s: Auto TT (U, ZIn, Zs, Uc); Auto TN/RCD (U, Zln, Zs, Rpe); Auto TN (U, ZIn, ZIpe, Rpe); Auto IT (U, ZIn, Isc, Isfl, IMD).
- Power measurements and harmonics analysis.
- Built-in help screens for referencing on
- Built-in fuse tables for automatic evaluation of the line / loop impedance
- On-line voltage monitoring: monitors all 3 voltages in real-time.
- Polarity swap: automatic polarity reversal on continuity test.
- Trip Lock function: loop impedance test without tripping the RCD.
- Built-in charger unit has a built-in charging circuit and comes complete with a set of rechargeable NiMH batteries.
- RCD auto: automated RCD testing procedure.
- Bluetooth communication with PC. Android tablets and smart phones via
- · PC SW EuroLink PRO for downloading of test results and report creation.
- EuroLink Android app, data management tool (option).

APPLICATION

- · Initial and periodic testing of domestic and industrial installations.
- · Testing of single and multiphase systems.
- Testing of TT, TN and IT earthing systems.
- · Medical installation testing.

STANDARDS

Functionality

- EN 61557;
- DIN 5032

Other reference standards for testing

- IEC/EN 60364-4-41;
- EN 61008;
- EN 61009:
- BS 7671;
- AS/NZ 3017; • CEI 64.8;
- HD 384:
- VDE 413

Electromagnetic compatibility

• EN 61326

Safety

- EN 61010-1;
- EN 61010-031;
- EN 31010-2-030:
- EN 31010-2-032

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FUNCTION		Measuring range	Resolution	Accuracy
CONTINUITY	Test Current 7 mA 2-wire	0.00 Ω 19.99 Ω	0.1 Ω	±(5 % of r. + 5 digits)
	T	20.0 Ω 1999 Ω	1Ω	(2.0), 5, 2, 11, 11, 1
	Test Current 200 mA 2-wire	0.00 Ω 19.99 Ω	0.01 Ω	±(3 % of r. + 3 digits)
		20.0 Ω 199.9 Ω 200.0 Ω 1999 Ω	0.1 Ω 1 Ω	±(5 % of r.) ±(5 % of r.)
INSULATION	Test Voltage 50/100/250 V	0.00 ΜΩ 19.99 ΜΩ	0.01 ΜΩ	±(5 % of r. + 3 digits)
RESISTANCE	Test voitage 30/100/230 v	20.0 ΜΩ 99.9 ΜΩ	0.01 1/112	±(10 % of r.)
KESISTANCE		100.0 ΜΩ 199.9 ΜΩ	0.1 ΜΩ	±(20 % of r.)
	Test Voltage 500/1000 V	0.00 ΜΩ 19.99 ΜΩ	0.01 ΜΩ	±(5 % of r. + 3 digits)
	and the grant of t	20.0 ΜΩ 99.9 ΜΩ	0.1 ΜΩ	±(5 % of r.)
		200 ΜΩ 999 ΜΩ	1 ΜΩ	±(10 % of r.)
RCD	Contact voltage	0.00 V 19.99 V	0.1 V	(-0%/±15 %) of r. ± 10 digits
		20.0 V 99.9 V		(-0%/±15 %) of r.
	Trip out time	0.0 ms 40.0 ms	0.1 ms	±1 ms
	T.i.	0.0 ms max.time	0.05 A N	±3 ms
	Trip out current	0.2xI∆N 1.1xI∆N (AC) 0.2xI∆N 1.5xI∆N (A) I∆N ≥30 mA)	0.05xI∆N	±0.1xIΔN
		0.2x1ΔN 1.3x1ΔN (A) 1ΔN ≥30 mA)		
IMPEDANCE	Zline L-L, L-N Ipsc	0.00 Ω 9.99 Ω	0.01 Ω	±(5 % of r. + 5 digits)
	2 2 2, 2 11 1930	10.0 Ω 99.9 Ω	0.1 Ω	=(5 % 61 11 1 5 digits)
		100 Ω 999 Ω	1Ω	±(10 % of r.)
		1.00 kΩ 9.99 kΩ	10 Ω	
	Zloop L-PE, Ipfc	0.00 Ω 9.99 Ω	0.01 Ω	±(5 % of r. + 5 digits)
		10.0 Ω 99.9 Ω	0.1 Ω	
		100 Ω 999 Ω	1Ω	±(10 % of r.)
VOLTAGE	TDMC	1.00 kΩ 9.99 kΩ	10 Ω	./2.0/
VOLTAGE	TRMS	0 550 V	1 V	±(2 % of r. + 2 digits)
	Frequency	0.00 Hz 9.99 Hz	0.01 Hz	±(0.2 % of r. + 1 digits)
CURRENT	TRMS, AC with A 1018	10.0 Hz 499.9 Hz 0.0 mA 99.9 mA	0.1 Hz 0.1 mA	±(5 % of r. + 5 digits)
CURRENT	TRIMS, AC WILLIA 1016	100 mA 999 mA	1 mA	±(3 % of r. + 3 digits) ±(3 % of r. + 3 digits)
		1.00 A 19.99 A	0.01 A	±(3 % of r.)
	TRMS, AC with A 1019	0.0 mA 99.9 mA	0.1 mA	indicative
		100 mA 999 mA	1 mA	±(5 % of r.)
		1.00 A 19.99 A	0.01 A	±(3 % of r.)
	TRMS, AC/DC with A 1391, range=40A		0.01 A	±(3 % of r. + 3 digits)
		2.00 A 19.99 A	0.01 A	±(3 % of r.)
	TRACE ACCIDICATE A 4224	20.0 A 39.9 A	0.1 A	±(3 % of r.)
	TRMS, AC/DC with A 1391, range =	0.00 A 19.99 A	0.01 A	indicative
	300A	20.0 A 39.9 A 40.0 A 299.9 A	0.1 A 0.1 A	±(3 % of r. + 5 digits)
EARTH	3 wire	0.00 Ω 19.99 Ω	0.01 Ω	±(5 % of r. + 5 digits)
RESISTANCE	3 WIIC	20.0 Ω 199.9 Ω	0.1 Ω	±(5 % 01 1. 1 5 digits)
		200.0 Ω 9999 Ω	1Ω	
	2 clamp	0.00 Ω 19.99 Ω	0.01 Ω	±(10 % of r. + 10 digits)
	•	20.0 Ω 30.0 Ω	0.1 Ω	±(20 % of r.)
		30.1 Ω 99.9 Ω	0.1 Ω	±(30 % of r.)
	Specific earth resistance	0.0 Ωm 99.9 Ωm	0.1 Ωm	\pm (5 % of r.) for Re 1 Ω 1999kΩ
		100 Ωm 999 Ωm	1Ωm	±(10 % of r.) for Re 2 kΩ 19.99kΩ
		1.00 Ωmk 9.99 kΩm	0.01 kΩm	\pm (20 % of r.) for Re > 20 k Ω
ILLUMINANCE	Tuno B	10.0 Ωmk 99.9 kΩm 0.01 lux 19.99 lux	0.1 kΩm 0.01 lux	±(5 % of r. + 2 digits)
ILLUMINANCE	туре в	20.0 lux 19.99 lux	0.01 lux	±(5 % 01 f. + 2 digits)
		200 lux 1999 lux	1 lux	±(5 % of r.)
		2.00 klux 19.99 klux	10 lux	±\J /0 01 1./
	Type C	0.01 lux 19.99 lux	0.01 lux	±(10 % of r. + 3 digits)
	/r - -	20.0 lux 199.9 lux	0.1 lux	(
		200 lux 1999 lux	1 lux	±(10 % of r.)
		2.00 klux 19.99 klux	10 lux	
GENERAL	Power supply	9 VDC (6x1.5 V battery or accu, size AA)		
	Overvoltage category	CAT II / 1000 VDC; CAT III / 600 V; CAT IV	/ 300 V	
	Protection class	Double insulation		
	COM port	BT, USB, RS232		
	Weight	1.3 kg		
	Size (Ixhxw)	230 x 103 x 115 mm		

STANDARD SET

MI 3102 BT

- Instrument EurotestXEPlug commander, 1.5 m
- Test lead, 3 x 1.5 m
- Earth test set, 3-wire, 20 m (test lead, 4 m; 2 x test lead, 20 m; 2 x test rod)
- Power supply adapter + 6 NiMH rechargeable batteries, size AA
- PC Software EuroLink PRO
- Test probe, 3 pcs (blue, black, green)

- Crocodile clip, 3 pcs (blue, black, green)
- RS232 PS/2 cable
- USB cable
- Soft carrying neck beltSoft carrying bag
- Short instruction manual
- Instruction manual on storage media
- Handbook on storage media
- Calibration certificate



Multifunctional installation testers MI 3102H BT EurotestXE 2,5 kV



MI 3102H BT EurotestXE 2,5 kV is a multifunctional measuring instrument which apart from all the necessary functions for complete installation safety testing according to IEC/EN 61557 performs insulation resistance measurement with the test voltage up to 2,5 kV (measuring range is up to 20 G Ω) and enables diagnostic test by PI and DAR indexes calculation. Besides, the MI 3102H BT EurotestXE 2,5 kV enables on-line voltage monitoring, phase sequence testing, earth resistance measurement, illuminance measurement and TRMS current measurement. EurotestXE 2,5 kV is equipped with integrated characteristics of fuses and RCDs for PASS / FAIL evaluation of test results. All the results can be quickly saved and referenced on the instrument and then downloaded via the EuroLink PRO software (included in the standard set) to the computer for evaluation and report generation after testing.

MEASURING FUNCTIONS

- Insulation resistance with DC voltage 50
 V to 2,5 kV and PI, DAR calculation;
- Continuity of PE conductors with 200 mA DC test current with polarity change;
- Continuity of PE conductors with 7 mA test current without RCD tripping;
- Continuity RPE with 200 mA AC on outlet:
- · Line/Loop impedance;
- Loop impedance with Trip Lock RCD function;
- TRMS voltage and frequency;
- · Phase sequence;
- Power and harmonics;
- RCD testing (general and selective, type AC, A, F);
- Earth resistance (3-wire and 2-clamps method);
- Specific earth resistance with Ro-adapter (option);
- TRMS leakage and load currents (option);
- Illumination (option).

KEY FEATURES

Predefined mini AUTO SEQUENCE*s:
 Auto TT (U, Zln, Zs, Uc);
 Auto TN/RCD (U, Zln, Zs, Rpe);
 Auto TN (U, Zln, Zlpe, Rpe).

- Insulation range: wide range of insulation test voltages from 100 V to 2500 V, readings up to 20 GΩ.
- Insulation diagnostics: polarisation Index (PI) and Dielectric Absorption Ratio (DAR) calculation.
- Power measurements and harmonics analysis.
- Built-in help screens for referencing on
- Built-in fuse tables for automatic evaluation of the line / loop impedance result.
- **On-line voltage monitoring:** monitors all 3 voltages in real-time.
- **Polarity swap:** automatic polarity reversal on continuity test.
- **Trip Lock function:** loop impedance test without tripping the RCD.
- Built-in charger & rechargeable batteries: unit has a built-in charging circuit and comes complete with a set of rechargeable NiMH batteries.
- RCD auto: automated RCD testing procedure.
- Bluetooth communication with PC, Android tablets and smart phones via built-in BT.
- PC SW EuroLink PRO for downloading of test results and report creation.
- EuroLink Android app, data management tool (option).

APPLICATION

- Initial and periodic testing of domestic and industrial installations.
- Testing of Insulation resistance of transformers, motors, cables, machines, etc
- Observation of insulation trends.
- Testing of single and multiphase systems.
- Testing of TT and TN supply systems.

STANDARDS

Functionality

• IEC/EN 61557

Other reference standards for testing

- IEC/EN 60364;
- EN 61008;
- EN 61009;
- EN 60755;
- BS 7671;
- AS/NZ 3760;
- CEI 64.8;
- HD 384;
- VDE 413

Electromagnetic compatibility

• EN 61326

Safety

- EN 61010-1;
- EN 61010-031;
- EN 31010-2-030;
- EN 31010-2-032

1.18 Accessories 1.54 Metrel Catalogue 2018

FUNCTION		Measuring range	Resolution	Accuracy
CONTINUITY	Test Current 7 mA 2-wire	0.00 Ω 19.99 Ω	0.1 Ω	±(5 % of r. + 5 digits)
	Test Current 200 mA 2-wire	20.0 Ω 1999 Ω 0.00 Ω 19.99 Ω	<u>1 Ω</u> 0.01 Ω	±(3 % of r. + 3 digits)
	rest current 200 ma 2-wire	20.0 Ω 199.9 Ω	0.01Ω	±(5 % of r.)
		200.0 Ω 1999 Ω	1 Ω	±(5 % of r.)
INSULATION RESISTANCE	Test Voltage 50/100/250 V	0.00 ΜΩ 19.99 ΜΩ	0.01 ΜΩ	±(5 % of r. + 3 digits)
RESISTANCE		20.0 ΜΩ 99.9 ΜΩ 100.0 ΜΩ 199.9 ΜΩ	0.1 ΜΩ	±(10 % of r.) ±(20 % of r.)
	Test Voltage 500/1000 V	0.00 ΜΩ 19.99 ΜΩ	0.01 ΜΩ	±(5 % of r. + 3 digits)
		20.0 ΜΩ 99.9 ΜΩ	0.1 ΜΩ	±(5 % of r.)
	Test Voltage 2500 V	200 ΜΩ 999 ΜΩ 0.00 ΜΩ 19.99 ΜΩ	1 MΩ 0.01 M0	±(10 % of r.) ±(5 % of r. + 3 digits)
	rest voltage 2500 v	20.0 ΜΩ 199.9 ΜΩ	0.1 ΜΩ	±(5 % of r.)
		200 ΜΩ 999 ΜΩ	0.1 ΜΩ	±(10 % of r.)
INSULATION	Calculation of PI, DAR Only for test	1.00 GΩ 19.99 GΩ 0.01 MΩ 9.99 MΩ	0.01 GΩ 0.01 MΩ	±(10 % of r.) ±(5 % of r. + 2 digits)
ANALAYSING	voltage 500/1000/2500 V	10.0 ΜΩ 100 ΜΩ	0.1 ΜΩ	±(5 % of r.)
RCD	Contact voltage	0.00 V 19.99 V	0.1 V	(-0%/±15 %) of r. ± 10 digits
		20.0 V 99.9 V		(-0%/±15 %) of r.
	Trip out time	0.0 ms 40.0 ms 0.0 ms max.time	0.1 ms	±1 ms ±3 ms
	Trip out current	0.2xIΔN 1.1xIΔN (AC)	0.05xIΔN	±0.1xIΔN
	F	0.2xIΔN 1.5xIΔN (A) IΔN ≥30 mA)		
IMPEDANCE	7line I. I. N. Ince	0.2xIΔN 2.2xIΔN (A) IΔN <30 mA)	0.01.0	1/F 0/ of x . F digits)
IMPEDANCE	Zline L-L, L-N Ipsc	0.00 Ω 9.99 Ω 10.0 Ω 99.9 Ω	0.01 Ω 0.1 Ω	±(5 % of r. + 5 digits)
		100 Ω 999 Ω	1 Ω	±(10 % of r.)
	711 DE 1-f-	1.00 kΩ 9.99 kΩ	10 Ω	,/F0/ -f F -l'\\
	Zloop L-PE, Ipfc	0.00 Ω 9.99 Ω 10.0 Ω 99.9 Ω	0.01 Ω 0.1 Ω	±(5 % of r. + 5 digits)
		100 Ω 999 Ω	1 Ω	±(10 % of r.)
VOLTAGE	TDMC	1.00 kΩ 9.99 kΩ	10 Ω	./2.0/ 5 2.1/ 1/2
VOLTAGE	TRMS Frequency	0 550 V 0.00 Hz 9.99 Hz	1 V 0.01 Hz	±(2 % of r. + 2 digits) ±(0.2 % of r. + 1 digits)
	Frequency	10.0 Hz 499.9 Hz	0.01 Hz	±(0.2 % 011. + 1 digits)
CURRENT	TRMS, AC with A 1018	0.0 mA 99.9 mA	0.1 mA	±(5 % of r. + 5 digits)
		100 mA 999 mA 1.00 A 19.99 A	1 mA 0.01 A	±(3 % of r. + 3 digits) ±(3 % of r.)
	TRMS, AC with A 1019	0.0 mA 99.9 mA	0.1 mA	indicative
		100 mA 999 mA	1 mA	±(5 % of r.)
	TRMS, AC/DC with A 1391, range=40A	1.00 A 19.99 A	0.01 A 0.01 A	±(3 % of r.) ±(3 % of r. + 3 digits)
	111113, 11c, be Will 11 1331, 1411ge= 1011	2.00 A 19.99 A	0.01 A	±(3 % of r.)
		20.0 A 39.9 A	0.1 A	±(3 % of r.)
	TRMS, AC/DC with A 1391, range = 300A	0.00 A 19.99 A 20.0 A 39.9 A	0.01 A 0.1 A	indicative ±(3 % of r. + 5 digits)
	300A	40.0 A 299.9 A	0.1 A	±(5 /0 01 1. + 5 digits)
EARTH	3 wire	0.00 Ω 19.99 Ω	0.01 Ω	±(5 % of r. + 5 digits)
RESISTANCE		20.0 Ω 199.9 Ω 200.0 Ω 9999 Ω	0.1 Ω 1 Ω	
	2 clamp	0.00 Ω 19.99 Ω	0.01 Ω	±(10 % of r. + 10 digits)
		20.0 Ω 30.0 Ω	0.1 Ω	±(20 % of r.)
	C:	30.1 Ω 99.9 Ω	0.1 Ω	±(30 % of r.)
	Specific earth resistance	0.0 Ωm 99.9 Ωm 100 Ωm 999 Ωm	0.1 Ωm 1 Ωm	±(5 % of r.) for Re 1 Ω 1999kΩ ±(10 % of r.) for Re 2 kΩ 19.99kΩ
		1.00 Ωmk 9.99 kΩm	0.01 kΩm	\pm (20 % of r.) for Re > 20 kΩ
		10.0 Ωmk 99.9 kΩm	0.1 kΩm	(5.0) 5 2 11 11)
ILLUMINANCE	туре в	0.01 lux 19.99 lux 20.0 lux 199.9 lux	0.01 lux 0.1 lux	±(5 % of r. + 2 digits)
		200 lux 1999 lux	1 lux	±(5 % of r.)
	T C	2.00 klux 19.99 klux	10 lux	/40.0/ 5 2 11 11 2
	Туре С	0.01 lux 19.99 lux 20.0 lux 199.9 lux	0.01 lux 0.1 lux	±(10 % of r. + 3 digits)
		200 lux 1999 lux	1 lux	±(10 % of r.)
		2.00 klux 19.99 klux	10 lux	·
GENERAL	Power supply Overvoltage category	9 VDC (6x1.5 V battery or accu, size AA) CAT II / 1000 VDC; CAT III / 600 V; CAT IV /	200 V	
	Protection class	Double insulation	V 00C	
	COM port	BT, USB, RS232		
	Weight	1.3 kg		
	Size (I x h x w)	230 x 103 x 115 mm		

STANDARD SET

MI 3102H BT

- Instrument EurotestXE 2,5 kV
- Plug commander, 1.5 m
- 2.5 kV test lead, 2 x 1.5 m
- Test lead, 3 x 1.5 m
- Earth test set, 3-wire, 20 m (test lead, 4 m; 2 x
- test lead, 20 m; 2 x test rod)
 Power supply adapter + 6 NiMH rechargeable batteries, size AA
- PC Software EuroLink PRO

- Test probe, 4 pcs (blue, black, green, red)
- Crocodile clip, 4 pcs (blue, black, green, red)
- RS232 PS/2 cable
- USB cable
- Soft carrying neck belt
- Soft carrying bag
- Short instruction manual
- Instruction manual on storage media
- Handbook on storage mediaCalibration certificate



Multifunctional installation testers MI 3100 SF FurotestFASI



MI 3100 SE EurotestEASI is a fast, accurate and easy to use multifunctional measuring instrument which performs a complete set of installation safety tests according to IEC/EN 61557. Besides, the MI 3100 SE EurotestEASI enables on-line voltage monitoring, phase sequence testing and earth resistance measurement. EurotestEASI is equipped with integrated characteristics of fuses and RCDs for PASS / FAIL evaluation of test results. All the results can be quickly saved and referenced on the instrument and then downloaded via the EuroLink PRO software (included in the standard set) to the computer for evaluation and report generation after testing.

MEASURING FUNCTIONS

- Insulation resistance with DC voltage from 50 V to 1000 V;
- Continuity of PE conductors with 200 mA test current with polarity change;
- Continuity of PE conductors with 7 mA test current without RCD tripping;
- Line impedance;
- · Loop impedance;
- Loop impedance with Trip Lock RCD function;
- TRMS voltage and frequency;
- · Phase sequence;
- RCD testing (general and selective, type AC, A, F);
- Earth resistance (3-wire method).

KEY FEATURES

- Predefined mini AUTO SEQUENCE*s:
 Auto TT (U, Zln, Zs, Uc);
 Auto TN/RCD (U, Zln, Zs, Rpe);
 Auto TN (U, Zln, Zlpe, Rpe).
- Built-in help screens for referencing on site.
- Built-in fuse tables for automatic evaluation of the line / loop impedance result.
- On-line voltage monitoring: monitors all 3 voltages in real-time.
- **Polarity swap:** automatic polarity reversal on continuity test.
- **Trip Lock function:** loop impedance test without tripping the RCD.
- Built-in charger unit has a built-in charging circuit and comes complete with a set of rechargeable NiMH batteries.
- RCD auto: automated RCD testing procedure.
- Bluetooth communication with PC, Android tablets and smart phones via optional BT dongle.
- PC SW EuroLink PRO for downloading of test results and report creation.
- EuroLink Android app, data management tool (option).

APPLICATION

- Initial and periodic testing of domestic and industrial installations.
- Testing of single and multiphase systems.
- Testing of TT and TN supply systems.

STANDARDS

Functionality

• IEC/EN 61557

Other reference standards for testing

- IEC/EN 60364-4-41;
- EN 61008;
- EN 61009;
- BS 7671;
- AS/NZ 3017

Electromagnetic compatibility

• EN 61326

Safety

- EN 61010-1;
- EN 61010-031;
- EN 31010-2-030;
- EN 31010-2-032

1.20 Accessories 1.54 Metrel Catalogue 2018

FUNCTION		Measuring range	Resolution	Accuracy	
CONTINUITY	Test Current 7 mA 2-wire	0.00 Ω 19.99 Ω 20.0 Ω 1999 Ω	0.1 Ω 1 Ω	±(5 % of r. + 5 digits)	
	Test Current 200 mA 2-wire	0.00 Ω 19.99 Ω 20.0 Ω 199.9 Ω 200.0 Ω 1999 Ω	0.01 Ω 0.1 Ω 1 Ω	±(3 % of r. + 3 digits) ±(5 % of r.) ±(5 % of r.)	
INSULATION RESISTANCE	Test Voltage 50/100/250 V	0.00 MΩ 19.99 MΩ 20.0 MΩ 99.9 MΩ 100.0 MΩ 199.9 MΩ	0.01 ΜΩ	±(5 % of r. + 3 digits) ±(10 % of r.) ±(20 % of r.)	
	Test Voltage 500/1000 V	0.00 MΩ 19.99 MΩ 20.0 MΩ 99.9 MΩ 200 MΩ 999 MΩ	0.01 MΩ 0.1 MΩ 1 MΩ	±(5 % of r. + 3 digits) ±(5 % of r.) ±(10 % of r.)	
RCD	Contact voltage	0.00 V 19.99 V 20.0 V 99.9 V	0.1 V	$(-0\%/\pm15\%)$ of r. \pm 10 digits $(-0\%/\pm15\%)$ of r.	
	Trip out time	0.0 ms 40.0 ms 0.0 ms max.time	0.1 ms	±1 ms ±3 ms	
	Trip out current	0.2xi∆n 1.1xi∆n (AC) 0.2xi∆n 1.5xi∆n (A) i∆n ≥30 mA) 0.2xi∆n 2.2xi∆n (A) i∆n <30 mA)	0.05xlan	±0.1xIan	
IMPEDANCE	Zline L-L, L-N lpsc	0.00 Ω 9.99 Ω 10.0 Ω 99.9 Ω 100 Ω 999 Ω 1.00 kΩ 9.99 kΩ	0.01 Ω 0.1 Ω 1 Ω 10 Ω	±(5 % of r. + 5 digits) ±(10 % of r.)	
	Zloop L-PE, lpfc	0.00 Ω 9.99 Ω 10.0 Ω 99.9 Ω 100 Ω 99.9 Ω	0.01 Ω 0.1 Ω 1 Ω	±(5 % of r. + 5 digits) ±(10 % of r.)	
		1.00 kΩ 9.99 kΩ	10 Ω	1 (10 /0 01 1.)	
/OLTAGE	TRMS	0 550 V	1 V	±(2 % of r. + 2 digits)	
	Frequency	0.00 Hz 9.99 Hz 10.0 Hz 499.9 Hz	0.01 Hz 0.1 Hz	±(0.2 % of r. + 1 digits)	
EARTH RESISTANCE	3 wire	0.00 Ω 19.99 Ω 20.0 Ω 199.9 Ω 200.0 Ω 9999 Ω	0.01 Ω 0.1 Ω 1 Ω	±(5 % of r. + 5 digits)	
GENERAL	Power supply	9 VDC (6x1.5 V battery or accu, size A	9 VDC (6x1.5 V battery or accu, size AA)		
	Overvoltage category	CAT II / 1000 VDC; CAT III / 600 V; CAT	CAT II / 1000 VDC; CAT III / 600 V; CAT IV / 300 V		
	Protection class	Double insulation			
	COM port	BT, USB, RS232			
	Weight	1.3 kg			

STANDARD SET

MI 3100 SE

- Instrument EurotestEASI
- Schuko-plug test cable, 1.5 m

- Test lead, 3 x 1.5 m
 Test probe, 3 pcs (blue, black, green)
 Crocodile clip, 3 pcs (blue, black, green)
 Power supply adapter + 6 NiMH rechargeable batteries, size AA

 • RS232 - PS/2 cable
- USB cable

- Soft carrying neck belt
- Soft carrying bag
 PC Software EuroLink PRO
 Short instruction manual
- Instruction manual on storage media
- Handbook on storage media
- Calibration certificate



Multifunctional installation testers MI 3125BT EurotestCOMBO



The MI 3125BT EurotestCOMBO performs all the necessary tests for installation safety testing on TT and TN systems. The large graphic display with backlight offers easy reading of results, indications, measurement parameters and messages. Two LED Pass/Fail indicators are placed on both sides of the LCD. MI 3125BT EurotestCOMBO contains integrated characteristics of fuses and RCDs (including B type) for the evaluation of test results. Each test has its own individual help screen describing how to connect the instrument into the installation and how to perform a measurement. All the results can be quickly saved and referenced on the instrument and then downloaded via the EuroLink PRO software, included in the standard set, to the computer for evaluation and report generation after testing. MI 3125BT EurotestCOMBO performs continuity, insulation, RCD, loop, line, voltage, frequency, earth resistance testing and phase sequence tests required by the EN 61557 standard.

MEASURING FUNCTIONS

- · Insulation resistance with DC voltage;
- Continuity of PE conductors with 200 mA test current with polarity change;
- Continuity of PE conductors with 7 mA test current (continuous measurement) without RCD tripping;
- Line impedance;
- · Loop impedance;
- Loop impedance with Trip Lock RCD function;
- TRMS voltage and frequency;
- Phase sequence;
- RCD testing (general and selective, type AC, A and B);
- Earth resistance (3-wire method).

KEY FEATURES

- LED Pass/Fail indicators: two LED indicators for PASS / FAIL evaluation of test results are placed on both sides of the LCD
- Help screens: instrument comes complete with built-in help screens for referencing on site.
- Earth resistance measurement: instrument performs 3-wire earth resistance testing with two additional rods
- Built-in fuse tables: this unique feature allows automatic evaluation of the

line / loop impedance compared to the regulations.

- Online voltage monitoring: monitors all 3 voltages in real-time.
- Upgradeable: if changes occur to the regulations, upgrades can be made to the firmware to keep the instrument up to date
- **Polarity swap:** automatic polarity reversal on continuity test.
- Insulation range: wide range of insulation test voltages from 50 V to 1000 V, reading up to 1000 M Ω .
- **Trip Lock function:** Zs (RCD) function performs a loop impedance test without tripping the RCD.
- Multi-system testing: tests on single and multiphase TT and TN systems.
- Built-in charger & rechargeable
 batteries: unit has a built-in charging
 circuit and comes complete with a set of
 rechargeable NiMH batteries.
- RCD auto: automated RCD testing procedure significantly reduces test time.
- · B type RCD testing is supported.
- BT connectivity: it enables BT communication with Android tablets and smart phones via built-in BT.
- PC SW Eurolink PRO included in the standard set enables downloading of test results and parameters and creation of test reports.

APPLICATION

- Initial and periodic testing of domestic and industrial installations:
- Testing of single and multiphase systems;
- Testing of TT and TN systems.

STANDARDS

Functionality

IEC/EN 61557

Other reference standards for testing

- VDE 0413;
- IEC/EN 61008;
- IEC/EN 61009;
- IEC/EN/HD 60364;
- HD 384; BS 7671;
- IEC/TR 60755;
- CEI 64.8;
- AS/NZ 3760;
- AS/NZ 3018

Electromagnetic compatibility

- IEC/EN 61326-1;
- IEC/EN 61326-2-2

Safety

- IEC/EN 61010-1;
- IEC/EN 61010-031

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FUNCTION	Measuring range	Resolution	Accuracy
nsulation resistance (EN 61557-2)	U = 50, 100, 250 VDC: R: 0.00 MΩ 19.99 MΩ 20.0 MΩ 99.9 MΩ	0.01 MΩ 0.1 MΩ	±(5 % of reading + 3 digits) ±10 % of reading
	100.0 MΩ 199.9 MΩ U = 500 VDC, 1 kVDC: R: 0.00 MΩ 19.99 MΩ 20.0 MΩ 99.9 MΩ	0.1 MΩ 0.01 MΩ 0.1 MΩ	±20 % of reading ±(5 % of reading + 3 digits) ±5 % of reading
	200 ΜΩ 999 ΜΩ	1 ΜΩ	±10 % of reading
Continuity 200 mA of PE conductor with polarity change (EN 61557-4)	0.00 Ω 19.99 Ω 20.0 Ω 199.9 Ω 200 Ω 1999 Ω	0.01 Ω 0.1 Ω 1 Ω	±(3 % of reading + 3 digits) ±5 % of reading ±5 % of reading
Low resistance continuity measurement, test current 7 mA (Continuous measurement)	0.0 Ω 19.9 Ω 20 Ω 1999 Ω	0.1 Ω 1 Ω	±(5 % of reading + 3 digits) ±(5 % of reading + 3 digits)
Loop impedance (EN 61557-3)	0.00 Ω 9.99 Ω 10.0 Ω 99.9 Ω 100 Ω 999 Ω 1.00 kΩ 9.99 kΩ	0.01 Ω 0.1 Ω 1 Ω 10 Ω	±(5 % of reading + 5 digits) ±(5 % of reading + 5 digits) ±10 % of reading ±10 % of reading
Line impedance (EN 61557-3)	0.00 Ω 9.99 Ω 10.0 Ω 99.9 Ω 100 Ω 999 Ω 1.00 kΩ 9.99 kΩ	0.01 Ω 0.1 Ω 1 Ω 10 Ω	±(5 % of reading + 5 digits) ±(5 % of reading + 5 digits) ±10 % of reading ±10 % of reading
Voltage drop	0.0 % 99.9 %	0.1 %	Consider accuracy of line impedance
Voltage	0 V 550 V	1 V	±(2 % of reading + 2 digits)
requency	0.00 Hz 9.99 Hz 10.0 Hz 499.9 Hz	0.01 Hz 0.1 Hz	±(0.2 % of reading + 1 digits)
Phase sequence (EN 61557-7)	1.2.3 or 3.2.1		
RCD testing (EN 61557-6)	IΔN: 10 mA, 30 mA, 100 mA, 300 mA, 500 m/	A, 1 A	
Contact voltage UC	0.0 V 19.9 V 20.0 V 99.9 V	0.1 V 0.1 V	(-0 % / +15 %) of reading ±10 digits (-0 % / +15 %) of reading
- Trip-out time	0 ms 40.0 ms 0 ms max. time	0.1 ms 0.1 ms	±1 ms ±3 ms
- Trip-out current	0.2 x $\mid \Delta N \dots 1.1 x \mid \Delta N \text{ (AC type)}$ 0.2 x $\mid \Delta N \dots 2.2 x \mid \Delta N \text{ (A type, } \mid \Delta N < 30 \text{ mA)}$ 0.2 x $\mid \Delta N \dots 1.5 x \mid \Delta N \text{ (A type, } \mid \Delta N ≥ 30 \text{ mA)}$ 0.2 x $\mid \Delta N \dots 2.2 x \mid \Delta N \text{ (B type)}$	0.05 x IΔN 0.05 x IΔN 0.05 x IΔN 0.05 x IΔN	$\pm 0.1 \times \Delta N$ $\pm 0.1 \times \Delta N$ $\pm 0.1 \times \Delta N$ $\pm 0.1 \times \Delta N$
Earth resistance (EN 61557-5)	0.00 Ω 19.99 Ω 20.0 Ω 199.9 Ω 200 Ω 9999 Ω	0.01 Ω 0.1 Ω 1 Ω	±(5 % of reading + 5 digits) ±(5 % of reading + 5 digits) ±(5 % of reading + 5 digits)
Power supply	6 x 1.2 V rechargeable batteries, type AA		
Overvoltage category	CAT III / 600 V; CAT IV / 300 V		
Protection class	Double insulation		
COM port	RS232 and USB		
Dimensions	140 x 80 x 230 mm		
Weight	1.0 kg		

STANDARD SET

MI 3125 BT

- Instrument EurotestCOMBO
- Set of carrying straps
- Test lead, 3 x 1.5 m
- Schuko-plug test cable, 1.5 m
- Test probe, 3 pcs (blue, black, green)
- Crocodile clip, 3 pcs (blue, black, green)
- Power supply adapter + 6 NiMH rechargeable batteries, type AA
- USB cable

- RS232 PS/2 cable
- PC SW EuroLink PRO
- Short instruction manual
- Instruction manual and handbook on storage media
- Calibration certificate



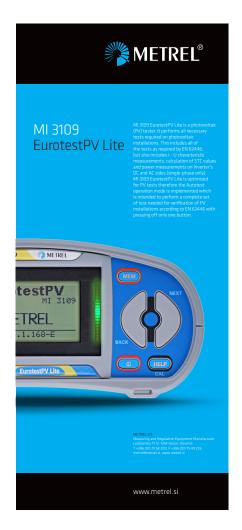
Picture of MI 3125 BT se



MI 3108 EurotestPV

MI 3108 EurotestPV is a combined photovoltaic tester and electrical installations safety tester. It enables complete testing of electrical installations according to EN 61557 standards and in addition performs all necessary tests required on single-phase photovoltaic (PV) installations. This includes all of the tests as required by EN 62446, but also includes I - U characteristic, Calculation of STC values and power measurements on Inverter's DC and AC sides. The unit is designed for the demanding working conditions (up to 1000 V, with 15 A DC). To greatly improve user safety the MI 3108 EurotestPV comes with the PV Safety Probe which ensures safe disconnection every time.







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Photovoltaic and electrical installations tester Selection Guide for Photovoltaic and Electrical installations Testers

FEATURES	Description	MI 3108 EurotestPV	MI 3109 EurotestPV Lite
			3 CALLES
ELECTRICAL	Insulation resistance up to 1000 V	•	•
INSTALLATION SAFETY	Continuity 200 mA	•	•
	Line / Loop Impedance	•	
	RCD A, AC, B	•	
	Earth resistance	•	
	Rotary field	•	
PV GENERATOR	Isc, Uoc	1000 V / 15 A	1000 V / 15 A
MEASUREMENTS	Automatic test sequence		•
	I-V curve	•	•
	Umpp, Impp, Pmax	•	•
	extrapolation to STC	•	•*
	Rs (calculated in PC SW)	•	•
ENVIRONMENT	Irradiance	•	•*
MEASUREMENTS	Module temperature	•	•*
PV SYSTEM POWER	DC side measurements U, I, P	•	•
MEASURENMENTS	AC side measurements (single phase) U, I, P	•	•
	PV and inverter energy conversion efficiency	•	•
EXTENDED POWER	P, Q, S, THDU, PF/cos fi	•	
FUNCTIONALITY	AC/DC current	•	
	Scope function	•	
	Energy	•	
	Harmonics (up to 11 th)	•	
GENERAL DATA	Memory size	I-V curve: ca. 500 meas. Other: ca 1800 meas.	
	Supply	6 x AA	
	Built-in battery charger	•	•
	Display	128 x 64 BW LCD	
	Overvoltage category	CAT II / 1000 V DC CAT III / 600 V CAT IV / 300 V	
	PC connectivity	•	•
	PC Software	EuroLink PRO	EuroLink PRO
	Weight (kg)	1.3	1.3
	Dimensions (mm)	230 x 103 x 115	230 x 103 x 115

^{*} Environment data can be entered manually or measured with optional accessory

Photovoltaic and electrical installations tester MI 3108 EurotestPV



MI 3108 EurotestPV is a combined photovoltaic tester and electrical installations safety tester. It enables complete testing of electrical installations according to EN 61557 standards and in addition performs all necessary tests required on single-phase photovoltaic (PV) installations. This includes all of the tests as required by EN 62446, but also includes I - U characteristic, Calculation of STC values as required by EN 61829 and power measurements on Inverter's DC and AC sides. The unit is designed for the demanding working conditions (up to 1000 V, with 15 A DC). To greatly improve user safety the MI 3108 EurotestPV comes with the PV Safety Probe which ensures safe disconnection every time.

MEASURING FUNCTIONS

Photovoltaic installations:

- · Measurements on DC side of PV installation:
- Voltage, current, power;
- Uoc (Open Circuit Voltage) and Isc (Short Circuit Current);
- I U curve of PV modules and strings;
- Irradiance;
- · Module temperature.
- · Measurements on AC side of PV installation:
- Voltage, current, power;
- Efficiency of PV module, inverter, PV system calculation.

Electrical installations:

- Insulation resistance;
- Continuity of PE conductors;
- Line impedance;
- Loop impedance (sub-functions with high current and without RCD tripping);
- RCD testing (type AC, A and B);
- Earth resistance;
- AC current (load and leakage);
- TRMS voltage, frequency, phase sequence;
- · Power, energy, harmonics.

KEY FEATURES

Photovoltaic installations:

 Calculation of STC values: the measured current and voltage values are, according to environment conditions, recalculated to Standard Test Condition values which makes possible, to compare the results even if they were taken under different test conditions.

- Graphical representation: the I-V characteristic of PV module or string is graphically represented on LCD display.
- Power and efficiency measurements: 2 voltage & 2 current channels for simultaneous AC & DC parameters measurements.
- PV Remote Unit: Optional unit for simultaneous measurements of solar irradiation and temperature of PV module.

Electrical installations

- **RCD Auto:** Automated RCD testing procedure significantly reduces test time.
- Trip Lock function: Loop impedance test are performed without tripping the RCD.
- **B type RCD testing:** is supported.
- Earth resistance measurement: instrument supports 3-wire earth resistance testing
- Built-in fuse tables: for automatic evaluation of the line / loop impedance
- **Online voltage monitoring:** monitors all 3 voltages in real time.
- Scope function: real-time U/I scope.
- Harmonics analysis: 1-phase power and energy measurements with up to 11th harmonics analysis is supported.
- Memory: Up to 1800 test results or up to 500 graphical results with timestamp can be stored in internal memory.
- BT connectivity: it enables BT communication with Android tablets and

- smart phones via optional BT dongle.
- Android application: enables advanced data management APP EuroLink PV and EuroLink Android.
- PC SW EuroLink PRO enables downloading, uploading, review, analyses and printing of test results.

APPLICATION

- Testing, evaluations and troubleshooting of photovoltaic installations.
- Power and energy efficiency measurements (AC and DC).
- Initial and periodic testing of domestic and industrial single and three-phase electrical installations.

STANDARDS

Functionality

- IEC/EN 61557 series;
- IEC 62446 (photovoltaics);
- IEC 61829.

Other reference standards for testing

- BS 7671;
- EN 61008;
- EN 61009;
- EN 60364-4-41;
- AS/NZ 3017

Electromagnetic compatibility

• EN 61326

Safety

- EN 61010-1;
- EN 61010-2-030;
- EN 61010-031;
- EN 61010-2-032

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PHOTOVOLTAIC INSTALLATION MEASUREMENTS

Function	Measuring range	Basic accuracy	
Voltage	0 VDC 999 VDC	±(1 % of reading + 2 digits)	
	0 VAC 999 VAC	±(1.5 % of reading + 3 digits)	
	I-V m.: 0 VDC 999 VDC	±(1 % of reading + 2 digits)	
Current	Panel m.: 0.0 mA 300 ADC	±(1 % of reading + 2 digits)	
	Invert. m.: 0.0 mA 300 AAC	±(1.5 % of reading + 3 digits)	
	I-V m.: 0.00 A 15 ADC	±(1 % of reading + 2 digits)	
Power	Panel m.: 0 999 kW	±(2.5 % of reading + 6 digits)	
	I-V m.: 0 14.99 kW	±(2 % of reading + 3 digits)	
U / I curve	1000 V / 15 A / 15 kW		
Irradiation	000 1.75 kW/m²	±(4 % of reading + 5 digits)	
Temperature	-10.0 °C + 85.0 °C	± 5 digits	

ELECTRICAL INSTALLATION MEASUREMENTS

Function	Measuring range	Basic accuracy	
Insulation resistance (EN 61557-2)	U = 50, 100, 250 VDC:		
	R: up to 199.9 MΩ	±(5 % of reading + 3 digits)	
	U = 500 VDC, 1 kVDC:		
	R: up to 999 MΩ	±(5 % of reading + 3 digits)	
Continuity, 200 mA (EN 61557-4)	0.00 Ω 1999 Ω	±(3 % of reading + 3 digits)	
Continuity, 7 mA	0.0 Ω 1999 Ω	±(5 % of reading + 3 digits)	
Loop impedance (EN 61557-3)	0.00 Ω 9.99 kΩ	±(5 % of reading + 5 digits)	
Line impedance (EN 61557-3)	0.00 Ω 9.99 kΩ	±(5 % of reading + 5 digits)	
Voltage	0 VAC 550 VAC	±(2 % of reading + 2 digits)	
Frequency	0.00 Hz 499.9 Hz	±(0.2 % of reading + 1 digits)	
Phase sequence (EN 61557-7)	1.2.3 or 3.2.1		
RCD testing (EN 61557-6)	I∆N: 10 mA, 30 mA, 100 mA, 300 mA, 500	$I\Delta N$: 10 mA, 30 mA, 100 mA, 300 mA, 500 mA, 1 A	
Contact voltage UC	0.0 V 99.9 V	(-0 % / +15 %) of reading	
Trip-out time	0 ms 40 ms	±1 ms	
Trip-out current	0.2 x IΔN 2.2 x IΔN	±0.1 x ΙΔΝ	
Earth resistance (EN 61557-5)	0.00 Ω 9999 Ω	±(5 % of reading + 5 digits)	
Energy	0.000 Wh - 1999 kWh		
Harmonics	up to 11th		

General	Main unit	Remote unit	
Display	128 x 64 dots matrix display with backlight	128 x 64 dots matrix display with backlight	
Power supply	6 x 1.2 V NiMH batteries, type AA	6 x 1.2 V NiMH batteries, type AA	
Overvoltage category CAT II / 1000 VDC; CAT III / 600 V; CAT IV / 300 V			
Protection class	double insulation		
COM port	RS232 and USB	RS232	
Dimensions	230 x 103 x 115 mm	140 x 230 x 80 mm	
Weight	1.3 kg	1.0 kg	

STANDARD SET

MI 3108 ST

- Instrument MI 3108 EurotestPV
- Soft carrying bag, 2 pcs
- Schuko-plug test cable
- Test lead, 3 x 1.5 m
- Test probe, 4 pcs (red, green, blue, black)
- Crocodile clip, 3 pcs (red, green, blue, black)
- PV Safety Probe
- PV MC3/4 male/female adapters
- AC/DC current clamp
- PV Reference Cell

- Temperature probe
- USB and RS232 PS/2 cable
- Power supply adapter + 6 NiMH batteries, type AA
- PC SW EuroLink PRO
- Set of carrying straps
- Short instruction manual
- Instruction manual and handbook on storage media
- Calibration certificate

MI 3108 PS

- MI 3108 ST
- EurotestPV Remote
- Tip commander
- PC SW EuroLink PRO Plus licence



Picture of MI 3108 PS set

Photovoltaic and electrical installations tester MI 3109 EurotestPV Lite



MI 3109 EurotestPV Lite is a photovoltaic (PV) tester. It performs all necessary tests required on photovoltaic installations. This includes all of the tests as required by EN 62446, but also includes I - U characteristic measurements, calculation of STC values as required by EN 61829 and power measurements on Inverter's DC and AC sides (single-phase only). MI 3109 EurotestPV Lite is optimized for PV tests therefore the Autotest operation mode is implemented which is intended to perform a complete set of test needed for verification of PV installations according to EN 62446 with pressing off only one button. With this instrument the tests for the first inspection of PV systems as well as periodic maintenance tests, evaluation tests or troubleshooting tests are possible. With optional accessories the same PV test functionality as with MI 3108 EurotestPV is available.

MEASURING FUNCTIONS

Photovoltaic installations:

- Measurements on DC side of PV installation:
- Insulation resistance;
- Continuity of PE conductors;
- Uoc (Open Circuit Voltage) and Isc (Short Circuit Current);
- I U curve of PV modules and strings;
- Voltage, current and power of strings and inverters;
- Irradiance;
- Module temperature.
- Measurements on AC side of PV installation:
- Voltage, current, power;
- Efficiency of PV module, inverter, PV system calculation.

KEY FEATURES

- Insulation and I-U curve measurements in one instrument: with MI 3109 only one instrument is needed to perform insulation measurements with up to 1000V for proofing the PV installation safety and I-U curve measurements needed for evaluation and troubleshooting of PV modules or strings.
- Autotest: This function is intended to perform a complete set of tests according to EN 62446 on PV modules or strings with pressing only one button:
- insulation resistance between positive output and earth;

- insulation resistance between negative output and earth;
- · open circuit voltage;
- short circuit current.
- Calculation to STC values: the measured current and voltage values are, according to environment conditions, recalculated to Standard Test Condition values which makes possible to compare the results of different measurements even if they were taken under different test conditions.
- Efficiency calculations: 2 voltage & 2 current channels for simultaneous AC & DC parameters measurements.
- PV Remote Unit: Optional unit for simultaneous measurements of solar irradiation and temperature of PV module.
- Graphical representation of module's
- I U curve: the I-V characteristic of PV module or string is graphically represented on LCD display.
- **Memory:** Up to 1800 test results or up to 500 graphical results with timestamp can be stored in internal memory.
- BT connectivity: it enables BT communication with Android tablets and smart phones via optional BT dongle.
- Android application: enables advanced data management APP EuroLink PV.
- PC SW EuroLink PRO enables downloading, uploading, review, analyses and printing of test results.

APPLICATION

- · First inspection Testing.
- Periodic maintenance tests.
- Evaluation and troubleshooting of photovoltaic installations.
- Power and efficiency measurements (AC and DC).

STANDARDS

Functionality

- IEC/EN 61557 series;
- IEC 62446 (photovoltaics);
- IEC 61829.

Electromagnetic compatibility

• EN 61326

Safety

- EN 61010-1;
- EN 61010-2-030;
- EN 61010-031;
- EN 61010-2-032

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Function	Measuring range	Basic accuracy
Voltage	0 VDC 999 VDC	±(1 % of reading + 2 digits)
	0 VAC 999 VAC	±(1.5 % of reading + 3 digits)
	I-V m.: 0 VDCC 999 VDC	±(1 % of reading + 2 digits)
Current	Panel m.: 0.0 mA 300 ADC	±(1 % of reading + 2 digits)
	Invert. m.: 0.0 mA 300 AAC	±(1.5 % of reading + 3 digits)
	I-V m.: 0.00 A 15 ADC	±(1 % of reading + 2 digits)
Power	Panel m.: 0 199.9 kW	±(2.5 % of reading + 6 digits)
	I-V m.: 0 14.99 kW	±(2 % of reading + 3 digits)
U / I curve	1000 V / 15 A / 15 kW	
Irradiation	000 1.75 kW/m²	±(4 % of reading + 5 digits)
Temperature	-10.0 °C + 85.0 °C	± 5 digits

ELECTRICAL INSTALLATION MEASUREMENTS				
Function	Measuring range	Basic accuracy		
Insulation resistance (EN 61557-2)	U = 50, 100, 250 VDC:			
	R: up to 199.9 MΩ	±(5 % of reading + 3 digits)		
	U = 500 VDC, 1 kVDC:			
	R: up to 999 MΩ	±(5 % of reading + 3 digits)		
Continuity, 200 mA (EN 61557-4)	0.00 Ω 1999 Ω	±(3 % of reading + 3 digits)		
Continuity, 7 mA	0.0 Ω 1999 Ω	±(5 % of reading + 3 digits)		

General	Main unit	Remote unit 128 x 64 dots matrix display with backlight	
Display	128 x 64 dots matrix display with backlight		
Power supply	6 x 1.2 V NiMH batteries, type AA	6 x 1.2 V NiMH batteries, type AA	
Overvoltage category	CAT II / 1000 VDC; CAT III / 600 V; CAT IV / 300 V		
Protection class	double insulation	double insulation	
COM port	RS232 and USB	RS232	
Dimensions	230 x 103 x 115 mm	140 x 230 x 80 mm	
Weight	1.3 kg	1.0 kg	

STANDARD SET

MI 3109 ST

- Instrument MI 3109 EurotestPV Lite
- Soft carrying bag
- Universal PV test lead, 3 x 1.5 m
- PV Continuity test lead, 3 x 1.5 m
 Test probe, 3 pcs (red, blue, green)
- Crocodile clip, 3 pcs (red, blue, green) • PV MC3/4 male/female adapters
- AC/DC current clamp
 Power supply adapter + 6 NiMH batteries, type AA
 USB and RS232 PS/2 cable
 PC SW EuroLink PRO

- Carrying strap
- Short instruction manual
- Instruction manual and handbook on storage media
- Calibration certificate

MI 3109 PS

- MI 3109 STEurotestPV Remote
- PV Safety Probe
- PV Reference Cell
- Temperature probe
- Soft carrying bagPC SW EuroLink PRO Plus licence



Single-functional Testers Selection Guide for Single-functional Testers

FEATURES	Description	MI 3121 Insulation / Continuity	MI 3122 Z Line-Loop / RCD
			3 to 10
NSULATION	Insulation resistance	•	
	Test voltage (VDC)	50 1000	
	Insulation resistance measuring range	up to 30 GΩ	
CONTINUITY AND LOW	Continuity of PE conductor with automatic polarity change, test current 200mA	•	
MEASUREMENT	Low resistance measurement (continuous measurement), test current 7 mA.	•	
.INE / LOOP	Line impedance with lpsc calculation		•
MPEDANCE	Loop impedance with lpsc calculation		•
	RCD Trip Lock loop impedance		•
	Built-in fuse tables for PASS / FAIL evaluation		•
RCD TESTING	Contact voltage without RCD tripping		•
	RCD trip-out time		•
	RCD trip-out current with rising test current		•
	Automatic testing of RCDs		•
	RCD type (general and selective)		AC / A
OLTAGE,	AC voltage measurement	•	AC / A
REQUENCY			
•	Online voltage monitor		•
NIACE CEOUENCE	Frequency measurement	•	•
PHASE SEQUENCE	L1 - L2 - L3		•
ARTH, CURRENT MEASUREMENTS	Earth resistance 3-(4-)wire method		
	Earth resistance 3-(4-)wire method with additional current clamp		
	Earth resistance measurement with 2 current clamps		
	Specific earth resistance		
	TRMS current		
	TRMS leakage / load current		
T EARTHING SYSTEM	Insulation Monitoring Devices (IMD) testing (IT systems)		
MEASUREMENTS	First fault leakage current (ISFL) measurement (IT systems)		
	Predefined mini Autosequences		
OTHER EATURES	Varistor test		
LATURES	Nominal frequency range	15 Hz 500 Hz	15 Hz 500 Hz
	PASS / FAIL evaluation of test results	•	•
	Touch electrode		•
	Help menu		•
OMMUNICATION PORTS	RS232	•	•
	USB	•	•
MEMORY, OFTWARE	Memory		•
I I I VVARE	Number of memory levels / memory locations	2 / 1500	3 / 1500
	Professional PC SW	Option	Option
	Advanced PC SW	Option	Option
GENERAL DATA	Safety category	CAT III / 600 V CAT IV / 300 V	CAT III / 600 V CAT IV / 300 V
	Batteries	6 x AA	6 x AA
	Built-in battery charger	•	•
	Weight	850 g	930 g
	Dimensions (mm)	140 x 80 x 230	140 x 80 x 230

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MI 3123 Earth / Clamp	MI 3110 EurotestiM	MI 2088 Earth Insulation
Earth / Clamp	Eurotestim	Earth Insulation
Disselve CATH		
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•	•	•
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3 / 1500	3 / 500	2 / 1000
Option	•	•
Option	Option	
CAT IV / 50 V	CAT III / 600 V	CAT III / 300 V
	CAT IV / 300 V	CAT II / 600 V
6 x AA	6 x AA	4 x CC
050	4.74	•
850 g	1.31	1.7
140 x 80 x 230	230 x 103 x 115	265 x 110 x 1185

Single-functional testers MI 3121 SMARTEC Insulation / Continuity



The MI 3121 SMARTEC Insulation / Continuity is a new generation tester for dead testing of electrical installations. With both an analogue and digital representation of the results, the instrument ensures accurate measurements up to 2000 Ω on continuity and up to 30 GΩ on insulation function. Configurable limits enable a PASS / FAIL evaluation of test results, which is accompanied with the bright red and green indicator lights for comfortable use even in the dark conditions. The MI 3121 is equipped with a built-in charger and has a magnetic holder in order to free up hands for testing. All the results can be quickly saved on the instrument and then downloaded via the optional A 1291 EuroLink PRO or A 1290 EuroLink PRO Plus software for evaluation and professional report generation after testing. The MI 3121 SMARTEC Insulation / Continuity performs continuity, insulation AC voltage and frequency measurement tests.

MEASURING FUNCTIONS

- Insulation resistance with DC voltage;
- Continuity of PE conductors with 200 mA test current with polarity change;
- Continuity of PE conductors with 7 mA test current (continuous measurement) without RCD tripping;
- TRMS voltage and frequency.

KEY FEATURES

- Insulation range: wide range of insulation test voltages from 50 V to 1000 V, measuring range up to 30 GΩ.
- Analogue scale and digital LCD: measuring results are displayed both in numeric and analogue representation.
- **Downloadable:** downloads via RS232 or USB cable directly to the PC with the help of the optional software.

- Upgradeable: if changes occur to the regulations upgrades can be made to the firmware to keep the instrument up to date.
- Polarity swap: automatic polarity reversal on continuity test.
- Built-in charger & rechargeable
 batteries: instrument has a built-in charging circuit and comes complete with a set of rechargeable NiMH batteries.
- Custom limits: if limits are set on insulation or continuity function then large green and red lights of the LEDs will indicate a PASS or FAIL evaluation of test result.
- Easy to use: large bright LCD display and large buttons enable easy handling of the instrument (even while wearing gloves).
- Magnetic holder: magnet for fixing instrument on metal surfaces enables hands-free operation.

APPLICATION

- Domestic dead circuit testing;
- · Industrial dead circuit testing;
- Telecommunication systems testing;
- Resistance measurements.

STANDARDS

Functionality

• IEC/EN 61557

Other reference standards for testing

- IEC/EN/HD 60364;
- AS/NZ 3018;
- CEI 64.8;
- HD 384;BS 7671;
- VDE 0413

Electromagnetic compatibility

- IEC/EN 61326-1;
- IEC/EN 61326-2-2

Safety

- IEC/EN 61010-1;
- IEC/EN 61010-031

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FUNCTION	Measuring range	Resolution	Accuracy		
Insulation resistance (EN 61557-2)	U = 500, 1000 VDC:				
	R: 0.00 MΩ 19.99 MΩ	0.01ΜΩ	±(5 % of reading + 3 digits)		
	20.0 ΜΩ 199.9 ΜΩ	0.1ΜΩ	±5 % of reading		
	200 ΜΩ 999 ΜΩ	1 ΜΩ	±5 % of reading		
	1.00 GΩ 4.99 GΩ	10 MΩ	±10 % of reading		
	5.00 GΩ 19.99 GΩ	10 MΩ	±20 % of reading		
		100 ΜΩ	Indicator only		
	U = 50, 100, 250 VDC:				
			±(5 % of reading + 3 digits)		
			±10 % of reading		
	100.0 ΜΩ 199.9 ΜΩ	0.1 ΜΩ	±20 % of reading		
Continuity 200 mA of PE conductor	0.00 Ω 19.99 Ω	0.01 Ω	±(3 % of reading + 3 digits)		
with polarity change (EN 61557-4)	20.0 Ω 199.9 Ω	0.1 Ω	±5 % of reading		
	200 Ω 1999 Ω	1Ω	±10 % of reading		
Low resistance measurement with 7 mA test current	0.0 Ω 19.9 Ω	0.1 Ω	±(5 % of reading + 3 digits)		
(continuous measurement)	20 Ω 1999 Ω	1 Ω	±10 % of reading		
Voltage	0.0 V 99.9 V	0.1 V	±(3 % of reading + 3 digits)		
	100 V 550 V	1 V			
Frequency	0.00 Hz 19.99 Hz	0.01 Hz	±(0.2 % of reading + 1 digits)		
	20.0 Hz 199.9 Hz	0.1 Hz			
	200 Hz 500 Hz	1 Hz			
Power supply	6 x 1.2 V rechargeable batteries, type AA				
Overvoltage category	CAT III / 600 V; CAT IV / 300 V				
Protection class	Double insulation				
COM port	RS232 and USB	0.0 MΩ 99.9 MΩ			
Dimensions	140 x 230 x 80 mm	20.0 GΩ 29.9 GΩ			
Weight	0.85 kg				

STANDARD SET

MI 3121

- MI 3121
 Instrument Smartec Insulation / Continuity
 Soft hand strap
 Test lead, 2 x 1.5 m
 Test probe, 2 pcs (black, red)
 Crocodile clip, 2 pcs (black, red)
 Power supply adapter + 6 NiMH rechargeable batteries, type AA
 Instruction manual on storage media

- Short instruction manual
- Handbook on storage media
- Calibration certificate



Single-functional testers MI 3122 SMARTEC Z Line-Loop / RCD



The MI 3122 SMARTEC Z Line-Loop / RCD is designed specifically for live circuit testing. The instrument contains integrated characteristics of fuses and RCDs for the evaluation of test results. The online voltage monitoring system allows the operator to control what is happening on three simultaneous voltages in real-time. The bright red and green PASS / FAIL lights and help screens for each measurement make the handling of the instrument easy and clear. All the results can be quickly saved on the instrument and then downloaded via the optional A 1291 EuroLink PRO or A 1290 EuroLink PRO Plus software for evaluation and professional report generation after testing. The MI 3122 SMARTEC Z Line-Loop / RCD performs RCD, loop, line, AC voltage, frequency and phase sequence tests required by the EN 61557 standard

MEASURING FUNCTIONS

- · Line impedance;
- · Loop impedance;
- Loop impedance with Trip Lock RCD function;
- TRMS voltage and frequency;
- · Phase sequence;
- RCD testing (general and selective, type AC and A).

KEY FEATURES

- Help screens: instrument comes complete with built-in help screens for referencing on site.
- LED Pass/Fail indicators: two LED indicators for PASS / FAIL evaluation of test results are placed on both sides of the LCD.
- Built-in fuse tables: this unique feature allows automatic evaluation of the line / loop impedance compared to the regulations.

- Online voltage monitoring: monitors all 3 voltages in real-time.
- Downloadable: downloads via RS232 or USB cable directly to the PC with the help of the optional software.
- Upgradeable: if changes occur to the regulations upgrades can be made to the firmware to keep the instrument up to date
- **Trip Lock function:** Zs (RCD) function performs a loop impedance test without tripping the RCD.
- Built-in charger & rechargeable batteries: instrument has a built-in charging circuit and comes complete with a set of rechargeable NiMH batteries.
- RCD auto: automated RCD testing procedure significantly reduces test time.
- Easy to use: large bright LCD display and large buttons enable easy handling of the instrument (even while wearing gloves).
- Magnetic holder: magnet for fixing instrument on metal surfaces enables hands-free operation.

APPLICATION

- Domestic and Industrial live circuit testing;
- Testing of single phase and 3-phase, TT and TN systems.

STANDARDS

Functionality

• IEC/EN 61557

Other reference standards for testing

- IEC/EN/HD 60364;
- IEC/EN 61008;
- IEC/EN 61009;
- IEC/EN/TR 60755;
- AS/NZ 3760;
- AS/NZ 3018;
- CEI 64.8;
- HD 384;
- BS 7671;
- VDE 0413

Electromagnetic compatibility

- IEC/EN 61326-1;
- IEC/EN 61326-2-2

Safety

- IEC/EN 61010-1;
- IEC/EN 61010-031

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FUNCTION	Measuring range	Resolution	Accuracy					
RCD testing (EN 61557-6)	IΔN: 10 mA, 30 mA, 100 mA, 300 mA, 500	$I\Delta N$: 10 mA, 30 mA, 100 mA, 300 mA, 500 mA, 1 A						
- Scaling factor for I∆N	x 0.5; x 1; x 2; x 5							
- Contact voltage UC	0.0 V 19.9 V 20.0 V 99.9 V	0.1 V 0.1 V	(-0%/+15%) of reading ± 10 digits (-0%/+15%) of reading					
- Trip-out current	$(0.2 1.1) \times I\Delta N$ (AC type) $(0.2 1.5) \times I\Delta N$ (A type, $I\Delta N \ge 30$ mA) $(0.2 2.2) \times I\Delta N$ (A type, $I\Delta N < 30$ mA)	0.05 x I∆N 0.05 x I∆N 0.05 x I∆N	± 0.1x ΙΔΝ ± 0.1x ΙΔΝ ± 0.1x ΙΔΝ					
- Trip-out time	0.0 ms 40.0 ms 0.0 ms max. time	0.1 ms 0.1 ms	± 1 ms ± 3 ms					
Loop impedance (EN 61557-3)	0.00 Ω 9.99 Ω 10.0 Ω 99.9 Ω 100 Ω 999 Ω 1.00 kΩ 9.99 kΩ	$\begin{array}{ccc} 0.01\Omega & \pm (5~\% \ of \ reading \\ 0.1\Omega & \pm (5~\% \ of \ reading \\ 1~\Omega & \pm 10~\% \ of \ reading \\ 10~\Omega & \pm 10~\% \ of \ reading \\ \end{array}$						
Line impedance (EN 61557-3)	0.00 Ω 9.99 Ω 10.0 Ω 99.9 Ω 100 Ω 999 Ω 1.00 kΩ 9.99 kΩ	0.01 Ω 0.1 Ω 1 Ω 10 Ω	±(5 % of reading + 5 digits) ±(5 % of reading + 5 digits) ±10 % of reading ±10 % of reading					
Voltage	0 V 550 V	1 V	±(2 % of reading + 2 digits)					
Frequency	15.0 Hz 499.9 Hz	0.1 Hz	±(0.2 % of reading + 1 digit)					
Phase sequence (EN 61557-7)	1.2.3 or 3.2.1							
Power supply	6 x 1.2 V rechargeable batteries, type AA							
Overvoltage category	CAT III / 600 V; CAT IV / 300 V							
Protection class	Double insulation							
COM port	RS232 and USB							
Dimensions	140 x 230 x 80 mm							
Weight	0.93 kg							

STANDARD SET

MI 3122

- Instrument Smartec Z Line Loop / RCD

- Instrument Smartec 2 Line Loop / RCD
 Soft hand strap
 Schuko-plug test cable
 Test lead, 3 x 1.5 m
 Test probe, 3 pcs (blue, black, green)
 Crocodile Cilp, 3 pcs (blue, black, green)
 Power supply adapter + 6 NiMH rechargeable batteries, type AA
- Instruction manual on storage mediaShort instruction manual
- Handbook on storage media
- Calibration certificate



Single-functional testers MI 3123 SMARTEC Earth / Clamp



The MI 3123 SMARTEC Earth / Clamp is a new generation earth resistance tester with the ability to perform 4-wire earth resistance measurement and 4-wire specific earth resistance measurement. With the optional A 1018 and A 1019 current clamps the instrument can perform 4-wire earth resistance measurement with one current clamp, contactless earth resistance testing with two clamps and TRMS current measurement up to 20 A. Configurable limits enable a PASS / FAIL evaluation of test results. All the results can be saved on the instrument and then downloaded via the optional software for evaluation and professional report generation after testing. The lightweight design, large bright LCD screen, built-in help screens, optional downloading via RS232 or USB ports and overvoltage category CAT IV make the MI 3123 an incredible earth resistance measuring instrument.

MEASURING FUNCTIONS

- Earth resistance, 4-wire method;
- Earth resistance, 4-wire method with one current clamp (option);
- Earth resistance, two clamps method (option);
- Specific earth resistance;
- TRMS current (option).

KEY FEATURES

- Earth resistance measurement: instrument performs standard 4-wire earth resistance tests with two earthing rods and specific earth resistance measurement.
- Selective earth resistance test: optional 4-wire earth resistance measurement in combination with an additional current clamp is used for measuring earth resistance of individual earthing rods.
- Contactless earth resistance test: earth resistance measurement with 2 current clamps without breaking the

loop is intended for measuring resistance of individual earthing rods and is recommended first of all for urban areas.

- Downloadable: downloads via RS232 or USB cable directly to the PC with the help of the optional software.
- Upgradeable: if changes occur to the regulations upgrades can be made to the firmware to keep the instrument up to date.
- Help screens: instrument comes complete with built-in help screens for referencing on site.
- Built-in charger & rechargeable batteries: instrument has a built-in charging circuit and comes complete with a set of rechargeable NiMH batteries.
- Custom limits: the limits can be set on any function, in that case large green and red lights of the LEDs will indicate a PASS or FAIL evaluation of test result.
- Easy to use: large bright LCD display and large buttons enable easy handling of the instrument (even while wearing gloves).
- Magnetic holder: magnet for fixing instrument on metal surfaces enables hands-free operation.

APPLICATION

- Testing on TT and IT systems;
- Testing sub-station earthing;
- Lightning system testing.

STANDARDS

Functionality

• IEC/EN 61557

Other reference standards for testing

- IEC/EN/HD 60364;
- AS/NZ 3018;
- CEI 64.8;HD 384;
- BS 7671;
- VDE 0413

Electromagnetic compatibility

- IEC/EN 61326-1;
- IEC/EN 61326-2-2

Safety

- IEC/EN 61010-1;
- IEC/EN 61010-031;
- IEC/EN 61010-2-032

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FUNCTION	Measuring range	Resolution	Accuracy
Earth resistance (4-wire method (EN 61557-5); 4-wire method with one current clamp)	0.00 Ω 19.99 Ω 20.0 Ω 199.9 Ω 200 Ω 1999 Ω 2000 Ω 9999 Ω	0.01 Ω 0.1 Ω 1 Ω 1 Ω	±(3 % of reading + 3 digits) ±(3 % of reading + 3 digits) ±5 % of reading ±10 % of reading
Earth resistance (2 clamps method)	0.00 Ω 19.99 Ω 20.0 Ω 30.0 Ω 30.1 Ω 99.9 Ω	0.01 Ω 0.1 Ω 0.1 Ω	±(10 % of reading + 10 digits) ±20 % of reading ±30 % of reading
Specific earth resistance (EN 61557-5)	0.0 Ωm 99.9 Ωm 100 Ωm 999 Ωm 1.00 kΩm 9.99 kΩm 10.0 kΩm 99.9 kΩm >100 kΩm	0.1 Ωm 1 Ωm 0.01 kΩm 0.1 kΩm 1 kΩm	Calculated value, consider earth resistance 4-wire method
TRMS Current	0.0 mA 99.9 mA 100 mA 999 mA 1.00 A 19.99 A	0.1 mA 1 mA 0.01 A	±(3 % of reading + 3 digits)
Power supply	6 x 1.2 V rechargeable batteries, type A	AΑ	
Overvoltage category	CAT IV / 50 V		
Protection class	Double insulation		
COM port	RS232 and USB		
Dimensions	140 x 230 x 80 mm		
Weight	0.85 kg	<u> </u>	

STANDARD SET

MI 3123

- Instrument Smartec Earth / Clamp
 Soft hand strap
 Test lead, 4.5 m (blue)
 Test lead, 4.5 m (red)
 Test lead, 20 m (green)
 Test lead, 20 m (black)

- Earth test rod, 4 pcs
 Power supply adapter + 6 NiMH rechargeable

- batteries, type AA
 Instruction manual on storage media
- Short instruction manual
- Handbook on storage media
- Calibration certificate



Single-functional testers MI 3110 FurotestIM



The MI 3110 EurotestIM is a perfect tool for testing of permanent integrated or portable Low Voltage Electrical Installa-tions supplied by Generator or Transformer and protected by an IT earthing system. Designed for simple but efficient safety testing of Integrated IT Earthing System powered with LV Generator or Transformer! With a single, pre-programmed AUTO SEQUENCE ° with sub-tests and adjustable limits it is possible to perform all the necessary verifications of safety limits of a specific LV IT installation.

MEASURING FUNCTIONS

- Voltage, frequency and phase sequence.
- Line impedance and prospective short circuit current.
- Voltage drop.
- First fault leakage current (ISFL).
- Testing of insulation monitoring devices (IMD).

KEY FEATURES

- AUTO SEQUENCE *: One single AUTO SEQUENCE * with programmable limits and sub-tests ensuring Safety on all PASS bar-rier parameters.
- **Voltage monitor:** IT System recognizing, Voltage Range and Voltage Balance.
- ISFL test: ISFL Single Fault Leakage current from Phase 1 and Phase 2 to PE. Fuse Trip-out Ability Evaluation, Line Impedance and Ipsc Prospective Short Circuit Current.
- IMD control: IMD Insulation / ELM Earth Leakage / RCM Residual Current Monitor Devices Control.
- IMD adjust: Alarm Trigger or Trip-Out Check and Adjust.

APPLICATION

- Safety and functionality on IT installations in industry, in hospitals;
- Connection of portable power generators;
- Firefighting mobile equipment, generators and pumps;
- Military vehicles and generators;
- · Police vehicles and generators;
- Construction sites and Road maintenance;
- SAT and radio / TV broadcasting mobile equipment;
- Safety and functionality on IT installations on the airports, concert halls, fair locations with generators;
- Marines and ships;
- Mines, other special locations;
- Adjustment and calibrations of IMD devices.

STANDARDS

Functionality

• IEC/EN 61557

Other reference standards for testing

- EN 60364-4-41;
- BS 7671;
- AS/NZS 3017

Electromagnetic compatibility

- IEC/EN 61326-1;
- IEC/EN 61326-2-2

Safety

- IEC/EN 61010 -1;
- EN 61010-2-030;
- EN 61010-031

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FUNCTION	Measuring range	Resolution	Accuracy
Voltage	0 V 550 V	1 V	±(2 % of reading + 2 digits)
Frequency	0.00 Hz 9.99 Hz 10.0 Hz 499.9 Hz	0.01 Hz 0.1 Hz	±(0.2 % of reading + 1 digit)
Phase sequence (EN 61557-7)	1.2.3 or 3.2.1		
Line impedance (EN 61557-3)	0.00 Ω 9.99 Ω 10.0 Ω 99.9 Ω	0.01 Ω 0.1 Ω	±(5 % of reading + 5 digits)
Prospective short-circuit current	0.00 A 0.99 A 1.0 A 99.9 A 100 A 999 A 1.00 kA 99.99 kA 100 kA 199 kA	0.01 A 0.1 A 1 A 10 A 1000 A	Consider accuracy of line resistance measurement
First fault leakage current (ISFL)	0.0 mA 19.9 mA	0.1 mA	±(5 % of reading + 3 digits)
Threshold indicative insulation resistance	5 kΩ 640 Ω	5 kΩ	Indicative values Up to 128 steps
Power supply	6 x 1.2 V rechargeable batteries, type AA		
Overvoltage category	CAT III / 600 V; CAT IV / 300 V		
Protection class	Double insulation		
Dimensions	230 x 103 x 115 mm		
Weight	1.1 kg		

STANDARD SET

MI 3110

- Instrument EurotestIM
- Soft carrying bag
 Mains measuring cable
 Test lead, 3 x 1.5 m
 Test probe, 3 pcs

- rest probe, a pus
 Crocodile clip, 3 pcs
 Set of carrying straps
 RS232-PS/2 cable
- USB cable

- Set of NiMH battery cells
- Power supply adapter
- PC software EuroLink PRO
- Short instruction manual
- Instruction manual on storage media
 Handbook on storage media
- Calibration Certificate



Single-functional testers MI 2088 Earth - Insulation Tester



The MI 2088 Earth - Insulation
Tester is a high professional,
multifunctional, portable test
instrument intended for carrying
out earth resistance, insulation
resistance and continuity
of protection conductors
measurements. The Earth Insulation Tester enables 4-wire
earth resistance measuring
method, 4-wire earth resistance
method in combination with one
clamp, two clamps earth resistance
measurement, 4-wire specific earth
resistance measurement and TRMS
current measurement. Besides the
breakdown voltage of overvoltage
protection devices can be checked by
the instrument. All the results can
be saved on the instrument and then
downloaded with the help of the
EarthLink software to the computer
for evaluation and report generation
after testing. The MI 2088 Earth
- Insulation Tester performs earth
resistance, continuity, insulation and
voltage measurements required by
the EN 61557 standard.

MEASURING FUNCTIONS

- Insulation resistance with DC voltage;
- Continuity of PE conductors with 200 mA test current with polarity change;
- Continuity of PE conductors with 7 mA test current (continuous measurement) without RCD tripping;
- Voltage;
- Earth resistance (4-wire method, one clamp method, two clamps method);
- Specific earth resistance;
- TRMS leakage and load currents (option);
- · Overvoltage protection devices testing.

KEY FEATURES

- · Earth resistance measurement:
- instrument performs 4-wire earth resistance measurement with two additional rods; 4-wire earth resistance measurement in combination with an additional current clamp; earth resistance measurement with 2 current clamps without breaking the loop and 4-wire specific earth resistance measurement.
- Downloadable: downloads via RS232 cable directly to the PC with the help of the software included in the standard set.
- **Polarity swap:** automatic polarity reversal on continuity test.
- Insulation range: wide range of insulation test voltages from 50 V to 1000 V, resistance measuring range up to 30 GΩ.
- PC SW EarthLink included in the standard set enables downloading of test results and parameters and creation of test reports.

APPLICATION

- Initial and periodic testing of domestic and industrial installations;
- Testing of single and multiphase systems;
- Testing of TT and TN systems.

STANDARDS

Functionality

• IEC/EN 61557

Other reference standards for testing

- IEC/EN/HD 60364;
- AS/NZ 3018;
- CEI 64.8;HD 384;
- BS 7671;
- VDE 0413;
- VDE 0413

Electromagnetic compatibility

- EN 50081 1;
- EN 50082 1

Safety

- IEC/EN 61010-1;
- IEC/EN 61010-031;
- IEC/EN 61010-2-032

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FUNCTION	Measuring range	Resolution	Accuracy
Insulation resistance (EN 61557-2)	U ≥ 250 VDC:		
	R: 0.000 MΩ 1.999 MΩ	0.001 MΩ	±(2 % of reading + 2 digits)
	2.00 ΜΩ 19.99 ΜΩ	0.01 MΩ	±(2 % of reading + 2 digits)
	20.0 ΜΩ 199.9 ΜΩ	0.1 ΜΩ	±(2 % of reading + 2 digits)
		1 ΜΩ	$\pm (1 \% \text{ of r.} / 1 \text{ G}\Omega + 2\% \text{ of r.} + 2 \text{ digits})$
		10 ΜΩ	$\pm (1 \% \text{ of r.} / 1 \text{ G}\Omega + 2\% \text{ of r.} + 2 \text{ digits})$
		100 ΜΩ	$\pm (1 \% \text{ of r.} / 1 \text{ G}\Omega + 2\% \text{ of r.} + 2 \text{ digits})$
		100 14117	±(± /0 011. / ± d12 1 2 /0 011. 1 2 d15(t3)
		0.001 ΜΩ	±(5 % of reading + 3 digits)
		0.001 ΜΩ	±(5 % of reading + 3 digits)
			, , ,
		0.1 ΜΩ	±(5 % of reading + 3 digits)
,		0.01 Ω	±(2 % of reading + 2 digits)
2.00 MΩ 19.99 MΩ 20.0 MΩ 199.9 MΩ 20.0 MΩ 199.9 MΩ 20.0 GΩ 19.99 GΩ 20.0 GΩ 29.9 GΩ 20.0 GΩ 29.9 GΩ U < 250 VDC: R: 0.000 MΩ 19.99 MΩ 2.00 MΩ 19.99 MΩ 2.00 MΩ 19.99 MΩ 2.00 MΩ 19.99 MΩ 20.0 MΩ 199.9 MΩ 20.0 Ω 199.9 Ω 200 Ω 199.9 Ω	0.1 Ω	±3 % of reading	
	200 Ω 1999 Ω	1 Ω	±3 % of reading
Low resistance continuity	0.0 Ω 199.9 Ω	0.1 Ω	±(3 % of reading + 3 digits)
measurement, test current 7 mA	200 Ω 1999 Ω	1 Ω	±(3 % of reading + 3 digits)
(continuous measurement)			· 3 3 /
Earth resistance 4-wire method	0.00 Ω 19.99 Ω	0.01 Ω	±(2 % of reading + 3 digits)
zarin resistance i vine memoa		0.1 Ω	±(2 % of reading + 3 digits)
cinuity 200 mA of PE conductor polarity change (EN 61557-4) resistance continuity surement, test current 7 mA tinuous measurement) h resistance 4-wire method one current clamp amp earth resistance measurement cific earth resistance (EN 61557-5) IS Current stor Test er supply r voltage category ection class I port		1Ω	±(2 % of reading + 3 digits)
		10 Ω	±5 % of reading
Farth resistance 4 wire method		0.01 Ω	±(2 % of reading + 3 digits)
			±(2 % of reading + 3 digits) ±(2 % of reading + 3 digits)
n one current clamp amp earth resistance measurement		0.1 Ω	
		1Ω	±(2 % of reading + 3 digits)
		10 Ω	±(2 % of reading + 3 digits)
2-clamp earth resistance measurement		0.01 Ω	±(10 % of reading + 2 digits)
	20.0 Ω 100.0 Ω	0.1 Ω	±20 % of reading
Specific earth resistance (EN 61557-5)	0.00 Ω 19.99 Ω	0.01 Ω	±(2 % of reading + 3 digits)
	20.0 Ω 199.9 Ω	0.1 Ω	±(2 % of reading + 3 digits)
	200 Ω 1999 Ω	1Ω	±(2 % of reading + 3 digits)
	2.00 kΩ 19.99 kΩ	10 Ω	±5 % of reading
	20.0 kΩ 199.9 kΩ	0.1 kΩ	±5 % of reading
	200 kΩ 999 kΩ (a < 8 m)	1 kΩ	±5 % of reading
		1 kΩ	±5 % of reading
FRMS Current	0.0 mA 99.9 mA	0.1 mA	±(5 % of reading + 3 digits)
		1 mA	±5 % of reading
	1.00 A 9.99 A	0.01 A	±5 % of reading
	10.0 A 99.9 A	0.1 A	±5 % of reading
	100 A 200 A	1 A	±5 % of reading
Varistor Test	0 V 1000 V		
	4 x 1.2 V rechargeable batteries or		±(5 % of reading + 10 V)
11.7		- V T'O A GIKGIIIIE NGII	eries, type c
<u> </u>	CAT III / 300 V; CAT II / 600 V		
Protection class	Double insulation		
COM port	RS232		
Dimensions			
Maiaht	1.7 kg		

STANDARD SET

MI 2088 ST

- Instrument Earth-Insulation Tester
 Test lead, 2 x 1,5 m
- Soft carrying bag
 RS232 cable
- Test probe, 2 pcs (red, black)
- Crocodile clipPC Software EarthLink
- Instruction manualHandbook on storage media
- Calibration certificate

MI 2088 - 20 m

- MI 2088 ST
- Earth test set, 20 m (test lead, 4 x 1 m; 2 x test lead, 20 m; 2 x test lead, 4.5 m; 4 x earth test rod; small soft carrying bag)

MI 2088 - 50 m

- MI 2088 ST
- Earth test set, 50 m (test lead, 4 x 1 m; 2 x test lead, 50 m; 2 x test lead, 1 m; 2 x test lead, 4.5 m; 4 x earth test rod; soft carrying bag)



Other instruments / adapters / accessories A 1532 EVSE adapter



The A 1532 EVSE adapter is a special accessory intended for testing Electric Vehicle Supply Equipment (EVSE) together with supported METREL installation testers. It is used for verification of electrical safety and functional testing of EVSE. It is intended for testing Mode 3 EV supply equipment with a type 2 connector. If used together with the MI 3152 EurotestXC's AUTO SEQUENCE®, the complete EVSE charging station can be tested (state-by-state) electrically and functionally with a push of a button. It is possible to create a professional station-based report with MESM

KEY FEATURES

- Banana socket outputs for connection to a 3-phase installation tester.
- Voltage indicators on EVSE output.
- Proximity Pilot resistance selector for simulation of EV cable presence and current rating detection.
- Control Pilot resistance selector for simulation of electric vehicle status.
- Socket output for connection to a 1-phase installation tester (Phase 1, Neutral, PE).
- Type 2 Male Plug connector for connection to EVSE.
- 6 mA EV RCD support.
- Functional tests support*.
- EVSE AUTO SEQUENCE® support*.
- MESM report creation**.
- Basic support:
- A 1532
- Partial support:
- 6 mA EV RCD
- EVSE report**
- Full support:
- Functional test support
- EVSE AUTO SEQUENCE® support

APPLICATION

- On-site testing of EVSE charging station installation.
- Initial and periodic testing of private, semi-private and public EVSE charging stations.

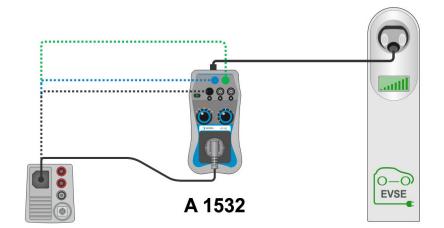
STANDARDS

Safety

• EN 61010-1

Functionality

• EN 61851-1



FUNCTION	Measuring range
Input voltage	400 V (3-phase)
Frequency	50 Hz
Test current	13 A
Proximity Pilot (PP) simulation	Open circuit, 13 A, 20 A, 32 A, 63 A
Control Pilot (CP) simulation	State A (not connected), State B (connected, not charging), State C (charging without ventilation) State D (charging with ventilation), State E (error - CP short to PE via diode)
Overvoltage category	300 V CAT II
Protection degree	IP 40
Pollution degree	2
Protection classification	Double insulation
Altitude	3000 m above sea level
Dimensions (L x W x H)	200 x 100 x 70 mm
Test lead length	0.5 m
Weight	0.82 kg
Working temperature range	0 °C 40 °C @ 95 % RH, non-condensing
Storage temperature range	-10 °C +70 °C
Maximum storage relative humidity	90 % RH (-10 °C +40 °C)
	80 % RH (40 °C 60 °C)

SUPPORTED INSTRUMENTS

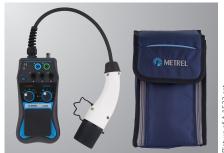
	EVSE adapter	Functional test	EVSE AUTOSE- QUENCE	EVSE report	
MI 3155 EurotestXD	•	•	•	•	•
MI 3152 EurotestXC	•	•	•	•	•
MI 3152H EurotestXC 2,5 kV	•	•	•	•	•
MI 3102 BT EurotestXE	•	•			•
MI 3102H BT EurotestXE 2,5 kV	•				•
MI 3125 BT Eurotest COMBO	•	•			•
MI 3100 SE EurotestEASI	•				
MI 3100 s EurotestEASI	•				
MI 3125 EurotestCOMBO	•				
MI 3105 EurotestXA	•				
MI 3101 EurotestAT	•				

* Functional tests and AUTO SEQUENCE® are supported only on the MI 3152 EurotestXC and MI 3152 H EurotestXC 2.5 kV testers. ** Report printing is only available via the MESM PC SW. The MESM license (P 1101) is to be purchased separately.

STANDARD SET

A 1532

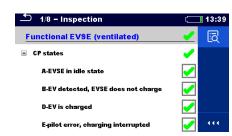
- Instrument EVSE adapter
- Small soft carrying bag
- Instruction manual



AUTO SEQUENCE EXAMPLE













Other instruments / adapters / accessories A 1143 Euro Z 290 A



The A 1143 Euro Z 290 A is a professional portable high current impedance tester. It performs high precision line and high precision fault loop impedance measurements in environments up to CAT IV / 310 V.

MEASURING FUNCTIONS

- High precision line impedance;
- High precision fault loop impedance;
- Contact voltage.

KEY FEATURES

- Independence: instrument is designed to work independently or in conjunction with: MI 2086 Eurotest 61557, MI 3101 EurotestAT, MI 3105 EurotestXA and MI 3321 MultiServicerXA.
- Range widening: adapts the instruments to read from 0.1 m Ω up to 19.99 Ω .
- Multi-system testing: works on both single

phase and 3-phase systems (115 V to 440 V).

- IPSC and IPFC calculation: IPSC and IPFC readings calculated up to 400 kA.
- **4-wire measurement** for elimination of voltage drop on measuring leads.
- Comfortable carrying: all the accessories are put in the strong, rugged, durable case of the instrument.
- LCD: Built-in LCD for standalone measurements.

APPLICATION

- High accuracy loop and line measurements;
- Power transformer and motor winding measurement

TECHNICAL DATA

FUNCTION	Measuring range	Resolution	Accuracy					
High resolution Line /	0.1 mΩ 199.9 mΩ	0.1 mΩ	\pm (5% of reading + 3 m Ω)					
Loop impedance measurement	200 m Ω 1999 m Ω	$1m\Omega$	\pm (5% of reading + 3 m Ω)					
	2.00 Ω 19.99 Ω	10 mΩ	\pm (5% of reading + 10 m Ω)					
Measuring voltage range	90 V 530 V							
Maximum test current (at 230 V)	, , , , ,							
Maximum test current (at 400 V)	, , , ,							
Maximum test current (at 530 V)	350 A (10 ms)							
Contact voltage	0 V 100 V	1 V	±(10% of reading + 3 digits)					
Power supply	4 x 1.5 V alkaline batteries	s, type C						
Overvoltage category	310 V / CAT IV							
Protection class	Double insulation							
Pollution degree	2							
Dimensions	345 x 160 x 335 mm							
Weight	5.0 kg							

STANDARDS

Functionality

• IEC/EN 61557

Other reference standards for testing

• IEC/EN/HD 60364; AS/NZ 3018; CEI 64.8; BS 7671; VDE 0413

Electromagnetic compatibility

• IEC/EN 61326-1; IEC/EN 61326-2-2

Safety

• IEC/EN 61010 -1; EN 61010-031

STANDARD SET

A 1143

- Instrument Euro Z 290 A
- Test lead, 2-wire, 2 pcs
- Test lead, black, 2 m
- Test probe, red, 2 pcs Crocodile clip, black, 3 pcs
- Crocodile clip, red, 2 pcs
- RS232 cable
- RS232-PS/2 cableInstruction manual
- Calibration certificate



re of A 1143 set

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Other instruments / adapters / accessories MI 2093 Line Tracer



MEASURING FUNCTIONS

- Tracing cables in walls, ceilings, floor and ground;
- Tracing live or voltage free cables:
- Locating cable interruptions and shortcircuits in cables;
- · Locating concealed sockets and distribution boxes;
- · Locating fuses and assignment to circuits;
- · Determining an individual wire in a bundle of wires:
- · Tracing pipe installations and other conductive loops.

KEY FEATURES

• Detection depth up to 2 m can be

- achieved.
- · Works on both, energized and nonenergized systems.
- The highly sensitive Receiver R10K detects injected signal around the measured line or object.
- Three levels of sensitivity adjustment: low, middle and high. Each level can be additionally precisely adjusted.
- · Dual, bar-graph and buzzer indicator ensures indication in dark and noisy environment.

APPLICATION

- Electrical installations testing:
- Cable networks testing;
- Pipe installations testing;
- Telecommunication systems testing.

STANDARDS

Electromagnetic compatibility

• IEC/EN 61326

Safety

- IEC/EN 61010-1;
- EN 61010-031

STANDARD SET

MI 2093

- Transmitter T10K
- Receiver R10K
- Test lead for R10K with built-in resistor and test probe, 1.5 m
- Test lead for T10K, 1.5 m, 2 pcs
- Special selective probe
- Test probe, black, 2 pcs
- Crocodile clip, black, 2 pcs
- Soft carrying bag
- · Instruction manual

TECHNICAL DATA

Transmitter T10K	
Power supply	4 x 1.5 V alkaline or 4 x 1.2 V rechargeable batteries, type AA
Overvoltage category	CAT III / 300 V
Dimensions	80 x 50 x 150 mm
Weight	280 g
Receiver R10K	
Power supply	1 x 9 V battery
Dimensions	45 x 450 x 210 mm
Weight	140 g



Other instruments / adapters / accessories A 1199 Ro - Adapter



The Ro - Adapter is a special accessory intended for using only with METREL installation testers It is designed for measurement o specific earth resistance.

KEY FEATURES

- Adapter is used for performing 4-wire specific earth resistance measurements;
- Designed for use in conjunction with most Metrel multifunction installation testers (see Selection Guide for EIS Accessories).
- The instrument comes complete with 4-wire test lead, 15 m red extension lead, 2 earthing rods and carrying bag;
- Instruction manual contains step by step guide on how to perform the measurement;
- It is recommended to use A 1199 in combination with 3-wire 20 m earth test lead set (\$ 2026).

APPLICATION

- 4-wire earth resistance measurement;
- Specific earth resistance measurement.

STANDARDS

Functionality

• IEC/EN 61557

Other reference standards for testing

- IEC/EN/HD 60364;
- AS/NZ 3018;
- CEI 64.8;
- BS 7671;
- VDE 0413

Electromagnetic compatibility

• IEC/EN 61326

Safetv

• IEC/EN 61010 -1

STANDARD SET

A 1199

- Ro adapter
- Small soft carrying bag
- Earth test rod, 2 pcs
- Test lead, red, 15 m
- Test lead 4 x 1.5 mInstruction manual
- Calibration certificate



TECHNICAL DATA

Power supply	4 x 1.5 V alkaline or 4 x 1.2 V rechargeable batteries, type AA
Overvoltage category	CAT IV / 50 V
Dimensions	100 x 200 x 50 mm
Weight	390 g

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Other instruments / adapters / accessories CS 2099 Eurocheck

The CS 2099 Eurocheck is a professional, multifunctional field calibrator intended for use with installation test instruments.
Accuracy and functionality of all Metrel and most other manufacturer's installation testers can be verified with the Eurocheck. The CS 2099 Eurocheck can provide a simple field calibration of the most frequently used functions when testing installations.



MEASURING FUNCTIONS

- Insulation calibration with test voltage up to 1000 V:
- Calibration of low resistance and continuity functions;
- Fault loop and trip-lock RCD impedance functions calibration (all test currents supported on Metrel instruments);
- Calibration of RCD trip-out time function;
- Calibration of line impedance measuring function:
- Calibration of voltage and frequency;
- PE test terminal functional verification;
- Automatic polarity verification.

APPLICATION

- On-site testing of installation measuring instruments;
- Occasional routine control of the safety testers.

STANDARDS

Electromagnetic compatibility

• IEC/EN 61326

Safety

- IEC/EN 61010 -1;
- EN 61010-031

STANDARD SET

CS 2099

- Instrument Eurocheck
- Small soft carrying bag
- Instruction manual

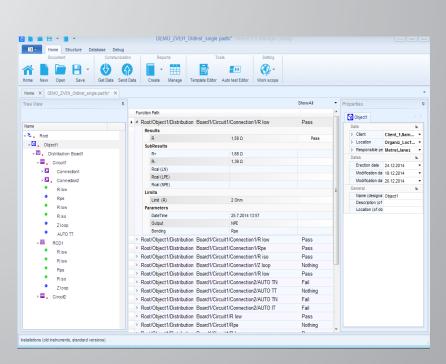


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TECHNICAL DATA

Power supply	230 V, 50 / 60 Hz	
Overvoltage category	CAT II / 300 V	
Dimensions	103 x 61 x 205 mm	
Weight	780 g	

PC software Metrel electrical safety manager



The Metrel Electrical Safety
Manager is a common application
for management of wide palette of
Metrel's electrical safety testers,
portable appliance testers, machine
testers and industrial safety testers.
This application has a unified user
interface with the new generation
of Metrel's instruments - same view
same meaning. It enables the pretreatment for the measurements,
viewing and editing of the
measurement results and generation
of professional reports. Depending
on the instrument model or type the
user can create AUTOSEQUENCEs,
custom tests or single tests. They
can be integrated into the custom
created test structures and then
uploaded into the measurement
instrument.

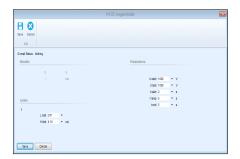
The downloaded measurement results can be viewed, analysed, edited and finally a professional report can be created and printed. These professional reports are predefined templates according to national standards and regulatory organisations where the user enters all the needed protocol data while the measurement results are automatically inserted into the predefined forms. This application is fully compatible with the new generation of Metrel's multifunction testers, starting with CE MultitesterXA and EurotestXC. With limited functionality some of the predecessor models like EurotestXE or EurotestCombo are also supported.

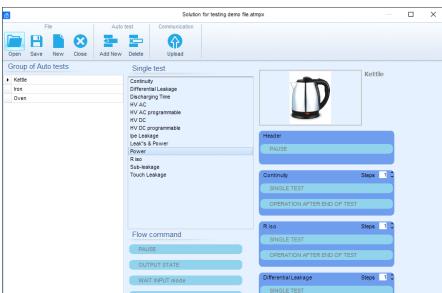
KEY FEATURES

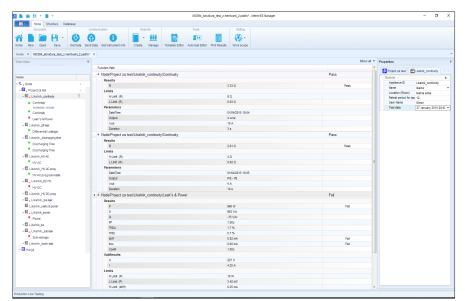
- Common platform for wide range of Metrel's instruments: a Windows based application for most of the future Metrel's instruments.
- Multilevel test structure editor: the installation structure can be created in advance on the PC and then simply uploaded to your tester.
- Measurement editor: enables definition
 of tests within the test structure with
 all parameters and sub parameters.
 After the structure is uploaded to the
 instrument, such predefined test can be
 selected and started without additional
 settings.
- AUTOSEQUENCE editor: application for easy and efficient preparation of AUTOSEOENCEs or custom tests.
- Report creator: enables automatic generation of professional test reports which include visual inspection of tested object and test results in tabular form.
- Multilingual reports according to local regulations: different languages for the application and reporting are supported.
- Export of test results: test results in text (.csv) or .xml format can be exported to other programs.

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Custom auto sequence, or group of them can be created on PC SW and uploaded to the instrument.



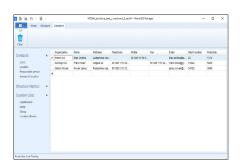


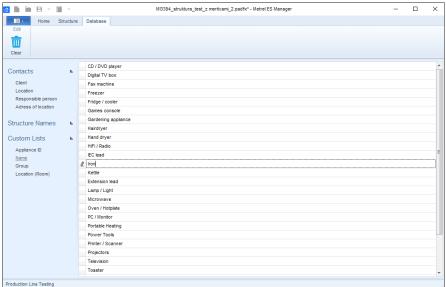


User defined structure with measurements and limits can be created on PC SW and uploaded to instrument.



User can define several different databases, containing information about Contacts, Structure names and Custom Lists.





PC software

A 1522 aMESM (Android Metrel Electrical Safety Manager)





The aMESM is an advanced electrical installation safety Testing tool for Android devices. It enables fast and simple data management of tested installations, as well as a quick overview of already performed tests. The Application enables the user to send results to the main office before leaving test site and enter and save data to the test instrument by using the smart phones' keyboard. It enables creation of customer and test location database as well as adding text and pictures, videos or voice records to the specific position in the test structure. All these features enable the user faster and easier data handling.

KEY FEATURES

- Complete database of tested installations in one location;
- · Easy data entering;
- Projects can be stored to your drop box account;
- Sending data to the main office before leaving the test site;
- · Overview of testing parameters;
- Adding text, picture, video or voice records to test results;
- Creation of customer and test location database.

aMESM is compatible with:

- MI 3155 EurotestXD
- MI 3152 EurotestXC
- MI 3152H EurotestXC 2,5 kV
- MI 3102 BT EurotestXE
- MI 3102H BT EurotestXE 2,5 kV
- MI 3100 SE EurotestEASI
- MI 3125BT EurotestCOMBO



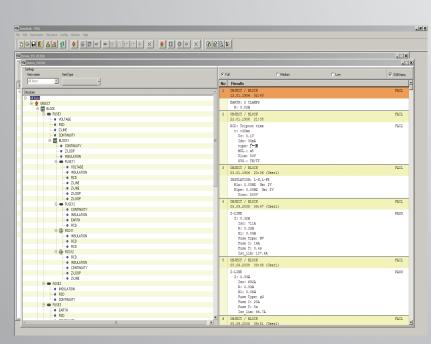




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PC software EuroLink PRO and EuroLink PRO Plus

The EuroLink PRO / PRO Plus software works in conjunction with Metrel's downloadable installation testers. The software automatically finds the instrument and allows the test engineer to download test results saved on the instrument, review the results, relocate test results (if required), print test reports and print installation structures for storing in the distribution board. With the more advanced Metrel installation testers, structures can be built with the software and uploaded to the instrument for easy installation navigation while performing on-site testing. Additionally the EuroLink PRO Plus software offers the ability to automatically generate professional PRO Plus Reports.



KEY FEATURES

- Automatic recognition of the instrument: when connecting your instrument to the PC it is automatically recognized by the software.
- Simple graphical visualisation of the installation structure: enables graphical representation of the tested installation which makes it easy to navigate in the installation
- 10-level structures: in conjunction with MI 3105 and MI 3101 PC software enables creating the electrical installation structures with up to 10 levels and 4 levels for other models.
- Rearranging of structures: the elements of the structure can be relocated and renamed.
- Installation structures printing: structures can be printed and stored in the distribution board for easier later identification of the installation elements.
- Structures upload: the installation structure can be created in advance on the PC and then simply uploaded to your tester MI 3108, MI 3109, MI 3105, MI 3101, MI 3102H CL, MI 3102H BT, MI 3102 BT, MI 3100 SE, MI 3125 BT and MI 3125B.
- Export of test results: test results in text format can be exported to other programs (MS Excel, MS Word).

- Automatic PRO Test Report generation: enables automatic generation of PRO Test Report (low, medium and high detailed).
- Automatic PRO Plus Test Report generation (PRO Plus version only): enables automatic generation of PRO Plus Test Report which include visual inspection of tested object and test results in tabular form.
- Suport of EuroLink Android: supports extended file format from EuroLink Android app.

PC SW EuroLink PRO / PRO Plus is compatible with:

 MI 3108, MI 3109, MI 3105, MI 3101, MI 3102, MI 3102H CL, MI 3102H BT, MI 3102 BT, MI 3100 SE, MI 3002, MI 3125 BT, MI 3125B, MI 3121, MI 3121H, MI 3122 and MI 3123.

Key features of PRO Plus Test Reports:

- Downloaded test results are automatically inserted onto PRO Plus forms
- Allows to fill out visual inspection form for tested fuse cabinet or earthing system.
- Automatically selects worst case test results for form completion.
- Easy test report generation and reviewing facilities.

Eurolink PRO Plus enables creation of the following test reports:

- PRO Plus Test Report
- NICEIC certificates (UK)
- ZVEH certificates (Germany)
- SiNa certificates (Switzerland)
- ÖVE certificates (Austria)
- HD 384 certificates (Greek)
- KEHE certificates (Greek)
- GOST R 50571 (Russia)UNE 202008 certificates (Spain)

PASSWORD PROTECTION

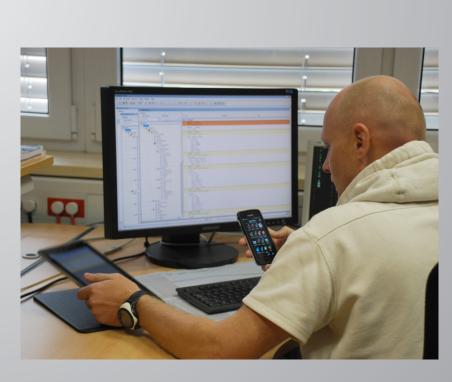
- PC SW EuroLink PRO is password protected for the following instruments:
- MI 3121,
- MI 3121H,
- MI 3122.
- MI 3123.

PC SW EuroLink PRO Plus is password protected for all Metrel installation testers.

ORDERING INFORMATION

- A 1291 PC SW EuroLink PRO with USB and RS232-PS/2 cable
- A 1290 PC SW EuroLink PRO Plus with USB and RS232-PS/2 cable
- A 1292 Upgrade code EuroLink PRO to EuroLink PRO Plus

PC software A 1431 EuroLink Android



The EuroLink Android is a data management tool for android tablets and smart phones. It is used in the field together with Metrel's Electrica Installation Safety testers to serve as a measurement pre- and post-processing tool. It also enables the wireless communication between instrument and Android device on one side and bunch of wireless communication methods between Android device and PC.

KEY FEATURES

- Attach notes, Photographs, Audio or Video Files!
- Create Structure of Electrical Installation at the site.
- Upload Structure of Electrical Installation to your test instrument
- Download measurement results to EuroLink Android application.
- Transfer Data, Share files or Send them through your Tablet or Smart Phone Tools to your Office for further manipulation.
- It is compatible with EuroLink PRO and EuroLinkPRO Plus PC SW.
- It supports Bluetooth dongle or built-in BT enabling communication channel between the below listed measuring instruments and a smart phone or a tablet with Android OS and installed application EuroLink Android.

Supported by BT dongle



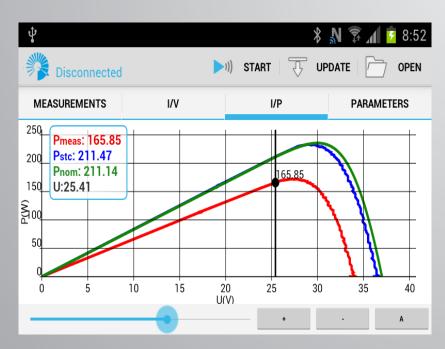
EuroLink Android is compatible with:

- MI 3105 EurotestXA (supported by BT dongle)
- MI 3101 EurotestAT (supported by BT dongle)
- MI 3102 BT EurotestXE
- MI 3102H BT EurotestXE
- MI 3100 SE EurotestEASI (supported by BT dongle)
- MI 3125BT EurotestCOMBO
- MI 3108 EurotestPV (supported by BT dongle)

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PC software A 1428 EuroLinkPV Android

The EuroLinkPV Android is a data management tool for android tablets and smart phones. It is used at the site of testing together with Metrel's Photovoltaic testers as a measurement pre- and post-processing tool. It enables the wireless communication between instrument and Android device. With this application testing of PV is more comfortable and effective



KEY FEATURES

- View the results of the I/V measurement in graphical or numerical form.
- $\bullet\,$ Compare the results with the nominal values and characteristic.
- Edit the module data stored in instrument memory using the Android Keyboard.
- Edit the module list stored in instrument memory.
- The module data can be selected from the huge module Data Base delivered within the EuroLinkPV Android application.
- It supports Bluetooth dongle enabling a communication channel between the below listed measuring instruments and a smart phone or a tablet with Android OS and installed application EuroLinkPV Android.

Supported by BT dongle



EuroLink Android is compatible with:

- MI 3108 EurotestPV (supported by BT dongle)
- MI 3109 EurotestPV Lite (supported by BT dongle)

Selection Guide for EIS Accessories

Photo	Part number	Description	Target application	MI 3155	MI 3152	MI 3152H	MI 3102 BT	MI 3102H BT	MI 3100 SE	MI 3125 BT	MI 3108	MI 3109	MI 3121	MI 3122	MI 3123	MI 3110	MI 2088	MI 2093	A 1143
	A 1143	Euro Z 290 A	Euro Z 290 A is the impedance tester which enables line / loop impedance measurements with an accuracy down to $0.1m\Omega$.	•	•	•													
	A 1532	A 1532 EVSE adapter	EVSE (Electric Vehicle Supply Equipment) adapter is a special accessory intended for testing Mode 3 EV supply equipment with a type 2 connector.	•	•	•	•	•	•	•									
0	A 1199	Ro-adapter	Ro-adapter is intended for performing earth resistance measurement in combination with installation safety tester.	•	•	•	•	•											
	A 1378	EurotestPV Remote	PV remote unit for measurement and logging of irradiance and temperature values.								•	•							
	A 1384	PV Safety Probe	The PV safety probe can safely disconnect the PV installation from the installation in case of a permanent short circuit.								•	•							
	CS 2099	Eurocheck	Eurocheck is a professional multifunctional field calibrator intended for use with installation safety testers.		•		•	•	•	•			•	•	•		•		
i, iii (i	A 1160	Fast charger for 8 AA batteries with a set of 6 NiMH bat., type AA	Fast battery charger for up to 8 pieces of AA rechargeable batteries, and a set of 6 pcs NiMH rechargeable batteries, type AA.		•	•	•	•	•	•	•	•	•	•	•	•		•	
	A 1169	Fast charger for AA, C, D and 9 V block batteries	Fast battery charger for up to 12 pcs AA, 6 pcs C or D rechargeable batteries, 4 pcs 9 V block batteries.		•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	A 1135	Power supply adapter 12 V / 1,2 A	Adapter for fast battery charging.		•	•													
	A 1548	Power supply adapter 12 V / 0,5 A					•	•	•	•	•	•	•	•	•	•	•		
	A 1569	Power supply adapter 12 V / 3 A	Adapter for fast battery charging.	•															
	A 1567	4400mAh battery pack	Li-lon Battery pack 7,2V 4400mAh.	•															
•	A 1568	8800mAh battery pack	Li-lon Battery pack 7,2V 8800mAh.	•															

• Option

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Photo	Part number	Description	Target application	MI 3155	MI 3152	MI 3152H	MI 3102 BT	MI 3102H BT	MI 3100 SE	MI 3125 BT	MI 3108	MI 3109	MI 3121	MI 3122	MI 3123	MI 3110	MI 2088	MI 2093
25 25 25 25 25 25 25 25 25 25 25 25 25 2	S 2080	1,2 V, 2500 mAh AA rechargeable batteries type AA, 6 pcs	A set of 6 pieces of rechargeable batteries type AA.		•	•	•	•	•	•	•	•	•	•	•	•		
	A 1427	PV Reference Cell	Irradiance sensor for PV measurements.								•	•						
	A 1400	PV Temperature probe	Temperature probe for measurement of PV module temperature.								•	•						
Q	A 1172	Luxmeter sensor, type B (PS/2)	Luxmeter sensor, type B, for high- accuracy illuminance measurement e.g. for emergency lightning inspection.	•	•	•	•	•										
	A 1173	Luxmeter sensor, type C (PS/2)	Illuminance probe for light conditions measurements with 0,1Lux resolution.	•	•	•	•	•										
000	A 1191	Receiver R10K	Receiver R10K is used for wire tracing, fuse identification and fault finding in low voltage electrical installations.	٠	•	•												
	A 1192	Selective probe for R10K	Very sensitive inductive sensor serves for contactless fuse and cable finding. To be used with A 1191.	٠														•
	A 1067	Test lead for R10K, 1.5 m, with built-in resistor	Test lead with probe enables fast and accurate fuse finding and current circuit allocation. To be used with A 1191.															•
	A 1256	Plug commander (straight cable)	Single phase schuko plug commander with TEST and MEM function keys for fast and simple measurements on one phase sockets.											•				
	A 1272	Plug commander (for Smartec)	Single phase schuko plug commander with TEST and MEM function keys for fast and simple measurements on one phase sockets.												•			
	A 1314	Plug commander	Single phase, 3-pin plug commander with TEST, MEM and function selection buttons and RGB LED status indicator.	٠	•	•	•	•	•	•	•					•		
Je-	A 1314 BLK	Plug commander	Single phase, 3-pin plug commander with TEST, MEM and function selection buttons and RGB LED status indicator.	•	•	•	•	•	•	•	•					•		

[•] Option

Photo	Part number	Description	Target application	MI 3155	MI 3152	MI 3152H	MI 3102 BT	MI 3102H BT	MI 3100 SE	MI 3125 BT	MI 3108	MI 3109	MI 3121	MI 3122	MI 3123	MI 3110	MI 2088	MI 2093	A 1143
	A 1401	Tip commander	Single phase, 3-wire tip commander with TEST, MEM and function selection buttons, RGB LED status indicator and front LED lamp.	•	٠	•	٠	•	•	•	•					•			
	A 1401 BLK	Tip commander	Single phase, 3-wire tip commander with TEST, MEM and function selection buttons, RGB LED status indicator and front LED lamp.	•	•	•	•	•	•	•	•					•			
	A 1244	Tip commander, 2-wire (straight cable)	Single phase 2-wire commander with test tip, TEST and SAVE function keys for installation safety measurements.										•	•					
	A 1270	Tip commander (for Smartec)	Single phase 2-wire commander with test tip, TEST and MEM function keys for installation safety measurements.										•	•					
	A 1300	Tip commander, 3-wire (for Smartec)	Single phase 3-wire commander with test tip, TEST and MEM function keys for installation safety measurements.											•					
\\\\	A 1018	Current clamp (low range, leakage)	High accuracy current clamp 1000 A / 1 A with jaw opening 52 mm and fixed 1.5 m cable for both load and low range / leakage current measurement and for earth resistance measurement as well.	•	•	•	•	•			•	•			•		•		
8	A 1019	Current clamp	Current clamp 1000 A / 1A with jaw opening 52 mm for general current measurements and in combination with A 1018 for earth resistance measurement without breaking the loop.	•	•	•	•	•							•		•	•	
	A 1068	Connection cable for clamp, 1.5 m	Connection cable for connecting current clamp on the instrument MI 2093.															•	
	A 1074	Mini current clamp 200 A / 0.2 A	Mini current clamp 200 A / 0.2 A with jaw opening 15 mm for current measurement in confined spaces.				•	٠							•		•	•	
	A 1391	AC/DC Current clamp	AC/DC Current Clamp with 40 and 300 A range.	•	•	٠	•	٠			•	•							
N. Committee	A 1558	Test lead, 4 x 1.5 m	4-wire test lead for continuity and impedance measurements on electrical installations.	•															
																	_		_

• Option

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Photo	Part number	Description	Target application	MI 3155	MI 3152	MI 3152H	MI 3102 BT	MI 3102H BT	MI 3100 SE	MI 3125 BT	MI 3108	MI 3109	MI 3121	MI 3122	MI 3123	MI 3110	MI 2088	MI 2093
	A 1021	Test lead, 4 x 1 m	4-wire test lead for measurements on electrical installations.					_									•	
38	A 1011	Test lead, 3 x 1.5 m	3-wire test lead for measurements on single or three phase electrical installations.	•	•	•	•	•	•	•	•			•		•		
	A 1055	Test lead, 2 x 1.5 m	2-wire test lead for continuity and insulation resistance measurements on electrical installations.	•		•		•					•					
	A 1385	PV fused test lead	Test cable for simultaneous AC/DC power and efficiency measurements of PV inverters.								•	•						
	S 2001	Earth test set, 4-wire, 20 m	Earth test set for earth resistance measurement on distance up to 20 m; set includes: test lead, 4 x 1 m; test lead, 20 m, 2 pcs; test lead, 4 m, 2 pcs; earth spikes, 4 pcs; soft carrying bag.														•	
	S 2002	Earth test set, 4-wire, 50 m	Earth test set for earth resistance measurement on distance up to 50 m; set includes: test lead, 4 x 1 m; test lead, 50 m, 2 pcs; test lead, 4 m, 2 pcs; test lead, 1 m, 2 pcs; earth spikes, 4 pcs; carrying bag.														•	
	S 2041	Earth test set, 4-wire, 50 m (for Smartec)	Earth test set for earth resistance measurement on distance up to 50 m; set includes: test lead, 50 m, 2 pcs; test lead, 4 m, 2 pcs; test lead, 1 m, 2 pcs; earth spikes, 4 pcs; soft carrying bag.												•			
	S 2026	Earth test set, 3-wire, 20 m	Earth test set for earth resistance measurement on distance up to 20 m; set includes: test lead, 20 m, 2 pcs; test lead, 4.5 m; earth spikes, 2 pcs; soft carrying bag.				•	•	•	•	•							
	S 2027	Earth test set, 3-wire, 50 m	Earth test set for earth resistance measurement on distance up to 50 m; set includes: test lead, 50 m, 2 pcs; test lead, 4.5 m; test lead, 1 m, 2 pcs; earth spikes, 2 pcs; soft carrying bag.	•	•	•	•	•	•	•	•							
0 0	S 2058	Insulation test plates	Two in one: Test plates for measurement of floor and wall insulation, $\Delta 625 \text{ cm}^2$ (acc. to EN 60364-6) and measurement of semi conductivity, 2,5 kg, $\emptyset 65 \text{ mm}$ (acc. to EN 61340-5-1).		•		•	•	•	•			•			•	•	
	A 1290	PC SW EuroLink PRO Plus with USB and RS232- PS/2 cable	Professional PC Software EuroLink PRO Plus enables downloading, data management and complete test report preparation. Delivered with RS232-PS/2 and USB communication cables.										•	٠	•			

[•] Option

Photo	Part number	Description	Target application	MI 3155	MI 3152	MI 3152H	MI 3102 BT	MI 3102H BT	MI 3100 SE	MI 3125 BT	MI 3108	MI 3109	MI 3121	MI 3122	MI 3123	MI 3110	MI 2088	MI 2093
	P 1101	BASIC to PRO licence key upgrade for Metrel ES Manager	Licence key for upgrading the Metrel ES Manager to advanced version with professional report creation functionality.	•	•	•	•	•	•	•								
	P 1102	Licence key for aMESM	The aMESM is an advanced portable appliance safety Testing tool for Android devices.	•	•	•	•	•	•	•								
	A 1291	PC SW EuroLink PRO with USB and RS232-PS/2 cable	PC Software EuroLink PRO enables downloading and test results management and printing of test reports. Delivered with RS232-PS/2 and USB communication cables.										•	•	•			
- OMIRE	A 1292	Upgrade code EuroLink PRO to EuroLink PRO Plus	Password for upgrading standard PC software EuroLink PRO to advanced PC SW EuroLink PRO Plus with professional report creation facility.				•	•	•	•	•	•	•	•	•	•		
	A 1431	EuroLink Android app	EuroLink Android app.				•	•	•	•								
	A 1012	Test lead, green, 4 m	Extension test lead for continuity measurements.	•	•	•	•	•	•	•	•	•				•		
	A 1154	Test lead, black, 4 m	Extension test lead for earth and continuity measurements.	•	•	•	•	•	•	•			•		•		•	
	A 1026	Test lead, red, 20 m	Extension test lead for continuity measurements.	•	•	•	•	•	•	•			•		•		•	
	A 1153	Test lead, black, 20 m	Extension test lead for earth and continuity measurements.	•	•	•	•	•	•	•			•		•		•	
	A 1164	Test lead, black, 50 m	Extension test lead for earth and continuity measurements.	•	•	•	•	•	•	•			•		•		•	
Q ₂	S 2009	Test lead set, 2 m, 4 pcs	Set of 4 test leads is intended for two clamp earth resistance measurement to connect current clamps on the instrument.												•			

• Option

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Photo	Part number	Description	Target application	MI 3155	MI 3152	MI 3152H	MI 3102 BT	MI 3102H BT	MI 3100 SE	MI 3125 BT	MI 3108	MI 3109	MI 3121	MI 3122	MI 3123	MI 3110	MI 2088	MI 2093
\bigcirc	S 2012	Continuity test lead, 10 m, 2 pcs (red, black)	2 pieces of extension test lead for continuity measurements.	•	•	•	•	•	•	•			•		•		•	•
	S 2025	Test lead, 1.5 m, 2 pcs (black, red)	Connection leads for different measurements.	•	•	•	•	•	•	•			•		•		•	•
*	A 1013	Crocodile clip, black	Crocodile clip assures secure and	•	•	•	•	•	•	•			•	•			•	•
	A 1064	Crocodile clip, red	 permanent contact during the measurement on bus bars, fixing screws, 	•							•	•	•					
1	A 1309	Crocodile clip, green	etc.	•	•	•	•	•	•	•				•				
1	A 1310	Crocodile clip, blue		•		•	•	•	•	•				•				
	A 1014	Test probe, black	Test probe with fi 4 mm connection is	•	•	•	•	•	•	•			•	•			•	•
1111	A 1015	Test probe, blue	 suitable for performing measurements both in mains outlets and in situations 	•		•	•	•	•	•	•	•		•				
† † † †	A 1016	Test probe, red	when no schuko outlet is present.	•							•	•	•				•	
1 1 1 1	A 1062	Test probe, green	_	•		•	•	•		•	•	•		•				
>	A 1198	Magnetic contact probe	Test probe with magnetic contact provides reliable contact with metal surface during the measurement.	•	•	•	•	•	•	•	•	•	•	•			•	
	A 1201	Insulated rod for CONTINUITY measurement	Insulated rod enables insulation resistance and continuity measurement on hard-to-reach objects, e.g. luminaries.	•	•	•	•	•	•	•	•	•	•				•	
	A 1202	Additional extension part for A 1201	Additional extension part for Insulated rod for CONTINUITY measurement A 1201.	•	•	•	•	•	•	•	•	•	•				•	
MEIREC	A 1551	Small carrying bag with Metrel logo	Small carrying bag for transport and storage of test instrument and all belonging standard set and euro set accessories.	•														
Owner.	A 1552	Large carrying bag with Metrel logo	Large carrying bag for transport and storage of test instrument and all belonging standard set and euro set accessories.	٠														
	A 1006	Soft carrying bag	Large soft carrying bag for transport and storage of test instrument and belonging accessories.														•	
⋒ METREL	A 1289	Soft carrying bag			•	•	•	•	•	•			•	•	•	•		
™ METREL	A 1020	Small soft carrying bag	Small soft carrying bag for transport and storage of test instrument or accessories.															•
	A 1271	Small soft carrying bag	_							•			•	•	•			
www.metrel.si	A 1302	Set of carrying straps	Set of carrying straps for carrying the measuring instrument around the neck allowing free hand use of the tester.	٠	•	٠	•	•	•		•	•						
	A 1303	Soft hand strap	Soft hand strap for holding the instrument.							•			•	•	•			

[•] Option

Photo	Part number	Description	Target application	MI 3155	MI 3152	MI 3152H	MI 3102 BT	MI 3102H BT	MI 3100 SE	MI 3125 BT	MI 3108	MI 3109	MI 3121	MI 3122	MI 3123	MI 3110	MI 2088	MI 2093
O	A 1110	Three phase adapter	3-phase test adapter for installation safety testing on 3-phase sockets type 16 A 3CEE.		•	•	•	•	•	•	•			•				
	A 1111 A 1215	Three phase adapter with switch	3-phase adapter with selection switch for installation safety testing on 3-phase sockets type 16 A 3CEE. The adapter allows seamless switching between measurements.		•	•	•	•	•	•	•			•				
120	A 1171	RS232 / USB adapter with 1 m cable	RS232 / USB adapter for instruments without USB communication port.														•	
***	A 1017	Communication cable RS232	RS232 interface cable for connecting the instrument with the PC.														•	
294 WI	A 1436	Bluetooth dongle	External Bluetooth adapter for wireless connection between Metrel's instruments and Smart phones, tablets and PCs.						•		•	•						
	A 1105	Barcode scanner	Barcode scanner for identification of barcode labelled installation structure elements like sockets, switches, fuses, switchboards, etc.	•	•	•					•	•						
3	A 1321	Barcode scanner (Bluetooth)	Barcode scanner for identification of barcode labelled appliances.	•	•	•												
0	A 1545	QR / Barcode scanner (Bluetooth)	QR / Barcode scanner for identification of barcode labelled appliances.	•	•	•												
	AM 1337	RFID Reader	RFID reader.								•	•						
**	S 2055	Set of 2 flat contact clamps, red, with fuse	Flat contact clamp with integrated fuse for a fast and safe contact on flat conductor bars, e.g. in low voltage installations. With red-coloured ring.															
**	S 2056	Set of 2 flat contact clamps, black	Flat contact clamp for a fast and safe contact on flat conductor bars, e.g. in low voltage installations.															
*Hy	S 2057	Set 5 of crocodile clips	Set of 3 black and 2 red crocodile clips, which assures secure and permanent contact during the measurement on bus bars, fixing screws, etc.															

• Option

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Content High Voltage Insulation / Continuity / Earth / Transformer

Electrical Installation Safety HIGH VOLTAGE DIAGNOSTICS Appliance / Machine / Switchboard Safety Power Quality Analysis Equipment for laboratories and Schools Digital Multimeters / Clamp Meters / Voltage and Continuity Testers Variable transformers	1.1 - 1.60 2.1 - 2.40 3.1 - 3.42 4.1 - 4.22 5.1 - 5.12 6.1 - 6.34 7.1 - 7.05
GOOD TO KNOW Testing the HV, Step / Contact Voltage and Earth Resistance	2.02
EARTH TESTER Selection Guide for Earth Tester MI 3290 Earth Analyser MI 3295 Step Contact Voltage Measuring System	2.06 2.07 2.10
TRANSFORMER TESTERS MI 3280 DT Analyser NEW	2.12
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HIGH VOLTAGE INSULATION TESTERS Selection Guide for HV Insulation Testers MI 3210 TeraOhmXA 10 kV MI 3205 TeraOhm 5 kV MI 3201 TeraOhm 5 kV Plus MI 2077 TeraOhm 5 kV MI 3202 GigaOhm 5 kV MI 3121H 2,5 kV Insulation / Continuity	2.22 2.24 2.26 2.28 2.30 2.32 2.34
PC SOFTWARE HVLink PRO	2.36
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Good to know Testing the HV, Step / Contact Voltage and Earth Resistance

Find out more about Insulation measurement techniques

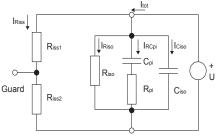
Insulation is a material property and is measured as insulation resistance. Characteristics of insulation tend to change through time, normally getting worse by ageing. Various physical phenomena have influence on insulation characteristics, like temperature, dirt, humidity, mechanical and electrical stresses, high-energy radiation, etc. Harsh installation environments, especially those with temperature extremes and / or chemical contamination, cause further deterioration.

Safety, operability and reliability are the most important parameters of electrical device containing insulation and this is the reason why insulation has to be measured. Insulation is measured in the initiating phase of electrical device and also later during maintenance works or repairing, and measurements are of simple and diagnostic type.

Basics of insulation measurements According to Ohms law,

I= U R

the current does not depend on time. But a simple measurement of insulation resistance shows that the current depends on time. The reasons for such behaviour of the current are different phenomena in insulation material after a voltage is applied. A typical insulation model is presented in figure below.

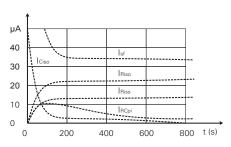


Insulation resistance and capacitance model, partial and total currents

U	Applied test voltage
Riss1 & Riss2	Surface leakage resistances
Riso	Insulation resistance
Ciso	Insulation capacitance
Rpi	Polarization resistance
Срі	Polarization capacitance

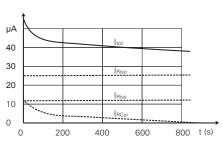
The total current Itot comprises of four partial currents.

Itot	Total current	
IRiss	Surface leakage current	
IRiso	Insulation leakage current	
IRCpi	Polarization absorption current	
ICiso	Capacitance charging current	



Typical current / time diagram for a real voltage source

In practice the insulation resistance measurement instrument does not include an ideal voltage source. At the start all available instrument power is used to charge the capacitor Ciso for short period. The voltage on connection points drops because of this.



Current diagram for an ideal voltage source

When DC voltage is suddenly applied to the insulation, the test current will start at a high value, gradually decrease with time, and finally level off to a stable value. The leakage current does not change with time, and this current is the primary factor on which the insulation quality may be judged.

Types of insulation testing

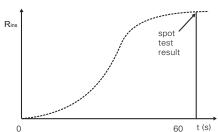
Various types of insulation testing are used to determine insulation characteristics.

DC voltage testing and AC voltage testing AC testing

AC testing is more suitable for performing withstanding or dielectric tests. While DC test gives more qualitative picture about the tested insulation.

Spot reading test

This is the simplest and fastest way of insulation resistance testing. Unfortunately only one test, with no prior tests, can be only a rough guide as to how good or bad the insulation is. In this test the instrument is connected across the insulation of the tested item. A test voltage is applied for a fixed period of time; usually a reading is taken after 1 minute as can be seen in figure.



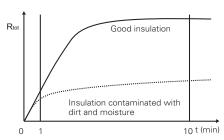
Typical insulation resistance/time diagram for a spot reading test

The spot reading test should only be carried out when the insulation temperature is above the dew point.

METREL's hint: The lower limit of insulation resistance may often be established according to the one mega-ohm rule: Insulation resistance should be at least 1 M Ω for each kilovolt of operating voltage, but not less than 1 M Ω (e.g. a motor rated at 5 kV working voltage should have a minimum resistance of 5 M Ω).

Time rise method / polarization index / dielectric absorption ratio

When test voltage is applied a bad insulation causes drop of the value $R_{\rm iso}$ and the increasing in the insulation leakage current $I_{\rm Riso}$. The absorption current is masked by a high insulation leakage current. The insulation leakage current stays at a fairly constant value and the resistance reading stays low. A good insulation shows continuous increasing of the resistance over a period. This is caused by the absorption that can be clearly seen. The absorption effect lasts far longer than the time required for charging the capacitance of the insulation.



Time diagrams of good and bad insulation tested with the timerise method

2.2 Accessories 2.37 Metrel Catalogue 2018

The result of this measurement is polarization index (PI), which is defined as the ratio of measured resistance in two time slots (typically the ratio is 10 min value to 1 min value at a continuous measurement).

PI value	Tested material status
1 - 1.5	Not acceptable (older types)
2 - 4 (typically 3)	Considered as good insulation (older types)
4 (very good insulation)	Modern type of good insulation systems

Typical values of polarization index

 $PI = \frac{R_{tot (10 \ min)}}{R_{tot (1 \ min)}}$

The results of this method don't depend on temperature and the method can give a conclusive information without comparing records of past tests.

Dielectric absorption ratio (DAR) is similar to the polarization index method. The only difference are periods for capturing the results which are usually 30 s (or 15 s) and 1 minute.

DAR value	Tested material status
< 1	Bad insulation
1 ≤ DAR ≤ 1.25	Acceptable insulation
> 1.4	Very good insulation

Typical values for dielectric discharge

DAR= Rtot (1 min) Rtot (30 s)

Dielectric discharge

It is difficult to determine the polarization index if polarization absorption current I_{RCni} is small compared to the others. Rather than measuring the polarization current during an insulation test, the dielectric discharge (DD) test can be performed. DD test is carried out after the completion of the insulation resistance measurement. Typically the insulation material is left connected to the test voltage for 10 ... 30 min and then discharged before the DD test is carried out. After 1 min a discharge current is measured to detect the charge re-absorption of the insulation material. A high re-absorption current indicates contaminated insulation (mainly based on moisture).

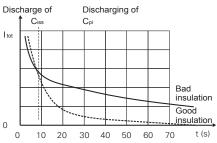
DD value	Tested material status
> 4	Bad
2 - 4	Critical
< 2	Good

Values of dielectric discharge

DD= Idis (1 min)

ldis (1 min)	discharging current measured 1 min after the voltage was switched off		
U	test voltage		
Ciso	capacitance of tested object		

Typical values of dielectric discharge



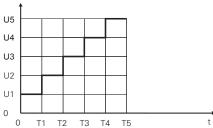
The current/time diagram of a good and bad insulation tested with dielectric discharge method

The dielectric discharge test is very useful for testing a multi-layer insulation.

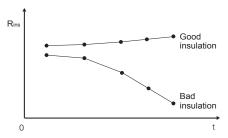
Step voltage insulation resistance test

Testing with a voltage far below the one expected in service often reveals moisture and dirt in insulation, whereas effects of ageing or mechanical damage of a fairly clean and dry insulation may not be revealed at such low stress. The step voltage method is very useful when testing with an instrument that has a lower test voltage than the rated test voltage of the tested item. In other words, step voltage test gives us useful results even in case we are not able to stress insulation with nominal electrical voltages.

The device under test is exposed to different test voltages that are applied in steps. The voltage starts at the lowest value and increases with defined steps up to the highest level.



Typical measuring procedure for step voltage measurement



Typical step voltage measurement results

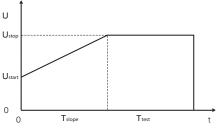
The shape of the curve represents the quality of insulation:

- The resistance of a damaged insulation will rapidly decrease.
- A good insulation has approximately constant resistance at all voltages.

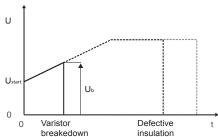
Withstanding voltage test

The withstanding voltage test is one of the basic insulation tests. Its principle is very simple - the voltage is stressing the device under test until the required test time or breakdown of insulation is reached.

The time gradient of increasing voltage, maximum voltage and the time of maximum test voltage are very important and depend on the type of device under test. These parameters are defined in adequate standards. The indication of a breakdown is a sudden increase in the current through insulation, beyond the predefined limit.



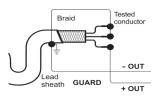
Measuring procedure for withstanding voltage measurement



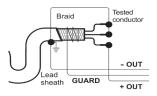
Measuring procedure for withstanding voltage measurement.

Typical connections for:

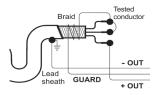
Power cables



Measurement of insulation resistance of cable between one conductor against other conductors including lead sheath

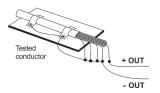


Measurement of insulation resistance of cable between one conductors against other conductors and lead sheath using the guard terminal to avoid leakage effects at the end of cable

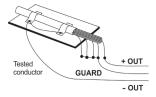


Measurement of insulation resistance of a cable between a conductor and lead sheath

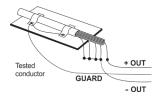
Control and communication cable



Measurement of insulation resistance between one lead of communication cable against other leads and sheath

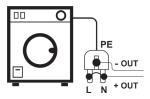


Measurement of insulation resistance of communication cable using the guard terminal. Resistance is measured between a lead and sheath



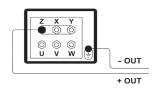
Measurement of insulation resistance of communication cable using the guard terminal. Resistance is measured between one lead and other leads

Home appliances and similar electrical devices



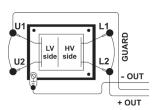
Measurement of household device, protection class I and class II

Induction motor

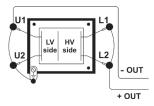


Measurement of insulation resistance of induction motor between all three phases against metal enclosure

Power transformer



The simplest measurement of insulation resistance of transformer

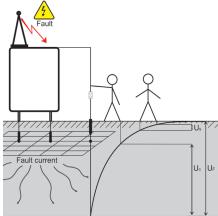


Measurement of insulation resistance on one HV winding against metal enclosure $\ensuremath{\mathsf{N}}$

Earthing

Correct earthing of exposed conductive parts of the object assures that the voltage on them stays below dangerous level in case of a fault. If fault happens a fault current will flow through the earthing electrode.

A typical voltage distribution occurs around the electrode (the "voltage funnel"). Fault currents close to power distribution objects (substations, distribution towers, plants) can be very high, up to 200 kA. This can result in dangerous step and contact voltages. If there are underground metal connections (intended or unknown) the voltage funnel can get atypical forms and high voltages can occur far from the point of failure. Therefore the voltage distribution in case of a fault around this objects must be carefully analysed.



Dangerous voltages on a faulty earthing system

Standard IEC 61140 defines following maximum allowed time / contact voltage relations:

Maximum time of exposure	Voltage		
> 5 s to ∞	Uc ≤ 50 Vac or ≤ 120 Vdc		
< 0.4 s	Uc ≤ 115 Vac or ≤180 Vac		
< 0.2 s	Uc ≤ 200 Vac		
< 0.04 s	Uc ≤ 250 Vac		

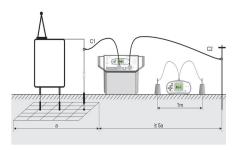
Maximum time durations vs fault voltage

For a longer exposure the touch voltages must stay below 50 V.

During the measurement a test current is injected into the earth through an auxiliary probe. A higher injected current improves the immunity against spurious earth currents.

Step voltage measurement

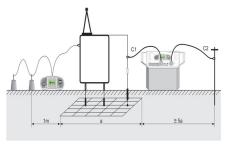
The measurement of step voltage is performed between two ground points at a distance of 1 m. The 25 kg measuring probes simulates the feet. The voltage between the probes is measured by a voltmeter with an internal resistance of 1 k Ω that simulates the body resistance.



Step voltage measurement

Contact voltage measurement

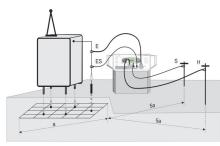
The measurement of contact voltage is performed between an earthed accessible metal part and ground. The voltage between the probes is measured by a voltmeter with an internal resistance of 1 $\ensuremath{\mathrm{k}\Omega}$ that simulates the body resistance.



Contact voltage measurement

Earth resistance measurement

For the earthing resistance test a voltage and current probe (serves as auxiliary earth) are used. Because of the voltage funnel it is important that the test electrodes are placed correctly.

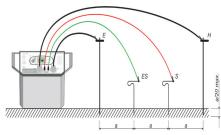


Earth resistance measurement

Specific earth resistance

For the specific earth resistance the test current is injected through two current probes (C1/H and C2/E).

The voltage probes S and ES must be placed between the current probes (equidistance 'a' between probes must be considered). Using different distances between the test probes means that the material at different depths is measured. By increasing the distances 'a' a deeper layer of ground material is measured.

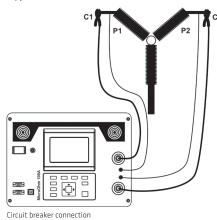


Specific earth resistance measurement

Low Resistance Measurement Four-wire Kelvin method

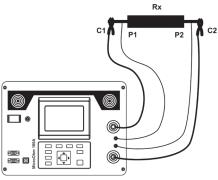
When measuring resistance <20 Ω it is advisable to use a four-wire Kelvin measurement technique for achieving high accuracy. By using this type of measurement configuration the test lead resistance is not included in the measurement, and the need for lead calibrating and balancing is eliminated.

Typical connections for:



C1 P1 P2 C2

Bus bar connection



Connecting instrument to the measured device

The measuring current is passed through the unknown resistance Rx using the C1 and C2 leads. The placing of these leads is not critical but should always be outside the P1 and P2 leads. The Volt drop across the Rx is measured across P1 and P2 and these should be placed exactly at the points to be measured.

Earth testers Selection Guide for Earth Testers

MEASUREMENTS	MI 3290 GL Earth Analyser	MI 3290 GP Earth Analyser	MI 3290 GF Earth Analyser	MI 3290 GX Earth Analyser	MI 3295 Step Contact Voltage Measuring System
					The Control Market Prince of the Control of the Con
EARTH RESISTANCE					
2/3/4 wire method	• / • / •	• / • / •	• / • / •	•/•/•	- / - / •
Fixed freq./sweep	55 15 kHz	55 15 kHz	55 15 kHz	55 15 kHz	55 Hz
Range @ 55 Hz	0 20 kΩ	0 20 kΩ	0 20 kΩ	0 20 kΩ	0 200 Ω
1 Clamp (Selective method)	•			•	
Range @ 55 Hz	0 20 kΩ			0 20 kΩ	
2 Clamp (Stakeless method)	•			•	
Range @ 164 Hz	0 100 Ω			0 100 Ω	
1 Flex/4Flex Clamp		• / •		• / •	
Fixed freq./sweep		55/1500 Hz		55/1500 Hz	
Range @ 55 Hz		0 20 kΩ		0 20 kΩ	
High frequency method	25 kHz			25 kHz	
Range	0 300 Ω			0 300 Ω	
Pulse method	10/350 μs			10/350 μs	
Range	0 200 Ω			0 200 Ω	
SPECIFIC EARTH RESISTANCE					
Wenner / Schlumberger	• / •	• / •	• / •	• / •	• / -
Range	0 20 kΩm	0 20 kΩm	0 20 kΩm	0 20 kΩm	0 100 kΩm
EARTH POTENTIAL					
Earth Potential			•	•	
Step & Touch voltage			•	•	•
Max. test current			> 220 mA	> 220 mA	55 A
RESISTANCE					
DC resistance			•	•	
Range/max. res. @200mA			0 2 kΩ/10mΩ	0 2 kΩ/10mΩ	
@7mA			0 20 kΩ/0,1Ω	0 20 kΩ/0,1Ω	
AC impedance			•	•	
Range/max. res.			0 20 kΩ/10mΩ	0 20 kΩ/10mΩ	
AC CURRENT					
Iron clamps	•			•	
Flex clamps		1 pce		4 pcs (GX4) 1 pce (GX1)	

2.6 Accessories 2.37 Metrel Catalogue 2018

Earth testers MI 3290 Earth Analyser



MI 3290 Earth Analyser is a portable, battery or mains powered test instrument with excellent IP protection (IP 54 open case), intended for measurement of earth resistance, specific earth resistance and earth potential of various energetic and nonenergetic objects. The user can choose between different methods from classic 3 wire earth resistance measurement up to one or four clamp method for measurement of pylons. He has a choice of measurement methods with different frequency methods: single frequency or frequency sweep from 55 Hz to 15 kHz, HF method with 25 kHz and pulse method simulating the lightning strike. High electrical noise immunity makes this instrument best suited for industrial environment. Instrument is available in multiple sets which are a combination of different accessories and measurement functions.

MEASURING FUNCTIONS

- Earth Resistance 2,3,4 -pole;
- Selective Earth Resist (1 x clamp);
- Earth Resistance (2 x iron clamps);
- Specific Earth Resistance (Wenner and Schlumberger method);
- HF-Earth Resistance (25 kHz, acc. to IEEE_Std 81);
- Earth Resistance of mono pylons with 10 m flex clamp;
- Earth Resistance of multi-leg pylons with up to four flex clamps;
- Current measurement (Iron, flex clamps);
- Low Ohm measurement 7 mA and 200 mA;
- Earth Potential;
- Step and contact measurements;
- Impulse Earth measurement 10/350 μs.

KEY FEATURES

- Possibility of performing all types of earth measurements with a single instrument.
- Analysis of earth impedance as a function of the frequency due to a wide measurement frequency band (55 Hz ... 15 kHz).

- Earth measurements on pylons with protective earth cable connected.
- Measurement on mono towers and 4-leg tower.
- A wide variety of measuring clamps: from iron clamps to flex clamps with 10 m length.
- HF-Earth resistance measurement (acc. to IEEE_Std 81).
- Sweep mode Z(f) on screen.
- 3.4" colour LCD display with touch screen.
- Floating Mains (universal 90 ... 260 V AC) or battery powered (built in fast charger).
- High degree of protection: IP 65 case closed, IP 54 case open.
- Checkbox different self-check methods.
- DC resistance measurements.
- Impulse impendance measurement for simulating the lightning strike.
- Support for single or automated measurements.
- PC SW for measurement pre and post processing: preparation of the test structure, result download, tree-view, table view and graphical view, storing and printing.

APPLICATION

Measurement of protective earthing of:

- Mono and multi-leg pylons with protective earth cable connected;
- MV to LV transformer stations;
- · Ski lifts, radio towers;
- Solar Power plants, wind and water turbine;
- Industrial areas.

STANDARDS

Functionality

- EN 61557 5
- IEEE 80 2000
- IEEE 81 2012
- IEEE 142
- IEEE 367 2012

Electromagnetic compatibility

• EN 61326

Safety

- EN 61010 1
- EN 61010 2 030 c
- EN 61010 2 032
- EN 61010 031

Method	Additional info	Measurement range	Uncertainty
Earth resistance 2, 3, 4 -pole	Open-terminal test voltage 20 or 40 VAC Short-circuit test current > 220 mA Test frequency	0.010.010.001.0	(20) (5 11 2 2 11 11)
	55 Hz329 Hz	0.010 Ω 19.99 kΩ	±(3 % of reading + 3 digits)
	659 Hz 2.63 kHz 3.29 kHz 15 kHz	0.00 Ω 1.999 kΩ 0.00 Ω 199.9 Ω	±(5 % of reading + 3 digits)
Selective earth resistance with	Open-terminal test voltage 40 VAC	0.00 11 135.5 11	±(8 % of reading + 3 digits)
iron clamp	Short-circuit test current > 220 mA Test frequency 55 Hz 329 Hz 659 Hz 1.50 kHz	0.010 Ω 19.99 kΩ 0.00 Ω 1.999 kΩ	±(8 % of reading + 3 digits)
Selective earth resistance of pylons with flex clamp	Open-terminal test voltage 40 VAC Short-circuit test current > 220 mA Test frequency 55 Hz329 Hz 659 Hz 1.50 kHz Passive mode	0.010 Ω 19.99 kΩ 0.00 Ω 1.999 kΩ 0.00 Ω 19.99 kΩ	±(8 % of reading + 3 digits)
Earth resistance with two iron clamps	Test frequency 82 Hz 329 Hz	0.00 Ω 9.99 Ω 10.0 Ω 49.9 Ω 50.0 Ω 100 Ω	±(5% of reading + 2 digits) ±(10 % of reading + 2 digits) ±(20 % of reading)
Specific earth resistance ro Wenner and Schlumberger method	Open-terminal test voltage 20 or 40 V AC Short-circuit test current >220 mA Test frequency 164 Hz	0.00 Ωm 19.99 kΩm	calculated value (consider uncertainty of 4 – pole measurement)
Earth Potential	Open-terminal test voltage 40 V AC Short-circuit test current >220 mA Test frequency 55 ÷ 329 Hz	0.0 mV 49.99 V	calculated value (consider uncertainty of 3 – pole measurement)
HF-Earth Resistance 3 pole	Open-terminal test voltage 40 VAC Short-circuit test current >40 mA Test frequency 25.000 Hz	0.00 Ω 19.9 Ω 20.0 Ω 299 Ω	±(3 % of reading + 2 digits)
Impulse Earth Resistance	Open-terminal test voltage ~120 V peak Short-circuit test current ~6 A peak Impulse waveform 10 / 350 µs	0.0 Ω 199 Ω	±(8 % of reading + 8 digits)
DC Resistance RLOW	Test current 200 mA	0.00 Ω 1.99 kΩ	±(2 % of reading + 2 digits)
OC Resistance CONT	Test current 7 mA	0.00 Ω 19.9 kΩ	±(3 % of reading + 2 digits)
AC Impedance	Test frequency 55 Hz 15 kHz	0.00 Ω 19.99 kΩ	±(3 % of reading + 2 digits)
Current RMS (Iron Clamp)	Nominal frequency 45 Hz1.5 kHz	1.0 mA7.99 A	±(2 % of reading + 3 digits)
Current RMS (Flex Clamp)	Nominal frequency 45 Hz1.5 kHz	10 mA 49.9 A	±(8 % of reading + 3 digits)
Battery power supply	14.4 V DC (4.4 Ah Li-ion)		
Mains power supply	90-260 VAC, 45-65 Hz, 100 VA (300 V CAT II)		
Degree of protection	IP 65 (case closed)		
•	IP 54 (case open)		
Dimensions (w x h x d)	36 x 16 x 33 cm		
Display	3.4" colour LCD display with backlight and touc	:h screen	
Communication	USB, BT		
Memory	>1GB		

SET SPECIFICATION

		GA LV F	G L Fit	G Fix
	PA PA	PA PA	PA PA	PA PA
Licence key	GX	GL	GF	GP
Measurement methods				
Ground Z 2-pole	•	•	•	•
Ground Z 3-pole	•	•	•	•
Ground Z 4-pole	•	•	•	•
Single/multi/sweep frequency	•	•	•	•
Wenner 4-pole	•	•	•	•
Schlumberger 4-pole	•	•	•	•
Selective (iron clamp)	•	•		
Stakeless 2-clamps	•	•		
Transient Impulse Impedance	•	•		
HF 25 kHz Impedance	•	•		
Step / Touch	•		•	
Voltage potential	•		•	
Low Impedance 4-point	•		•	
Low Resistance 200 mA	•		•	

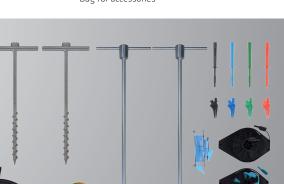
2.8 Accessories 2.37 Metrel Catalogue 2018

	GX	GL	GF	GP
Tower Passive one rod / Flex clamps	•			•
Tower FOP / 1xFlex clamp	GX1			•
Tower FOP / 4xFlex clamp	GX4			Option
Mono Tower FOP / Flex clamp	•			•
Measurement accessory				
Current earth spike, 90 cm, 2 pcs Potential earth spike, 50 cm 2 pcs G clamp Shielded test lead on reel, 75 m Test lead on reel 50 m, 3 pcs (black, green, blue) Test lead, 5 m, 2 pcs (blue, red) Set of test probes, crocodile clip and 2 m test lead, 4 pcs	•	٠	•	•
Flex clamp 5 m with 15 m shielded cable	4 pcs (GX4) 1 pce (GX1)			1 рсе
Iron clamp, 2 pcs	•	•		
Kelvin clamp with 2,5 m cable, 2 pcs	•		•	
Step Contact Meter Measuring Set	•		•	

ORDERING INFORMATION

All model versions include following accessory:

- Instrument MI 3290
 Current earth spike 90 cm, 2 pcs
 Potential earth spike 50 cm, 2 pcs
 Connection lead black 2 m
- Test lead 5 m blue
- Test lead 5 m red
- Test lead 50 m black on cable reel
- Test lead 50 m green on cable reel
- Test lead 50 m blue on cable reel
- Shielded test lead 75 m on reel
- G clamp
 Set of test probes, crocodile clip and 2 m test lead, 4 pcs
- Bag for accessories





- Licence GX
- Iron clamp A 1018 with 3,5 m test lead
- Iron clamp A 1019
- Flex clamp 5 m with 15 m shielded cable
- Kelvin clamp with 2,5 m cable, 2 pcs
- Voltmeter MI 3295M with 2 wire test lead
- Soft carrying bag
- Step voltage test plate, 2 pcs
- NiMH battery cells, type AA, 6 pcs
- Power supply adapter
- Bag for accessories

🔛 💯 🏦 MI 3290 GX4

- MI 3290 GX1
- Flex clamp 5 m with 15 m shielded cable, 3 pcs
- Bag for accessories



MI 3290 GL

- · Licence GL
- Iron clamp A 1018 with 3,5 m test lead
- Iron clamp A 1019

III MI 3290 GF

- Licence GF
- Kelvin clamp with 2,5 m cable, 2 pcs
- Voltmeter MI 3295M with 2 wire test lead

4

- Soft carrying bag Step voltage test plate, 2 pcs
- NiMH battery cells, type AA, 6 pcs
- · Power supply adapter



MI 3290 GP

- Licence GP
- Flex clamp 5 m with 15 m shielded cable
- Bag for accessories





Earth testers MI 3295 Step Contact Voltage Measuring System



The MI 3295 Step Contact Voltage Measuring System is a voltage measuring system intended for testing and verification of protective earthing of power stations, substation and other power systems. The system consists of Station for current generation and autonomous voltage Meter. Due to high test current (up to 55 A) and effective noise cancellation the MI 3295 ensures very accurate and stable measurements of Step and Contact Voltages with the resolution down to 10 µV. A few voltmeters can be used simultaneously for faster analysis of voltage distribution around the tested object. All test results and parameters can be saved into the instrument's memory for further downloading, analysis and test report printing with the help of the PC SW Metrel ES Manager or HVLink PRO.

MEASURING FUNCTIONS

- Step voltage;
- · Contact voltage;
- Specific earth resistance;
- Earth resistance;
- Potential;
- · Leakage current.

KEY FEATURES

- Accurate: high accuracy of the measurements due to a high current of up to 50 A and effective suppression of noise.
- Noise immunity: excellent immunity even against changing earth currents.
- Autonomous Step Voltage meter: no need for long potential leads; a few meters can be used simultaneously.
- **Safe:** high safety due to low output voltage (55 V).
- **Low weight:** the weight of the Station is 29.5 kg only.
- Memory: up to 1000 test results can be saved into the 3-level internal memory of the system.
- PC SW Metrel ES Manager or HVLink
 PRO included in the standard set enables downloading and analysis of results and printing of test reports.

APPLICATION

Measurement of protective earthing of:

- · Power stations;
- Substations;
- Distribution towers;
- Other power systems.

STANDARDS

Functionality

- ANSI/IEEE Std 81;
- EN 61557-5;
- RAT 2008;
- HD 673 N4

Electromagnetic compatibility

• EN 61326

Safety

- EN 61010-1;
- EN 61010-031

2.10 Accessories 2.37 Metrel Catalogue 2018

FUNCTION	Measuring range	Resolution	Accuracy
tep voltage, Contact voltage (measuring range Um)	0.01 19.99 mV	0.01 mV	±(2 % of reading + 2 digits)
	20.0 199.9 mV	0.1 mV	±(2 % of reading + 2 digits)
	200 1999 mV	1 mV	±(2 % of reading + 2 digits)
	2.00 19.99 V	0.01 V	±(2 % of reading + 2 digits)
	20.0 V 59.9 V	0.1 V	±(2 % of reading + 2 digits)
Step voltage, Contact voltage (calculated measuring	0.0 199.9 V	0.1 V	calculated value*
range U)	200 999 V	1 V	
Test current	55 A max		
Test voltage	< 55 V		
Test frequency	55 Hz		
Current	0.00 9.99 A	0.01 A	±(3 % of reading + 5 digits)
Current	10.0 99.9 A	0.01 A	±(3 % of reading + 3 digits)
Resistance to earth	0.001 1.999 Ω	0.001 Ω	±(2 % of reading + 5 digits)
Resistance to earth			
	2.00 19.99 Ω	0.01 Ω	±(2 % of reading + 5 digits)
	20.0 99.9 Ω	0.1 Ω	±(2 % of reading + 5 digits)
	100.0 199.9 Ω	0.1 Ω	±5 % of reading)
Specific earth resistance	0.00 9.99 Ωm	0.01 Ωm	Calculated value, consider accuracy of
	10.0 99.9 Ωm	0.1 Ωm	Resistance to earth function.
	100 999 Ωm	1Ωm	
	1.00 k 9.99 kΩm	10 Ωm	
	10.0 k 99.9 kΩm	100 Ωm	
Potential (MI 3295M)	0.01 19.99 mV	0.01 mV	±(2 % of reading + 2 dig)
	20.0 199.9 mV	0.1 mV	
	200 1999 mV	1 mV	
	2.00 19.99 V	0.01 V	
	20.0 59.9 V	0.1V	
Eurrent (MI 3295M)	1.0 99.9 mA	0.1 mA	±(2 % of reading 3 dig)
ron clamp A 1018	100 999 mA	1 mA	. 5 5.
•	1.00 9.99 A	0.01 A	
Eurrent (MI 3295M)	10.0 99.9 mA	0.1 mA	±(8 % of reading + 5 dig)
Flex clamp A 1587	100 999 mA	1 mA	(
F	1.00 9.99 A	0.01 A	
	10.0 30.0 A	0.1 A	
	10.0 50.0 A	0.1 A	
Open circuit voltage	< 50 VAC		
Test current	< 7.5 A		
est frequency	55 Hz		
STATION	33112		
Power supply	230 V / 50 or 60 Hz		
Communication port	RS232		
Memory	1000 memory locations		
Overvoltage category	CAT II / 300 V		
Measuring category	CAT IV / 50 V		
Protection degree	IP 30		
Display	LCD with backlight (128 x 64 dots)		
Dimensions	563 x 275 x 257 mm		
Veight	29.5 kg		
METER			
Power supply	6 x 1.2 V rechargeable batteries, type A	A	
Communication ports	USB, RS232		
Memory	1500 memory locations		
Measuring category	CAT IV / 50 V		
Protection degree	IP 40		
Display	LCD with backlight (128 x 64 dots)		
Dimensions	230 x 103 x 115 mm		
Weight	1.3 kg		

^{*}Displayed Step / Contact voltage is obtained on base of calculation: Us = Umeas Iraut / Igen; Uc = Umeas Iraut / Igen; Irault (selectable): 1 A ... 200 kA

STANDARD SET

- Instruments MI 3295M and MI 3295S
- Mains cable
- Step voltage probe (25 kg), 2 pcs: A 1353
 Current earth spike A 1529, 2 pcs
- Potential earth spike, 60 cm A 1629, 2 pcs
- Current test lead, 50 m, black, 10 mm2, with crocodile clip, on wheel, A 1325
- Current test lead, 10 m, black, 10 mm2, with crocodile clip, A 1392
- G clamp A 1530
- Test lead, black, 2 x 3 m
- Test lead, green, 10 m

- Test lead, black, 1.5 m
- Test lead, green, 4 m
- Test lead, red, 50 m
- Connection lead with crocodile clip, red, 1 m
- Crocodile clip, 2 pcs
- RS232 cable
- USB cable
- Soft carrying bag, 2 pcs
- Soft carrying neck belt
- NiMH battery cells, type AA, 6 pcs
 Power supply adapter
- CD with instruction manual and PC SW Metrel ES Manager and HVLink PRO
- Instruction manual
- Calibration certificate



Transformer testers MI 3280 Digital Transformer Analyser



Analyser is a portable, battery (Li-ion) powered test instrument intended for diagnosing of turn ratio phase deviation, excitation current and winding resistance of single and three phase transformers. It has an excellent IP protection: IP65 (case closed), IP54 (case open) allowing the use of the instrument in harsh environments. The operation is straightforward and clear to enable the user to operate the instrument without the need for special training For advanced users the AUTO SEQUENCES and visual tests are

MEASURING FUNCTIONS

Available functions and features offered by the Digital Transformer Analyser:

- Turn ratio measurement of single and three phase transformers;
- Phase deviation between high voltage and low voltage winding;
- Excitation current;
- Winding resistance measurement of single and three phase transformers (Power Transformers up to 1,6 MVA).

KEY FEATURES

- A 3.4" color LCD display with touch screen offers easy-to-read results and all associated parameters.
- The operation is straightforward and clear to enable the user to operate the instrument without the need for special training.

- Test results can be stored on the instrument. PC software that is supplied as a part of standard set enables transfer of measured results to PC where they can be analysed or printed.
- Built-in help screens for referencing on site.
- · Autotest sequences.
- Built-in charger and rechargeable batteries as standard accessory.
- BT communication with PC, Android tablets and smart phones via built-in BT.
- PC SW Metrel ES Manager for creation of test structures and uploading, downloading of test results, autotest editor and report creation.
- High degree of protection IP 65 (case closed), IP 54 (case open).

APPLICATION

- Three phase and single phase power transformers.
- · Voltage transformers.
- · Current transformers.

STANDARDS

Functionality

- C57.12.70
- IEC 60076-1

Electromagnetic compatibility

• EN 61326

Safety

- EN 61010 1
- EN 61010 2 030
- EN 61010 2 033
- EN 61010 031

Li - ion battery pack

• IEC 62133

Function		Measuring range	Resolution	Accuracy
		0.8000 9.9999	0.0001	±(0.2% of reading + 2 digits)
		10.000 99.999	0.001	±(0.2% of reading + 2 digits)
	Excitation voltage	100.00 999.99	0.01	±(0.2% of reading + 2 digits)
	80 V	1000.0 1999.9	0.1	±(0.5% of reading + 2 digits)
		2000.0 3999.9	0.1	±(0.5% of reading + 2 digits)
		4000.0 8000.0	0.1	±(1.0% of reading + 2 digits)
		0.8000 9.9999	0.0001	±(0.2% of reading + 2 digits)
		10.000 99.999	0.001	±(0.2% of reading + 2 digits)
	Excitation voltage	100.00 999.99	0.01	±(0.2% of reading + 2 digits)
	40 V	1000.0 1999.9	0.01	±(0.5% of reading + 2 digits)
		2000.0 3999.9	0.1	±(0.5% of reading + 2 digits)
URN RATIO		4000.0 8000.0	0.1	n/a
, rA, rB, rC		0.8000 9.9999	0.0001	±(0.2% of reading + 2 digits)
	Excitation voltage	10.000 99.999	0.001	±(0.2% of reading + 2 digits)
	10 V	100.00 999.99	0.01	±(0.5% of reading + 2 digits)
		1000.0 8000.0	0.1	n/a
		0.8000 9.9999	0.0001	±(0.2% of reading + 2 digits)
	Excitation voltage	10.000 99.999	0.001	±(0.2% of reading + 2 digits)
	5 V	100.00 999.99	0.01	±(0.5% of reading + 2 digits)
		1000.0 8000.0	0.1	n/a
		0.8000 9.9999	0.0001	±(0.2% of reading + 2 digits)
	Eusitation voltage	10.000 99.999	0.0001	±(0.5% of reading + 2 digits)
	Excitation voltage 1 V	100.00 999.99	0.01	n/a
	1 V	100.00 8000.0	0.1	n/a
		0.10 mA 9.99 mA	0.01 mA	±(2 % of reading + 0.20 mA)
XCITATION	T	10.0 mA 99.9 mA	0.01 mA	±(2 % of reading + 0.20 mA) ±(2 % of reading + 2 digits)
URRENT	Test frequency 55, 65 or 70 Hz	10.0 mA 999 mA	1 mA	±(2 % of reading + 2 digits)
, iA, iB, iC	55, 65 61 76 112			
NIACE		1.00 A 1.10 A	0.01 A	±(2 % of reading + 2 digits)
PHASE DEVIATION i, jA, jB, jC	Test frequency 55, 65 or 70 Hz	-180.00 180.00 °	0.01°	±(0.05°)
		1.0 mΩ 999.0 mΩ	0.1 mΩ	±(2 % of reading + 3 digits)
VINDING	Test current	1.000 Ω 9.999 Ω	0.001 Ω	±(2 % of reading + 2 digits)
ESISTANCE	10 mA 1000 mA	10.00 Ω 99.99 Ω	0.01 Ω	±(2 % of reading + 2 digits)
R, RA, RB, RC		100.0 Ω 999.9 Ω	0.1 Ω	±(2 % of reading + 2 digits)
	Battery power supply	14.4 V DC (4.4Ah Li-ion)		(
	Battery charging time	typical 4.5 h (deep discha	rge)	
	Mains power supply	90-260 VAC, 45-65 Hz, 10		
	Protection classification	reinforced insulation	(
ENERAL	Measuring category	50 V CAT IV		
	Pollution degree	2		
	Degree of protection	IP 65 (case closed), IP 54 ((case onen)	
	Dimensions (w x h x d)	360 x 160 x 330 mm	rase ohem	
	Weight	8.8 kg, (with battery and		

STANDARD SET

- Instrument MI 3280
 4 wire test lead with Kelvin clips, 2.5 m 4 pcs
 USB cable
 Mains cable

- Soft carrying bag
 Metrel ES Manager BASIC license*
 Instruction manual
- Calibration certificate

^{*}Metrel ES Manager can be downloaded free of charge from Metrel Web server.









Continuity testers Selection Guide for Continuity Insulation Testers

MEASUREMENTS	MI 3252 MicroOhm 100A	MI 3250 MicroOhm 10A	MI 3242 MicroOhm 2A
		O O O O	
Measuring range	1 nΩ 20 Ω	100 nΩ 2 kΩ	1μΩ 200 Ω
No. of ranges	6	7	6
Current into load	2 m Ω at 100 A	200 mΩ at 10 A	1 Ω at 2 A
Highest resolution	1 nΩ	0.1 μΩ	1μΩ
Basic accuracy	0.25 %	0.25 %	0.25 %
Test current	100 A, 50 A, 10 A, 1 A, 100 mA	10 A, 1 A, 100 mA, 10 mA, 1 mA	2 A, 100 mA, 10 mA
OTHER FEATURES			
Measurement modes	Single, Continuous	Single, Automatic, Inductive, Contir	nuousSingle, Automatic, Inductive, Continuous
Test method	4-wire, unidirectional	4-wire, Bidirectional	4-wire, Bidirectional
Auto ranging		•	•
PASS / FAIL indication	•	•	•
Temperature compensation		•	
COMMUNICATION PORTS			
RS232	•	•	•
USB	•	•	•
MEMORY, SOFTWARE			
Memory	•	•	•
Number of memory locations	1000 / 2 levels	1000	1500
Software	HVLink PRO	HVLink PRO	HVLink PRO
GENERAL DATA			
Display type	Graphical LCD	Graphical LCD	Graphical LCD
Backlight	•	•	•
Safety category	CAT IV / 50 V CAT II / 300 V	CAT IV / 300 V CAT II / 300 V	CAT IV / 300 V CAT III / 600 V
Rechargeable batteries	•	•	•
Battery	12 V / 12 Ah	6 x NiMH, type HR14	6 x NiMH, type AA
Built-in battery charger		•	•
Low battery indication	•	•	•
Mains voltage	115 / 230 V AC, 50 / 60 Hz, 200 VA	90-260 V AC, 45-65 Hz, 50 W	
Weight	11.8 kg	2.8 kg	0.8 kg
Dimensions (mm)	410 x 175 x 370	310 x 130 x 250	140 x 80 x 230

Continuity testers MI 3252 MicroOhm 100A



portable low resistance ohmmeter used to measure low contact resistances of circuit breakers, switches and busbar joints using test current from 100 mA to 100 A. Used 4-lead Kelvin testing method ensures very high accuracy of results (0.25%) due to elimination of test leads resistance. The instrument can be powered from both mains supply and internal battery. PC SW HVLink PRO supplied as a standard accessory enables downloading, analysis and export of test results and printing of test reports.

MEASURING FUNCTIONS

- Resistance measurement with adjustable test current (100 mA ... 100 A);
- Voltage drop measurement.

KEY FEATURES

- Accurate: $1 \text{ n}\Omega$ best resolution with 0.25% accuracy.
- Bar graph: on screen resistance bar graph.
- Battery powered: the instrument enables measurements with 100 A for up to 10 minutes when powered from internal battery only.
- Safe: sustain external voltages in case of wrong connection, protection level (CAT IV / 50 V); automatically detects continuity in current circuit.
- Single and continuous measuring modes.
- **Custom limits:** the limits can be set for PASS or FAIL evaluation of test result.
- Portable: rugged carrying case with a handle and lightweight design (less than 12 kg) enable easy moving the instrument between sites.
- High protection degree: IP 64.
- **Memory:** built-in memory enables storage of up to 1000 test results.
- Downloadable: downloads test results via RS232 or USB cable directly to the PC with the help of the HVLink PRO software.

APPLICATION

Measurement the resistance of:

- High, middle and low voltage circuit breakers;
- High, middle and low voltage disconnecting switches;
- High current busbar joints;
- Cable splices;
- · Welding joints.

STANDARDS

Functionality

- IEC 62271-100;
- IEC 62271-1;
- ANSI C37.09;
- ASTM B 539;
- NMEA AB 4-1996;
- El Real Decreto 223/2008

Electromagnetic compatibility

• IEC 61326-1 Class B

Safety

• EN 61010-1;

2.16 Accessories 2.37 Metrel Catalogue 2018

$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	100 A / 50 A 50 A / 10 A 1 / 10 A 1 A / 100 mA 100 mA Current of reading 100 A
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	50 A / 10 A 1 / 10 A 1 A / 100 mA 100 mA Current of reading 100 A
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	1 / 10 A 1 A / 100 mA 100 mA Current of reading 100 A
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1 A / 100 mA 100 mA Current of reading 100 A
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	100 mA Current f reading 100 A
	Current f reading 100 A
Voltage 200 μΩ 1.000 mV 20.000 mV 1 μV ±0.25 % o 2 mΩ 20.00 mV 100.00 mV 10 μV 10.00 mV 100.00 mV 10 μV	f reading 100 A
2 mΩ	
10.00 mV 100.00 mV $$ 10 μ V	
	100 A
	50 A
$20~\text{m}\Omega$ $100.0~\text{mV} \dots 1.0000~\text{V}$ $0.1~\text{mV}$	50 A
20.0 mV 200.0 mV 0.1 mV	10 A
$200~\text{m}\Omega$ $200.0~\text{m}V$ $2.0000~\text{V}$ $0.1~\text{m}V$	1 A
20.0 mV 200.0 mV 0.1 mV	10 A
2 Ω 200.0 mV 2.0000 V 0.1 mV	1 A
20.0 mV 200.0 mV 0.1 mV	100 mA
20 Ω 200.0 mV 2.0000 V 0.1 mV	100 mA
Power supply 230 / 115 VAC	
Battery 12 VDC / 12 Ah	
Overvoltage category CAT IV / 50 V	
Display 320 x 240 LCD with backlight	
Communications RS 232 and USB	
Memory 512 kB (1000 test results)	
Dimensions 410 x 175 x 370 mm	
Weight 11.8 kg	

STANDARD SET

- Instrument MicroOhm 100A
- Current test lead with crocodile clip, 5 m, 25 mm2, 2 pcs
- 2 pcs
 Potential test lead, 5 m, 2 pcs (red, black)
 Test probe, 2 pcs (red, black)
 Crocodile clip, 2 pcs (red, black)
 Mains cable
 RS232 cable

- USB cable

- Bag for accessories PC SW HVLink PRO
- Instruction manual
- Calibration certificate



Continuity testers MI 3250 MicroOhm 10A



The MI 3250 MicroOhm 2A is portable low resistance ohmmeter for measuring low resistances of breakers and switches, busbars, cable joints, small to medium sized transformer and motor windings for industrial application, etc., with test current up to 10 A. The used 4-lead Kelvin testing method together with automatic bidirectional procedure ensure very high accuracy of test results (0,25%). The instrument can be powered by mains or internal rechargeable batteries. Test results can be stored on the instrument and with PC software HVLink PRO that is supplied as a part of standard set enables transfer of measured results to PC where they can be analysed or printed

MEASURING FUNCTIONS

- Bidirectional resistance measurement from 0,1 $\mu\Omega$ up to 2000 Ω with test current up to 10 A;
- Temperature compensation (with optional temperature probe).

KEY FEATURES

- Accurate: $0.1 \, n\Omega$ best resolution with 0.25% accuracy.
- Bar graph: on screen resistance bar graph.
- Battery powered: more than 1000 measurements with 10 A test current can be performed when powered by internal battery only.
- Safe: High overvoltage category CAT IV / 300 V.

- Four measuring modes: Automatic, single, continuous and inductive.
- Automatic thermal EMF elimination: with automatic bidirectional measurement.
- Temperature compensation: measured resistance can be adjusted according to ambient temperature, which can be entered manually or measured by external probe.
- Custom limits: limits can be set for PASS/FAIL evaluation of test results.
- **Portable:** lightweight 3 kg design with carry handle and shoulder strap.
- Memory: built-in memory enables storage of up to 1000 test results.
- Downloadable: stored test results can be via RS232 or USB interface transferred to the PC with installed HVLink PRO software, which enables downloading, review, analyses and printing of the test results.

APPLICATION

Measurement the resistance of:

- · Bus bar joints;
- Motor and transformer windings;
- Cables:
- Fuses;
- Aircraft frame bonds;
- Rail and pipe bonds;
- · Lightning conductor bonding.

STANDARDS

Electromagnetic compatibility

• IEC 61326-1

Safety

- EN 61010-1;
- EN 61010-031;

2.18 Accessories 2.37 Metrel Catalogue 2018

FUNCTION	Measuring range	Resolution	Accuracy	Current
Resistance	1.9999 mΩ	0.1 μΩ	±(0.25 % of reading + 0.01 % FS)	10 A
	$19.999~\text{m}\Omega$	1 μΩ	±(0.25 % of reading + 0.01 % FS)	10 A/1 A
	$199.99~\text{m}\Omega$	10 μΩ	±(0.25 % of reading + 0.01 % FS)	10 A/1 A/100 mA
	1.9999 Ω	100 μΩ	±(0.25 % of reading + 0.01 % FS)	1 A/100 mA/10 mA
	19.999 Ω	$1\mathrm{m}\Omega$	±(0.25 % of reading + 0.01 % FS)	100 mA/10 mA
	19.999 Ω	$10~\text{m}\Omega$	±(1 % of reading + 0.1 % FS)	1 mA
	199.99 Ω	$10~\text{m}\Omega$	±(0.25 % of reading + 0.01 % FS)	10 mA
	199.99 Ω	$100~\text{m}\Omega$	±(1 % of reading + 0.25 % FS)	1 mA
	1.9999 kΩ	1 Ω	±(1 % of reading + 0.25 % FS)	1 mA
Power supply (mains voltage)	90 260 VAC / 60 VA			
Power supply (batteries)	6 x 1.2 V NiMH 3500 r	nAh batteries, type C		
Operation	> 1000 single measurements			
Overvoltage category	CAT IV / 300 V			
Protection class	Double insulation			
Display	320 x 240 LCD with ba	acklight		
Communication	RS232 and USB			
Memory	1000 memory location	15		
Dimensions	310 x 130 x 250 mm			
Weight	2.8 kg			

STANDARD SET

- Instrument MI 3250
 Test cable, 2 m, with Kelvin Clip, 2 pcs
- Test cable, 2 III, with Relvin clip, 2 pcs
 Test cable with Kelvin Probe, 2 pcs
 Test cable, 2.5 m, 4 pcs (2 x black, 2 x red)
 Crocodile clip, 4 pcs (2 x black, 2 x red)
- Test probe, 2 pcs (red, black)
- Mains cable
- USB cable and RS232 cable
 NiMH rechargeable batteries, type C, 6 pcs

- PC SW HVLink PRO
- Bag for accessories
 Instruction manual
- Calibration certificate



Continuity testers MI 3242 MicroOhm 2A



MI 3242 MicroOhm 2 A is a portable low resistance ohmmeter used to measure low resistances of switches, relays, connectors, bus bars, power distribution cable joints, motor & generator winding, power transformers, power inductors, rail track joints, wire and cable resistance, welding joints for industrial application, etc., with test current up to 2 A.

MEASURING FUNCTIONS

• Bidirectional resistance measurement from 1 $\mu\Omega$ up to 199,9 Ω with test current up to 2 A.

KEY FEATURES

- Four measuring modes: Automatic, single, continuous and inductive.
- Automatic thermal EMF elimination: with automatic bidirectional measurement.
- Accurate: $1 \mu \Omega$ best resolution with 0.25% accuracy.
- **Noise rejection:** 50 Hz / 60 Hz ripple detection and rejection.
- Battery powered: more than 800 measurements of 500 m Ω load ∞ 2

A test current & 15 s measurement duration.

- Safe: High overvoltage protection (CAT III / 600 V) allows measurement in substations and other points with low line resistance. Internal protection circuit protects user and instrument from inadvertent connection to lines.
- Custom limits: Pre-programmed limits with PASS/FAIL evaluation of measurement result and bright REEN/ RED indicators providing visual evaluation of the results.
- Portable: Lightweight portable design.
- Memory: Up to 1500 test results with timestamp can be stored in internal memory.
- **Downloadable:** PC SW HVLink PRO enables downloading, review, analyses and printing of test results.

APPLICATION

Measurement the resistance of: In inductive mode:

- Motor & generator winding;
- Power transformer;
- · Power inductors;
- Wire & cable resistance.

STANDARDS

Electromagnetic compatibility

- EN 61326 Class A
- Safety
- EN 61010-1;
- EN 61010-031

2.20 Accessories 2.37 Metrel Catalogue 2018

FUNCTION	Measuring range	Resolution	Accuracy	Current
Resistance	9.999 mΩ	1 μΩ	±(0.25 % of reading + 2 digits)	2 A
	99.99 mΩ	10 μΩ		
	999.9 mΩ	100 μΩ		
	99.99 mΩ	10 μΩ		100 mA
	999.9 mΩ	100 μΩ		
	9.999 Ω	1 mΩ		
	19.99 Ω	10 mΩ		
	999.9 mΩ	100 μΩ		10 mA
	9.999 Ω	1 mΩ		
	99.99 Ω	10 mΩ		
	199.9 Ω	100 mΩ		
Voltage	0 49.9	0.1 V	±(2 % of reading + 2 digits)	
	50 550	1 V		
Frequency	10.0 99.9	0.1 Hz	±(0.2 % of reading + 1 digit)	
	100 500	1 Hz		
Power supply (batteries)	9 VDC (6 x 1.5 V batte	ry or accu, size AA)		
Operation	> 800 single measurer	nents		
Overvoltage category	CAT III / 600 V; CAT IV	/ 300 V		
Protection class	Double insulation			
Display	128 x 64 dots matrix (display with backlight		
Communication	RS232 and USB			
Memory	1500 memory location	15		
Dimensions	140 x 80 x 230 mm			
Weight	0.8 kg			

STANDARD SET

- Instrument MI 3242 MicroOhm 2A
- Test cable with Kelvin Probe
- Test cable 4 wire, 2.5 m
- Crocodile clip, 4 pcs (2x black, 2x red)
 Test probe, 2 pcs (black)

- Power supply adapter

 1.2 V NiMH rechargeable battery, 6pcs
 RS23 serial cable
- USB cable

- Soft carrying bagPC SW HVLink PRO
- Instruction manual
- Calibration certificate



High voltage insulation testers Selection Guide for HV Insulation Testers

MEASUREMENTS	MI 3210 TeraOhmXA 10 kV	MI 3205 TeraOhmXA 5 kV
Test voltage range	50 VDC 10 kVDC	50 VDC 5 kVDC
Voltage steps	50 V	50 V
Insulation resistance measuring range	20 ΤΩ	15 ΤΩ
Calculation of DD, DAR, PI	•	•
Withstanding voltage test	•	•
Voltage ramp test	•	•
Leakage current measurement	•	•
Capacitance measurement	•	•
Short circuit / charge current	5 mA	6 mA
Voltage measurement AC / DC	up to 600 V	up to 600 V
OTHER FEATURES		
Custom tests	•	•
Programmable timer	•	•
Automatic discharge after test	•	•
Graph R(t)	•	•
Bar graph	•	•
Auto adjustment function	•	•
Auto ranging	•	•
Audible warnings	•	•
Guard terminal	•	•
Shielded test leads	•	•
COMMUNICATION PORTS		
USB/ RS232	• / •	• / •
BLOETOOTH	•	•
MEMORY, SOFTWARE		
Memory	•	•
Number of memory locations	1000	4 MB
Software	HVLink PRO	HVLink PRO
GENERAL DATA		
Display type	Graphical LCD	Graphical LCD
Backlight	•	•
Safety category	CAT IV / 600 V	CAT IV / 600 V
Rechargeable batteries	•	•
Built-in battery charger	•	•
Low battery indication	•	•
Battery life (no load connected)	4 h at 10 kV	7 h at 5 kV
Weight	6.5 kg	6.5 kg
Dimensions (mm)	345 x 160 x 335	345 x 160 x 335

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MI 3201 Tera0hm 5 kV Plus	MI 2077 TeraOhm 5 kV	MI 3202 GigaOhm 5 kV	MI 3121H Insulation/Continuity
S A D D	District Control of the Control of t		
250 VDC 5 kVDC	250 VDC 5 kVDC	250 VDC 5 kVDC	100 VDC 2.5 kVDC
25 V	50 V	250 V; 500 V; 1 kV; 2.5 kV; 5 kV	100 V; 250 V; 500 V; 1 kV; 2.5 kV
10 ΤΩ	5 ΤΩ	1ΤΩ	100 GΩ
•	•		•
•	•		
•	•		
•	•		
•	•		
5 mA	1.4 mA	5 mA	3 mA
up to 600 V	up to 600 V	up to 600 V	up to 550 V
•	•		•
•	•	•	•
•			
•	•	•	•
•	•	•	•
•	•	•	•
•	•	•	•
•	•	•	
•	Option	•	
•/•	Option / •		
•	•		
1000	1000		1500
Option (HVLink PRO)	Option (TeraLink)		Option (EuroLink PRO)
Craphical I CD	Craphical I CD	Custom LCD	Cuctom LCD
Graphical LCD	Graphical LCD •	• Custom LCD	• Custom LCD
CAT IV / 600 V	CAT III / 600 V	CAT IV / 600 V	CAT III / 600 V; CAT IV / 300 V
•	Option	•	•
	•	•	
•	•	•	•
4 h at 5 kV	4 h at 5 kV	4 h at 5 kV	13 h
3 kg	2.1 kg	3 kg	850 g
310 x 130 x 250	2.1 kg 265 x 110 x 185	310 x 130 x 250	140 x 80 x 230
טוכ X טונ X טונ	ZOD X IIU X IØD	טוט ג וטט ג בטט	14U X OU X ZOU

High voltage insulation testers MI 3210 TeraOhmXA 10 kV



MI 3210 TeraOhm XA 10 kV is a portable, battery or mains powered test instrument with excellent IP protection (IP65), intended for diagnosing of Insulation Resistance by using high DC test voltages of up to 10 kV. Because of its robustness (CAT IV protection) and high immunity to radiated RF fields it is best suited for industrial environment

MEASURING FUNCTIONS

- Insulation Measurement;
- Diagnostic Test (PI, DAR, DD);
- Step Voltage Test;
- Withstanding Voltage Test (DC) up to 10 kV:
- Voltage and frequency measurement up to 550 V TRMS.

KEY FEATURES

- Insulation resistance up to 20 $T\Omega$.
- Adjustable test voltage (50 V...10 kV) 50 V and 100 V step.
- Programmable timer.
- Capacitance measurement.
- Charging rate for capacitive load < 3 s / μF at 10 kV.
- Automatic discharge of test object after

completion of measurement.

- Guard terminal.
- High voltage breakdown detection.
- Custom defined tests.
- Auto adjustment function.
- Measurement results in numerical and graphical form.
- PC software HVLink PRO for downloading and analysing of the test results and test report printing.
- Isolated RS232 and USB communication ports, BT interface.
- High quality accessories including shielded test leads in standard set.
- High EM interferences protection: Input AC current noise rejection (1 mA∞600 V) and additional averaging of the result (5, 10, 30, 60).
- CAT IV / 600 V.
- Mains and rechargeable battery power supply.

APPLICATION

- Power transformers;
- Measuring transducers in distribution networks;
- Testing insulation resistance of rotating machinery and cables;
- Production line periodic testing and maintenance;
- Troubleshooting and analysis of all kinds of insulation problems;
- High voltage generators;
- · Surge arrestors.

STANDARDS

Electromagnetic compatibility

• EN 61326 class A

Safety

- EN 61010-1 (instrument);
- EN 61010-2-030;
- EN 61010-2-033;
- EN 61010-031 (accessories)

2.24 Accessories 2.37 Metrel Catalogue 2018

FUNCTION	Measuring range	Resolution	Accuracy
Insulation resistance	0.01 MΩ 9.99 MΩ 10.0 MΩ 99.9 MΩ 100 MΩ 999 MΩ	10 kΩ 100 kΩ 1 MΩ	±(5% of reading + 3 digits) ±(5% of reading + 3 digits) ±(5% of reading + 3 digits)
	1.00 GΩ 9.99 GΩ 10.0 GΩ 99.9 GΩ	10 ΜΩ 100 ΜΩ	±(5% of reading + 3 digits) ±(5% of reading + 3 digits)
	100 GΩ 999 GΩ 1.0 TΩ 9.9 TΩ 10 TΩ 20 TΩ	1 GΩ 100 GΩ 1 TΩ	±(5% of reading + 3 digits) ±(5% of reading + 3 digits) ±(15% of reading + 3 digits)
Test voltage	0 V 999 V 1.00 kV 9.99 kV 10.0 kV 14.0 kV	1 V 10 V 100 V	±(5% of reading + 3 digits)
Insulation leakage current	1.00 mA 5.00 mA 100 μA 999 μA 10.0 μA 99.9 μA 1.00 μA 9.99 μA 100 nA 999 nA 10.0 nA 99.9 nA	10 μA 1 μA 100 nA 10 nA 1 nA 100 pA	±(5% of reading + 3 digits)
	0.00 nA 9.99 nA	10 pA	±(10% of reading + 0.15 nA)
Dielectric absorption ratio (DAR)	0.01 9.99 10.0 100.0	0.01 0.1	±(5% of reading + 2 digits)
Polarization index (PI)	0.01 9.99 10.0 100.0	0.01 0.1	±(5% of reading + 2 digits)
Dielectric discharge (DD)	0.01 9.99 10.0 100.0	0.01 0.1	±(5% of reading + 2 digits)
Voltage AC/DC	5.0 V 99.9 V 100 V 550 V	0.1 V 1 V	±(2% of reading + 2 digits)
Frequency	10 Hz 500 Hz	0.1 Hz	±(0.2% of reading + 1 digits)
Capacitance	20.0 nF 999 nF 1.00 μF 9.99 μF 10.0 μF 50.0 μF	1 nF 10 nF 100 nF	±(5% of reading + 2 digits)
Power supply	12 V DC (3.4 Ah Lead - Acid)		
Display	320 x 240 dots matrix display wit	h backlight	
Overvoltage category	CAT IV / 600 V		
Protection class	Double insulation		
COM port	RS232, USB and Bluetooth		
Dimensions	345 x 160 x 335 mm		
Weight	6.5 kg		

STANDARD SET

- Instrument MI 3210 TeraOhmXA 10 kV
 10 kV shielded test lead with probe, 2 m
 10 kV shielded test lead, 2 m, 2 pcs (black, red)
 10 kV crocodile clip, 2 pcs (black, red)
- Guard test lead, green, 2 m
 Crocodile clip, green

- Mains cable
 PC SW HVLink PRO with USB and RS 232 cable
- Handbook "Guide to modern insulation testing" on storage media
- Instruction manual on storage media
- Calibration certificate



High voltage insulation testers MI 3205 TeraOhm 5 kV



MI 3205 TeraOhm XA 5kV is a portable battery (Li-ion) or mains powered test instrument with excellent IP protection (IP65 case closed and IP54 case open), intended for diagnosing of Insulation Resistance by using high test voltages of up to 5 kV. It is designed and produced with the extensive knowledge and experience acquired through many years of working in this field.

MEASURING FUNCTIONS

- Insulation Measurement;
- Diagnostic Test (PI, DAR, DD);
- Step Voltage Test;
- Withstanding Voltage Test (DC) up to 5 kV;
- Voltage and frequency measurement up to 550 V TRMS.

KEY FEATURES

- Insulation resistance up to 15 T $\!\Omega.$
- Adjustable test voltage (50 V...5 kV) 50 V and 100 V step.
- · Programmable timer.
- Capacitance measurement.
- Charging rate for capacitive load < 1.5 s / uE at 5 kV
- Automatic discharge of test object after completion of measurement.
- Guard terminal.
- · High voltage breakdown detection.

- Custom defined tests.
- Auto adjustment function.
- Measurement results in numerical and graphical form.
- PC software HVLink PRO for downloading and analysing of the test results and test report printing.
- Isolated RS232 and USB communication ports, BT interface.
- High quality accessories including shielded test leads in standard set.
- High EM interferences protection: Input AC current noise rejection (1 mA@300 V) and additional averaging of the result (5, 10, 30, 60).
- CAT IV / 600 V.
- Increased working nominal altitude to 3000 m.
- High power Li-ion battery pack (14.8V, 4.4Ah).
- Mains and rechargeable battery power supply.

APPLICATION

- Power transformers;
- Measuring transducers in distribution networks;
- Testing insulation resistance of rotating machinery and cables;
- Production line periodic testing and maintenance;
- Troubleshooting and analysis of all kinds of insulation problems;
- High voltage generators;
- · Surge arrestors and varistors.

STANDARDS

Electromagnetic compatibility

• EN 61326 class A

Safety

- EN 61010-1 (instrument)
- EN 61010-2-030
- EN 61010-2-033
- EN 61010-031 (accessories)

2. 26 Accessories 2.37 Metrel Catalogue 2018

FUNCTION	Measuring range	Resolution	Accuracy
Insulation resistance	0.01 MΩ 9.99 MΩ	10 kΩ	±(5% of reading + 3 digits)
	10.0 ΜΩ 99.9 ΜΩ	100 kΩ	±(5% of reading + 3 digits)
	100 ΜΩ 999 ΜΩ	1 ΜΩ	±(5% of reading + 3 digits)
	1.00 GΩ 9.99 GΩ	10 MΩ	±(5% of reading + 3 digits)
	10.0 GΩ 99.9 GΩ	100 ΜΩ	±(5% of reading + 3 digits)
	100 GΩ 999 GΩ	1 GΩ	±(5% of reading + 3 digits)
	1.0 ΤΩ 9.9 ΤΩ	100 GΩ	±(15% of reading + 3 digits)
	10 ΤΩ 15 ΤΩ	1 ΤΩ	±(15% of reading + 3 digits)
Test voltage	0 V 999 V	1 V	±(5% of reading + 3 digits)
	1.00 kV 4.99 kV	10 V	
Insulation leakage current	1.00 mA 5.00 mA	10 μΑ	
	100 μΑ 999 μΑ	1 μA	
	10.0 μΑ 99.9 μΑ	100 nA	±(5% of reading + 3 digits)
	1.00 μΑ 9.99 μΑ	10 nA	
	100 nA 999 nA	1 nA	
	10.0 nA 99.9 nA	100 pA	
	0.00 nA 9.99 nA	10 pA	±(10% of reading + 0.15 nA)
Dielectric absorption ratio (DAR)	0.01 9.99	0.01	±(5% of reading + 3 digits)
	10.0 100.0	0.1	
Polarization index (PI)	0.01 9.99	0.01	±(5% of reading + 2 digits)
	10.0 100.0	0.1	
Dielectric discharge (DD)	0.01 9.99	0.01	±(5% of reading + 2 digits)
_	10.0 100.0	0.1	
Capacitance	20.0 nF 999 nF	1 nF	±(5% of reading + 3 digits)
	1.00 μF 9.99 μF	10 nF	
	10.0 μF 50.0 μF	100 nF	
True RMS voltmeter	5 V 550 V		±(2 % of reading +2 digits)
(DC, 45 Hz 65 Hz)			
Frequency	10 Hz 500 Hz		±(0.2 % of reading +1 digit)
Power supply	90-260 VAC, 45-65 Hz or 14,4 VDC (4	4,4 Ah Li-Ion)	
Protection degree close / open case	IP 65 / IP 54		
Display	320 x 240 dots matrix display with b	packlight	
Overvoltage category	CAT IV / 600 V		
Protection class	Reinforced insulation 🛽		
Degree of protection	IP 65 (case closed)		
	IP 54 (case open)		
COM port	RS232, USB and Bluetooth		
Dimensions	345 x 160 x 335 mm		
Weight	6.5 kg		

STANDARD SET

- Instrument TeraOhmXA 5 kV
 10 kV shielded test lead, 2 m, 2 pcs (black, red)
 10 kV crocodile clip, 2 pcs (black, red)
 Guard test lead, green, 2 m
 Crocodile clip, green

- Mains cable
- PC SW HVLink PRO with USB and RS 232 cable
- Handbook "Guide to modern insulation testing" on storage media
 Instruction manual on storage media
- Calibration certificate



High voltage insulation testers MI 3201 TeraOhm 5 kV Plus



The new insulation tester MI 3201 TeraOhm 5 kV Plus is a portable instrument intended to measure insulation resistance by using high DC test voltages up to 5 kV. TeraOhm 5 kV Plus enables insulation resistance measurements up to 10 TΩ, step voltage test, withstanding voltage test, PI, DD and DAR calculation and capacitance measurement. The large LCD screen enables real-time graph R(t) to be displayed. Results can be stored and downloaded to a computer via USB or RS232 connection with the help of the optional HVLink PRO software. The high quality instrument, shielded test leads and quality accessories included in the standard set enable to perform insulation testing quickly and effectively.

MEASURING FUNCTIONS

- Insulation resistance measurement;
- Step voltage insulation resistance testing;
- Withstanding voltage testing;
- Diagnostic test (PI, DD, DAR);
- R(t) graph plotting;
- Capacitance measurement;
- Voltage measurement;
- Frequency measurement.

KEY FEATURES

- Measuring range up to 10 T Ω .
- Wide range of DC test voltages: from 250 V up to 5000 V in steps of 25 V.
- Withstanding voltage: testing of insulation with programmable ramp test voltage from 250 V up to 5 kV and programmable threshold current.
- Step voltage: insulation resistance measurement with five discrete proportionately set test voltages and programmable timer per step.
- Automated testing: PI, DD, DAR calculations with automated resistance ranging. All data is displayed during one single measurement.

- **Guard test terminal:** for elimination of potential surface leakage currents.
- Fault finding: fully programmable step voltage and withstanding voltage test functions assist in diagnosing faults in insulation.
- **Graph R(t):** real time resistance against time graph plotting facility to graphically illustrate the response of a material to an applied test voltage.
- Built-in timer: programmable timer from 1 s up to 10+0 min.
- Automatic discharge of tested object after test.
- Fast testing: 5 mA current source for quick charging of capacitive load.
- Accurate: selectable noise rejection filters and shielded test leads included in a standard set ensure accurate measurement.
- Safe: high CAT IV / 600 V voltage protection.
- Built-in charger & rechargeable batteries: instrument has a built-in charger and comes complete with a set of rechargeable NiMH batteries.
- Portable: lightweight 3 kg design with carry handle and shoulder strap.

APPLICATION

- Testing insulation resistance of rotating machinery, cables, transformers, HV generators, surge arresters;
- Production line periodic testing and maintenance;
- Troubleshooting and analysis of all kinds of insulation problems;
- · Diagnostic testing.

STANDARDS

Functionality

• IEC/EN 61557-2

Electromagnetic compatibility

• EN 61326 class B

Safety

- EN 61010-1;
- EN 61010-031

2.28 Accessories 2.37 Metrel Catalogue 2018

Insulation resistance $ \begin{array}{ccccccccccccccccccccccccccccccccccc$	±(5 % of reading + 3 digits) ±(15 % of reading + 3 digits) ±(15 % of reading + 3 digits) ±(15 % of reading + 3 digits)
10.0 MΩ 99.9 MΩ 100 kΩ 100 MΩ 999 MΩ 1 MΩ 1.00 GΩ 9.99 GΩ 10 MΩ 10.0 GΩ 99.9 GΩ 100 MΩ 100 GΩ 999 GΩ 1 GΩ	±(5 % of reading + 3 digits) ±(15 % of reading + 3 digits)
100 MΩ 999 MΩ 1 MΩ 1.00 GΩ 9.99 GΩ 10 MΩ 10.0 GΩ 99.9 GΩ 100 MΩ 100 GΩ 999 GΩ 1 GΩ	±(5 % of reading + 3 digits) ±(5 % of reading + 3 digits) ±(5 % of reading + 3 digits) ±(5 % of reading + 3 digits) ±(15 % of reading + 3 digits)
1.00 GΩ 9.99 GΩ 10 MΩ 10.0 GΩ 99.9 GΩ 100 MΩ 100 GΩ 999 GΩ 1 GΩ	±(5 % of reading + 3 digits) ±(5 % of reading + 3 digits) ±(5 % of reading + 3 digits) ±(15 % of reading + 3 digits)
10.0 GΩ 99.9 GΩ 100 MΩ 100 GΩ 999 GΩ 1 GΩ	±(5 % of reading + 3 digits) ±(5 % of reading + 3 digits) ±(15 % of reading + 3 digits)
100 GΩ 999 GΩ	±(5 % of reading + 3 digits) ±(15 % of reading + 3 digits)
100 000 000 000 000 000 000 000 000 000	±(15 % of reading + 3 digits)
1.00 111 111 0.00 111 10 101	
	+(3 % of reading + 3 V)
<u>Test voltage</u> 0 V 5500 V 1V	, , ,
Insulation leakage current 0.00 nA 9.99 nA 0.01 nA	±(5 % of reading + 0.05 nA)
10.0 nA 99.9 nA 0.1 nA	
100 nA 999 nA 1 nA	
1.00 μA 9.99 μA	
10.0 µA 99.9 µA 100 nA	
100 μΑ 999 μΑ 1μΑ	
1.00 mA 5.50 mA 10 μA	
Dielectric absorption ratio (DAR) 0.01 9.99 0.01	±(5 % of reading + 2 digits)
10.0 100.0 0.1	±5 % of reading
Polarization index (PI) 0.01 9.99 0.01	±(5 % of reading + 2 digits)
10.0 100.0 0.1	±5 % of reading
Dielectric discharge (DD) 0.01 9.99 0.01	±(5 % of reading + 2 digits)
10.0 100.0 0.1	±5 % of reading
Voltage AC / DC 0 V 600 V 1V	±(3 % of reading + 4 V)
Frequency 45.0 Hz 65.0 Hz 0.1 Hz	±0.2 Hz
Capacitance 0.0 nF 99.9 nF 0.1 nF	±(5 % of reading + 4 nF)
100 nF 999 nF 1 nF	
1.00 µF 50.00 µF 10 nF	
Power supply $6 \times 1.2 \text{ V NiMH rechargeable batteries, type C}$	
Display Matrix LCD with backlight, 160 x 116 dots	
Overvoltage category CAT IV / 600 V	
Protection class Double insulation	
COM port RS232 and USB	
Dimensions 310 x 130 x 250 mm	
Weight 3 kg	

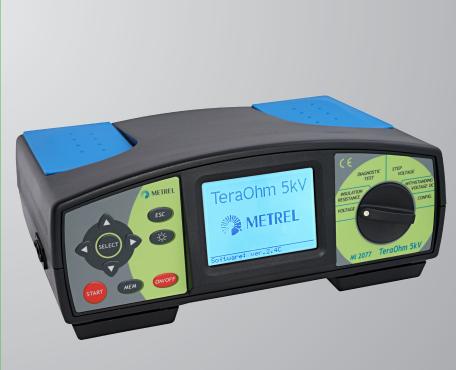
STANDARD SET

- Instrument TeraOhm 5 kV Plus
- Small soft carrying bag
- Small soft carrying bag
 Mains cable
 10 kV shielded test lead with probe, black, 2 m
 10 kV shielded test lead with probe, red, 2 m
 10 kV crocodile clip, 2 pcs (black, red)
 Guard lead, green, 2 m
 Crocodile clip, green

- 6 x 1.2 V NiMH rechargeable batteries, type C
 Handbook on storage media
- Instruction manual
- Calibration certificate



High voltage insulation testers MI 2077 TeraOhm 5 kV



The MI 2077 TeraOhm 5 kV is an advanced, field proven high voltage diagnostic insulation tester. Its small lightweight design make it easily portable and its bright LCD display ensures that readings can be made in almost any lighting conditions. TeraOhm 5 kV enables insulation resistance measurements up to 5 $T\Omega$, step voltage test, withstanding voltage test, PI, DD and DAR calculation and capacitance measurement. Built-in memory and optional PC SW TeraLink enables data storing, downloading to PC, analysis of test results and printout of test reports.

MEASURING FUNCTIONS

- Insulation resistance measurement;
- Step voltage insulation resistance testing;
- Withstanding voltage testing;
- Diagnostic test (PI, DD, DAR);
- Capacitance measurement;
- Voltage measurement;
- Frequency measurement.

KEY FEATURES

- Measuring range up to 5 TΩ.
- Wide range of DC test voltages: from 250 V up to 5000 V in steps of 50 V.
- Withstanding voltage: testing of insulation with programmable ramp test voltage from 250 V up to 5 kV and programmable threshold current.
- **Step voltage:** insulation resistance measurement with five discrete proportionately set test voltages and programmable timer per step.
- Automated testing: PI, DD, DAR calculations with automated resistance ranging. All data is displayed during one single measurement.

- Fault finding: fully programmable step voltage and withstanding voltage test functions assist in diagnosing faults in insulation.
- Guard test terminal: for elimination of potential surface leakage currents.
- Automatic discharge of tested object after test.
- Accurate: selectable noise rejection filters ensure accurate measurement.
- **Built-in timer:** programmable timer from 1s up to 30 min.
- **Memory:** stores up to 1000 results with date and time stamp.
- Easy to read: large custom LCD dot matrix display with bar graph and with backlight.
- Built-in charger: instrument has a builtin charger which enables measurement during the charging.
- **Portable:** lightweight 2.1 kg design with carrying bag and neck strap.

APPLICATION

- Testing insulation resistance of rotating machinery, cables, transformers, HV generators, surge arresters;
- Production line periodic testing and maintenance;
- Troubleshooting and analysis of all kinds of insulation problems;
- · Diagnostic testing.

STANDARDS

Functionality

• IEC/EN 61557-2

Electromagnetic compatibility

• EN 61326 class B

Safety

- EN 61010-1;
- EN 61010-031

2.30 Accessories 2.37 Metrel Catalogue 2018

FUNCTION	Measuring range	Resolution	Accuracy
Insulation resistance	0 kΩ 999 kΩ	1 kΩ	±(5 % of reading + 3 digits)
	1.00 MΩ 9.99 MΩ	10 kΩ	±(5 % of reading + 3 digits)
	10.0 ΜΩ 99.9 ΜΩ	100 kΩ	±(5 % of reading + 3 digits)
	100 ΜΩ 999 ΜΩ	1 ΜΩ	±(5 % of reading + 3 digits)
	1.00 GΩ 9.99 GΩ	10 MΩ	±(5 % of reading + 3 digits)
	10.0 GΩ 99.9 GΩ	100 ΜΩ	±(5 % of reading + 3 digits)
	100 GΩ 999 GΩ	1 GΩ	±(5 % of reading + 3 digits)
	1.00 ΤΩ 5.00 ΤΩ	10 GΩ	±(5 % of reading + 3 digits)
Test voltage	0 V 5500 V	1 V	±(3 % of reading + 3 V)
Insulation leakage current	0.00 nA 9.99 nA	0.01 nA	±(5 % of reading + 0.05 nA)
	10.0 nA 99.9 nA	0.1 nA	
	100 nA 999 nA	1 nA	
	1.00 μΑ 9.99 μΑ	10 nA	
	10.0 μΑ 99.9 μΑ	100 nA	
	100 μΑ 999 μΑ	1 μΑ	
	1.00 mA 1.54 mA	10 μΑ	
Dielectric absorption ratio (DAR)	0.01 9.99	0.01	±(5 % of reading + 2 digits)
	10.0 100.0	0.1	±5 % of reading
Polarization index (PI)	0.01 9.99	0.01	±(5 % of reading + 2 digits)
	10.0 100.0	0.1	±5 % of reading
Dielectric discharge (DD)	0.01 9.99	0.01	±(5 % of reading + 2 digits)
	10.0 100.0	0.1	±5 % of reading
Voltage AC / DC	0 V 600 V	1 V	±(3 % of reading + 3 V)
Frequency	45.0 Hz 65.0 Hz	0.1 Hz	±0.2 Hz
Capacitance	0.0 nF 99.9 nF	0.1 nF	±(5 % of reading + 2 digits)
	100 nF 999 nF	1 nF	
	1.00 μF 50.00 μF	10 nF	
Battery power supply	6 x 1.2 V NiMH rechargeable batteries, ty	ype C	
Display	Matrix LCD with backlight, 160 x 116 dots	S	
Overvoltage category	CAT III / 600 V		
Protection class	Double insulation		
COM port	RS232 (optional USB with serial convert	er)	
Dimensions	265 × 110 × 185 mm		

STANDARD SET

MI 2077

- Instrument TeraOhm 5 kV
 Soft carrying bag
 Mains cable
 Test lead, black, 2 m
 Test lead, red, 2 m

- Guard lead, green, with crocodile clip, 2 m
 Test probe, black
 Test probe, red

- Crocodile clip, black, 2 pcsHandbook on storage mediaInstruction manual
- Calibration certificate



Picture of MI 2077 set

High voltage insulation testers MI 3202 GigaOhm 5 kV



The MI 3202 GigaOhm 5 kV provides quick and accurate testing of insulation resistance. Five test voltages up to 5 kV and 1 TΩ resistance measuring range cover most of the industrial and power distribution applications. The large analogue / digital LCD screen with backlight offers easy reading of test results. The instrument is placed in a rugged carrying case which allows to use it in barsh environments

MEASURING FUNCTIONS

- Insulation resistance measurement;
- Voltage measurement;
- Frequency measurement.

KEY FEATURES

- Measuring range up to 1 TΩ.
- Analogue scale and digital LCD: measuring results are displayed both in numeric and analogue form.
- Quick set-up: quick and easy selection of test voltage (250 V; 500 V; 1 kV; 2,5 kV; 5 kV).

- Fast testing: 5 mA current source for quick charging of capacitive load.
- **Guard test terminal:** for elimination of potential surface leakage currents.
- Automatic discharge of tested object after test.
- Safe: high CAT IV / 600 V voltage protection.
- Easy to read: large bright LCD with backlight.
- Built-in charger & rechargeable
 batteries: instrument has a built-in charger and comes complete with a set of rechargeable NiMH batteries.
- High quality accessories: shielded test leads are included in a standard set.
- **Portable:** lightweight 3 kg design with carry handle and shoulder strap.

APPLICATION

- Testing insulation resistance of rotating machinery and cables;
- Production line periodic testing and maintenance;
- Troubleshooting and analysis of all kinds of insulation problems.

STANDARDS

Functionality

• IEC/EN 61557-2

Electromagnetic compatibility

• EN 61326 class B

Safety

- EN 61010-1;
- EN 61010-031

2.32 Accessories 2.37 Metrel Catalogue 2018

FUNCTION	Measuring range	Resolution	Accuracy
Insulation resistance	5 kΩ 999 kΩ	1 kΩ	±(5 % of reading + 3 digits)
	1.00 MΩ 9.99 MΩ	10 kΩ	±(5 % of reading + 3 digits)
	10.0 ΜΩ 99.9 ΜΩ	100 kΩ	±(5 % of reading + 3 digits)
	100 MΩ 999 MΩ	1 ΜΩ	±(5 % of reading + 3 digits)
	1.00 GΩ 9.99 GΩ	10 MΩ	±(5 % of reading + 3 digits)
	10.0 GΩ 99.9 GΩ	100 ΜΩ	±(5 % of reading + 3 digits)
	100 GΩ 999 GΩ	1 GΩ	±(10 % of reading + 3 digits)
Test voltage	0 V 5500 V	1 V	±(3 % of reading + 3 V)
Voltage AC / DC	0 V 600 V	1 V	±(3 % of reading + 4 V)
Frequency	45.0 Hz 65.0 Hz	0.1 Hz	±0.2 Hz
Battery power supply	6 × 1.2 V NiMH rechargeable bat	teries, type C	
Display	Analogue / digital LCD with bacl	dight	
Overvoltage category	CAT IV / 600 V		
Protection class	Double insulation		
Dimensions	310 x 130 x 250 mm		
Weight	3 kg		

STANDARD SET

- MI 3202
 Instrument GigaOhm 5 kV
 Mains cable
 10 kV shielded test lead with probe, black, 2 m
 10 kV shielded test lead with probe, red, 2 m
 10 kV crocodile clip, 2 pcs (black, red)
 Guard lead, green, 2 m
 Crocodile clip, green
 6 x 1.2 V NiMH rechargeable batteries, type C

- Handbook on storage media Instruction manual Calibration certificate



High voltage insulation testers MI 3121H SMARTEC 2,5 kV Insulation / Continuity



The MI 3121H Smartec 2,5 kV Insulation / Continuity is the portable measuring instrument for complete diagnostic testing of insulation and continuity measurements. Due to insulation resistance measurement with the test voltages up to 2.5 kV (measuring range is up to 100 G Ω) and calculation of PI and DAR indexes the instrument is suited for testing insulation of cable lines, current and voltage transformers, electric motors, etc. Due to configurable limits the instrument enables PASS / FAIL evaluation of test results which is accompanied with bright green or red light of LEDs. Additional features include magnetic holder for fixing the tester on the metal surface and built-in charger. The MI 3121H is compatible with EuroLink PRO software which enables downloading and analysis of test results and creation of professional test reports.

MEASURING FUNCTIONS

- Insulation resistance with DC voltage up to 2.5 kV:
- Diagnostic test (PI, DAR calculation);
- Continuity of PE conductors with 200 mA test current and polarity change;
- Continuity of PE conductors with 7 mA test current (continuous measurement) without RCD tripping;
- TRMS voltage and frequency.

KEY FEATURES

- High measuring range: up to 100 G Ω with test voltage from 100 to 2500 V.
- Insulation diagnostics: PI and DAR calculation for determining if the insulation damaged or contaminated.
- **Guard test terminal:** for elimination of potential surface leakage currents.
- **Polarity swap:** automatic polarity reversal on continuity test.

- Analogue scale: measuring results are displayed in numeric and analogue representation.
- Custom limits: if limits are set on insulation or continuity function then large green and red lights of the LEDs will indicate a PASS or FAIL evaluation of test result.
- Safe: suited for testing on CAT IV installations.
- Built-in charger & rechargeable
 batteries: instrument has a built-in
 charging circuit and comes complete with
 a set of rechargeable NiMH batteries.
 Memory: two level memory structure for
 saving of test results and parameters.
- **Downloadable:** downloads via RS232 or USB cable directly to the PC with the help of the PC software EuroLink PRO.
- Easy to use: large bright LCD display and large buttons enable easy handling of the instrument (even while wearing gloves).
- Magnetic holder: magnet for fixing instrument on metal surfaces enables hands-free operation.

APPLICATION

- Measurement of insulation resistance of transformers, motors, cables, machines, etc.;
- Testing on CAT IV installations (distribution side of installations, industrial plants, etc.);
- Observation of insulation trends;
- Testing of PE conductors continuity and main and supplementary PE connections.

STANDARDS

Functionality

- IEC/EN 61557 Parts 1, 2, 4, 10
- IEC/EN 60364
- VDE 100
- BS 7671 17th edition
- CEI 64.8

Electromagnetic compatibility

• IEC/EN 61326-1;

Safety

- EN 61010-1;
- EN 61010-031

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FUNCTION	Measuring range	Resolution	Accuracy
	U = 500, 1000, 2500 VDC:		
	R: 0.00 MΩ 19.99 MΩ	0.01ΜΩ	±(5 % of reading + 3 digits)
	20.0 ΜΩ 199.9 ΜΩ	0.1ΜΩ	±5 % of reading
	200 ΜΩ 999 ΜΩ	1 ΜΩ	±5 % of reading
	1.00 GΩ 4.99 GΩ	10 MΩ	±10 % of reading
Insulation resistance (EN 61557-2)	5.00 GΩ 19.99 GΩ	10 MΩ	±20 % of reading
	20.0 GΩ 99.9 GΩ	100 ΜΩ	±20 % of reading
	U = 100, 250 VDC:		
	R: 0.00 MΩ 19.99 MΩ	0.01 ΜΩ	±(5 % of reading + 3 digits)
	20.0 ΜΩ 199.9 ΜΩ	0.1 ΜΩ	±10 % of reading
	200 ΜΩ 999 ΜΩ	1 ΜΩ	±20 % of reading
PI. DAR	0.01 9.99	0.01	±(5 % of reading + 2 digits)
PI, DAR	10.0 100.0	0.1	±5 % of reading
S 11 11 200 A F.P.F. L 1	0.00 Ω 19.99 Ω	0.01 Ω	±(3 % of reading + 3 digits)
Continuity 200 mA of PE conductor	20.0 Ω 199.9 Ω	0.1 Ω	±5 % of reading
with polarity change (EN 61557-4)	200 Ω 1999 Ω	1 Ω	±10 % of reading
Low resistance measurement with 7 mA test current	0.0 Ω 19.9 Ω	0.1 Ω	±(5 % of reading + 3 digits)
(continuous measurement)	20 Ω 1999 Ω	1 Ω	±10 % of reading
	0.0 V 99.9 V	0.1 V	. /2.0/
Voltage	100 V 550 V	1 V	±(3 % of reading + 3 digits)
	0.00 Hz 19.99 Hz	0.01 Hz	
Frequency	20.0 Hz 199.9 Hz	0.1 Hz	±(0.2 % of reading + 1 digits)
. ,	200 Hz 500 Hz	1 Hz	
Power supply	6 x 1.2 V rechargeable batteries, type AA		
Overvoltage category	CAT III / 600 V; CAT IV / 300 V		
Protection class	Double insulation		
COM port	RS232 and USB		
Dimensions	140 x 230 x 80 mm		
Weight	0.85 kg		

STANDARD SET

- MI 3121H
 Instrument Smartec 2,5 kV Insulation /

- Instrument Smartec 2,5 kV Insulation / Continuity
 Soft hand strap
 Test lead, 2 x 1.5 m
 Test probe, 2 pcs (black, red)
 Crocodile clip, 2 pcs (black, red)
 Power supply adapter + 6 NiMH rechargeable batteries, type AA
- Instruction manual on storage media
- Short instruction manual
- Handbook on storage mediaCalibration certificate



PC software HVLink PRO



The HVLink PRO software works in conjunction with Metrel newest HV insulation testers, Step Contact Voltage Measuring System and MicroOhms. The software automatically recognizes connected instrument and allows the customer to download test results saved on the instrument, review the results, rename and relocate data if needed and print test reports.

KEY FEATURES

- Automatic recognition of the instrument: when connecting your instrument to the PC it is automatically recognized by the software.
- **Tree view:** all the results are represented in tree view for easy data management.
- Rearranging of structures: the elements of the tree structure can be relocated and renamed.
- **R(t) graphs:** if graph R(t) was enabled when testing with the instrument MI 3200 or MI 3201 then it can be plotted and printed with the software.
- Measurement tables: if graph R(t) was enabled when testing with the instrument MI 3200 or MI 3201 then a table with fixed R(t) values can be viewed and printed.

- Export of test results: test results in text format can be exported to other programs (MS Excel, MS Word).
- Automatic Test Report generation: enables automatic generation of Test Report (low, medium and high detailed).

PC SW HVLink PRO is compatible with:

- MI 3210 TeraOhmXA 10 kV
- MI 3200 Tera0hm 10 kV
- MI 3201 TeraOhm 5 kV Plus
- MI 3295 Step Contact Voltage Measuring System
- MI 3252 MicroOhm 100A

PASSWORD PROTECTION

PC SW HVLink PRO is password protected for the following instruments:

- MI 3200 TeraOhm 10 kV
- MI 3201 TeraOhm 5 kV Plus

ORDERING INFORMATION

• A 1275 PC SW HVLink PRO with USB and RS232-PS/2 cable

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Selection Guide for HV Accessories

Photo	Part number	Description	Target application	MI 3290	MI 3295	MI 3280	MI 3252	MI 3250	MI 3242	MI 3210	MI 3205	MI 3201	MI 2077	MI 3202	MI 3121H
	MI 3295M Set	Step Contact Meter Measuring Set	Additional MI 3295M Set for simultaneous measurements of step voltage and contact voltage on different test points. Set includes instrument MI 3295M, test lead, 2 x 3 m, soft carrying bag, soft carrying neck belt, NiMH battery, type AA, 6 pcs, Power supply adapter.	•	•										
	A 1014	Test probe, black	Test probe with fi 4 mm connection is suitable for performing measurements both in mains outlets and in situations when no schuko outlet is present.												٠
*	A 1013	Crocodile clip, black	Crocodile clip assures secure and permanent contact during the measurement on bus bars, fixing screws,										•		•
	A 1064	Crocodile clip, red	etc.										•		
	A 1309	Crocodile clip, green										•	•	•	
	S 2036	HV crocodile clip, 2 pcs (red, black)	10 kV crocodile clips for HV insulation resistance measurement assure secure and permanent contact during the measurement on bus bars, fixing screws, etc.							•	•	•	•	٠	
	A 1046	1.2 V NiMH battery, type C, 6 pcs	A set of 6 pieces of rechargeable batteries, type C.									•	•	•	
111111	S 2054	1.2 V NiMH battery, type D, 6 pcs	A set of 6 pieces of rechargeable batteries, type D.												
22.22	A 1169	Fast charger for AA, C, D and 9 V block batteries	Fast battery charger for up to 12 pcs AA, 6 pcs C or D rechargeable batteries, 4 pcs 9 V block batteries.		•			•	•			•	•	•	•
#O»	A 1017	Communication cable RS232	RS232 interface cable for connecting the instrument with the PC.							•	•	•	•		
	A 1171	RS232 / USB adapter with 1 m cable	RS232 / USB adapter for instruments without USB communication port.										•		
	A 1056	PC SW TeraLink with RS232 cable	PC Software TeraLink supplied with RS232 interface cable supports test results downloading and creation of test reports.										•		
	A 1275	PC SW HVLink PRO	HVLink PRO is a downloading and data management PC software with R=f(t) graph printing functionality (for HV insulation testers). It comes delivered with RS232 and USB communication cables.		•		•			•	•	•			
	A 1291	PC SW EuroLink PRO with USB and RS232- PS/2 cable	PC Software EuroLink PRO enables downloading and test results management and printing of test reports. Delivered with RS232-PS/2 and USB communication cables.												•
	A 1333	Resistor SHUNT, 750 μΩ	Resistor SHUNT is used for testing correctness of micro ohmmeters.				•	•							

A 1353 5 2053 5 2058	Step voltage probe (25 kg), 2 pcs Step voltage plates	Additional voltage probes for step voltage measurements. Light replacement for 25kg Step voltage probes A	•	•									
	Step voltage plates	Light replacement for 25kg Step voltage probes A											
5 2058		1353.	•	•									
	Insulation test plates	Two in one: Test plates for measurement of floor and wall insulation, $\Delta 625~\text{cm}^2$ (acc. to EN 60364-6) and measurement of semi conductivity, 2,5 kg, Ø65 mm (acc. to EN 61340-5-1).						•	٠	•	٠	•	•
A 1012	Test lead, green, 4 m	Extension test lead.								•	•	•	
\ 1154	Test lead, black, 4 m	Extension test lead for earth and continuity measurements.											•
\ 1319	2.5 kV test lead, 3 x 1.5 m	3-wire test lead with GUARD connection for insulation resistance measurements with test voltage up to 2,5 kV. Recommended to be used when measuring high insulation resistances (>10 G Ω).											•
À 1153	Test lead, black, 20 m	Extension test lead for earth and continuity measurements.											•
\ 1383	Temperature probe with 3 m cable	Temperature probe with measuring range from -55 °C to +125 °C for measurement of ambient temperature.					•						
\ 1437	Test lead with Kelvin probe	Test lead with Kelvin probe for fast resistance measurements.											
\ 1407	Test cable Kelvin 500 A, 2,5 m	Test cable with 500 A Kelvin clamps for easy and accurate resistance measurements with MI 3242.					•						
\ 1408	Test cable Kelvin, 2,5 m	Test cable with Kelvin clamps for easy resistance measurements with MI 3242.					•						
5 1072	Continuity test lead, with crocodile clip, 2 x 2.5 m, 2 pcs	Kelvin test probes with crocodile clips and protection shield as lightweight alternative to clips within the standard set.	•				•						
4 4	1154 1319 1153 1437 1407	Test lead, black, 4 m 2.5 kV test lead, 3 x 1.5 m Test lead, black, 20 m Test lead, black, 20 m Test lead with Kelvin probe Test cable Kelvin 500 A, 2,5 m Test cable Kelvin, 2,5 m Continuity test lead, with crocodile clip,	mm (acc. to EN 61340-5-1). x1012 Test lead, green, 4 m Extension test lead. x1154 Test lead, black, 4 m Extension test lead for earth and continuity measurements. x1319 2.5 kV test lead, 3 x 1.5 m 3-wire test lead with GUARD connection for insulation resistance measurements with test voltage up to 2.5 kV. Recommended to be used when measuring high insulation resistances (>10 GΩ). x1153 Test lead, black, 20 m Extension test lead for earth and continuity measurements. x1383 Temperature probe with 3 m cable Temperature probe with measuring range from -55 °C to +125 °C for measurement of ambient temperature. x1437 Test lead with Kelvin measurements. Test lead with Kelvin probe for fast resistance measurements. x1407 Test cable Kelvin measurements. Test cable with S00 A Kelvin clamps for easy and accurate resistance measurements with MI 3242. x1408 Test cable Kelvin, 2,5 m Test cable with Kelvin clamps for easy resistance measurements with MI 3242. x1408 Test cable Kelvin, 2,5 m Test cable with Kelvin clamps for easy resistance measurements with MI 3242. x1408 Test cable Kelvin, 2,5 m Test cable with Kelvin clamps for easy resistance measurements with MI 3242.	mm (acc. to EN 61340-5-1). Test lead, green, 4 m Extension test lead. Extension test lead. Extension test lead for earth and continuity measurements. 2.5 kV test lead, 3 -wire test lead with GUARD connection for insulation resistance measurements with test voltage up to 2,5 kV. Recommended to be used when measuring high insulation resistances (>10 GΩ). Test lead, black, 20 m Extension test lead for earth and continuity measurements. Extension test lead for earth and continuity measurements. Temperature probe with 3 m cable Temperature probe with measuring range from -55 °C to +125 °C for measurement of ambient temperature. Test lead with Kelvin probe for fast resistance measurements. Test cable Kelvin 500 A, 2,5 m Test cable with 500 A Kelvin clamps for easy and accurate resistance measurements with MI 3242.	mm (acc. to EN 61340-5-1). Test lead, green, 4 m Extension test lead. Test lead, black, 4 m Extension test lead for earth and continuity measurements. 2.5 kV test lead, 3 × 1.5 m Survice test lead with GUARD connection for insulation resistance measurements with test voltage up to 2.5 kV. Recommended to be used when measuring high insulation resistances (>10 Gn). Test lead, black, 20 m Extension test lead for earth and continuity measurements. Temperature probe with 3 m cable Temperature probe with measuring range from -55 °C to +125 °C for measurement of ambient temperature. Test lead with Kelvin probe for fast resistance measurements. Test cable Kelvin Test lead with Kelvin probe for fast resistance measurements. Test cable Kelvin Test cable with 500 A Kelvin clamps for easy and accurate resistance measurements with MI 3242. Test cable Kelvin, 2.5 m Test cable with Kelvin clamps for easy resistance measurements with MI 3242.	mm (acc. to EN 61340-5-1). Test lead, green, 4 m Extension test lead. Extension test lead. 3-wire test lead with GUARD connection for insulation resistance measurements with test voltage up to 2,5 kV. Recommended to be used when measuring high insulation resistances (>10 GD). Test lead, black, 20 m Extension test lead for earth and continuity measurements. Test lead, black, 20 m Extension test lead for earth and continuity measurements. Temperature probe with 3 m cable -55 °C to +125 °C for measurement of ambient temperature. Test lead with Kelvin probe for fast resistance measurements. Test cable Kelvin Soo A, 2,5 m Test cable with 500 A Kelvin clamps for easy and accurate resistance measurements with MI 3242. Test cable Kelvin, 2,5 m Test cable with Kelvin clamps for easy resistance measurements with MI 3242.	mm (acc. to EN 61340-5-1). Test lead, green, 4 m Extension test lead. Extension test lead. Extension test lead for earth and continuity measurements. 3-wire test lead with GUARD connection for insulation resistance measurements with test voltage up to 2,5 kV. Recommended to be used when measuring high insulation resistances (>10 GO). Test lead, black, 20 m Extension test lead for earth and continuity measurements. Extension test lead for earth and continuity measurements. Temperature probe with 3 m cable -55 °C to +125 °C for measurement of ambient temperature. Test lead with Kelvin probe for fast resistance measurements. Test lead with Kelvin Test lead with Kelvin probe for fast resistance measurements. Test cable Kelvin Test cable with 500 A Kelvin clamps for easy and accurate resistance measurements with MI 3242. Test cable Kelvin, 2.5 m Test cable with Kelvin clamps for easy resistance measurements with MI 3242. Test cable Kelvin, 2.5 m Test cable with Kelvin clamps for easy resistance measurements with MI 3242.	mm (acc. to EN 61340-5-1). Test lead, green, 4 m Extension test lead. Test lead, black, 4 m Extension test lead for earth and continuity measurements. 2.5 kV test lead, 3-wire test lead with GUARD connection for insulation resistance measurements with test voltage up to 2.5 kV. Recommended to be used when measuring high insulation resistances (>10 GΩ). Test lead, black, 20 m Extension test lead for earth and continuity measurements. Test lead, black, 20 m Extension test lead for earth and continuity measurements. Test lead with 3 m cable	mm (acc. to EN 61340-5-1). Test lead, green, 4 m Extension test lead. Extension test lead. Test lead, black, 4 m Extension test lead for earth and continuity measurements. 3 - wire test lead with GUARD connection for insulation resistance measurements with test voltage up to 2,5 kV. Recommended to be used when measuring high insulation resistances (>10 Gn). Test lead, black, 20 m Extension test lead for earth and continuity measurements. Temperature probe with 3 m cable	mm (acc. to EN 61340-5-1). Test lead, green. 4 m Extension test lead. Extension test lead. Extension test lead. Extension test lead for earth and continuity measurements. 3 - Wire test lead with GUARD connection for insulation resistance measurements with test voltage up to 2,5 kV Recommended to be used when measuring high insulation resistances (>10 GI). Test lead, black, 20 m Extension test lead for earth and continuity measurements. Extension test lead for earth and continuity measurements. Temperature probe with measuring range from -55 °C to +125 °C for measurement of ambient temperature. Test lead with Kelvin Test lead with Kelvin probe for fast resistance measurements. Test cable Kelvin Test cable with 500 A Kelvin clamps for easy and accurate resistance measurements with MI 3242. Test cable Kelvin, 2,5 m Test cable with Kelvin clamps for easy resistance measurements with MI 3242. Test cable Kelvin, 2,5 m Test cable with Kelvin clamps for easy resistance measurements with MI 3242.	mm (acc. to EN 61340-5-1). Test lead, green, 4 m Extension test lead. Test lead, black, 4 m Extension test lead for earth and continuity measurements. 1319 2.5 kV test lead, 3 x 1.5 m Simulation resistance measurements with test voltage up to 2.5 kV, Recommended to be used when measuring high insulation resistances (>10 CD). Test lead, black, 20 m Extension test lead for earth and continuity measurements. Test lead, black, 20 m Extension test lead for earth and continuity measurements. Temperature probe with 3 m cable -55 °C to +125 °C for measurement of ambient temperature. Test lead with Kelvin probe for fast resistance measurements. Test cable Kelvin 500 A, 2.5 m Test cable with Kelvin clamps for easy and accurate resistance measurements with MI 3242. Test cable Kelvin, 2.5 m Test cable with Kelvin clamps for easy resistance measurements with MI 3242.	mm (acc. to EN 61340-5-1). Test lead, green, 4 m Extension test lead. Test lead, black, 4 m Extension test lead for earth and continuity measurements. Test lead, black, 4 m Extension test lead with GUARD connection for insulation resistance measurements with test voltage up to 2,5 kV, test lead when measuring high insulation resistance (S10 GD). Test lead, black, 20 m Extension test lead for earth and continuity measurements. Test lead, black, 20 m Extension test lead for earth and continuity measurements. Temperature probe with 3 m cable -55 °C to +125 °C for measurement of ambient temperature. Temperature. Test lead with Kelvin probe for fast resistance measurements. Test cable Kelvin 500 A, 2,5 m Test cable with Kelvin clamps for easy and accurate resistance measurements with MI 3242. Test cable Kelvin, 2,5 m Test cable with Kelvin clamps for easy resistance measurements with MI 3242.	mm (acc. to EN 61340-5-1). Test lead, green, 4 m Extension test lead. Test lead, black, 4 m Extension test lead for earth and continuity measurements. Test lead, black, 4 m Extension test lead with GUARD connection for insulation resistance measurements with test voltage up to 2,5 kV. Recommended to be used when measuring high insulation resistances (>10 GO). Test lead, black, 20 m Extension test lead for earth and continuity measurements. Test lead, black, 20 m Extension test lead for earth and continuity measurements. Temperature probe with 3 m cable

• Option

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Photo	Part number	Description	Target application	MI 3290	MI 3295	MI 3280	MI 3252	MI 3250	MI 3242	MI 3210	MI 3205	MI 3201	MI 2077	MI 3202	MI 3121H
QQ	S 2046	Current test lead with insulated crocodile clip, 5 m, 25 mm², 2 pcs	100 A current test lead with insulated crocodile clip for performing accurate resistance measurements with MI 3252.				•								
66	S 2081	Set of Kelvin test leads with small crocodiles, 5m	Set of test leads for MI 3280 for measurements on low power transformers			•									
41 200 PO	S 2052	Current test lead with crocodile clip, 10 m, 50 mm2, 2 pcs	Extended 100 A current test leads for accurate measurements with MI 3252.				•								
% (0)	S 2003	5 kV test lead set, 2 m, 2 pcs	5 kV test lead set, including 2 test leads and 2 crocodile clips, for safe insulation testing.										•		
	S 2029	10 kV shielded test lead, 8 m, 2 pcs	10 kV shielded test leads improve accuracy of HV insulation resistance measurement in environments							•	•	•		•	
Olly	S 2084	10 kV shielded test lead + guard, 8 m, 2 pcs	with high content of external electromagnetic interferences.							•	•	•		•	
	S 2030	10 kV shielded test lead, 15 m, 2 pcs	_							•	•	•		•	
Qu,	S 2039	5 kV shielded test lead, 15 m, 2 pcs	5 kV shielded test leads for MI 2077 improve accuracy of HV insulation resistance measurement in environments with high content of external electromagnetic interferences.										•		
	S 2042	5 kV shielded test lead with test probe, 10 m, 2 pcs	Set of 5 kV shielded test leads with test probe and Guard test lead with crocodile clip for MI 2077 improves accuracy of HV insulation resistance measurement in environments with high content of external electromagnetic interferences.										•		
Qm	S 2044	5 kV shielded test lead with test probe, 15 m, 2 pcs	5 kV shielded test leads with test probe improve accuracy of HV insulation resistance measurement in environments with high content of external electromagnetic interferences.										•		
\ \ \ 2	A 1018	Current clamp (low range, leakage), 1.5 m length	High accuracy current clamp 1000 A / 1 A with jaw opening 52 mm and fixed 3.5 m cable for both load and low range / leakage		•										
	A 1018 3M5	Current clamp (low range, leakage), 3.5 m length	current measurement and for earth resistance measurement as well.	•											
8	A 1019	Current clamp	Current clamp 1000 A / 1 A with jaw opening 52 mm for general current measurements and in combination with A 1018 for earth resistance measurement without breaking the loop.	•											
	A 1587	Flexible current clamp 3000-300-30 A	Single phase flexible current clamp with three selectable measuring ranges. With banana plug. Powered with alkaline or rechargeable batteries		٠										
• Ontion															

[•] Option

Photo	Part number	Description	Target application	MI 3290	MI 3295	MI 3280	MI 3252	MI 3250	MI 3242	MI 3210	MI 3205	MI 3201	MI 2077	MI 3202	MI 3121H
	A 1487	Flexible current clamp 50A 5m	Flexible current clamp with circumference of 5m and connection cable of 15m, max. 50 A.	•											
	A 1509	Test lead 50m black on cable reel	Test lead on a cable reel, black, 50 m, extendable.	•			Ħ						T		_
	A 1510	Test lead 50m green on cable reel	Test lead on a cable reel, green, 50 m, extendable.	•											
	A 1525	Test lead 50m blue on cable reel	Test lead on a cable reel, blue, 50 m, extendable.	•											
	A 1526	Test lead 5m blue	Test lead, blue, 5 m, banana plug on both sides.	•											
	A 1527	Test lead 5m red	Test lead, red, 5 m, banana plug on both sides.	•			T								
	A 1528	Professional current earth spike 50cm	Professional earth spike, 50 cm, with banana socket (drill).	•	•										
	A 1529	Professional current earth spike 90cm	Professional earth spike, 90 cm, with banana socket (smooth).	•	•										
	A 1629	Current and potential earth spike (with 3m lead)	For effective earth potential measurements		•										
4	A 1530	G clamp	Professional G clamp for perfect contacting, with banana socket.	•	•										
	P 1201	MI 3290 GL licence key	for Grounding and Lightning functionality of Earth Analyser.	•					_				-		_
	P 1202	MI 3290 GP licence key	for Grounding of Pylons functionality of Earth Analyser.	•											
	P 1203	MI 3290 GF licence key	for Grounding and voltage Funnel functionality of Earth Analyser.	•											
	P 1204	MI 3290 GX2 upgrade licence key	A licence key for upgrade from base functionality (GP/GL/GF) to full functionality (GX) of Earth Analyser MI 3290.	•											
⊘ METREL [*]	A 1081	Bag for accessories	Bag for accessories, with Metrel logo.		•										
G Milita	A 1271	Small soft carrying bag	Small soft carrying bag for transport and storage of test instrument or accessories.									•	•	•	•
	A 1006	Soft carrying bag	Large soft carrying bag for transport and storage of test instrument and belonging accessories.										•		•

• Option

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Content Appliance / Machine / Switchboard Safety

Electrical Installation Safety High Voltage Diagnostics APPLIANCE / MACHINE / SWITCHBOARD SAFETY Power Quality Analysis Equipment for laboratories and Schools Digital Multimeters / Clamp Meters / Voltage and Continuity Testers Variable transformers	1.1 - 1.60 2.1 - 2.40 3.1 - 3.42 4.1 - 4.22 5.1 - 5.12 6.1 - 6.34 7.1 - 7.05
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MACHINE AND SWITCHBOARD TESTERS Selection Guide for Machine and Switchboard Testers Rack mount adapter NEW MI 3394 CE MultiTesterXA MI 3394 CE MultiTesterXA SETS MI 3321 MultiServicerXA	3.20 3.21 3.22 3.24 3.26
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SELECTION GUIDE FOR HV ACCESSORIES	3.35

Good to know Testing the Safety of Appliances

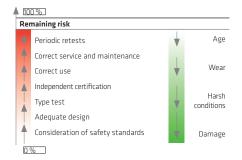
Find out more about testing safety of electrical equipment.

Primary goal of testing safety of electrical equipment is to use all electrical equipment without danger. Common accidents caused by electrical equipment are:

- Injuries through electric shock caused by malfunctioned equipment;
- · Injuries through overheated equipment;
- · Fire and explosions.

To prevent risk and possible danger caused by using electrical appliances and other equipment appropriate safety testing procedure should be performed. Testing of electrical equipment is not regulated the same way in all countries. For instance in Germany, UK, Australia testing of all electrical equipment is strictly regulated by law. Through their positive experience it can be assumed that other countries will follow in the future.

Safety of electrical equipment depends on different factors which can improve or worsen the safety level.



Types of safety tests of electrical equipment are:

- Type testing;
- End of line testing;
- Maintenance testing;
- Periodic testing.

According to the standards electrical equipment is divided in:

- · Electrical appliances;
- · Electrical equipment in medical use;
- · Electrical machines;
- · Electrical switchgears.

Classification of appliances by field of use:

- Laboratory equipment;
- Measuring and regulating equipment;
- Power supplies;
- Heating appliances;
- Handheld tools;
- Luminaries:
- Consumer electronic:
- Information and communication technology (computers, fax machines, scanners, etc.);
- Prolongation cords, IEC supply cords;
- Appliances for medical use.

Classification of appliances by protection classes:

According to the design electrical equipment can be divided in three classes.

In the table below the differences between classes are described.

Class	1	II	III
Marking	no		
Connection to protection (PE) conductor of the installation.	yes all accessible metal parts (case etc.) are connected to the PE con- nection.	no d	no connection to mains
Basic insulation	performed	performed	performed / looser limits
Supplementary or reinforced insulation	not needed in general, needed if there are acces- sible unearthed metal parts 1)	performed	not needed
Supply cord	three pole (L,N, PE)	can be two pole	two pole
Notes	installation must have adequate earthing resist- ance		must be supplied from a SELV (safety low voltage) source, typically 12 V or 24 V

Portable appliances - measurements: Visual check

Visual test of the equipment is intended to confirm that there are no visible signs of damage or defects. Result of visual test can be stored on most of Metrel GT testers for future reference.

Earth bond (continuity of protective conductor) test

With the earth bond test following is determined:

- That the contacts between accessible metal parts and PE conductor are firm.
- That PE wire in the appliance supply cord is undamaged.
- That there are no signs of poor contacts, corrosion etc.



Earth bond test

Test signal is applied between PE pin of supply cord and accessible earthed metal parts.

Insulation resistance

Insulation resistance between live conductors and all accessible metal parts (earthed and isolated) is checked. This test discloses faults caused by pollution, moisture, deterioration of insulation material etc.



Insulation resistance test for Class I device

High DC voltage test signal is applied between connected live pins and PE contact of supply cord. Unearthed accessible metal parts are NOT included in this test and are measured as Class II items.



Insulation resistance test for Class II device

High DC voltage test signal is applied between connected live pins and accessible isolated metal part.

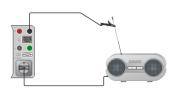
Substitute leakage test

In this test the live and neutral conductors of the appliance are shorted together and voltage of 30 - 50 V AC is applied between this point and either the earth conductor (class I) or the probe connected to any exposed conductive part (class I and class II). The test measures how much current passes from the live conductors into the test point.



Substitute leakage test for Class I device

AC test signal is applied between connected live pins and PE contact of supply cord. Isolated accessible metal parts are NOT included in this test and are measured as Class II items.



Substitute leakage test for Class II device

AC test signal is applied between connected live pins and accessible isolated metal part.

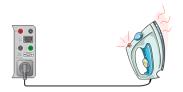
Leakage current tests

In this test the sum of leakage currents caused by appliance insulation resistances (resistive currents through the insulation material, fault currents through decreased insulation) and capacitances (capacitive leakage current) is checked. Excessive leakage currents are most often caused by deterioration of the appliance insulation (pollution, ageing, moisture) or faults in mains circuits of appliances.

3.2 Accessories 3.35 Metrel Catalogue 2018

In general three leakage currents are measured: the differential leakage current, the PE conductor (direct) leakage current and the touch leakage current.

PE conductor lekage test

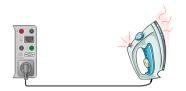


PE conductor leakage current test for Class I device

Appliance must be powered on. The current flowing through appliance PE conductor is measured. Appliance must be placed isolated against ground. Unearthed accessible metal parts are not included in this test. They are considered as class II parts and are checked in the Touch Leakage test.

Differential leakage current test

Differential leakage measures the difference in current between the live and neutral cable which provides a true value of how much current the appliance leaks to ground.

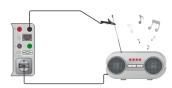


Differential leakage current test for Class I device

Appliance must be powered on. The leakage current is measured as the difference of currents through L and N conductors. Unearthed accessible metal parts are not included in this test. They are considered as class II parts and are checked in the Touch Leakage test.

Touch leakage test

Leakage leakage current is a current that would flow via the isolated accessible metal part (if touched) through body to ground are measured in this test.



Touch leakage current test for Class II device

Appliance must be powered on. The current through the isolated accessible metal parts is measured (each part separately).

Polarity test

Polarity test checks the correctness of polarity of IEC leads, prolongation cords etc. is checked. With this test shorts, crossed and opened wires in cords can be found.



Polarity test

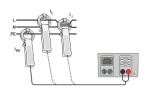
Measurement of load and leakage currents with current clamps

Advantages of clamp measurements are:

- Measured electrical equipment does not need to be disconnected from the mains.
- Selective current tests can be performed by embracing individual conductors.
- Individual currents can be measured without disconnections.

Current clamps are best suited for:

- functional testing of fixed installed appliances;
- functional testing of appliances with nominal currents >16 A;
- troubleshooting of current paths in appliances.

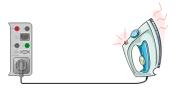


Current measurement with current clamps

Appliance must be powered on. By embracing separate conductors load or leakage currents can be measured.

Functional test

Functional check explores if the appliance is working properly. The use of more sophisticated measuring instruments permits load testing, which is an effective way of determination if there are faults in the appliance.

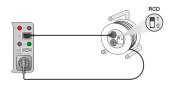


Functional test

PRCD test

This test checks how long it takes for a portable RCD to trip out in the case that a fault occurs.





PRCD testing

Active polarity test

This test provides testing of PRCD protected cords while voltage is applied to tested object.



Active polarity test

Autosequences

All Metrel GT testers contain built-in predefined test sequences which are specified sets of measurements, limits and test parameters. To select the correct test sequence first the type and class of appliance must be determined. Then all safety relevant accessible conductive parts must be found. After that the test sequence, test limits and parameters must be selected. It is of a great advantage if this can be made automatically by the measuring instrument.

Custom test sequences

In case of testing unusual appliances or appliances that require a special method of testing that is not included in the standard autosequences custom defined test sequences can be used.

Project uploading

When retesting a site or location, project uploading allows previously saved information to be reloaded onto the GT tester to speed up testing and enable trend comparison.

Trend comparison

Trend comparison allows test information from different dates to be compared in order to discover if deterioration is occurring in an appliance. In case the deterioration was found, the test engineer can make an informed decision as to if the frequency of testing and inspection is sufficient for the appliance.

GT testers Selection Guide for GT Testers

MEASUREMENTS MI 3360 MI 3309 MI 3311 OmegaGT XA NEW BT DeltaGT GammaGT







APPLICATIONS			
PAT / Medical / Welding / 3PH / Service & reapair	• / • 1 / • / • / • 2	• / - / - / -	• / - / - / -
MEASUREMENTS		, , , ,	
Continuity 200 mA	•	•	•
Continuity 10 A	•		
Continuity 25 A	•3		
nsulation resistance 250 VDC	•	•	•
Insulation resistance 500 VDC	•	•	•
Differential leakage current	•	•	
PE Leakage	•		
Touch leakage current	•	•	
Substitute leakage current	•	•	•
Leakage current measurements with optional clamp	•	•	
Flash test	•4		
RCD testing	AC / A / B	AC / A ⁵	
PRCD testing / Extended PRCD testing	•/•	• / -	
Polarity test (IEC lead test) / Active polarity	•/•	• / -	• / -
Functional (load) test	•	•	/
Voltage TRMS	<u> </u>	•	•
ADDITIONAL FEATURES			
PASS / FAIL evaluation	•	•	•
Mains supply check	•	•	•
Built-in Checkbox (available in UK model only)	<u> </u>		•
Graphical LCD / Touch screan	• / •	• / -	• / -
Graphical con-line help	•	•	•
Real time clock	•	•	•
QWERTY keyboard	<u> </u>		
Auto testing (organizer, custom autotests)	•	•	•
QR-code shortcut auto testing / Barcode	• / •	• / •	• / •
Communication ports USB / RS232 / BLUETOOTH	•/•/•	• / • / •	• / • / Option
'Test and tag" (barcode scanner + label printer)	•	-	• γ • γ Ομείσιι
Data download to PC	•	•	•
Project upload from PC	•	<u> </u>	•
PC SW PATLink PRO / MESM	- / •	• / •	. /
Number of memory locations	- / • SD 8GB (up to 32GB)	1500	• / - 1500
STANDARD / OPTIONAL ACCESSORIES	טט סטס (up נט אַבעט <u>ה)</u>	IDUU	1500
QR-code custom testing	Option	Option	Option
<u>. </u>	· · · · · · · · · · · · · · · · · · ·	Option Option	Option
Barcode Isbal printer	Option		<u> </u>
Barcode label printer	Option	Option	Option
QR label printer Basic PC SW	Option	Option •	Option Option
	Ontion		· · · · · · · · · · · · · · · · · · ·
Advanced PC SW Android app	Option	Option	Option Option
	Option Option	Option	Ομιίοιι
3PH active adapter NFC / RFID	Option / -		
•	ομιιστι / -		
GENERAL DATA	C 1 kg	0.96 kg	0.9c.ka
Weight Dimensions	6.1 kg 310 x 130 x 250	0.86 kg 140 x 80 x 230	0.86 kg 140 x 80 x 230

3.4 Accessories 3.35 Metrel Catalogue 2018

¹ MI 3360 M only ² MI 3360 F only ³ MI 3360 25A only ⁴ MI 3360 F only ⁵ RCD t only

GT testers Selection Guide for Printers, Apps and Scanners

STRL	JMENT						MI 3360 OmegaGT	XA NEW	MI 3321 Multiservi	cerXA	MI 3309 BT DeltaG	г	MI 3311 Ga	mmaGT
STRL	JMENT HW V	/ERSION	l						HW 4		HW 3			
UETO	отн соммі	JNICATI	ON								Built in BLUETOOT	Н	Bluetooth on DONGLE	/ia external
				Available at local authorised reseller	140101	KECIOIN			ZAMINIA December 1	o in				
				ocal a			Barcode	QR	Receipt	Barcode	Barcode	QR	Barcode	QR
				Available at l	EU incl. UK	AUS/NZ	3/831063/42288-0		The state of the s	3/831003/421680	3/63/1663/42464(5)		5/33/035/038/035	
CABLE ONLY		A 1489	Able printer		•		•	•	DOM Briefe		•	•	•	•
	1/ 8/ 8°	1	Zebra BT lable printer set		•	•	•	•		•	•	•	•	•
CABLE OR BLUETOOTH	CHAINTERMORIE	MTP 400	Printek mobile printer	•		•						• *		
CABLE		A 1488	Able printer		•		•	•			•	•	•	•
BLUETOOTH VIA ANDROID		RW 220	Zebra mobile printer	•	•	•	•	•				• *		
ВLUETOOTH		P4T	Zebra mobile printer	•		•	•	•				• *		
		A 1434	aPAT Android		•	•					•	•		
ВLUET00ТН		A 1433	PATLink Android		•	•					•	•	•	•
		A 1521	aMESM		•	•	•	•						
CABLE		A 1105	Barcode scanner		•	•	•			•	•		•	
ООТН	3	A 1321	Barcode scanner		•	•	•				•*			
ВLUETOOTH	3	A 1545	QR/Barcode scanner		•	•	•	•						

* Suported via Android app aPAT only ** Printing via APP supported only from S 2062

GT testers MI 3360 OmegaGT XA



New series of OmegaGT XA brings 4 models of the instrument, intended for professional use in the most demanding applications. All of them support user accounts, which means that one device can be used by several electricians. Model versions cover the following fields of testing: portable appliances, welding equipment, medical devices and professional testing of PRCD devices. All instruments have an advanced built-in user interface that enables the execution of pre-defined and user-created AUTOSEQUENCE®s. Large memory capacity (8 GB microSD card) enables the user long term saving and archiving of data. All the instruments are specially designed for long-term testing, since their memory structure enables simple searching through the archive of devices and quick re-execution of (periodic) tests. Great emphasis was put on support for peripheral devices such as printers and barcode or QR code scanners and RFID readers (in Bluetooth and wired versions). On top of that, all instrument versions are supported by our Metrel ES Manager PC software.

MEASURING FUNCTIONS

- Visual inspections;
- Fuse test;
- Continuity // Protective earth resistance 200mA:
- Continuity // Protective earth resistance 10A, 25A (25A, M, F, models only);
- Insulation Resistance (Riso, Riso-S);
- Sub-Leakage Current, Substitute Leakage Current S;
- Differential Leakage current;
- PE leakage current;
- Touch leakage current;
- Insulation resistance, IEC/EN 62353;
- Touch leakage current, IEC/EN 62353;
- Equipment leakage (direct, differential, alternative) IEC/EN 62353;
- Applied part leakage (direct, alternative), IEC/EN 62353;
- Insulation resistance, (optional A 1422) IEC/EN 60974-4;
- Welding circuit leakage, (optional A 1422) IEC/EN 60974-4;
- Primary leakage, (optional A 1422) IEC/EN 60974-4;
- No-load voltage, (optional A 1422) IEC/EN 60974-4;
- Power (P, S, Q, PF, THDu, THDi, CosØ, I, U,);
- PRCD test, (2 pole, 3 pole, K/ Di (varistor), S (3-pole)):
- PRCD PE probe test, PRCD open conductor test, PE conductor (PRCD) test;
- RCD test, (type A, AC, B, B+, F);
- Flash test, (1500V, 3000V);
- Polarity / Active polarity test;
- Clamp current (with optional A 1579).

KEY FEATURES

- Touch screen: high resolution colour touch screen, 4.3" TFT.
- Double manipulation: keyboard and touch screen enable the user to control the instrument in any manner they like.
- Pre-defined AUTOSEQUENCE s: enable the user simple and quick execution of test sequence for the chosen device.
- Read the code and test: QR and barcode system of labelling in combination with AUTOSEQUENCE®s enables the user quick and simple testing of electrical devices.
- Testing groups: the instruments have built-in filters in accordance with their area of application, which enables the user simple choice of needed test sequences.
- Support for PRCD testing: support for all types of PRCDs, including 2-pole, 3-pole, K/Di (varistor), S (3 pole) and testing with the PE probe.
- Support for RCD testing: all instruments support testing of A, AC, B, B+ and F RCDs.
- Fuse testing: the instrument has a special, integrated testing module for quick testing of all types of fuses.
- Hard-wired devices: the instruments have integrated additional test terminals that enable the user simple testing of hardwired devices.
- High-voltage testing (only MI 3360 F): the instrument enables insulation resistance measurement that has to be performed after repairs or maintenance of electrical devices.

- Testing of medical devices (only MI 3360 M): the instrument enables testing of medical devices in accordance with IEC/EN 62353.
- Testing of welding equipment (only in combination with A 1422): all models of OmegaGT XA support testing of welding equipment in accordance with IEC/EN 60974-4.
- Large memory: support for microSD memory cards, 8 GB card already integrated in the instrument, although that can be expanded to 37 GB.
- that can be expanded to 32 GB.
 PC SW Metrel ES Manager: enables creation of test structures, user-defined AUTOSEQUENCE®s, professional test reports and data transfer for archiving.
- aMESM Android SW: enables QR code scanning, and uploading of pre-prepared user-defined AUTOSEQUENCE®s.

APPLICATIONS

- Testing of portable electrical equipment;
- Testing of fixed installed electrical equipment;
- Testing of medical electrical equipment;
- Testing of 3-phase electrical equipment;
- Testing of electrical welding equipment;
- Testing of portable switchboards with integrated PRCD switches;
- Testing of extension leads with integrated PRCD switches.

3.6 Accessories 3.35 Metrel Catalogue 2018

TECHNICAL DATA

Continuity	/ Protective earth resistance Continuity	v 200mA, (10A, 25A, or	ily at models: MI 3360 25A	, MI 3360 M, MI 3360 F)
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FUNCTION	Measuring range	Resolution	Accuracy
₹	0.00 Ω 19.99 Ω	0.01 Ω	±(2 % of reading + 2 D)
	20.0 Ω 99.9 Ω	0.1 Ω	± 3 % of reading
	100.0 Ω 199.9 Ω	0.1 Ω	± 5 % of reading
	200 Ω 999 Ω	1 Ω	indicative
Insulation Resistance (Rice Rice C) Inc	ulation varietance. Insulation varietance. C. /2E	0.1/ E00.1/)	
	ulation resistance, Insulation resistance -5 (25)		
FUNCTION	Measuring range	Resolution	Accuracy
Riso Riso-S	0.00 MΩ 19.99 MΩ	0.01 ΜΩ	±(3 % of reading + 2 D)
11130 3	20.0 MΩ 99.9 MΩ	0.1 ΜΩ	± 5 % of reading
	100.0 ΜΩ 199.9 ΜΩ	0.1 ΜΩ	± 10 % of reading
Substitute leakage current, (Isub, Isub-S	6) Open circuit voltage (230Va.c.,110Va.c.),		
FUNCTION	Measuring range	Resolution	Accuracy
Isub	0.00 mA 1.99 mA	0.01 mA	±(3 % of reading + 3 D)
sub-S	2.00 mA 19.99 mA	0.01 mA	± 5 % of reading
Differential Leakage current			
FUNCTION	Measuring range	Resolution	Accuracy
ldiff	0.000 mA 1.999 mA	1μA	±(3 % of reading + 3 D)
<u></u>	2.00 mA 19.99 mA	0.01 mA	± 5 % of reading
	2.00 11/7 15.55 11/7	5.511111	_ 5 % 5caumg
PE leakage current			
FUNCTION	Measuring range	Resolution	Accuracy
lpe	0.000 mA 1.999 mA	1μΑ	±(3 % of reading + 3 D)
	2.00 mA 19.99 mA	0.01 mA	± 5 % of reading
Touch leakage current			
FUNCTION	Measuring range	Resolution	Accuracy
tou	0.000 mA 1.999 mA	1μΑ	±(3 % of reading + 3 D)
	2.00 mA 19.99 mA	0.01 mA	± 5 % of reading
Danier (author) O. 1855 (1)			3
Power (active) @ Idiff / Ipe / Itou			
FUNCTION	Measuring range	Resolution	Accuracy
Р	0 W 999 W	1 W	±(5 % of reading + 5 D)
	1.00 kW 3.70 kW	10 W	± 5 % of reading
Power			
Power (active)			
FUNCTION	Measuring range	Resolution	Accuracy
P	0 W 999 W	1 W	±(5 % of reading + 5 D)
	1.00 kW 3.70 kW	10 W	± 5 % of reading
Power (Apparent)			
ower (Apparent)			
	Measuring range	Resolution	Accuracy
FUNCTION	Measuring range 0 VA 999 VA	Resolution 1 VA	Accuracy ±(5 % of reading + 5 D)
FUNCTION			<u> </u>
FUNCTION 5	0 VA 999 VA	1 VA	±(5 % of reading + 5 D)
FUNCTION S Power (Reactive)	0 VA 999 VA 1.00 kVA 3.70 kVA	1 VA 10 VA	±(5 % of reading + 5 D) ± 5 % of reading
FUNCTION S Power (Reactive) FUNCTION	0 VA 999 VA 1.00 kVA 3.70 kVA Measuring range	1 VA 10 VA Resolution	±(5 % of reading + 5 D) ± 5 % of reading Accuracy
FUNCTION S Power (Reactive) FUNCTION	0 VA 999 VA 1.00 kVA 3.70 kVA Measuring range ±(0 VAr 999) VAr	1 VA 10 VA Resolution	±(5 % of reading + 5 D) ± 5 % of reading Accuracy ±(5 % of reading + 5 D)
FUNCTION S Power (Reactive) FUNCTION	0 VA 999 VA 1.00 kVA 3.70 kVA Measuring range	1 VA 10 VA Resolution	±(5 % of reading + 5 D) ± 5 % of reading Accuracy
FUNCTION S Power (Reactive) FUNCTION C Power factor	0 VA 999 VA 1.00 kVA 3.70 kVA Measuring range ±(0 VAr 999) VAr ±(1.00 kVAr 3.70) kVAr	1 VA 10 VA Resolution 1 VAr 10 VAr	±(5 % of reading + 5 D) ± 5 % of reading Accuracy ±(5 % of reading + 5 D) ± 5 % of reading
FUNCTION FUNCTION Power factor FUNCTION	0 VA 999 VA 1.00 kVA 3.70 kVA Measuring range ±(0 VAr 999) VAr ±(1.00 kVAr 3.70) kVAr Measuring range	1 VA 10 VA Resolution 1 VAr 10 VAr Resolution	±(5 % of reading + 5 D) ± 5 % of reading Accuracy ±(5 % of reading + 5 D) ± 5 % of reading Accuracy
FUNCTION FUNCTION Power factor FUNCTION	0 VA 999 VA 1.00 kVA 3.70 kVA Measuring range ±(0 VAr 999) VAr ±(1.00 kVAr 3.70) kVAr	1 VA 10 VA Resolution 1 VAr 10 VAr	±(5 % of reading + 5 D) ± 5 % of reading Accuracy ±(5 % of reading + 5 D) ± 5 % of reading
FUNCTION S Power (Reactive) FUNCTION Q Power factor FUNCTION	0 VA 999 VA 1.00 kVA 3.70 kVA Measuring range ±(0 VAr 999) VAr ±(1.00 kVAr 3.70) kVAr Measuring range 0.00i 1.00i	1 VA 10 VA Resolution 1 VAr 10 VAr Resolution	±(5 % of reading + 5 D) ± 5 % of reading Accuracy ±(5 % of reading + 5 D) ± 5 % of reading Accuracy
FUNCTION S Power (Reactive) FUNCTION Q Power factor FUNCTION PF Total Harmonic Distortion (voltage)	0 VA 999 VA 1.00 kVA 3.70 kVA Measuring range ±(0 VAr 999) VAr ±(1.00 kVAr 3.70) kVAr Measuring range 0.00i 1.00i 0.00c 1.00c	1 VA 10 VA Resolution 1 VAr 10 VAr Resolution 0.01	±(5 % of reading + 5 D) ± 5 % of reading Accuracy ±(5 % of reading + 5 D) ± 5 % of reading Accuracy ±(5 % of reading + 5 D)
FUNCTION S Power (Reactive) FUNCTION Q Power factor FUNCTION PF Total Harmonic Distortion (voltage) FUNCTION	0 VA 999 VA 1.00 kVA 3.70 kVA Measuring range ±(0 VAr 999) VAr ±(1.00 kVAr 3.70) kVAr Measuring range 0.00i 1.00i 0.00c 1.00c	1 VA 10 VA Resolution 1 VAr 10 VAr Resolution 0.01	±(5 % of reading + 5 D) ± 5 % of reading Accuracy ±(5 % of reading + 5 D) ± 5 % of reading Accuracy ±(5 % of reading + 5 D)
FUNCTION FUNCTION Power factor FUNCTION Power factor FUNCTION PF Total Harmonic Distortion (voltage)	0 VA 999 VA 1.00 kVA 3.70 kVA Measuring range ±(0 VAr 999) VAr ±(1.00 kVAr 3.70) kVAr Measuring range 0.00i 1.00i 0.00c 1.00c	1 VA 10 VA Resolution 1 VAr 10 VAr Resolution 0.01	±(5 % of reading + 5 D) ± 5 % of reading Accuracy ±(5 % of reading + 5 D) ± 5 % of reading Accuracy ±(5 % of reading + 5 D)
FUNCTION S Power (Reactive) FUNCTION Q Power factor FUNCTION PF Total Harmonic Distortion (voltage) FUNCTION THDU	0 VA 999 VA 1.00 kVA 3.70 kVA Measuring range ±(0 VAr 999) VAr ±(1.00 kVAr 3.70) kVAr Measuring range 0.00i 1.00i 0.00c 1.00c	1 VA 10 VA Resolution 1 VAr 10 VAr Resolution 0.01	±(5 % of reading + 5 D) ± 5 % of reading Accuracy ±(5 % of reading + 5 D) ± 5 % of reading Accuracy ±(5 % of reading + 5 D)
FUNCTION FOWER (Reactive) FUNCTION Power factor FUNCTION PF Total Harmonic Distortion (voltage) FUNCTION THDU Total Harmonic Distortion (current) FUNCTION	0 VA 999 VA 1.00 kVA 3.70 kVA Measuring range ±(0 VAr 999) VAr ±(1.00 kVAr 3.70) kVAr Measuring range 0.00i 1.00i 0.00c 1.00c	1 VA 10 VA Resolution 1 VAr 10 VAr Resolution 0.01	±(5 % of reading + 5 D) ± 5 % of reading Accuracy ±(5 % of reading + 5 D) ± 5 % of reading Accuracy ±(5 % of reading + 5 D)

Cosinus Fi

FUNCTION	Measuring range	Resolution	Accuracy
Cos FI	0.00i 1.00i	0.01	±(5 % of reading + 5 D)
	0.00c 1.00c		
Current			
FUNCTION	Measuring range	Resolution	Accuracy
I	0.00 A 16.00 A	0.01 A	±(3 % of reading + 5 D)
Voltage			
FUNCTION	Measuring range	Resolution	Accuracy
U	0.0 V 199.9 V	0.1 V	±(3 % of reading + 10 D)
	200 V 264 V	1 V	±3 % of reading

(P)RCD test (Type RCD: AC, A, F, B, B+), test current (10mA, 15mA, 30mA) / test current (100mA, 300mA with: A 1322, A 1422) Trip-out time

FUNCTION	Measuring range	Resolution	Accuracy
tΔN	0 ms 300 ms (999 ms*) (½xI∆N)	1 ms	±3 ms
	0 ms 300 ms (IΔN)	1 ms	±3 ms
*According to standard AS/NZS 3017	0 ms 40 ms (5xlΔN)	1 ms	±3 ms

Trip-out current

FUNCTION	Measuring range	Resolution	Accuracy
IΔ	0.2xIΔN 2.2xIΔN	0.05xI∆N	±0.1xI∆N

Contact voltage (RCD test only)

FUNCTION	Measuring range	Resolution	Accuracy
Uc	0.0 V 19.9 V	0.1 V	(-0 % / +15 %) of reading 10 D
	20.0 V 99.9 V	0.1 V	(-0 % / +15 %) of reading

Additional PRCD tests PE conductor (Type = 2 pole, 3 pole, S(3 pole))

FUNCTION	Measuring range	Resolution	Accuracy
Riso	0.00 Ω 19.99 Ω	0.01 Ω	±(2 % of reading + 2 D)
Riso-S	20.0 Ω 99.9 Ω	0.1 Ω	±3 % of reading
	100.0 Ω 199.9 Ω	0.1 Ω	±5 % of reading
	200 Ω 999 Ω	1 Ω	indicative

PE conductor (Type = K/ Di (varistor)), A voltage is applied between PE connections of the PRCD-K. There is a 'PASS' if PRCD trips.

Open conductor PRCD, Mains voltage is applied to the mains test socket. Disconnection of the L, N and PE connections is performed inside the instrument. There is a 'PASS' if the PRCD trips.

PRCD PE probe test, Mains voltage is applied to the mains test socket. A safe voltage sufficiently high to activate the protection circuit in the PRCD is applied to the P/S terminal.

 $\textbf{Polarity,} \; \mathsf{Test} \; \mathsf{voltage} \; (\mathsf{normal}) < \mathsf{50} \; \mathsf{V} \; / \; \; \mathsf{Test} \; \mathsf{voltage} \; (\mathsf{active}) \; \mathsf{mains} \; \mathsf{voltage}$

Clamp current, True RMS current using 1000:1 current clamp

FUNCTION	Measuring range	Resolution	Accuracy
I	0.10 mA 9.99 mA	0.01 mA	±(5 % of reading + 10 digits)
diff	10.0 mA 99.9 mA	0.1 mA	±(5 % of reading + 5 digits)
ре	100 mA 999 mA	1 mA	±(5 % of reading + 5 digits)
	1.00 A 9.99 A	0.01 A	±(5 % of reading + 5 digits)
Accuracy of current transformer is not considered. Frequency range of current clamp is not considered.	10.0 A 24.9 A	0.1 A	±(5 % of reading + 5 digits)

Flash test (1500V, 3000V), Current a.c. (apparent)

FUNCTION	Measuring range	Resolution	Accuracy
I	0.00 mA 2.50 mA	0.01 mA	*(5 % of reading + 5 D)

Open circuit voltage: 1500 V, 3000 V (-0/+5%) @ 115 V, 230 V / Short circuit current: < 3.5 mA

Riso 500 V Medical equipment

FUNCTION	Measuring range	Resolution	Accuracy
Riso	0.00 ΜΩ 19.99 ΜΩ	0.01 ΜΩ	±(3 % of reading + 2 D)
Output voltage	20.0 MΩ 199.9 MΩ	0.1 ΜΩ	±5 % of reading
FUNCTION	Measuring range	Resolution	Accuracy
Um	0 V 600 V	1 V	±(3 % of reading + 2 D)

3.8 Accessories 3.35 Metrel Catalogue 2018

Equipment leakage current, Medical equipment (direct, differential, alternative)

FUNCTION	Measuring range	Resolution	Accuracy
leq	0.000 mA 1.999 mA	1 μΑ	±(3 % of reading + 3 D)
	2.00 mA 19.99 mA	0.01 mA	±(5 % of reading)
Ulpe (direct, differential, alternative)			
FUNCTION	Measuring range	Resolution	Accuracy
Ulpe	0 V 299 V	1 V	±(2 % of reading + 2 D)
Power (direct, differential)			
FUNCTION	Measuring range	Resolution	Accuracy
Р	0 W 999 W	1 W	±(5 % of reading + 5 D)
	1.00 kW 3.70 kW	10 W	±5 % of reading
Applied Part leakage current, Medical equipme	ent (direct, alternative)		
FUNCTION	Measuring range	Resolution	Accuracy
lap	0.000 mA 1.999 mA	1 μΑ	±(3 % of reading + 3 D)
	2.00 mA 19.99 mA	0.01 mA	±(5 % of reading)
Uap (direct, alternative)			
FUNCTION	Measuring range	Resolution	Accuracy
Uap	0 V 299 V	1 V	±(2 % of reading + 2 D)
Power (direct)			
FUNCTION	Measuring range	Resolution	Accuracy
Р	0 W 999 W	1 W	±(5 % of reading + 5 D)
	1.00 kW 3.70 kW	10 W	±5 % of reading
Touch current (Medical equipment)			
FUNCTION	Measuring range	Resolution	Accuracy
ltou	0.000 mA 1.999 mA	1 μΑ	±(3 % of reading + 3 D)
	2.00 mA 19.99 mA	0.01 mA	±(5 % of reading)
Ulpe (direct)			
FUNCTION	Measuring range	Resolution	Accuracy
Ulpe	0 V 299 V	1 V	±(2 % of reading + 2 D)
•			
Power (direct)			
FUNCTION	Measuring range	Resolution	Accuracy
P	0 W 999 W	1 W	±(5 % of reading + 5 D)
	1.00 kW 3.70 kW	10 W	± 5 % of reading

Measurements for electrical welding equipment per IEC/EN 60974-4 (Welding equipment) optional with A 1422 Insulation resistance Riso (Welding equipment) Welding Circuit leakage (Ileak W-PE), (Welding equipment) Primary Leakage (I diff), (Welding equipment) No-load voltage, (Welding equipment)

GENERAL DATA

Mains supply

Supply voltage, frequency 110 V / 230 V AC, 50 Hz / 60 Hz Max. load

10 A continuous, 16 A short duration, 1.5 kW motor

CAT II / 300V ≤ 2000 m Mains supply overvoltage category Altitude

Measuring categories

Cat II / 300 V Cat II / 300 V Cat II / 300 V Instrument: Test socket: Plug test cable:

Protection classifications

IP 40 / IP 20 (mains test socket) Degree of protection

Colour TFT display, 4.3 inch, 480 x 272 pixels Display

Touch screen Capacitive Communication

depends on microSD card size Memory

RS232 interfaces

Standard USB Type B USB 2.0 Class 2 Bluetooth 31 cm \times 13 cm \times 25 cm

Dimensions (w×h×d): Weight 6.1 kg

Operation conditions 0 °C ... +40 °C Working temperature range:

85 % RH (0 °C ... 40 °C), non-condensing Maximum relative humidity:

SUPPORTED INSTRUMENTS

Due to the differences in testing standards globally, it has becoming increasingly important for manufacturers to ensure that their products are safe for the consumer and industrial markets. Depending on the application Metrel offers different sets in combination of tester plus accessories.

Measuring function	MI 3360	MI 3360 25A	MI 3360 M	MI 3360 F
Visual inspections	•	•	•	•
Fuse test	•	•	•	•
Continuity // Protective earth resistance 200mA	•	•	•	•
Continuity // Protective earth resistance 10A, 25A		•	•	•
Insulation Resistance (Riso, Riso-S),	•	•	•	•
Substitute Leakage Current, Substitute Leakage Current - S	•	•	•	•
Differential Leakage current	•	•	•	•
PE leakage current	•	•	•	•
Touch leakage current	•	•	•	•
Polarity / Active polarity test	•	•	•	•
Power (P, S, Q, PF, THDu, THDi, CosØ, I, U)	•	•	•	•
P-RCD, (2 pole, 3 pole, K/ Di (varistor), S (3-pole))	•	•	•	•
PRCD PE probe test, open conductor test, PE conductor test	•	•	•	•
RCD test, (type A, AC, B, B+, F)	•	•	•	•
Flash test, (1500V, 3000V)				•
Insulation resistance, IEC/EN 62353			•	
Touch leakage current, IEC/EN 62353			•	
Equipment leakage (direct, differential, alternative) IEC/EN 62353	}		•	
Applied part leakage (direct, alternative), IEC/EN 62353			•	
Insulation resistance, (optional A 1422) IEC/EN 60974-4	•	•	•	•
Welding circuit leakage, (optional A 1422) IEC/EN 60974-4	•	•	•	0
Primary leakage, (optional A 1422) IEC/EN 60974-4	•	•	•	•
No-load voltage, (optional A 1422) IEC/EN 60974-4	٠	•	•	•
Clamp current (with optional A 1579)	٠	•	•	•

Notes:

in combination with optional accessories,

IEC/EN 60974-4 measurements are supported with active 3-phase adapter A 1422 only,

Clamp current leakage measurements are supported with optional clamps A 1579

WHY TEST PORTABLE APPLIANCES?

The need for portable and fixed appliance testing is becoming more profound, since devices such as air conditioning units, hand dryers, electrical heaters and many more similar ones have become ubiquitous. But, with frequent use come heightened risks for mechanical an electrical failures. Current legislation therefore dictates, that all devices in public use require periodic testing to determine their safety. If they are damaged, they can cause a fire or even death through electrocution.

We have prepared four different models of the MI 3360 OmegaGT XA to cover the entire spectrum of testing applications and give the user greater flexibility.



ORDERING INFORMATION



STANDARD SET

MI 3360

- Instrument MI 3360 (25A, M, F) OmegaGT XA
- Bag for accessories
- Smartball pen with touch screen function
- Flash test probe (MI 3360 F only)
- Crocodile clip, red (MI 3360 F only)
- Crocodile clip, black
- IEC test cable, 2 m
- Test lead, black
- Test tip, black
- Mains cable
- USB cable
- Calibration Certificate
- Short form instruction manual
- CD with instruction manual (full version)
- PC SW Metrel ES Manager BASIC*

*Metrel ES Manager can be downloaded free of charge from Metrel Web server. license

The MI 3360 OmegaGT XA is intended for testing applications, that don't require a more robust testing of continuity, such as public institutions, hotels, schools etc. where used electrical devices fall mainly in I, II and III protection classes. But, despite limited functionality the instrument supports both (optional) 3-phase adapters.

The MI 3360 25A OmegaGT XA is intended for more demanding testing applications that encompass devices in environments such as construction sites, factories, electrical equipment rental services etc. where they are subjected to increased mechanical and electrical loads and therefore require more robust testing of continuity. Besides standard 200 mA, the instrument also offers 10 A and 25 A continuity testing.

The MI 3360 M OmegaGT XA is intended for testing of medical devices, since all supported tests are in accordance with IEC/EN 62353. Special emphasis is given on accurate testing of leakage current

The MI 3360 F OmegaGT XA is intended for testing of portable appliances after repair or maintenance with HV voltage tests with 1500 V or 3000 V for added assurance









KEY FEATURES

- Single tests;
- AUTOSEQUENCE®s;
- · Automatic PASS/FAIL evaluation;
- Printing of test reports;
- 8 GB memory card for saving test data:
- · Label printing;
- · Scanning of QR and barcodes;
- Use of aMESM Android app for scanning OR codes:
- PRCD testing.

KEY FEATURES

- Single tests; AUTOSEQUENCE®s;
- · Automatic PASS/FAIL evaluation;
- Printing of test reports;
- 8 GB memory card for saving test data:
- Label printing (serial or Bluetooth);
- · Scanning of QR and barcodes (serial or Bluetooth);
- 3-phase device testing with A 1322 / A 1422;
- · 3-phase extension cord testing;
- · PRCD testing;
- Welding equipment testing (A 1422) in accordance with IEC/EN 60974-4 (option).

KEY FEATURES

- Single tests; AUTOSEQUENCE®s;
- Automatic PASS/FAIL evaluation;
- Printing of test reports;
- 8 GB memory card for saving test data.
- Label printing (serial or Bluetooth);
- Scanning of QR and barcodes (serial or Bluetooth);
- Testing of electrical medical devices in accordance with IEC/EN 62353.

KEY FEATURES

- Single tests;AUTOSEQUENCE®s;
- · Automatic PASS/FAIL evaluation;
- Printing of test reports;
- 8 GB memory card for saving test data:
- Label printing (serial printer);
- · Scanning of QR and barcodes (serial scanner);
- Testing of electrical devices in service.

GT testers MI 3309 BT DeltaGT



The MI 3309 BT DeltaGT is both battery and mains powered multifunctional instrument intended to perform measurements for testing the electrical safety of portable electrical equipment. Integrated unique PRCD testing technology prevents tripping out of mains RCD during measurement. Due to dual power capability of MI 3309 it enables performing of differential leakage current test in spite of its lightweight portable design. Large graphical LCD with backlight, two PASS / FAIL LED indicators and HELP screens for each measurement make the handling of the instrument clear and simple. Up to 1500 test results with parameters can be stored in the internal memory of the instrument and then downloaded to the PC for further data handling and creation of test report. Lightweight design, pre-programmed and custom test sequences, optional barcoding, android keyboard application and RFID systems make the MI 3309 an ideal instrument for high volume professional safety testing of portable appliances.

MEASURING FUNCTIONS

- Functional and visual inspection;
- Earth bond resistance;
- Insulation resistance;
- Insulation resistance of isolated accessible conductive parts;
- Substitute leakage current;
- Substitute leakage current of isolated accessible conductive parts;
- Differential leakage current test;
- · Touch leakage test;
- RCD and portable RCD testing, type (K, S);
- Power test;
- IEC cord polarity test;
- Leakage and load currents with current clamp;
- TRMS voltage meter;
- Enhanced TRMS test.

KEY FEATURES

- Autosequencing: pre-programmable VDE compatible autosequences, up to 50 custom prepared autosequences and barcode autotests speed up testing and ensure that no tests are missed.
- Dual powered: the instrument can oper-

ate from mains power or batteries.

- PASS / FAIL: large green and red lights for additional PASS / FAIL indication placed at the sides of the LCD.
- **Fixed appliance testing:** additional inputs and optional accessories enable testing of fixed installed appliances.
- Scan and test: optional QR or barcoding system and PASS / FAIL QR or barcode label printing make retesting quick and simple
- RFID: support for advanced RFID identification system.
- RCD testing: instrument enables testing of parameters of RCDs and portable RCDs.
- Memory: large data flash memory allows to store up to 1500 test results and parameters for further downloading to PC.
- Built-in charger & rechargeable batteries: instrument has a built-in charging circuit and comes complete with a set of rechargeable NiMH batteries.
- **Bluetooth:** enables communication with PC, printers, and android devices.
- Android application: enables advanced data management, use of smart phones camera for scanning QR and bar-code.
- PC SW PATLink PRO included in the standard set enables downloading, view-

ing, printing of test results and exporting of data to spreadsheet applications.

PC SW PATLink PRO Plus enables advanced analysis of test results, upload of pre-programmed custom autosequences and creation of professional test reports.

APPLICATION

- · Professional GT safety testing;
- General GT safety testing;
- After repair GT safety testing.

STANDARDS

Functionality

- EN 61557;
- VDE 0404-1;
- VDE 0404-2;
- VDE 0701-0702:
- NEN 3140

Electromagnetic compatibility

• EN 61326

Safety

- EN 61010-1;
- EN 61010-031;

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TECHNICAL DATA

FUNCTION	Measuring range	Resolution	Accuracy
PE continuity (200 mA)	0.00 Ω 19.99 Ω 20.0 Ω 199.9 Ω 200 Ω 1999 Ω	0.01 Ω 0.1 Ω 1 Ω	±(5 % of reading + 3 digits) Indication only Indication only
Insulation resistance (250 VDC, 500 VDC)	0.00 MΩ 19.99 MΩ 20.0 MΩ 49.9 MΩ 50.0 MΩ 199.9 MΩ	0.01 ΜΩ 0.1 ΜΩ 0.1 ΜΩ	±(5 % of reading + 3 digits) ±(5 % of reading + 3 digits) Indication only
Substitute leakage current (30 VAC)	0.00 mA 9.99 mA 10.0 mA 20.0 mA	0.01 mA 0.1 mA	±(5 % of reading + 3 digits) ±(5 % of reading + 3 digits)
Touch leakage current	0.00 mA 7.00 mA	0.01 mA	±(10 % of reading + 5 digits)
Differential leakage current	0.00 mA 19.99 mA	0.01 mA	±(5 % of reading + 5 digits)
Functional test: apparent power	0.00 kVA 4.00 kVA	0.01 kVA	±(5 % of reading + 3 digits)
RCD and portable RCD: trip-out time (I Δ N=10 mA, 15 mA, 30 mA)	0 ms 300 ms (½xlΔN) 0 ms 300 ms (lΔN) 0 ms 40 ms (5xlΔN)	0.1 ms 0.1 ms 0.1 ms	±3 ms ±3 ms ±1 ms
Clamp current	0.00 mA 9.99 mA 10.0 mA 99.9 mA 100 mA 999 mA 1.00 A 9.99 A 10.0 A 16.0 A	0.01 mA 0.1 mA 1 mA 0.01 A 0.1 A	<pre>±(5 % of reading + 10 digits) ±(5 % of reading + 5 digits)</pre>
Voltage TRMS	80 V 300 V	1 V	±(2 % of reading + 2 digits)
Polarity test	Test voltage < 50 VAC		
Enhanced TRMS test (Detects: No live, active ne	utral reversal, N fault, PE fault, Multiple	e fault)	
Voltage UL-N, UL-PE, UN-PE	80 V 300 V	1 V	±(2 % of reading + 2 digits)
R Loop	0.00 kΩ 1.99 kΩ	0.01 kΩ	±(10 % of reading + 5 digits)
GENERAL			
Power supply	6 x 1.2 V NiMH rechargeable ba	tteries, type AA; 230 V, 50	Hz / 60 Hz
Overvoltage category	CAT II / 300 V		
COM port	RS232, USB and Bluetooth		
Dimensions	140 x 80 x 230 mm		
Weight	1.2 kg		

STANDARD SET

MI 3309

- Instrument MI 3309 BT DeltaGTSmall soft carrying bag

- IEC cable, 2 m, 2 pcs Test lead, black, green, brown, 1.5 m
- Crocodile clip, black, green, brown
- Test probe, black, green, brown
- PC software PATLink PRO
- RS232 cable

- USB cable
- NiMH rechargeable batteries, type AA, 6 pcs
- Instruction manual on storage media
- Short instruction manual
- Calibration certificate



GT testers MI 3311 GammaGT



The MI 3311 GammaGT is a battery powered multifunctional instrument intended to perform measurements for testing the electrical safety of portable electrical equipment. Due to large graphical LCD with backlight, two PASS / FAIL LED indicators and HELP screens for each measurement the handling of the instrument is clear and simple. Up to 1500 test results with parameters can be stored in the internal memory of the instrument and then downloaded to the PC for further data handling and creation of test report. Lightweight design, pre-programmed and custom test sequences, optional barcoding, android keyboard application and RFID systems and built-in calibration unit make the MI 3311 an ideal instrument for high volume professional safety testing of portable appliances.

MEASURING FUNCTIONS

- Continuity test with 200 mA:
- Insulation resistance;
- Insulation resistance of isolated accessible conductive parts;
- Substitute leakage current;
- Substitute leakage current of isolated accessible conductive parts;
- IEC cord polarity test;
- TRMS voltage;
- · Functional and visual inspection.

KEY FEATURES

- Autosequencing: pre-programmable VDE compatible autosequences, up to 50 custom prepared autosequences and barcode autotests speed up testing and ensure that no tests are missed.
- Checkbox: built-in calibration unit performs calibration of the instrument and the calibration results are automatically stored into instrument's memory.
- PASS / FAIL: large green and red lights of the LEDs indicate a PASS or FAIL evaluation of test result.
- Scan and test: optional QR or barcoding system and PASS / FAIL QR or barcode label printing make retesting quick and simple.

- **RFID:** support for advanced RFID identification system.
- User friendly: large LCD screen, two Pass / Fail LED indicators, help screens and warnings make the instrument an extremely easy to use.
- Multi-tasking: instrument performs continuity test, 250 V and 500 V insulation tests, substitute leakage measurement, functional and polarity tests.
- **Memory:** up to 1500 test results with measuring parameters can be stored in two level memory and downloaded to the PC with the help of PC SW PATLink PRO.
- Built-in charger & rechargeable batteries: instrument has a built-in charging circuit and comes complete with a set of rechargeable NiMH batteries.
- Android application: enables advanced data management, use of smart phones camera for scanning QR and bar-code.
- PC SW PATLink PRO enables downloading, viewing, printing of test results and exporting of data to spreadsheet applications.
- PC SW PATLink PRO Plus enables advanced analysis of test results, upload of pre-programmed custom autosequences and creation of professional test reports.

APPLICATION

- Professional GT testing:
- · General GT testing;
- · After repair GT safety testing.

STANDARDS

Functionality

- EN 61557;
- VDE 0404-1;
- VDE 0404-2;
- VDE 0701;
- VDE 0702;
- NEN 3140

Electromagnetic compatibility

• EN 61326

Safety

- EN 61010-1;
- EN 61010-031;

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TECHNICAL DATA

FUNCTION	Measuring range	Resolution	Accuracy
PE continuity (200 mA)	0.00 Ω 19.99 Ω	0.01 Ω	±(5 % of reading + 3 digits)
	20.0 Ω 199.9 Ω	0.1 Ω	Indication only
	200 Ω 1999 Ω	1Ω	Indication only
Insulation resistance (250 VDC, 500 VDC)	0.00 MΩ 19.99 MΩ	0.01 ΜΩ	±(5 % of reading + 3 digits)
	20.0 ΜΩ 49.9 ΜΩ	0.1 Μ Ω	±(5 % of reading + 3 digits)
	50.0 MΩ 199.9 MΩ	0.1 Μ Ω	Indication only
Substitute leakage current	0.00 mA 9.99 mA	0.01 mA	±(5 % of reading + 3 digits)
	10.0 mA 20.0 mA	0.1 mA	±(5 % of reading + 3 digits)
Voltage	0 V 300 V	1 V	±(2 % of reading + 2 digits)
Polarity test	Test voltage < 50 VAC		
Power supply	6 x 1.2 V NiMH rechargeable b	patteries, type AA	
Overvoltage category	CAT II / 300 V		
COM port	RS232, USB and Bluetooth (c	optional A 1436 BT dongle)	
Dimensions	140 x 80 x 230 mm		
Weight	0.86 kg		

STANDARD SET

MI 3311

- Instrument GammaGT
- Small soft carrying bag
 IEC cable, 2 m

- Test probe, black
 Test lead, black, 1.5 m

- Test lead, black, 1.5 fff
 Crocodile clip, black
 Power supply adapter
 NiMH rechargeable batteries, type AA,

6 pcs

- Instruction manual
- Calibration certificate



Other instruments / Adapters / Accessories A 1322 and A 1422 Active 3-phase Adapter



Metrel's A 1322 Multifunctional test adapter is designed for troubleshooting, as well as for periodic testing on 3-phase appliances and machinery. Unique functions such as, active polarity testing, differential leakage testing and testing of 3-phase RCD's make the A 1322 Active 3-phase Adapter an ideal instrument for advanced applications. The A 1322 adapter is designed for use alongside the MI 3321 MultiservicerXA, MI 3360 OmegaGT, enabling functional tests to be carried out on machines up to 40 A. Several test socket outlets make this instrument an ideal tester for testing industrial extension leads that may also be RCD protected. The A 1422 Multifunctional test adapter has complete support for testing of Arc Welding Equipment in accordance to EN 60974-4 and VDE 0544-4.

KEY FEATURES

- Testing of Open-Circuit Voltage at ARC Welding Units in accordance to EN 60974-4 (A 1422 only);
- All tests on 3-phase electrical equipment can be carried out, including live leakage test, power, polarity, RCD and Active polarity;
- Simple connection to the GT/MACHINE tester with automatic detection;
- Simple test procedures, identical to single phase equipment;
- Test sequence for 3-phase tests are automatically set, based on entered test codes and input voltages;
- Built-in CEE 3-PH/32A 5 pin, CEE 3-PH/16A 5 pin and CEE 1-PH/16A 3 pin test sockets;
- Instrument comes complete with all accessories necessary for comfortable measurements and kept in a robust waterproof case.

APPLICATION

- Testing of single and 3-phase ARC Welding equipment (A 1422 only);
- Professional 3-PH portable appliance testing;
- Professional 3-PH machine testing.

STANDARDS

Functionality

- EN 60974-4 (A 1422 only);
- VDE 0544-4 (A 1422 only);
- VDE 0404-1;
- VDE 0404-2;
- VDE 0701-0702;
- EN 60204-1 Ed.5;
- EN 60439;
- EN 61439-1;
- AS / NZS 3760;
- NEN 3140

Electromagnetic compatibility

• EN 61326-1

Safety

- EN 61010-1;
- EN 61010-031;

STANDARD SET

A 1322

- Active 3-Phase Adapter
- Bag for accessories
- Connection cable between Adapter and Instrument
- 3-phase mains cable 16 A male / 32 A female, 5 pin. 2 m
- RS232 cable
- Instruction manual, short instruction manual
- · Calibration certificate

A 1422

- Test lead, 1.5 m, (blue, red)
- Test probe, (blue, red)



Picture of MI 1422 s

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TECHNICAL DATA

FUNCTION	Measuring range	Resolution	Accuracy
Differential leakage current (230/400 VAC or 120/208 VAC)	0.00 mA 9.99 mA	0.01 mA	±(5 % of reading + 5 digits)
Power / Functional test (230/400 VAC or 120/208 VAC)	0.00 kVA 24.29 kVA	0.01 kVA	±(5 % of reading + 5 digits)
Active power readout	0.00 kW 24.29 kW	0.01 kW	±(5 % of reading + 5 digits)
Reactive power readout	0.00 kVAr 24.29 kVAr	0.01 kVAr	±(5 % of reading + 5 digits)
Power factor readout	0.00 1.00	0.01	±(5 % of reading + 5 digits)
3-phase RCD / Test current (10 mA, 15 mA, 30 mA, 100 mA, 300 mA) Type (AC, A, B)	0 ms 300 ms (½ x l∆N, l∆N) 0 ms 150 ms (2 x l∆N) 0 ms 40 ms (5 x l∆N)	1 ms 1 ms 1 ms	±3 ms ±3 ms ±3 ms
Portable RCD trip-out current readout (B type PRCD)	0.2 x IΔN 2.2 x IΔN	0.05 x I∆N	±0.1 x ΙΔΝ
Power supply	230 V ±10 %		
Overvoltage category	CAT II / 300 V		
Protection class	I		
COM port	RS232		
Dimensions	335 x 160 x 335 mm		
Weight	7.2 kg		
A 1422 (only)	·		
Welding circuit leakage current; Primary leakage current readout	0.00 mA 14.99 mA	0.01 mA	±(5 % of reading + 5 digits)
No load voltage readout;			
(AC peak or DC peak)	0.0 A 199.9 mA	0.1 A	±(5 % of reading + 5 digits)
(AC RMS)	0.0 A 139.9 mA	0.1 A	±(5 % of reading + 5 digits)

KEY FEATURES

A 1322 and A 1422	MI 3360	MI 3321
Earth bond / continuity resistance 200 mA	•	•
Earth bond / continuity resistance 10A / 25 A	•2 / •2	•/-
Continuity (single / auto)		•
Insulation resistance	•	•
Insulation resistance – s	•	•
High voltage test	•3	•
Loop impedance and prospective fault current		•
Discharging time		•
Voltage, frequency, three-phase rotary field		•
Substitute leakage current	•	•
Substitute leakage – s	•	•
Differential leakage current	•	•
PE Leakage	•	
3-phase differential leakage current	•	•
Touch leakage current	•	•
Polarity test	•	•
Active polarity test	•	•
3-phase polarity test / 3-phase active polarity test	•	•
Clamp current test	•	•
P/RCD test, type (AC, A, B)	•	•
3-phase P/RCD test, type (AC, A, B)	•	•
Power / functional test	•	•
3-phase power / functional test	•	•
A 1422 (only)		
Continuity test (according to IEC/ EN 60974-4)	•	•
Insulation resistance (according to IEC/ EN 60974-4)	•	•
Leakage current (according to IEC/ EN 60974-4)	•	•
No load voltage (according to IEC/ EN 60974-4)	•	•

² 3360 25 A, M, F only ³ MI 3360 F only

Good to know Testing the Safety of Machines and Switchboards

Find out more about testing safety of machines.

Typical hazardous situations related to electrical equipment are:

- failures or faults in the electrical equipment resulting in the possibility of electric shock or electrical fire;
- failures or faults in control circuits resulting in the malfunctioning of the machine;
- disturbances or disruptions in power sources as well as failures or faults in the power circuits resulting in the malfunctioning of the machine;
- loss of continuity of circuits that depends on sliding or rolling contacts, resulting in failure of a safety function;
- electrical disturbances either from outside the electrical equipment or internally generated, resulting in the malfunctioning of the machine;
- release of stored energy (either electrical or mechanical) resulting in electric shock or unexpected movement that can cause injury;
- audible noise at levels that cause health problems to persons;
- surface temperatures that can cause injury.

To verify the electrical safety of machines the appropriate measurements should be performed:

- after erection of machine:
- after installation of machine:
- after upgrading or changing of machine;
- and during periodic retests of machine.

Verification of safety of machines

According to IEC/EN 60204, Ed.5 verification of electrical safety of machines is performed by inspection and measurements:

- Inspection that the electrical equipment complies with its technical documentation;
- Verification of protection against indirect contact by automatic disconnection;
- Insulation resistance test;
- High voltage test;
- Protection against residual voltages;
- Functional tests.

Safety - measurements: Visual test

A visual check must be carried out before each electrical safety test.

The visual inspection discloses most of faults!

A thorough visual check must be carried out before each electrical safety test.

Check of:

- Wiring connection points. Especially PE connections are important!
- Protection covers, housings
- Inscriptions and markings related to safety must be clearly readable.
- Cable layout, radiuses, isolation
- Switches, regulators, lamps, keys
- · Parts subjected to wear out
- Electrical and mechanical protection devices (barriers, switches, fuses, alarms)
- · Openings, filters
- Technical documentation, instructions for use available
- Installation of the appliance must be performed according to the user manuals.
- During visual inspection the measuring points for the electrical testing have to be determined too.

Check that there are no signs of:

- Damage
- Pollution, moisture, dirt that can jeopardize safety
- Corrosion
- Overheating

Verification of protection against indirect contact by automatic disconnection This verification step is quite complex and must always be carried out in some form. The standard EC/EN 60204, Ed.5 allows simplified testing procedures regarding to the status of machine.

The status of the machine can be selected on base of:

- Condition of supplied machine (dismantled, fully assembled);
- Technical documentation (availability of existing verification report of electrical wiring of machine);
- Length of conductors after installation;
- Incoming supply characteristics loop impedance.

How to select the appropriate machine status and test extent is described in EN/ IEC 60204. Table 9.

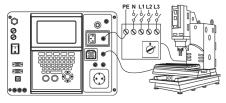
Once the machine status and test extent are defined the limits for the Continuity and/or ZLOOP test should be defined.

Continuity test

This test determines that the PE and equipotential connections inside the machine have proper resistance that corresponds to their length and cross-section.

Size of test current should be between at least 0.2 A and approximately 10 A Higher currents are preferred, especially for low resistance values, i.e. larger cross sectional areas and/or lower conductor length.

Before continuity measurement test leads compensation is required to eliminate the influence of test leads resistance and instrument's internal resistance.

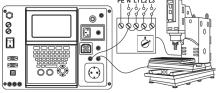


Continuity test

Insulation resistance test

This test discloses faults caused by pollution, moisture, deterioration of insulation metal. etc.

Insulation resistance between live conductors and accessible (earthed or isolated) metal parts is checked.



Insulation resistance test

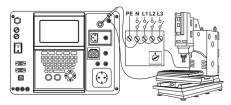
Components and devices that are not rated to withstand the test voltage shall be disconnected during the testing.

Lower test voltages should be used for sensitive electronic equipment and surge protective devices.

High voltage withstanding test

The HV withstanding test is used to confirm integrity of the insulation materials. During the test the insulation materials in the machine are stressed with a higher voltage than during normal operation. A powerful AC high voltage source is applied between the live/ neutral input terminals and the metal housing of the machine. The instrument trips out if the leakage current exceeds the predefined limit.

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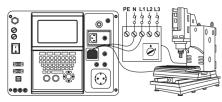
HV withstanding test

Components and devices that are not rated to withstand the test voltage shall be disconnected during the testing.

Components and devices that have been voltage tested in accordance with their product standards may be disconnected during testing.

Loop impedance and prospective fault

The instrument measures the impedance of the fault loop and calculates the prospective fault current. The results can be compared to limit values set on base of selected protective circuit breakers or RCDs. The measurement complies with requirements of the standard EN 61557-3.



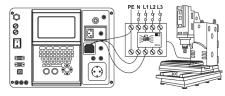
Loop impedance test

RCD testing

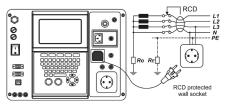
Various test and measurements are required for verification of RCDs in RCD protected machines. Measurements are complies to the EN 61557-6 standard.

The following measurements and tests can be performed:

- Contact voltage,
- · Trip-out time,
- Trip-out current,
- RCD autotest.



Testing of RCD in RCD protected machine



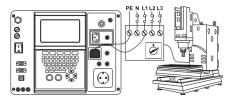
Testing of RCD in electrical installation

Discharge Time

If large capacitors in machines are disconnected from supply there is often a remaining (residual) charge on internal machine components.

Live parts having a residual voltage greater than 60 V after the supply has been disconnected, shall be discharged to 60 V or less within a time period of 5 s after disconnection of the supply.

For plugs or similar devices with exposed conductors (for example pins) if plugged out it shall be discharged to 60 V or less within a time period of 1 s after disconnection of the supply.



Discharge time test

Functional test

Functional check explores if the machine is working properly.

Following items should be checked while the machine is operating:

- Temperature regulators, monitors;
- RCDs and other disconnection devices;
- Operation of functional disconnecting devices;
- Operation of switches, lamps, keys;
- Rotating parts, motors, pumps;
- Power consumption, etc.

Machine and switchboard testers Selection Guide for Machines and Switchboards Testers

MEASUREMENTS	MI 3394 CE MultiTesterXA	MI 3321 MultiServicerXA
	CE MULTIESTERIA	MultiservicerxA
MEASUREMENTS		
Withstanding test 1000 VAC	•	•
Withstanding test 1890 VAC	•	•
Withstanding test 2200 VAC	•	•
Withstanding test 100 5000 VAC (500 VA)	•	
Withstanding test 500 6000 VDC	•	
Continuity 100 mA	•	
Continuity 200 mA	•	•
Continuity 4 A	•	
Continuity 10 A	•	•
Continuity 25 A	•	
Insulation resistance 50 VDC	•	
Insulation resistance 100 VDC Insulation resistance 250 VDC	•	
	•	•
Insulation resistance 500 VDC Insulation resistance 1000 VDC	•	•
Differential leakage current	•	•
	•	•
Touch leakage current Substitute leakage current	•	•
PE leakage	•	•
Discharge time	•	•
Leakage current measurement with optional clamp		•
RCD, PRCD testing		•
Line impedance		•
Loop impedance		•
Voltage measurement	•	•
Frequency measurement		•
Phase rotation indication		•
Polarity test (IEC lead test)		•
Functional (load) test	•	•
ADITIONAL FEATURES		
PASS / FAIL evaluation	•	•
Mains supply auto check	•	•
Graphical LCD / Colur touch LCD	• / •	• / -
Graphical on-line help	•	•
Backlight	•	•
Real time clock	•	•
QWERTY keyboard	•	•
Auto testing (organizer, custom autotests)	•	•
Barcode shortcut auto testing		•
Communication ports RS232 / USB / Bluetooth / Ethernet	• / • / • / •	•/•/-/-
"Test and tag" (barcode scanner + label printer)		•
Data download to PC	•	•
Project upload from PC to instrument	•	•
Trend (compare)		•
Number of memory locations	up to (32 GB)	6000
STANDARD / OPTIONAL ACCESSORIES		
Barcode scanner / RFID / NFC	Option / - / Option	Option / Option / -
Label printer	Option	Option
PC SW PATLink PRO		•
PC SW PATLink PRO Plus		Option
Metrel ES Manager	•	
GENERAL DATA		
Power supply	115 V / 230 V	115 V / 230 V
Weight	17 kg	8.4 kg
Dimensions (mm)	435 x 155 x 292	345 x 160 x 335

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Machine and switchboard testers Rack mount adapter

MI 3394 CE MultiTesterXA is a premium GT tester and undoubtedly the most advanced such product on the market today, offering great versatility in a variety of testing applications. Part of that adaptability is the option to use the instrument in the standalone mode or mounted in a rack, as a part of a larger testing line. Many of our customers have expressed greater interest in the latter and have reached to us for an adaptable mounting solution, for a variety of racks.

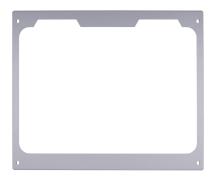




For them, we have designed two rack mount adapters, intended to be used with RITAL square hole racks, but also suitable for a number of third-party racks. The A 1584 Rack mount adapter for MI 3394 CE MultiTesterXA enables the mounting of the said instrument, while the A 1586 Rack mount adapter for A 1460 CE Adapter ensures that this useful accessory is close to the instrument and can be easily connected at the back.

A 1584 Rack mount adapter for MI 3394 CE MultiTesterXA

A 1586 Rack mount adapter for A 1460 CE Adapter





A 1584 is a rack mount adapter for 19" rack, which is designed to hold the MI 3394 CE MultiTesterXA. This product kit includes the parts needed for complete and easy installation of the adaptor kit in RITAL square hole racks, and some third-party racks.

A 1586 is a rack mount adapter for 19" rack, which is designed to hold the A 1460 CE Adapter. This product kit includes the parts needed for complete and easy installation of the adaptor kit in RITAL square hole racks, and some third-party racks.

Machine and switchboard testers MI 3394 CE MultiTesterXA



The MI 3394 CE MultiTesterXA is a portable instrument intended for electrical safety testing and CE certification of electrical appliances, machines and switchboards during the production. The instrument features in strong data management facility enabling the user to create custom auto-tests with predefined limits for pass/fail evaluation, to import predefined structure including test sequences or complete projects from PC software, plus strong memory organizer. The PC software MES-Manager enables the upload of automated test sequences, projects, downloading of test results to the PC, automatic data storage into a file, printing of test reports. Due to selected test functions, durable construction and accompanying PC SW package CE MultiTesterXA is the perfect instrument for electrical safety testing in the most demanding environments like laboratories, automated production lines or specialized workshops.

MEASURING FUNCTIONS

- High Voltage, programmed (AC/DC).
- High Voltage, burn test (optional A 1560)
- · Continuity tests.
- Insulation resistance measurement.
- Substitute leakage current.
- Differential leakage current.
- Touch leakage current.
- PE-leakage current.
- · Discharge time.
- Functional test (power P/S/Q, voltage, current, cos fi, frequency, ThdU, ThdI,PF).

KEY FEATURES

- Data management: the instrument features in unique user friendly data management facility and state of the art memory organizer.
- Multiple test terminals: different test terminals enabling the user to choose from performing single tests or autosequences from single test socket.

- MicroSD: support for microSD memory card (8-GB supplied with the instrument) up to 32GB.
- **Colour display:** 3.4 "colour LCD display with touch screen.
- **Hi-pot:** high voltage AC (5kV at 500VA) and DC (6kV) test.
- Continuity: 4 wire continuity test with selectable test current (0.2 A, 4 A, 10A, 25A) enabling precise measurements.
- Communication: 4 RS232, USB, Ethernet and Bluetooth communication ports enabling downloading, uploading and remote control over instrument.
- Multi-system testing: the instrument can be used on TT, TN, IT and 115 V supply systems.

APPLICATION

- · Laboratories,
- Automated production lines,
- Specialized workshops.

STANDARDS

Functionality

- IEC 60335 Household and similar electrical appliances
- 61439-1 Low-voltage switchgear and controlgear assemblies
- IEC 60598 Luminaires
- IEC 60950 Safety of information
- Technology equipment
- IEC 61010 Safety requirements for electrical equipment
- VDE 0701-702 Inspection after repair, modification of electrical appliances Periodic inspection on electrical appliances General requirements for electrical safety
- EN 50191 Erection and operation of electrical test equipment

Electromagnetic compatibility

• EN 61326-1

Safety

- EN 61010-1;
- EN 61010-2-030:
- EN 61010-031;
- EN 61557

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TECHNICAL DATA

FUNCTION	Measuring range	Resolution	Accuracy
HVAC, Programmable HV AC			
Test voltage (AC)	0 1999 V	1 V	±(3 % of reading)
	2.00 5.99 kV	10 V	±(3 % of reading)
Test current apparent capacitive	0.0 99.9 mA	0.1 mA	±(3 % of reading + 3 digits)
resistive	0.0 mA 99.9 mA	0.1 mA	Indicative
103136140	-99.9 mA 99.9 mA	0.1 mA	Indicative
Short circuit current	> 200 mA	U.I IIIA	mulcative
Output power	500 VAmax		
	SUU VAIIIAX		
IV DC, Programmable HV DC			(= a) (= 1))
Test voltage (DC)	0 1999 V	1 V	±(3 % of reading)
	2.00 6.99 kV	10 V	±(3 % of reading)
Test current	0.01 9.99 mA	0.01 mA	±(5 % of reading + 3 digits)
lischarging time			
t	0.0 9.9 s	0.1 s	±(5 % of reading + 3 digits)
Up	0 550 V	1 V	±(5 % of reading + 3 digits)
ontinuity (0.2A, 4A, 10A, 25A)	0 330 1		_(3 % 61 1000115 . 3 015103)
	0.00.0 10.00.0	0.010	. /2 0/ 2 :)
R	0.00 Ω 19.99 Ω	0.01Ω	±(2 % of reading + 2 digits)
	20.0 Ω 99.9 Ω	0.1Ω	±(3 % of reading)
	100.0 Ω 199.9 Ω	0.1Ω	±(5 % of reading)
	200 Ω 999 Ω	1Ω	Indicative
isulation resistance (250 V, 500 V, 1000 V), Insulat	ion resistance - S (250 V, 500 V.	1000 V)	
Riso/Riso-s	0.00 ΜΩ 19.99 ΜΩ	0.01 ΜΩ	±(3 % of reading + 2 digits)
,	20.0 ΜΩ 199.9 ΜΩ	0.1 ΜΩ	±(5 % of reading)
Output voltage	0 V 1200 V	1 V	
Output voltage (50) (100) (100)		I V	±(3 % of reading + 2 digits)
nsulation resistance (50 V, 100 V), Insulation resist			
Riso/Riso-s	0.00 ΜΩΩ 19.99 ΜΩ	0.01 ΜΩ	±(5 % of reading + 2 digits)
	20.0 ΜΩΩ 199.9 ΜΩ	0.1 ΜΩ	±20 % of reading
Output voltage	0 V 1200 V	1 V	±(3 % of reading + 2 digits)
open circuit voltage <50 V a.c.)	0 1 1200 1		_(3 % 01 10dding 12 digits)
Isub / Isub s	0.00 mA 19.99 mA	10 ۸	±(5 % of reading + 3 digits)
	0.00 IIIA 19.33 IIIA	10 μΑ	±(5 % 01 reauling + 3 ungits)
Differential Leakage current			
ldiff	0.00 mA 19.99 mA	0.01 mA	±(3 % of reading + 5 digits)
PE leakage current			
lpe	0.00 mA 19.99 mA	0.01 mA	±(3 % of reading + 3 digits)
	0.00 IIIA 13.33 IIIA	0.01111A	±(3 /0 01 Teauling + 3 digits)
ouch leakage current			(- 0) 5 11 - 11 1 1
Itou	0.00 mA 19.99 mA	0.01 mA	±(3 % of reading + 3 digits)
ower			
P	0.00 W19.99 W	0.01 W	±(5 % of reading + 5 D)
	20.0 W199.9 W	0.1 W	±(5 % of reading)
	200 W 1999 W	1 W	±(5 % of reading)
	2.00 kW 3.70 kW	10 W	±(5 % of reading)
r			
S	0.00 VA19.99 VA	0.01 VA	±(5 % of reading + 10 D)
	20.0 VA199.9 VA	0.1 VA	±(5 % of reading)
	200 VA 1999 VA	1 VA	±(5 % of reading)
	2.00 kVA 3.70 kVA	10 VA	±(5 % of reading)
0	0.00 VAr19.99 VAr	0.01 VAr	±(5 % of reading + 10 D)
•	20.0 VAr199.9 VAr	0.1 VAr	±(5 % of reading)
	200 VAr 1999 VAr	1 VAr	±(5 % of reading)
	2.00 kVAr 3.70 kVAr	10 VAr	±(5 % of reading)
PF			
rr	0.00i 1.00i	0.01	±(5 % of reading + 5 digits)
	0.00c 1.00c	0.01	±(5 % of reading + 5 digits)
THDU	0.0% 99.9%	0.1%	±(5 % of reading + 5 digits)
THDI	0 mA999 mA	1 mA	±(5 % of reading + 5 D)
	1.00 A 16.00 A	10 mA	±(5 % of reading)
Cos fi	0.00i 1.00i	0.01	±(5 % of reading + 5 digits)
CO3 11	0.00c 1.00c	0.01	±(5 % of reading + 5 digits)
11	0.00c 1.00c		1/2 0/ of roading - 10 -1:-!\
U		0.1	±(3 % of reading + 10 digits)
	200 V 264 V	1 V	±(3 % of reading)
	0 mA999 mA	1 mA	±(3 % of reading + 5 D)
	1.00 A 16.00 A	10 mA A	±(3 % of reading)
ower supply	110 V / 230 V AC, 50 Hz / 6	0 Hz	
Over Supply Overvoltage category	CAT II / 300 V, CAT II / 600		nlv)
		ν (חוטכווו / חוטכחב, UI	пул
rotection class	<u> </u>		
IV output	5 kV a.c. / 6 kV d.c., double	insulation	
iv output			
	4 x RS232, 1 x USB, 1 x Blue	LOULII	
COM port	4 x RS232, 1 x USB, 1 x Blue 43 5 cm x 29 2 cm x 15 5 cm		
	4 x RS232, 1 x USB, 1 x Blue 43,5 cm x 29,2 cm x 15,5 cm 17 kg		

Note: Technical specification relates to HW 3 version.

STANDARD SET

MI 3394 Euro set

- Instrument CE MultiTesterXA
 HV test pistol with 2 m cable, 2 pcs
- Continuity test lead, 2.5 m, 2 pcs
- Continuity test lead, red, 1.5 m, 1pcs
- Insulation test lead, red, 2.5 m
- Insulation test lead, black, 2.5 m
- Crocodile clip, black, 2 pcs
- Crocodile clip, red, 3 pcs

- · Discharge time cable
- Mains cableBag for accessories
- Calibration certificate
- RS232 cable
- USB cable
- CD with instruction manual (full version)
 Metrel ES Manager BASIC license*

*Metrel ES Manager can be downloaded free of charge from Metrel Web server.



Machine and switchboard testers MI 3394 CE MultiTesterXA CE testing and certifying



Due to the differences in testing standards globally, it has becoming increasingly important for manufacturers to ensure that their products are safe for the consumer and industrial markets.

THE NEED FOR TESTING

Protecting users from potentially life threatening injuries from electrocution as a result of faulty insulation, or inadequate grounding, is of paramount importance.

The new CE MultiTesterXA, in conjunction with the CE test adaptor A 1460, provides a thorough and expeditious solution in the execution of auto tests via a single test terminal. This solution is intended for electrical safety testing and CE certification of electrical appliances, machines and switchboards during production.

Metrel has designed and developed three separate models to address the varied tests and applications required.

		MI 3394 EURO SET	MI 3394 LINE SET	MI 3394 ST SET	MI 3394 LAB SET
_	MI 3394 Instrument CE MultiTesterXA	•	LINE SEI	• • • • • • • • • • • • • • • • • • •	• LAB SEI
STANDARD		•	<u>. </u>		
2	A 1460 CE Test adapter		•		
Ž	S 2073 HV test lead 5m, without pistols			•	
ò	A 1560 Burn Link adapter				•
	A 1105 Barcode scanner		•		
	A 1511 Tip Comander		•		
	HV test pistol with 2 m cable, 2 pcs	•			•
	Continuity test lead, 2.5 m, 2 pcs	•	•	•	•
	Continuity test lead, red, 1.5 m, 1pcs	•	•	•	•
	Insulation test lead, red, 2.5 m	•	•	•	•
	Insulation test lead, black, 2.5 m	•	•	•	•
	Crocodile clip, black, 3 pcs	•	•	•	•
	Crocodile clip, red, 2 pcs	•	•	•	•
	Discharge time cable	•	•	•	•
	Mains cable	•	•	•	•
	Bag for accessories	•	•	•	•
	Calibration certificate	•	•	•	•
	RS232 cable	•	•	•	•
	USB cable	•	•	•	•
	A 1521 USB isolator		•		
	CD with instruction manual (full version)	•	•	•	•
	Metrel ES Manager BASIC license	•	•	•	•
AL	A 1496 2-LED signal tower lamp HV	•	•	•	•
OPTIONAL	A 1497 4-LED signal tower lamp	•	•	•	•
O	A 1495 Remote pedal	•	•	•	•

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The **LINE set** is defined to be most ideal for automated testing of equipment on production lines. The MI 3394, in combination with the A 1460, provides the user full hands free operation in executing the tests. Metrel ES manager software enables configuration of test procedures (sequences) which are uploaded to the tester and used for automated testing. Test sequences can be started via a remote pedal or tip commander. Predefined test limits are used for the evaluation of PASS/FAIL status, with results being automatically stored on the microSD memory card. Unique ID of tested equipment can be added via barcode scanner during the test procedure.

The **STANDARD set** is defined based on typical requirements for smaller production. The instrument's intuitive touch screen display enables easy selection of required tests and test limits for fast test execution. Test limits are used for PASS/FAILL evaluation, results of the test can be stored under different memory structure levels. The set enables execution of all available single tests. Optionally, the user can also use barcode scanner for entering the equipment's ID.

The **LAB set** is defined to cover requirements that are most often required in test laboratories or R&D department's for type testing. One of the most important test to be carried out is the dielectric withstand test which can be destructive or non-destructive. The MI 3394 supports the execution of both. To execute the destructive withstanding test, the Burn Link Adapter (A 1560) must be used. The set includes also a set of professional HV test pistols for carrying out AC + DC HV tests safely. The rest of the available tests can be carried out via different test terminals. All the tested data can be stored on an 8GB micro SD card.





- Custom defined automatic test sequences via PCSW Metrel ES Manager,
- Execution of test sequences via A 1460 CE test adapter,
- · Hands free operation,
- PASS/FAIL and warning lamps,
- Programmable inputs and outputs,
- Programmable messages, pauses and several different flow commands,
- Execution of all tests via single test terminal.
- Built-in microSD memory card (8GB supplied with the instrument).
- A 1460 has a built-in robust fuse housing, enabling countless change of protective fuses.
- A 1460 has a built-in parallel test terminals to the test socket (enabling the user to plug in custom made test terminal).
- Test commander has a built in LED torch lamp and PASS/FAIL status LED lamps.
- Execution of test commands via test commander test button.
- Bar-code scanner enabling identification of barcode labeled appliances.



KEY FEATURES

- Creation of structure with dedicated tests,
- · PASS/FAIL evaluation of test results,
- · Execution of all single tests,
- Programmable High Voltage (AC + DC) test,
- 4-wire continuity test.



KEY FEATURES

- · Execution of all single tests,
- Programmable High Voltage (AC + DC) test,
- HV burn test, with limited breakdown current,
- 4-wire continuity test,
- PASS/FAIL evaluation of test results.
- Execution of auto-test via test terminals of the instrument.
- Built-in microSD memory card (8GB supplied with the instrument).

Machine and switchboard testers MI 3321 MultiServicerXA



Multifunctional portable test instrument MI 3321 MultiServicerXA is intended to perform all necessary measurements for testing the electrical safety of portable electrical equipment, machines and switchgears. It is the first machine tester covering all necessary tests according to new IEC/EN 60204 ed.5 including Loop impedance, RCD and HV tests. MultiServicerXA enables measurement of discharge time, power and current consumption and resistance to excessive voltages which are the main parameters in the safety testing of hard wired appliances and large machinery. With an easy to use user interface, large graphic LCD, QWERTY keyboard, help menus with connection diagrams and extra ports for testing fixed installations the MI 3321 is the best solution for safety testing.

MEASURING FUNCTIONS

- Continuity tests (200 mA, 10 A);
- · Insulation resistance;
- Withstanding voltage tests (1000 V, 1890 V, 2200 V);
- Substitute leakage current;
- Differential leakage current;
- Touch leakage current;
- IEC cord polarity test;
- Leakage and load TRMS current measurement with current clamp;
- Portable RCD testing;
- · RCD testing;
- Line and loop impedance;
- High resolution line / loop impedance ($m\Omega$).
- Discharge time;
- Three phase voltage / rotary field;
- · Functional test.

KEY FEATURES

- 3 in 1: instrument performs testing of portable appliances (acc. to VDE 0701 0702), machines (acc. to IEC/EN 60204 Ed.5) and switchgears (acc. to IEC/ EN 60439 and the new IEC 61439) including functional and leakage tests for DUTs with nominal power up to 3.5 kW.
- Multi-tasking: up to 18 different measurements can be performed either as a single test or pre-programmed test sequences (GT mode).
- Automated: automatic testing and PASS / FAIL evaluation of test results

- according to appropriate standard.
- Project uploading: previous test data can be uploaded for fast retesting of the object.
- Scan and test: optional barcoding system and PASS / FAIL barcode label printing make retesting quick and simple.
- **RFID:** support for advanced RFID identification system.
- User friendly: large LCD screen, full QWERTY keyboard, help screens and warnings make the instrument an extremely easy to use.
- Fixed appliance tests: ports, leads and optional accessories fully support the testing of fixed machines and appliances while normal socket supports plug-in machines and appliances testing.
- RCD testing: instrument enables testing of parameters of RCDs and portable RCDs.
- Clamp leakage current measurement: quick measurement of leakage current with current clamps directly on power supply cable without disconnection of appliance from mains.
- Discharge time test: testing of how long it takes for the machine discharge after power is removed.
- Withstanding voltage test: instrument performs 2500 VAC, 1890 VAC and 1000 VAC withstanding voltage tests with settable current limit.
- Trend functionality: test results can be uploaded from PC to the instrument for comparison between old and new test results onsite.

- **Downloadable:** up to 6000 test results with measuring parameters can be stored in two level memory and downloaded to the PC with the help of PC SW PATLink PRO.
- PC SW PATLink PRO included in the standard set enables downloading, viewing, printing of test results and exporting of data to spreadsheet applications.
- PC SW PATLink PRO Plus enables advanced analysis of test results, upload of structures and data upload to the instrument for on-site comparison of old and new results, upload of preprogrammed custom autosequences and creation of professional test reports.

APPLICATION

- · Factory machinery safety testing;
- Industrial safety testing;
- Portable appliances safety testing;
- Switchgear safety testing.

STANDARDS

Functionality

IEC/EN 61557; IEC 60439-1; EN 60204;
 IEC/EN 60204-1 Ed.5; IEC/EN 60439; IEC
 60755; IEC 60598-1; VDE 0404; VDE 0701-0702; IEC/EN 61439-1.

Electromagnetic compatibility

• EN 61326

Safety

- EN 61010-1;
- EN 61010-031

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TECHNICAL DATA

UNCTION	Measuring range	Resolution	Accuracy
Vithstanding test with 1890 VAC and 2200 VAC:			
Test voltage	0 V 3000 V	1 V	±(5 % of reading + 5 digits)
Current	0.0 mA 99.9 mA	0.1 mA	±(10 % of reading + 8 digits)
Vithstanding test with 1000 VAC:			
Test voltage	0 V 1500 V	1 V	±(5 % of reading + 5 digits)
Current	0.0 mA 199.9 mA	0.1 mA	±(5 % of reading + 5 digits)
	200 mA 500 mA	1 mA	±(5 % of reading + 5 digits)
nsulation resistance with 250 VDC; 500 VDC	0.000 ΜΩ 0.500 ΜΩ	$0.001\mathrm{M}\Omega$	±(10 % of reading + 5 digits)
	0.501 ΜΩ 1.999 ΜΩ	0.001 ΜΩ	±(5 % of reading + 3 digits)
	2.00 ΜΩ 19.99 ΜΩ	0.01 ΜΩ	±(5 % of reading + 3 digits)
	20.0 ΜΩ 199.9 ΜΩ	0.1 ΜΩ	±(5 % of reading + 3 digits)
nsulation - S resistance with 250 VDC; 500 VDC	0.000 ΜΩ 0.500 ΜΩ	0.001 ΜΩ	±(10 % of reading + 5 digits)
	0.501 ΜΩ 1.999 ΜΩ	0.001 MΩ	±(5 % of reading + 3 digits)
	2.00 ΜΩ 19.99 ΜΩ	0.01 ΜΩ	±(5 % of reading + 3 digits)
PE continuity with 10 A (GT)	0.00 Ω 1.99 Ω	0.01 Ω	±(5 % of reading + 3 digits)
PE continuity with 10 A (other)	0.000 Ω 0.999 Ω	0.001 Ω	±(5 % of reading + 6 digits)
NE 4' '1 200 A	1.00 Ω 1.99 Ω	0.01 Ω	±(5 % of reading + 3 digits)
PE continuity with 200 mA	0.00 Ω 1.99 Ω	0.01 Ω	±(5 % of reading + 3 digits)
Discharge time	0.0 s 9.9 s	0.1 s	±(5 % of reading + 3 digits)
Differential leakage current	0.00 mA 9.99 mA	0.01 mA	±(5 % of reading + 5 digits)
Substitute leakage current	0.00 mA 19.99 mA	0.01 mA	±(5 % of reading + 5 digits)
ouch leakage current	0.00 mA 2.50 mA	0.01 mA	±(10 % of reading + 5 digits)
unctional test	0.00 kVA 4.00 kVA	0.01 kVA	±(5 % of reading + 3 digits)
RMS current with clamp	0.00 mA 9.99 mA	0.01 mA	±(5 % of reading + 10 digits)
	10.0 mA 99.9 mA	0.1 mA	±(5 % of reading + 5 digits)
	100 mA 999 mA	1 mA	±(5 % of reading + 5 digits)
	1.00 A 9.99 A	0.01 A	±(5 % of reading + 5 digits)
	10.0 A 24.9 A	0.1 A	±(5 % of reading + 5 digits)
PRCD testing	IΔN: 10, 15, 30 mA		
Trip-out time	0 ms 300 ms (1/2xl∆N)	1 ms	±3 ms
	0 ms 300 ms (I∆N)	1 ms	±3 ms
200	0 ms 40 ms (5xIΔN)	1 ms	±3 ms
RCD testing	IΔN: 10, 30, 100, 300, 500, 1000 mA	0.417	(0 0 () 45 0 () 5 U 40 U
- Contact voltage	0.0 V 19.9 V	0.1 V	(-0 %/+15 %) of reading ±10 dig.
	20.0 V 99.9 V	0.1 V	(-0 %/+15 %) of reading
- Trip-out time	0.0 ms 40.0 ms	0.1 ms	±1 ms
	0.0 ms 300.0 ms	0.1 ms	±3 ms
Trip-out current	0.2×ΙΔΝ 1.1×ΙΔΝ (AC type)	0.05×IΔN 0.05×IΔN	±0.1×ΙΔΝ ±0.1×ΙΔΝ
	0.2×I∆N 1.5×I∆N (A type, I∆N ≥30 mA) 0.2×I∆N 2.2×I∆N (A type, I∆N <30 mA)		±0.1×1ΔN ±0.1×1ΔN
ault loop impedance / Line impedance	0.2×1ΔN 2.2×1ΔN (A type, 1ΔN <30 IIIA) 0.00 Ω 9.99 Ω	0.05×IΔN 0.01 Ω	±0.1×1ΔN ±(5 % of reading + 5 digits)
ашт юор ппрецансе / ств ттредансе	0.00 Ω 9.99 Ω 10.0 Ω 99.9 Ω	υ.υτΩ 0.1 Ω	±(5 % of reading + 5 digits) ±(5 % of reading + 5 digits)
	100 Ω 1999 Ω	1Ω	±10 % of reading + 5 digits)
/oltage	0 V 550 V	1 V	±(2 % of reading + 2 digits)
requency	14.0 Hz 499.9 Hz	0.1 Hz	±(0.2 % of reading + 2 digits)
Power supply	115 V / 230 V, 50 Hz / 60 Hz	0.1112	±\0.2 /0 01 1caumg + 1 uigit/
	CAT II / 300 V		
Overvoltage category	,		
Protection class	l Dealla Luch		
OM port	RS232 and USB		
Dimensions	345 x 160 x 335 mm		
Veight	8.4 kg		

STANDARD SET

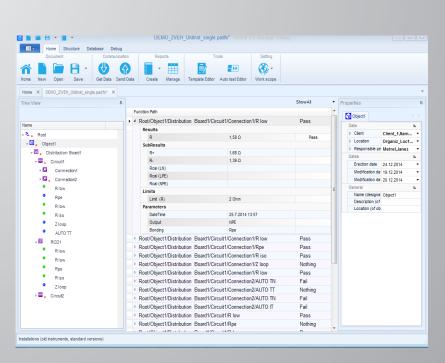
MI 3321

- Instrument MultiServicerXA
- HV test lead with test probe
 HV test kead with crocodile
- Plug test cable
- 3-wire test lead
- Test lead, black, 1.5 m
 Test lead, green, 1.5 m
 Test lead, red, 4 m

- Test probe, 4 pcs (black, red, green, blue)
 Crocodile clip, black, 3 pcs
- Protective bag for accessories
- PC SW PATLink PRO with RS232 and USB cable
- Instruction manualCalibration certificate



PC software Metrel electrical safety manager



The Metrel Electrical Safety
Manager is a common application
for management of wide palette of
Metrel's electrical safety testers,
portable appliance testers, machine
testers and industrial safety testers.
This application has a unified user
interface with the new generation
of Metrel's instruments - same view
same meaning. It enables the pretreatment for the measurements,
viewing and editing of the
measurement results and generation
of professional reports. Depending
on the instrument model or type the
user can create AUTOSEQUENCEs,
custom tests or single tests. They
can be integrated into the custom
created test structures and then
uploaded into the measurement
instrument.

The downloaded measurement results can be viewed, analysed, edited and finally a professional report can be created and printed. These professional reports are predefined templates according to national standards and regulatory organisations where the user enters all the needed protocol data while the measurement results are automatically inserted into the predefined forms. This application is fully compatible with the new generation of Metrel's multifunction testers, starting with CE MultitesterXA and EurotestXC. With limited functionality some of the predecessor models like EurotestXE or EurotestCombo are also supported.

KEY FEATURES

- Common platform for wide range of Metrel's instruments: a Windows based application for most of the future Metrel's instruments.
- Multilevel test structure editor: the installation structure can be created in advance on the PC and then simply uploaded to your tester.
- Measurement editor: enables definition
 of tests within the test structure with
 all parameters and sub parameters.
 After the structure is uploaded to the
 instrument, such predefined test can be
 selected and started without additional
 settings
- AUTOSEQUENCE editor: application for easy and efficient preparation of AUTOSEQENCEs or custom tests.

- Report creator: enables automatic generation of professional test reports which include visual inspection of tested object and test results in tabular form.
- Multilingual reports according to local regulations: different languages for the application and reporting are supported.
- Export of test results: test results in text (.csv) or .xml format can be exported to other programs.

MESM SW is compatible with:

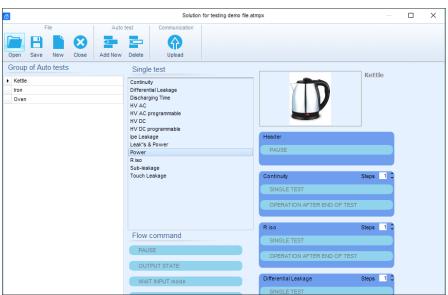
- MI 3309 DeltaGT ³
- MI 3394 CE MultiTesterXA
- MI 3360 OmegaGT XA
- MI 3360 25A OmegaGT XA
- MI 3360 M OmegaGT XA
- MI 3360 F OmegaGT XA

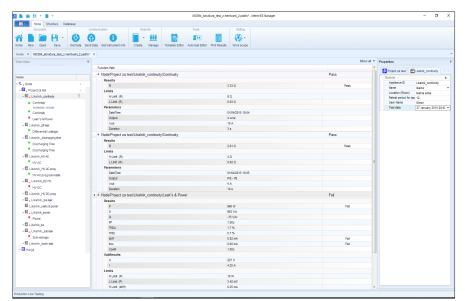
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^{*} Not fully supported (AutoSequence editor is not enabled).

Custom auto sequence, or group of them can be created on PC SW and uploaded to the instrument.



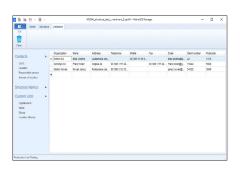


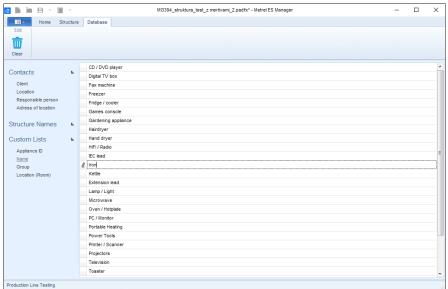


User defined structure with measurements and limits can be created on PC SW and uploaded to instrument.



User can define several different databases, containing information about Contacts, Structure names and Custom Lists.





PC software A 1522 aMESM (Android Metrel Electrical Safety Maneager)



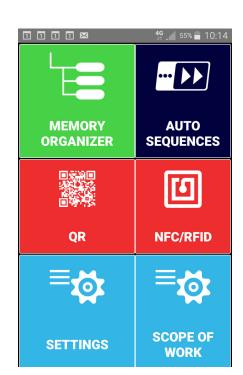
The aMESM is an advanced portable appliance safety Testing tool for Android devices. It enables fast and simple data management of tested appliances, as well as a quick overview of already performed tests. The Application enables the user to send results to the main office before leaving test site and enter and save data to the test instrument by using the smart phones' keyboard. It enables creation of customer and test location database as well as adding text and pictures, videos or voice records to the specific position in the test structure. All these features enable the user faster and easier data handling.

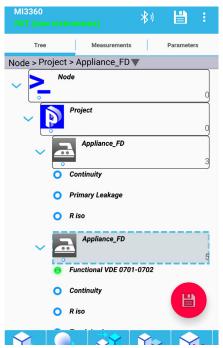
KEY FEATURES

- Complete database of tested appliances in one location.
- · Easy data entering.
- Projects can be stored to your drop box account.
- Sending data to the main office before leaving the test site.
- Overview of testing parameters.
- Adding text, picture, video or voice records to test results.
- Creation of customer and test location database.
- Use of smart phones barcode or QR code scanner for quicker data entry.

aMESM is compatible with:

- MI 3394 CE MultiTesterXA
- MI 3360 OmegaGT XA
- MI 3360 25A OmegaGT XA
- MI 3360 M OmegaGT XA
- MI 3360 F OmegaGT XA

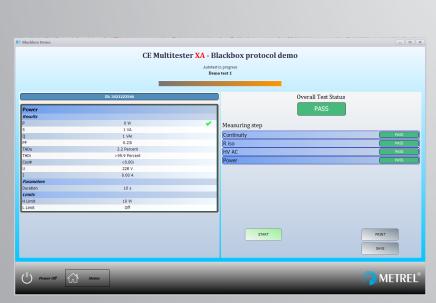




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PC software Black-box protocol

The instrument MI 3394 CE
MultiTester XA supports two
communication protocols,
basic and advanced. The basic
communication protocol called
"Black-box protocol" enables twoway communication intended for
controlling the instrument as a
black-box. It is basically a system
of rules that allows a PC as a
master to start communication
by sending the request command
to the instrument, which answers
according to the protocol. This
enables hands free operation
as the control over the tester is
delegated to an automatized
system. Such solution is suitable
for automatized production line
testing. For presentation purposes
Metrel has developed a PC SW
application called Black-Box Demo,
which allows remote control
over the tester via different
communication ports (Ethernet,
RS232, USB or Bluetooth).



The Black-Box demo enables the user to start AutoSequence®s from the tester remotely and it enables an automatic print out of the test report after the AutoSequence® is completed.

The Black-box protocol is designed also to be used with other PC SW engineering tools such as Visual Basic, C++ and LabView, which, with some effort, can be used to perform remote communications between your computer and test instrument, as well as gather and store data for later analysis.

However, if you simply wish to manually enter one command at a time using (Ethernet, RS232, USB or Bluetooth), a communications package, such as HyperTerminal, can be very useful.

PC software PATLink PRO and PATLink PRO Plus



PC software PATLink PRO is an advanced, user friendly software package designed with the portable appliance testing engineer in mind. The graphical interface with drag and drop data relocation, data filtering, data archiving functions and automatic report generation allows a variety of users with a range of different skills and abilities to create professional reports which include company logos. The PATLink PRO Plus software introduces extra features including the ability to reload data onto Metrel uploadable / downloadable testers, perform trend analysis on equipment and introduces PRO Plus certificates and individual appliance reports.

KEY FEATURES

- Full data filtering: All data can be filtered by different parameters: Retest Date, Test Date, Project, User, etc.
- Tree style or table style: Data can be represented in tree or table view.
- **Drag and drop:** The elements of the structure can be relocated and renamed.
- Customer database: It allows test engineer to create his own database of customers fully equipped with all appropriate data.
- Company logo loading: Load company logos into the software so that they can be printed on test reports.
- Data backup: All downloaded data can be backed up to prevent the loss of valuable data for example in case of hard disk failure
- Appliance information editing: Allows you to edit data, e.g. to set up Retest Date, Repair Code, add Comments, etc.
- Export of test results: Data of selected appliances together with test results can be exported to other programs (MS Excel, MS Word).
- **PDF report:** Test Report can be transformed into PDF format.
- Full built-in help files: Integrated help menu contains detailed explanation of PC SW handling
- Automatic self-test record keeping: Results of the CHECKBOX function (MI 3311 only) can be automatically transferred to

the PC and printed onto the test reports.

- "Plug & Play": When meter is connected to the PC it is automatically recognized by the software.
- Upload data back to GT tester: User can upload test results from the previous measurement session (e.g. from last year) so the same tests can be simply repeated and results of both measurements can be compared (MI 3321).
- Autosequences upload: Test autosequences can be prepared via PATLink PRO and then sent to the tester (MI 3321, MI 3309, MI 3311) for testing speedup.
- Structures upload: The structure of test site can be created in advance on the PC and then simply uploaded to the tester (MI 3321); if needed any deviations can be adjusted on the tester on site.
- **Trend analysis:** Enables to compare test results of the last and previous tests.
- Automatic PRO report generation:
 Enables automatic generation of Test
 Report (standard or full detailed).
- PATLink PRO Plus professional reports:
 The PRO Plus report displays results as the PRO version but enables editing the information before printing the report.

PC SW PATLink PRO / PRO Plus is compatible with:

- MI 3321 MultiservicerXA
- MI 3309 BT Delta GT
- MI 3311 GammaGT

The following Certificates for PRO version are available:

- Full detailed PRO Electrical equipment test report;
- METREL PAT PRO Electrical equipment test report.

The following Certificates for PRO Plus version are available:

- METREL PRO Plus (Single) Electrical equipment test report;
- METREL Full detailed PRO Electrical equipment test report;
- METREL PAT PRO Plus Electrical equipment test report.

PASSWORD PROTECTION

PC SW PATLink PRO is password protected for the following instrument:

• MI 3311

PC SW PATLink PRO Plus is password protected for all Metrel PAT testers.

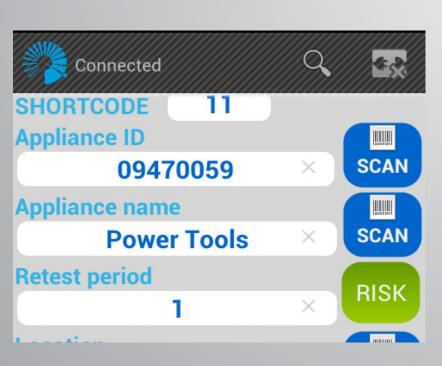
ORDERING INFORMATION

• A 1305 PC SW PATLink PRO with USB and RS232-PS/2 cable

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PC software A 1433 PATLink Android

The PATLink Android is a powerful tool. It enables fast and simple data management of tested appliances, as well as a quick overview of already performed tests by simply scanning a QR code. The application enables the user to enter and save data to the test instrument by using a Smart phones' keyboard. Also it enables a creation of the custom made database for portable appliances' ID's, the appliances' locations. All these features enable the user a faster and easier data handling. PATLink Android enables the user to scan the QR codes which contain information of the previous results, the test status, and the previously used test sequence. Based on this information the user can start the retest of the appliance with a single press on the Android application.



KEY FEATURES

- On site comparison of the test results;
- Creation of the custom database;
- Use of Smart phones camera for the QR and Barcode scanning;
- Use of Smart Phones virtual keyboard.

ADDITIONAL FEATURES

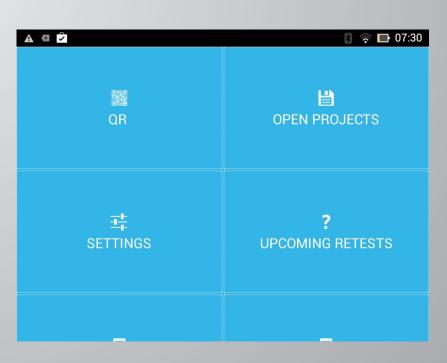
- In Built Risk Assessment tool to provide correct Re-Test periods in accordance with COP version 4;
- Protect your business by applying QR codes instead of Bar Codes.

PATLink Android is compatible with:

- MI 3309 BT DeltaGT
- MI 3311 GammaGT (supported by BT dongle)



PC software A 1434 aPATLink Android



The aPATLink Android is Advanced Portable Appliance Testing tool. It enables fast and simple data management of tested appliances, as well as a quick overview of already performed tests by simply scanning a QR code. The application enables the user to send results to the main office before leaving test site, enter and save data to the test instrument by using a Smart phones' keyboard. Also it enables a creation of the custom made database for portable appliances' ID's, the appliances' names and the appliances' locations. All these features enable the user a faster and easier data handling.

KEY FEATURES

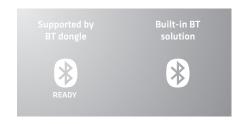
- Complete database of tested appliances on one location;
- Upcoming retest warning on your smart phone or tablet;
- Simple, custom auto-test creation (MI 3309BT DeltaGT);
- Use of smart phones barcode or QR code scanner for quicker data entry;
- Remote control of GT tester;
- · Easy data entering;
- Projects can be stored to your drop box account;
- Sending data to main office, before leaving test site;
- Built in risk assessment calculator;
- None skilled user can perform test simply by scanning the QR code containing all needed information for specific appliance;
- Overview of testing parameters by simple scanning QR code.

ADDITIONAL FEATURES

- In Built Risk Assessment tool to provide correct Re-Test periods in accordance with COP version 4;
- Protect your business by applying QR codes instead of Bar Codes.

aPATLink Android is compatible with:

MI 3309 BT DeltaGT



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Selection Guide for GT Accessories

Photo	Part number	Description	Target application	MI 3360	MI 3309 BT	MI 3311	A 1322	A 1422	MI 3394	MI 3321
	A 1143	Euro Z 290 A	Euro Z 290 A is the impedance tester which enables line / loop impedance measurements with an accuracy down to 0.1 m Ω .							•
	A 1322	Active 3-phas Adapter	A 1322 Multifunctional test adapter is designed for troubleshooting, as well as for periodic testing on 3-phase appliances and machinery.	•						•
	A 1422	Active 3-phas Adapter Plus	A 1422 Multifunctional test adapter is designed for troubleshooting, as well as for periodic testing on 3-phase appliances, machinery, and ARC welding equipment.	•						•
	A 1584	Rack mount adapter for MI 3394 CE MultiTesterXA	A 1584 is a rack mount adapter for 19" rack, which is designed to hold the MI 3394 CE MultiTesterXA. This product kit includes the parts needed for complete and easy installation of the adaptor kit in RITAL square hole racks, and some third-party racks.						•	
	A 1586	Rack mount adapter for A 1460 CE Adapter	A 1586 is a rack mount adapter for 19" rack, which is designed to hold the A 1460 CE Adapter. This product kit includes the parts needed for complete and easy installation of the adaptor kit in RITAL square hole racks, and some third-party racks.						•1	
	A 1460	CE Adapter	Provides a thorough and expeditious solution in the execution of auto tests via a single test terminal, A 1511 2M5 included in set.						•	
ΔΔ	A 1560	Burn Link adapter	For performing insulation breakdown test with limited breakdown current "30" mA".						•	
	A 1207	Three phase adapter	The 3-phase adapter for substitute leakage current, insulation resistance and continuity measurements on electric loads equipped with 16A and 32A CEE 3P sockets.	•	•	•			•	•
	A 1556	Medical adapter	Medical multi-probe adapter for testing all applied parts with a single measurement. Adapter is designed to be used in combination with MI 3360 M model.	•						
	A 1610	Continuity test adapter	Continuity test adapter enabling point-to-point testing of earth continuity with 10 & 25 A test current.	•2						
	A 1474	115 V test adapter	115 V test adapter for testing 115 V appliances, (available for UK/NZ/AUS models only).	٠						

- Option
- •¹ A 1460 CE Adapter only
- $\bullet^2\,$ MI 3360 25A, MI 3360 M, MI 3360 F only

Photo	Part number	Description	Target application	MI 3360	MI 3309 BT	MI 3311	A 1322	A 1422	MI 3394	MI 3321
	A 1316	3-phase adapter (16 A CEE-Schuko)	3-phase adapter for testing 3-phase appliances.	•	•	•			•	٠
	A 1317	3-phase adapter (32 A CEE-Schuko)	3-phase adapter for testing 3-phase appliances.	•	•	•			•	•
	A 1110	Three phase adapter	3-phase test adapter for installation safety testing on 3-phase sockets type 16 A 3CEE.							•
	A 1111 A 1215	Three phase adapter with switch	3-phase adapter with selection switch for installation safety testing on 3-phase sockets type 16 A 3CEE. The adapter allows seamless switching between measurements.							•
0	A 1373	3-phase mains cable / adapter 32 A male / 32 A female, 5 pin, 2 m	3-phase test adapter, for testing of 3 phase extension leads in combination with A 1322 / Active 3-phase Adapter. 3-phase power supply cable for A 1322 / Active 3-phase adapter.				•	•		
	A 1375	1-phase mains cable / adapter 32 A / 16 A Schuko, 3 pin, 2 m	1-phase Power supply cable for A 1322 / Active 3-phase adapter.				•	•		
	A 1376	3-phase adapter 16 A male / 16 A female, 5 pin, 2 m	3-phase test adapter, for testing of 3 phase extension leads in combination with A 1322 / Active 3-phase Adapter.				•	•		
	A 1394	1-phase adapter 16 A male / 16 A female, 3 pin, 2 m	1-phase test adapter for, testing of 1 phase extension leads in combination with A 1322 / Active 3-phase Adapter.				•	•		
	A 1418	1-phase adapter 16 A, 3 pin female / 16 A Schuko male, 2 m	1-phase test adapter for, testing of 1 phase extension leads in combination with A 1322 / Active 3-phase Adapter.				•	•		
	A 1419	1-phase adapter 16 A, 3 pin male / 16 A Schuko female, 2 m	1-phase test adapter for, testing of 1 phase extension leads in combination with A 1322 / Active 3-phase Adapter.				•	•		
	A 1423	Adapter for welding equipment, fi 14/CX20	Test adapter for measuring leakage current, insulation, earth bond and no load voltage on ARC welding equipment.					•		
	A 1424	Adapter for welding equipment, fi 21/CX22	o.ooo rottage off rive metaling equipment.					•		
	A 1425	Adapter for welding equipment, fi 21/CX25						•		

• Option

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Photo	Part number	Description	Target application	MI 3360	MI 3309 BT	MI 3311	A 1322	A 1422	MI 3394	MI 3321
	A 1283	Shielded leakage current clamp	Current clamp with high resolution for accurate leakage current measurements.							•
	A 1472	Leakage current clamp	Current clamp with high resolution for accurate leakage current measurements.		•					
	A 1579	Leakage current clamp	Current clamp with high resolution for accurate leakage current measurements.	•						
	A 1388	Adapter Schuko / Schuko	Measuring adapter for leakage current measurements: for measuring differential leakage current, protective conductor current, neutral current and load current, through leakage current clamp. All wires are separated.	•	•					•
	A 1389	Adapter CEE 5-P 16A / CEE 5-P 16A	Measuring adapter for leakage current measurements: for measuring differential leakage current, protective conductor current, neutral current and load current, through leakage current clamp. All wires are separated.	•	•					•
	A 1390	Adapter CEE 5-P 32A / CEE 5-P 32A	Measuring adapter for leakage current measurements: for measuring differential leakage current, protective conductor current, neutral current and load current, through leakage current clamp. All wires are separated.	•	•					•
	A 1421	External buzzer	Acoustics signal for auto-continuity measurement.							•
O Descrip	A 1495	Remote control pedal	Remote control pedal is used for safe remote start of high voltage insulation test and additionally allows free hand operation of the worker.						•	
	A 1511 2M5	Tip Commander 2,5 m	Tip commander serves as a remote control for execution of passive						•	
	A 1511 5M	Tip Commander 5 m	tests, has a built in LED torch lamp and PASS/FAIL status LED's.						•	
15 1	A 1511 10M	Tip Commander 10 m	_						•	
	A 1497	Warning lamp / 4 LED's signal tower with buzzer	Colour - LED signal tower with build-in buzzer visually and acoustically signalizes ongoing tests and test conditions.						•	
	A 1496	Warning lamp / 2-LED signal tower HV	Warning lamps visually signalize ongoing HV insulation test and warn the user about dangerous voltage conditions.						•	

[•] Option

Photo	Part number	Description	Target application	MI 3360	MI 3309 BT	MI 3311	A 1322	A 1422	MI 3394	MI 3321
-	A 1499	External power supply 24V	If the LED tower lamp is used in combination with CE MultitesterXA the external power supply should be used.						•	
	A 1079	Discharge time cable	Adaptor for measuring discharge time on internal electronic components.						•	
	A 1060	Power splitter for discharge time measurement	T-type power splitter for measurements of discharge time on machinery and switchgear.						•	•
	S 1058	Continuity test lead, 2 x 10 m, 2 pcs	Extension test leads for continuity measurements.						•	
O	S 2073	HV test lead 5m, without pistols	High voltage extension test leads for measurements on larger electrical equipment.						•	
1	S 2078	HV test lead 2m, with pistols, 2pcs	High voltage test leads with pistols for measurements on larger electrical equipment.						•	•
A.S.	S 1072	Continuity test lead with crocodile clip, 2 x 2.5 m, 2 pcs	Extension test leads with protection shield and with crocodile clips for continuity testing with high test currents (10 A, 25 A).						•	
	S 2012	Continuity test lead, 10 m, 2 pcs (red, black)	2 pieces of extension test lead for continuity measurements.						•	•
	S 2025	Test lead, 1.5 m, 2 pcs (black, red)	Connection leads for different measurements.						•	•
	A 1059	Insulation and Continuity adapter	1-phase 16 A CEE plug adapter for insulation resistance and continuity measurements.							•
	A 1447	PRCD Extension adapter	Adapter for testing of PRCD-S/K, supported from HW4.							•
	A 1153	Test lead, black, 20 m	Extension test lead for earth and continuity measurements.		•	•	•	•	•	•

• Option

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Photo	Part number	Description	Target application	MI 3360	MI 3309 BT	MI 3311	A 1322	A 1422	MI 3394	MI 3321
/ / 	A 1154	Test lead, black, 4 m	Extension test lead for earth and continuity measurements.		•	•	•	•	•	•
	A 1331	Test lead with crocodile clip, black, 1,5 m	Test lead with crocodile clip for PAT testing.	٠	•	•				•
	A 1334	IEC cable, 2 m	Additional IEC cable for performing PRCD test.		•					•
8	A 1341	Test lead, green 1.5 m	Test lead for PAT safety testing.	•	•					•
98	A 1342	Test lead, brown 1.5 m	Test lead for PAT safety testing.	•	•					
***	A 1309 A 1310	Crocodile clip, green Crocodile clip, blue	Crocodile clip assures secure and permanent contact during the measurement on bus bars, fixing screws, etc.	•	•					•
***	A 1297 A 1013 A 1064 A 1062	Crocodile clip, brown Crocodile clip, black Crocodile clip, red Tect probe groop	Test probe with fild mm connection is suitable for performing	•	•	•				•
	A 1015 A 1298 A 1014	Test probe, green Test probe, blue Test probe, brown Test probe, black	Test probe with fi 4 mm connection is suitable for performing measurements both in mains outlets and in situations when no schuko outlet is present.	•	•	•			•	•
www	A 1016 A 1268	Test probe, red Test probe, brush type, 4 mm	Test probe, brush type, assures good galvanic contact when measuring on revolving parts, flat surfaces, screw connections and similar. Equipped with standard 4 mm connector.	•	•	•			•	•
	A 1488	BT Able printer, (battery or mains operated)	Printer supports printing of bar-codes which contain a complete appliance information and PASS or FAIL status of result, or QR codes which contain information of the previous results, the test status, and the previously used test sequence.	•	•	•				
	A 1489	Label printer Able, with power and data cables, (battery or mains operated)	Printer supports printing of bar-codes which contain a complete appliance information and PASS or FAIL status of result, or QR codes which contain information of the previous results, the test status, and the previously used test sequence.	•	•	•				
	S 2062	BT label printer set, (mains operated)	Printer supports printing of bar-codes which contain a complete appliance information and PASS or FAIL status of result, or QR codes which contain information of the previous results, the test status, and the previously used test sequence.	٠	٠	٠			•	٠
	<u> </u>		Printer supports printing of simple labels including PASS or FAIL status of result, Appliance name, ID number, User information and test date.						•	

[•] Option

Photo	Part number	Description	Target application	MI 3360	MI 3309 BT	MI 3311	A 1322	A 1422	MI 3394	MI 3321
	A 1379	Paper for A 1276, printer	Spare thermal receipt paper for printer A 1276.							•
	A 1450	Spare label roll for S 2062	Spare label roll for s 2062, (2500 labels per roll)	•	•	•			•	•
	A 1520	Labels for ABLE printer, (250 labels per roll)	Spare label roll for printer A 1488 and 1489, (250 labels per roll)	•	•					
	A 1105	Barcode scanner	Barcode scanner for identification of barcode labelled appliances.	•	•	•			•	•
	A 1105 2D	Barcode scanner 2D RS232 connection	2D Barcode scanner for identification of barcode labelled appliances	•					•	•
3	A 1321	Barcode scanner (Bluetooth)	Barcode scanner for identification of barcode labelled appliances.	•					•	
	A 1545	QR / Barcode scanner (Bluetooth)	QR / Barcode scanner for identification of barcode labelled appliances.	•					•	
THE STATE OF THE S	A 1106	Barcode labels, 1000 pcs	Appliances can be marked with barcode labels for easier identification.		•	•				•
	A 1107	RFID reader / writer	RFID reader / writer allows to read and upload test results and information about tested electrical equipment to the RFID tags.		•	•				•
	A 1571	NFC reader / writer	NFC reader / writer allows to read and upload test results and information about tested electrical equipment to the NFC tags (NTAG 216).	•					•	
	A 1572	NFC tags, fi 34mm self-stick 50 pcs	NFC tags have sufficient memory space to store test results, test code and tested appliance information	•					•	
	A 1573	NFC labels, fi 29 mm self-stick 50 pcs	NFC labels have sufficient memory space to store test results, test code and tested appliance information	•					•	
	A 1574	NFC cable-tie, L 130 mm 50 pcs	NFC cable-ties have sufficient memory space to store test results, test code and tested appliance information	•					•	

• Option

3.40 Accessories 3.35 Metrel Catalogue 2018

Photo	Part number	Description	Target application	MI 3360	MI 3309 BT	MI 3311	A 1322	A 1422	MI 3394	MI 3321
•:•	A 1108	RFID tags, self-stick, 25 pcs RFID tags, key tag, 25 pcs	RFID tags sufficient memory space to store test results and tested appliance information.		•	•				•
	A 1337	RFID tags, self-stich 50 pcs	RFID tags have sufficient memory space to store test results and tested appliance information.		•	•				•
Į į į	A 1160	Fast charger for 8 AA batteries with a set of 6 NiMH bat., type AA	Fast battery charger for up to 8 pieces of AA rechargeable batteries, and a set of 6 pcs NiMH rechargeable batteries, type AA.		•	•				
· · · · · · · · · · · · · · · · · · ·	A 1169	Fast charger for AA, C, D and 9 V block batteries	Fast battery charger for up to 12 pcs AA, 6 pcs C or D rechargeable batteries, 4 pcs 9 V block batteries.		•	•				
# () %	A 1017	Communication cable RS232	RS232 interface cable for connecting the instrument with the PC.				•	•	•	•
100	A 1171	RS232 / USB adapter with 1 m cable	RS232 / USB adapter for instruments without USB comunication port.						•	
	A 1578	RS232 to USB adapter for external USB keyboard	The A 1578 adapter enables the connection of external USB keyboard, for easy data entering.	•						
	A 1073	PC SW CE Link with RS232 cable	PC SW CE Link is a multi-purpose software for programming of the MI 2094, test data downloading and evaluation and creation of test reports.						•	
WINC	A 1203	Upgrade code PATLink PRO to PATLink PRO Plus	Password for upgrading standard PC software PATLink PRO to advanced PC SW PATLink PRO Plus with professional report creation facility.		•	•				•
	A 1305	PC SW PATLink PRO with USB and RS232- PS/2 cable	PC Software PATLink PRO enables downloading, data management and printing of test reports. Comes delivered with RS232-PS/2 and USB communication cables.		•	•				•
w ()	A 1306	PC SW PATLink PRO Plus with USB and RS232-PS/2 cable	PATLink PRO Plus is an advanced PC SW which enables downloading, test results analysis, data upload to the instrument and professional test report creation. Delivered with RS232 and USB COM cables.			•				

[•] Option

Photo	Part number	Description	Target application	MI 3360	MI 3309 BT	MI 3311	A 1322	A 1422	MI 3394	MI 3321
	A 1433	PATLink Android	Enables fast and simple data management of tested appliances, as well as a quick overview of already performed tests by simply scanning a QR code.		•	•				
	A 1434	aPATLink Android			•					
12	P 1102	Licence key for aMESM	The aMESM is an advanced portable appliance safety Testing tool for Android devices.	٠					•	
- Owner	A 1436	Bluetooth dongle	External Bluetooth adapter for wireless connection between Metrel's instruments and Smart phones, tablets and PCs.			•				
	P 1101	BASIC to PRO licence key upgrade for Metrel ES Manager	Licence key for upgrading the Metrel ES Manager to advanced version with professional report creation functionality.	•					•	
	P 1301	MI 3360 M licence key	A licence key enabling Medical functionality per EN 62353 for OmegaGT XA MI 3360 25A	•						
	A 1521	USB isolator	It is intended as galvanic insulation of USB interface between our products and PC to prevent damage of USB connected equipment in case of accidentally applied voltage difference between two types of equipment.						•	
gi.	A 1458	SanDisk MicroSD card reader	Move data between your computer and memory card with memory card reader.						•	
9 Minu	A 1271	Small soft carrying bag	Small soft carrying bag for transport and storage of test instrument or accessories.		•	•	•	•	•	•
O MEREL	A 1289	Soft carrying bag	Large soft carrying bag for transport and storage of test instrument and belonging accessories.	•	•	٠	•	•	•	•
Osum.	A 1550	Large carrying bag	Large soft carrying bag for transport and storage of test instrument and belonging accessories.	٠						
www.metrel.si	A 1302	Set of carrying straps	Set of carrying straps for carrying the measuring instrument around the neck allowing free hand use of the tester.		•	•				
	A 1303	Soft hand strap	Soft hand strap for holding the instrument.		•	•				

• Option

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Content

Power Quality Analysis

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Good to know Power Quality Testing

Find out more about modern power quality measurement techniques

There are quite a few reasons for measuring and analysing power quality nowadays. Potential interactions between end use equipment and electric distribution system, external electromagnetic interferences, resonant states between electrical circuits and some other factors call for a need to be analysed in order that harmful consequences can be omitted or prevented.

Power quality analysing includes measurements of:

- · Phase to ground voltages;
- · Phase to neutral voltages;
- · Neutral to ground voltages;
- Phase to phase voltages in three-phase systems:
- · Phase currents;
- Current in a neutral conductor;
- Frequency;
- Power Factor, cos fi;
- Harmonic components of current and voltage and their direction;
- Waveform of current and voltage at specific circumstances (peak magnitude, primary frequency, time of occurrence, rising rate);
- Transients.

Active Power (P)

Active power is the power generated if a voltage is placed over a purely resistive load and current is allowed to flow. Active power is usually measured in watts (W) or kilowatts (kW).

Reactive Power (Q)

Reactive power is the power that is generated by reactive components (e.g. inductors, capacitors) to create a magnetic field. This is usually measured in Volt-Ampers reactive (var).

Apparent Power (S)

Apparent power is the perceived power from a load that has both resistive and reactive components. Apparent power is the vector sum of both active and reactive power and is usually measured in Volt-Amperes (VA).

Power Factor

Power factor is a measure of a power system's efficiency and is the ratio of real power to apparent power.

Energy

Energy is the generation or use of electric power over a period of time. This is usually expressed in kilowatt-hours (kWh).

Fundamental frequency

The fundamental frequency is the lowest and most predominant frequency in a power system (e.g. the fundamental frequency of the mains voltage in the EU is 50 Hz). The fundamental frequency is also called the 1st harmonic of the system.

Voltage events

Dips

Supply voltage dip represents temporary drops of the voltage under the nominal level.

Swells

Supply voltage swells represents temporary voltage increases under the nominal level.

Interruptions

Voltage interruption is classified as a network's isolation from any source of supply.

Unbalance

Supply voltage unbalance arises when rms values or phase angles between consecutive phases are not equal.

Harmonics

Harmonics are integer frequency multiplication of the fundamental frequency (e.g. with a fundamental of 50 Hz, the 2nd harmonic is 50 x 2 = 100 Hz, 3nd harmonic is 50 x 3 = 150 Hz). Harmonics can be caused by a variety of modern day equipment including resonating transformers, switch-mode power supplies, IT equipment, etc.

Interharmonics

Interharmonics are harmonics that are not an integer multiplication of the fundamental frequency. The main sources of interharmonic waveform distortion are static frequency converters, induction motors and arcing devices.

Total Harmonic Distortion (THD)

THD is the ratio of a wave's harmonic content (for voltage or current) to its fundamental component.

Transients

Transient is a term for short, highly damped momentary voltage or current disturbance. They usually appear as a consequence of external electromagnetic interferences (atmospheric electric discharges, switching manoeuvres).

Flickers

Flicker appears as changing illumination intensity which is a reflection of a changing voltage level.

Inrush current

As a motor begins the current needed to start the motor can be 10 to 15 times the normal operating current. This initial surge of current can cause dips in voltage and can be hard to analyse with normal test instruments, for this reason an analyser with a fast logging function is required.

Instrument connection to the LV and MV Power Systems

When connecting the instrument it is essential that both current and voltage connections are correct. In particular the following rules have to be observed:

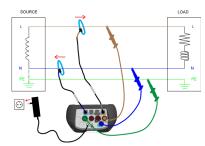
Current clamp-on current transformers

- The arrow marked on the clamp-on current transformer has to point in the direction of current flow, from supply to load:
- If the clamp-on current transformer is connected in reverse the measured power in that phase would normally appear negative.

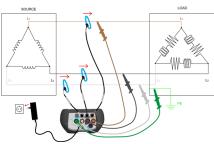
Phase relationships

• The clamp-on current transformer connected to current input connector I1 has to measure the current in the phase line to which the voltage probe from L1 is connected.

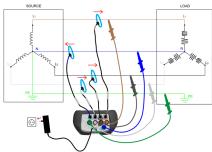
In case of events capturing, it is recommended to connect unused voltage inputs to N voltage input.



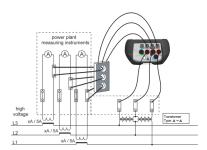
Connection to 1-phase 3-wire system



Connection to 3-phase 3-wire system



Connection to 3-phase 4-wire system



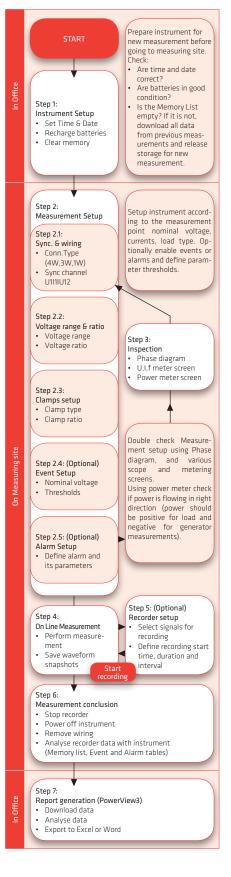
Connecting instrument to the existing current transformers in medium voltage system

Recommended Recording Practice

Power quality measurements are specific type of measurements, which can last several days or even up to several weeks. Usually recording campaign is performed to:

- Statistically analyse some point in the network.
- Troubleshoot malfunctioning device or machine.

Mostly long-term measurements are performed only once, so why it is very important to properly set measuring equipment. Measuring with wrong setting can lead to false or useless measurement results. In the following flow chart recommended recorder procedure is shown (with MI 2892 PowerMaster).



Power quality improvement

Captured with Power Analyser data can be used for improvement of supplied power quality. There are different ways to increase efficiency of power supply.

Cutting power peaks

One of the simplest and the most efficient way to decrease the electricity power bill is by lowering peaks of consumed power (peak demand). This can be achieved by:

- reorganization of production processes;
- embedded generation.

The first solution can be implemented in systems where some tasks can be stopped or rescheduled.

The second solution can be implemented in systems with generators that are often used as a back-up power supply.

Both solutions require additional monitoring and control systems that are designed upon previously conducted measurement and analysis of the situation in the field. Another possibility to increase efficiency is by increasing the power factor using corrective techniques.

Capacitor Banks

Capacitor banks are the devices most susceptible to the presence of harmonics. Since consumer's loads usually have inductive characteristics, capacitor banks are used for compensation of inductive currents. This feature allows:

- better overall system performance;
- increasing availability of active power;
- decreasing transmission loses;
- increasing voltage;
- decreasing financial penalty because of poor power factor.

EN 50160 Standard Overview

EN 50160 is one of the most important standards in field of power quality which defines, describes and specifies the main characteristics of the voltage at a network user's supply terminals in public low voltage and medium voltage distribution networks under normal operating conditions. This standard describes the limits or values within which the voltage characteristics can be expected to remain over the whole of the public distribution network and does not describe the average situation usually experienced by an individual network user.

Power Quality Analysers Selection Guide for Power Quality Analysers

MEASUREMENTS	MI 2892 Power Master	MI 2885 Master Q4	MI 2883 Energy Master
		Master Quality	Energy Master
[ANDARD			
C 61000-4-30 Compliance	Class A 0.1%	Class S	Class S
IDUTE	(Independant certificate)		
NPUTS umber of current measuring channels	4	4	4
lumber of current measuring channels	4	4	3
utomatic range selection/auto-rangeing	• / •	• / •	• / •
phase flexible current clamps 3000/300/30 A (included in Euro set)	4	4	3
MEASUREMENTS			
RMS Current measurement (Min., Max., Avg.)	•	•	•
RMS Voltage measurement (Min., Max., Avg.)	•	•	•
cope function	•	•	•
In-line harmonics measurement	•	•	•
requency measurement	•	•	•
lower measurement (W, VA, VAr)	•	•	•
HD and harmonics analysis	•	•	•
nterharmonics analysis	•	•	•
Power Factor and cos fi Registration of voltage events (sags, swells, interruptions)	•	•	•
itatistical evaluation	•	•	•
urrent in neutral conductor	•	•	With optional clamp
Phase diagram	•	•	•
Inbalance	•	•	•
N 50160 Analysis / IEEE 519 / Energy consumption optimization	• / • / •	• / • / •	• / • / •
licker measurement	•	•	•
ransients measurement	•		
Vaveform recording	•	•	
nrush currents	•	•	
/FD (variable frequency drives)	•	•	
nergy measurement	•	•	•
ignalling	•	•	•
emperature measurement	•	Optional	Optional
ntegration period	1 7200 s	1 7200 s	1 7200 s
Ower measurements in compliance with IEEE 1459 / Classic (vector or arithmetic)	• / •	• / •	• / •
Simultaneous General / waveform / inrush	•	•	
Conection check	•	•	•
olour coding	•	•	•
OMMUNICATION PORTS			
JSB	•	•	•
RS232	For GPS only	For GPS only	
PS time synchronisation	Optional	Optional	
Remote instruments control (3G / WiFi)	Optional	Optional	
Remote instruments control (Ethernet / Intranet)	• / •	• / •	
ENERAL	400 272 4 2 ' TET	400 272 4 2 1 1 757	400272.4.2.1.1. TET
Graphical LCD with backlight	480 x 272 4.3 inch color TFT	480 x 272 4.3 inch color TFT	480 x 272 4.3 inch color TFT
On-site analysis of recorded data Built-in power supply for flexible clamps	•	•	•
Maximal recording time	Over a year	Over a year	Over a year
Memory module size	8 GB supplied, up to 32 GB	8 GB supplied, up to 32 GB	8 GB supplied, up to 32 GB
C Software PowerView3 (Free)	• ob supplied, up to 32 db	• •	• ob supplied, up to 32 db
Maximal test voltage – interphase value	1730 V rms	1730 V rms	1730 V rms
Maximal test voltage – between phase and PE conductors	1000 V rms	1000 V rms	1000 V rms
requency range	50Hz system	50Hz system	50Hz system
- · · · · · · - · · · · · · · · · · · ·	42.500Hz 57.500Hz	42.500Hz 57.500Hz	42.500Hz 57.500Hz
	60Hz system	60Hz system	60Hz system
	51.000Hz 69.000Hz	51.000Hz 69.000Hz	51.000Hz 69.000Hz
	VFD (5 Hz - 110 Hz)	VFD (5 Hz - 110 Hz)	
	400 Hz	400 Hz	CATIVALETTA
Over voltage category	CAT IV / 600 V	CAT IV / 600 V	CAT IV / 600 V
	CAT III / 1000 V	CAT III / 1000 V	CAT III / 1000 V
AC power supply	•	•	•
Built-in battery charger	• C v A A	• 	• E v A A
Rechargeable batteries (NiMH) Battery life (typically)	6 x AA 4.5 h	6 x AA 4.5 h	6 x AA 4.5 h
Veight	4.5 п 0.96 kg	4.5 п 0.96 kg	4.5 n 0.96 kg
versite			
Dimensions (mm)	230 x 140 x 80	230 x 140 x 80	230 x 140 x 80

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Power Quality Analysers Differences for Power Quality Analysers

MI 2892 Power Master



MI 2885

MI 2883 Energy Master



Flagship of our line of power quality analysers and aimed primarily at dedicated professionals, who specialize in high accuracy measurements and analysis, whose validity is backed by a Class A independent certificate.

Designed for power quality assessment and troubleshooting in low and middle voltage electrical systems and checking power correction equipment performance and verification of electrical system capacity before adding new loads.

For users interested in long term monitoring and analysis of electrical systems for the purpose of energy quality and consumption management and formulation of cost saving measures.

- Class A 0,1 % (independent certificate)
- Top tier PQA instrument
- General recorder
- Waveform recorder
- Transient recorder

- Class S
- · Intermediate PQA instrument
- General recorder
- Waveform recorder

- Class S
- · Basic PQA instrument
- General recorder

Power Quality Analysers Comparison for Power Quality Analysers

MODEL		MI 2892 Power Master	MI 2885 Master Q4	MI 2883 Energy Master
TANDARD	IEC 61000-4-30 Compliance	Class A 0,1% (independent certificate)	Class S	Class S
	EN 50160	•	•	•
NUMBER OF INPUT	Current channels	4	4	4
CHANNELS	Voltage channels	4	4	3
SUPPLIED CURRENT	1-phase flexible current clamps 3000/300	4	4	3
	/30 A (A 1227) (included in Euro set)	,		,
	Limited / Standard profile	• / •	• / •	• / •
MEASUREMENTS	Voltage AC + DC	•	•	•
	Current AC +DC	•	•	•
	Frequency	•	•	•
	Power measurements in compliance with IEEE 1459 / Classic (vector or arithmetic)	• / •	• / •	• / •
	Energy	•	•	•
	Harmonics	•	•	•
	Interharmonics	•	•	•
	Flickers	•	•	•
	Phase diagram	•	•	•
	Signalling	•	•	•
	Under/Over voltage deviation	•	•	•
	Interrupts, Dips, Swells and RVC	•	•	•
	Alarms	•	•	•
IUMBER OF INPUT HANNELS UPPLIED CURRENT ENSORS ENERAL RECORDER MEASUREMENTS VAVEFORM RECORDER TRIGGERS ON) ROUBLESHOOTING EATURES	Phase diagram	•	•	•
	Neutral current	•	•	With optional clamp
	Temperature	•	With optional sensor	With optional sensor
WAVEFORM RECORDER	Events	•	•	
TRIGGERS ON)	Alarms	•	•	
	Level I (Inrush recorder)	•	•	
	Level U (Inrush recorder)	•	•	
	Time interval	•	•	
RANSIENT RECORDER	Envelope	•		
TRIGGERS ON)	Level (I, In, U, Un)	•		
ROUBLESHOOTING	On-line scope mode	•	•	•
EATURES	Waveform snapshoot	•	•	•
	GPS receiver	Optional	Optional	
	WiFi / 3G modem	Optional	Optional	
REMOTE COM	Ethernet / Intranet	• / •	• / •	
MICROSD CARD (MAX 32 GB)	8 GB	•	•	•
PC SW	PowerView3 (free of charge)	•	•	•

Power Quality Analysers Selection Guide for Clamps

Part	No.	Smart Clamps	Description	Target application	MI 2892 Power Master	MI 2885 Master Q4	MI 2883 Energy Master
A 1501		•	1-phase mini flexible current clamp 3000/300/30 A / 1V	Single phase flexible current clamp with three selectable measuring ranges. Does not require external power supply as it is powered by the measuring instrument.	•	•	•
A1502		•	1-phase mini flexible current clamp 3000/300/30 A / 1V	Single phase flexible current clamp with three selectable measuring ranges. Does not require external power supply as it is powered by the measuring instrument.	•	•	•
A1503		•	1-phase mini flexible current clamp 6000/600/60 A / 1V	Single phase flexible current clamp with three selectable measuring ranges. Does not require external power supply as it is powered by the measuring instrument.	•	•	•
A 1281	R	•	Current clamp 0.5/5/100/1000 A / 1 V	High accuracy current clamp 0.5/5/100/1000 A / 1V for precise current and power measurements including leakage current measurement.	•	•	•
A 1227	0	•	1-phase flexible current clamp 3000/300/30 A /1V	Single phase flexible current clamp with three selectable measuring ranges. Does not require external power supply as it is powered by the measuring instrument.	•	•	•
A 1445	0	•	1-phase flexible current clamp 3000/300/30 A / 1 V	Single phase flexible current clamp with three selectable measuring ranges. Does not require external power supply as it is powered by the measuring instrument.	•	•	•
A1446	0	•	1-phase flexible current clamp 6000/600/60 A / 1 V	Single phase flexible current clamp with three selectable measuring ranges. Does not require external power supply as it is powered by the measuring instrument.	•	•	•
A 1391 PQA			Current clamp 40/300 A / 1 V	AC + DC current clamp 40/300 A / 1 V with jaw opening 25 mm for power measurements. Battery Life, 66 hours typical (Alkaline).	•	•	•
A 1033	R		Current clamp 1000 A / 1 V	High accuracy current clamp 1000 A / 1 V with jaw opening 52 mm and fixed 1.5 m cable for power measurements with Metrel power quality analysers.	•	•	•
A 1588		•	Current clamp 0.5/5/50 A	High accuracy current clamp 0.5/5/50 A for precise current and power measurements including leakage current measurement			
A 1636			Current clamp: DC 2000 A ; AC: 1000 A	DC current clamp 2000 A; AC current clamp 1000 A with jaw opening 73 mm (fi 68 mm) for power measurements (photo voltaic) Battery operated (9V)			
A 1122			Mini current clamp 5 A / 1 V	Mini current clamp 5 A / 1 V with jaw opening 15 mm for power measurements. Requires A 1561 connection cable.	•	•	•
A 1069			Mini current clamp 100 A / 1 V	Mini current clamp 100 A / 1 V with jaw opening 15 mm for power measurements. Requires A 1561 connection cable.	•	•	•
A 1287	O		1-phase flexible current clamp 3000/300/30 A / 1 V	Single phase flexible current clamp with three selectable measuring ranges. Powered by alkaline or rechargeable batteries.	•	•	•
A 1037	02(II) 02(II) 02(II)		Current transformer 5 A / 1 V	3-phase transformer for power measurements on distribution panels with 5 A nominal output current.	•	•	•

SMART CLAMPS KEY FEATURES:

- Cover wide current range;
- Are automatically recognized by the instrument;
- Are switchless (range selection on the instrument);
- Do not require external power supply.

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Power Quality Analysers Selection Guide for Clamps

Part	: No.	Туре	Jaw opening/lo	Ranges oop	Measurement Ranges	RMS accuracy 50/60 Hz	Phase accuracy 50/60 Hz	RMS accuracy 1500 Hz	Phase accuracy 1500 Hz	Overvoltage category; IP
A 1501		s-Flex	fi 7 cm	30 A 300 A 3000 A	3 A 60 A 5 A 600 A 50 A 6000 A	± 1 % ± 1 % ± 1 %	< 1°	± 3 %	< 10°	CAT IV / 600 V; IP 64
A 1502		s-Flex	fi 14 cm	30 A 300 A 3000 A	3 A 60 A 5 A 600 A 50 A 6000 A	±1% ±1% ±1%	< 1°	± 3 %	< 10°	CAT IV / 600 V; IP 64
A 1503		s-Flex	fi 27 cm	60 A 600 A 6000 A	6 A 120 A 10 A 1200 A 100 A 12000 A	±1% ±1% ±1%	< 1°	± 3 %	< 10°	CAT IV / 600 V; IP 64
A 1281	B	Iron	5.2 cm	0.5 A 5 A 100 A 1000 A	50 mA 1 A 0.5 A 10 A 10 A 175 A 100 A 1200 A	± 0,5 % ± 0,5 % ± 0,5 % ± 1,2 %	< 0.5°	± 1.5 %	< 1.5°	CAT III / 600 V; IP 20
A 1227	0	Flex	fi 14 cm	30 A 300A 3000 A	3 A 60 A 10 A 600 A 60 A 6000 A	±1% ±1% ±1%	< 1°	± 3 %	< 10°	CAT IV / 600 V; IP 64
A 1445		Flex	fi 19 cm	30 A 300A 3000 A	3 A 60 A 10 A 600 A 60 A 6000 A	±1% ±1% ±1%	< 1°	± 3 %	< 10°	CAT IV / 600 V; IP 64
A 1446	0	Flex	fi 27 cm	60 A 600A 6000 A	6 A 120 A 20 A 1200 A 120 A 12000 A	± 1 % ± 1 % ± 1 %	< 1°	± 3 %	< 10°	CAT IV / 600 V; IP 64
A 1391 PQA		Iron	2.5 cm	40 A 300 A	2 A 40 A 20 A 300 A	± 3 % ± 3 %	< 3°	± 3 %	< 10°	CAT IV / 600 V; IP 64
A 1033	R	Iron	5.2 cm	1000 A 100 A	50 A 1200 A 5 A 200 A	± 2 % ± 3 %	< 2°	± 3.5 %	< 3°	CAT III / 600 V; IP 20
A 1588	0	Iron	40 mm	0.5A 5A 50A	50 mA 1.5 A 0.5 A 15 A 5 A 150 A	0.5 % 0.5 % 0.5 %	< 0.5 °	1.5 %	< 3 °	CAT II / 600 V; IP 40
A 1636	0	Iron	73mm		DC: 40 A 2000 A AC: 20 A 1000 A	2 % FS	< 3°	2 % FS-	< 6 °	CAT III / 600 V; IP 40
A 1122		Iron	1.5 cm	5 A 0.5 A	250 mA 10 A 25 mA 1 A	± 1 % ± 1 %	< 6°	± 3 %	< 6°	CAT III / 600 V; IP 20
A 1069		Iron	1.5 cm	100 A 10 A	5 A 200 A 500 mA 20 A	± 1 % ± 1 %	< 3°	± 3 %	< 2°	CAT III / 600 V; IP 20
A 1287		Flex	fi 14 cm	30 A 300 A 3000 A	3 A 60 A 10 A 600 A 60 A 6000 A	± 1 % ± 1 % ± 1 %	< 1°	± 3 %	< 10°	CAT IV / 600 V; IP 64
A 1037	9211 9211 9311 9311 8511	Iron	N/A	0.5 A 5 A	10 mA 1 A 0.5 A 10 A	±0,3 % ±0,3 %	< 0.5°	± 1 %	< 1.0°	CAT III / 600 V; IP 40

Ranges are specified for pure sine wave, reduced crest factor (< 1.5),

Power Quality Analysers MI 2892 Power Master



graphical colour display enabling the installation simply by connecting the for troubleshooting power quality

MEASURING FUNCTIONS

- Voltage: TRMS, peak, crest factor (4-channel):
- · Current: TRMS, peak, crest factor (4-channel);
- Power (active, reactive, apparent);
- · Power measurements fully compliant with IEEE 1459 (active, non active, fundamental, harmonic, load unbalance) and classic (vector or arithmetic) method;
- VFD (Variable Frequency Drives);
- · Unbalance, flicker measurement;
- Harmonic and interharmonic analysis up to 50th harmonics, THD measurement;
- Energy (active, reactive, generated, consumed):
- Capturing and recording of power supply events (shutdowns, interruptions, swells,
- · Inrush currents monitoring and recording;
- · Waveform/inrush displaying, snapshot and recording;
- Transients recording;
- Power quality analysis according to EN 50160, IEEE 519;
- Recording up to 7 adjustable alarms;
- · Temperature measurement;
- Power factor cos fi.

KEY FEATURES

- · 4-voltage channels with wide measurement range: 0 ... 1000 Vrms (CAT III / 1000 V);
- · 4-current channels with support for automatic clamp recognition and "on instrument" range selection;
- Automatic Smart Clamp detection and Smart Clamp range selection;
- Sampling frequency on transients recording 49 kSamples/sec;
- Compliance with power quality standard IEC 61000-4-30 Class A;
- · Complete power quality analysis according to EN 50160 including signalling and interharmonics;
- Support for microSD memory card (8-GB supplied with the instrument) up to 32GB;
- Color-coded input terminals and terminal labels to suit your application region;
- · Intuitive main menu and large icons that makes the equipment very easy to navigate and configure:
- · Current clamp auto range selection;
- Powerful PC SW PowerView3 enables downloading, view, analysis of recorded data and professional report creation;
- Flexible clamps (without additional power supply) are included in the Euro set;
- Remote communication via Ethernet (GPS clock synchronization - optional).

APPLICATION

- Energy consumption optimization;
- Power quality assessment and troubleshooting in low and middle voltage electrical systems;
- Checking power correction equipment performance;
- Long-term analysis;
- Predictive maintenance:
- · Verification of electrical system capacity before adding loads.

STANDARDS

Functionality

• EN 61010-1

Measurements:

- IEC/EN 61000-4-30, Class A:
- IEC/EN 61557-12:
- IEC/EN 61000-4-7, Class I;
- IEC/EN 61000-4-15;
- EN 50160;
- IEEE 1448;
- IEEE 1459:
- IEEE 519

Electromagnetic compatibility (EMC):

• EN 61326

4.8 Accessories 4.18 Metrel Catalogue 2018

TECHNICAL DATA

FUNCTION		
Voltage inputs	AC+DC	
Number of inputs	5	
Nominal voltage range (L - N)	Phase (L-N): 50 1000 Vrms / Line (L-L): 50 1	730 Vrms
Measuring range	10% 150% of nominal voltage	
Accuracy	IEC 61000-4-30 Class A, ±0.1% of nominal voltage	Je.
Sampling rate	7 kSamples per sec @ 50/60 Hz, sync with mains	
Samping rate	1.7 kSamples per sec @ VFD (5 Hz - 110 Hz)	
	12.2 kSamples per sec @ 400 Hz	
Mains frequency range	42,5 69,0 Hz ±10 mHz	
Manis frequency failise	5 110 Hz ± 10 mHz (VFD)	
	335,0 465,0 Hz ± 100 mHz	
Current inputs	AC+DC	
Number of inputs	4	
Measuring range (with A1227 flex clamps)	3 6000 Arms ±1.5% of m.v.	
Measuring range (with A1281 iron clamps)	50 m 1200 Arms ±0.5% of m.v.	
Functions	Measuring range	Accuracy
Power (P, Q, S, cos fi, PF)	Depends on voltage and selected clamps	IEC 61557-12 Class 1
Energy	Depends on voltage and selected clamps	Active: IEC 62053-21 Class 1
Ee. 51	Sepends on voltage and selected clamps	Reactive: IEC 62053-23 Class 2
Harmonics (DC 50th) @50/60 Hz	0 20% of nom. voltage	IEC 61000-4-7 Class 1
Harmonics (DC 13th) @400 Hz	5 25 % 61 Hollin Voltage	120 01000 17 01033 1
Harmonics (DC 20th) @VFD (5 - 16 Hz)		
Harmonics (DC 13th) @VFD (16 - 33 Hz)		
Harmonics (DC 5th) @VFD (33 - 110 Hz)		
Interharmonics (1 50th) @ 50/60 Hz	0 20% of nom. voltage	IEC 61000-4-7 Class 1
Internamionics (1 20th) @VFD (5 - 16 Hz)	o 20 % of florif. Voltage	IEC 01000-4-7 Class I
, , , , , , , , , , , , , , , , , , , ,		
Interharmonics (1 13th) @VFD (16 - 33 Hz)		
Interharmonics (1 5th) @VFD (33 - 110 Hz)	0.2 10	IEC C1000 4 15 Class E3
Mains signalling	0.2 10 0 15% of nom. voltage	IEC 61000-4-15 Class F3 IEC 61000-4-30 Class A
Unbalance	Voltage: 0 5%	IEC 61000-4-30 Class A
Olibalance	Current: 0 17%	
Temperature	-10 85 °C	±0.5 °C
Dips, Swell	10 150% of nom. voltage	±0.2 % of nominal voltage
Dips, Swell	10 130 % of florifi. Voltage	±1 cycle
Interrupts	0 10% of nom. voltage	±1 cycle
Recorders	o iii to to or rionii vortage	_ reyele
Memory	8GB microSD, up to 32GB supported	
General recorder	odb micross, up to seeb supported	
Integration period	1s 2h	
Recorded signals	> 1000 (voltages, currents, harmonics, power)	
Necoraca signais	Minimal, maximal and average value per interval	
	- Voltage events	
	- Custom alarms	
Duration	> 1 year (depends on size of SD card)	
Waveform recorder	> 1 year (depends on size or 55 card)	
Duration	Up to 20 seconds of voltage and current wavefor	m
Trigger	Manual, Voltage Events, Custom Alarms, voltage	
Transient recorder	, undar, voitage Events, edstorn Aranns, voitage	or carrent lever (illiabil)
Sampling rate	> 50ksamples/sec	
Duration	Up to 50 cycles of voltage and current waveform	
Trigger	Manual, voltage envelope or level	
General	Marida, voltage envelope of level	
Display	4.3 inch colour TFT (480 x 272)	
Communication	USB, Ethernet, RS-232	
Time synchronisation	GPS receiver (A 1355)	
,	, ,	sizo A A
Power supply	110 240 Vac or 6 x NiMh rechargeable batteries	o, SIZE AA
Overvoltage category	CAT IV / 600 V or CAT III / 1000 V	
Weight	0,96 kg	
Dimensions	230 x 140 x 80 mm	

STANDARD SET

MI 2892 Euro set

- Instrument Power Master
- 1-phase flexible current clamps 3000 / 300 / 30 A (A 1227), 4 pcs
- Test probe, (brown, black, grey, green, blue), 5 pcs
 Crocodile clip, (brown, black, grey, green, blue),
- 5 pcs
- Voltage measurement lead, (brown, black, grey, green, blue), 5 pcs
- Labels for color coding
- Temperature probe

- microSD memory card 8.0GB
- microSD card reader
- PC SW PowerView3
- RS232, USB and Ethernet patch cable
- Power supply adapter
- 1.2 V NiMH rechargeable battery, 6 pcs
- Soft carrying bag Instruction manual
- Calibration certificate

MI 2892 Standard set

• Without A 1227 1-phase flexible current clamps, 4 pcs



Power Quality Analysers MI 2885 Master Q4



the MI 2885 Master Q4 is an ideal troubleshooting tool. The recorders are designed to automatically record all important data and waveforms of voltage events like Dips and Swells. In addition the user can set 7 optional triggers for capturing waveforms of selected quantities. A large easy-to-read graphical colour display enabling the user to detect harmonics, phasors and waveforms anomalies in the installation simply by connecting the device. The handy Quick Set buttons makes the instrument more user friendly and are allowing faster data overview. The instrument is designed for a long term recording as well as for troubleshooting power quality problems in three-phase and single-phase power distribution systems. Advanced PC SW package PowerView3 enables detailed analysis of recorded data, direct reading from the microSD memory card, analysis of long term records and automatic creation of professional test report.

MEASURING FUNCTIONS

- Voltage: TRMS, peak, crest factor (4-channel);
- Current: TRMS, peak, crest factor (4-channel);
- Power (active, reactive, apparent);
- Power measurements fully compliant with IEEE 1459 (active, non active, fundamental, harmonic, load unbalance) and classic (vector or arithmetic) method;
- VFD (Variable Frequency Drives);
- Unbalance, flicker measurement;
- Harmonic and interharmonic analysis up to 50th harmonics, THD measurement;
- Energy (active, reactive, generated, consumed);
- Capturing and recording of power supply events (shutdowns, interruptions, swells, dips);
- Inrush currents monitoring and recording;
- Waveform/inrush displaying, snapshot and recording;
- Power quality analysis according to EN 50160, IEEE 519;;
- Recording up to 7 adjustable alarms;
- · Temperature measurement;
- Power factor cos fi.

KEY FEATURES

- 4-voltage channels with wide measurement range: 0 ... 1000 Vrms (CAT III / 1000 V);
- 4-current channels with support for automatic clamp recognition and "on instrument" range selection;
- Automatic Smart Clamp detection and Smart Clamp range selection;
- Compliance with power quality standard IEC 61000-4-30 Class S;
- Complete power quality analysis according to EN 50160 including signalling and interharmonics;
- Support for microSD memory card (8-GB supplied with the instrument) up to 32 GB;
- Color-coded input terminals and terminal labels to suit your application region;
- Intuitive main menu and large icons that makes the equipment very easy to navigate and configure;
- Current clamp auto range selection;
- Powerful PC SW PowerView3 enables downloading, view, analysis of recorded data and professional report creation;
- Flexible clamps (without additional power supply) are included in the Euro set;
- Remote communication via Ethernet (GPS clock synchronization - optional).

APPLICATION

- Energy consumption optimization;
- Power quality assessment and troubleshooting in low and middle voltage electrical systems;
- Checking power correction equipment performance;
- Long-term analysis;
- Predictive maintenance;
- Verification of electrical system capacity before adding loads.

STANDARDS

Functionality

• EN 61010-1

Measurements:

- IEC/EN 61000-4-30,Class S;
- IEC/EN 61557-12;
- IEC/EN 61000-4-7, Class I;
- IEC/EN 61000-4-15;
- EN 50160;
- IEEE 1448;
- IEEE 1459;IEEE 519
- .

Electromagnetic compatibility (EMC):

• EN 61326

4.10 Accessories 4.18 Metrel Catalogue 2018

TECHNICAL DATA

FUNCTION		
Voltage inputs	AC+DC	
Number of inputs	5	
Nominal voltage range (L – N)	Phase (L-N): 50 1000 VRMS	
3 3 . ,	Line (L-L): 50 1730 VRMS	
Measuring range	10% 150% of nominal voltage	
Accuracy	IEC 61000-4-30 Class S, ±0.5% of nominal voltage,	
,		
Sampling rate	7 kSamples per sec @ 50/60 Hz, sync with mains freq.	
NA ' - 6	1.7 kSamples per sec @ VFD (5 Hz - 110 Hz)	
Mains frequency range	42,5 69,0 Hz ±10 mHz	
	5 110 Hz ± 10 mHz (VFD)	
Current inputs	AC+DC	
Number of inputs	4	
Measuring range (with A1227 flex clamps)	3 6000 ARMS ±1.5% of m.v.	
Measuring range (with A1281 iron clamps)	50 m 1200 ARMS ±0.5% of m.v.	
Functions	Measuring range	Accuracy
Power (P, Q, S, cos fi, PF)	Depends on voltage and selected clamps	IEC 61557-12 Class 1
Energy	Depends on voltage and selected clamps	Active: IEC 62053-21 Class 1
- .		Reactive: IEC 62053-23 Class 2
Harmonics (DC 50th) @50/60 Hz	0 20% of nom. voltage	IEC 61000-4-7 Class 1
Harmonics (DC 20th) @VFD (5 - 16 Hz)	<u> </u>	
Harmonics (DC 13th) @VFD (16 - 33 Hz)		
Harmonics (DC 5th) @VFD (33 - 110 Hz)		
Interharmonics (1 50th) @ 50/60 Hz	0 20% of nom. voltage	IEC 61000-4-7 Class 1
	U 20% UI HUIH. VUILAGE	IEC 01000-4-7 Class I
Interharmonics (1 20th) @VFD (5 - 16 Hz)		
Interharmonics (1 13th) @VFD (16 - 33 Hz)		
Interharmonics (1 5th) @VFD (33 - 110 Hz)		
Flicker	0.2 10	IEC 61000-4-15 Class F3
Mains signalling	0 15% of nom. voltage	IEC 61000-4-30 Class S
Unbalance	Voltage: 0 5%	
	Current: 0 17%	
Temperature	-10 85 °C	±0.5 °C
Dips, Swell	10 150% of nom. voltage	±0.2 % of nominal voltage
		±1 cycle
Interrupts	0 10% of nom. voltage	±1 cycle
Recorders		
Memory	8GB microSD, up to 32GB supported	
General recorder	, , , , , , , , , , , , , , , , , , ,	
Integration period	1s 2h	
Recorded signals	> 1000 (voltages, currents, harmonics, power)	
	Minimal, maximal and average value per interval	
	- Voltage events	
	- Custom alarms	
Duration		
Duration Waveform recorder	> 1 year (depends on size of SD card)	
	11- t- 20df td	
Duration	Up to 20 seconds of voltage and current waveform	
Trigger	Manual, Voltage Events, Custom Alarms, Voltage or current level (inrush), Time interval	
General		
Display	4.3 inch color TFT (480 x 272)	
Communication	USB. Ethernet	
Time synchronisation	GPS receiver (A 1355)	
,	, ,	
Power supply	110 240 Vac or 6 x NiMh rechargable batteries, size AA	A
Overvoltage category	CAT IV / 600 V or CAT III / 1000 V	
Weight	0,96 kg	
Dimensions	230 x 140 x 80 mm	

STANDARD SET

MI 2885 Euro set

- Instrument Power Q4
- 1-phase flexible current clamps 3000 / 300 / 30 A (A 1227), 4 pcs
- Test probe, (brown, black, grey, green, blue), 5 pcs
- Crocodile clip, (brown, black, grey, green, blue), 5 pcs
 Voltage measurement lead, (brown, black, grey,
- green, blue), 5 pcs

 Labels for color coding
- microSD memory card 8.0GB

- microSD card reader
- PC SW PowerView3
- RS232, USB and Ethernet patch cable
- Power supply adapter
 1.2 V NiMH rechargeable battery, 6 pcs
- Soft carrying bag
- Instruction manual
- Calibration certificate

MI 2885 Standard set

• Without A 1227 1-phase flexible current clamps, 4 pcs



Power Quality Analysers MI 2883 Energy Master



hand-held three phase power quality analyser, specially designed for energy logging and subsequently efficiency calculation. Reducing energy use reduces energy costs and may result in a financial cost saving. Energy Master serves as a perfect tool for long term logging and later post processing of recorded data. Large easy-to-read graphical colour display enabling the user on site analysis and data checks. The handy Quick Set buttons makes the instrument more user friendly and are allowing faster data overview. Advanced PC SW package PowerView3 enables detailed analysis of recorded data, direct reading from the microSD memory card, analysis of long term records and automatic creation of professional test report.

MEASURING FUNCTIONS

- Voltage: TRMS, peak, crest factor (3-channel);
- Current: TRMS, peak, crest factor (4-channel);
- Power (active, reactive, apparent);
- Power measurements fully compliant with IEEE 1459 (active, non active, fundamental, harmonic, load unbalance) and classic (vector or arithmetic) method;
- Unbalance, flicker measurement;
- Harmonic and interharmonic analysis up to 50th harmonics, THD measurement;
- Energy (active, reactive, generated, consumed);
- Capturing and recording of power supply events (shutdowns, interruptions, swells, dips);
- Power quality analysis according to EN 50160;
- Recording up to 7 adjustable alarms;
- Temperature measurement:
- Power factor cos fi.

KEY FEATURES

- 3-voltage channels with wide measurement range: 0 ... 1000 Vrms (CAT III / 1000 V);
- 4-current channels with support for automatic clamp recognition and "on instrument" range selection;
- Automatic Smart Clamp detection and Smart Clamp range selection;
- Compliance with power quality standard IEC 61000-4-30 Class S;
- Complete power quality analysis according to EN 50160 including signalling and interharmonics;
- Support for microSD memory card (8-GB supplied with the instrument) up to 32GB:
- Color-coded input terminals and terminal labels to suit your application region;
- Intuitive main menu and large icons that makes the equipment very easy to navigate and configure;
- Current clamp auto range selection;
- Powerful PC SW PowerView3 enables downloading, view, analysis of recorded data and professional report creation;
- Flexible clamps (without additional power supply) are included in the Euro set.

APPLICATION

- · Energy consumption optimization;
- Checking power correction equipment performance;
- · Long-term analysis;
- Predictive maintenance;
- Verification of electrical system capacity before adding loads.

STANDARDS

Functionality

• EN 61010-1

Measurements:

- IEC/EN 61000-4-30,Class S;
- IEC/EN 61557-12;
- IEC/EN 61000-4-7, Class I;
- IEC/EN 61000-4-15;
- EN 50160;
- IEEE 1448;IEEE 1459;
- IEEE 519

Electromagnetic compatibility (EMC):

• EN 61326

4.12 Accessories 4.18 Metrel Catalogue 2018

TECHNICAL DATA

FUNCTION		
Voltage inputs	AC+DC	
Number of inputs	4	
Nominal voltage range (L – N)	Phase (L-N): 50 1000 VRMS	
	Line (L-L): 50 1730 VRMS	
Measuring range	10% 150% of nominal voltage	
Accuracy	IEC 61000-4-30 Class S, ±0.5% of nominal voltage	
Sampling rate	7 kSamples per sec @ 50/60 Hz, sync with mains f 42.5 69.0 Hz ±10 mHz	freq.
Mains frequency range		
Current inputs	AC+DC	
Number of inputs Measuring range (with A1227 flex clamps)	4 3 6000 ARMS ±2% of m.v.	
Measuring range (with A1281 iron clamps)	50 m 1200 ARMS ±2% of m.v.	
Functions	Measuring range	Accuracy
Power (P. O. S. cos fi, PF)	Depends on voltage and selected clamps	IEC 61557-12 Class 1
Energy	Depends on voltage and selected clamps	Active: IEC 62053-21 Class 1 Reactive: IEC 62053-23 Class 2
Harmonics (DC 50th)	0 20% of nom. voltage	IEC 61000-4-7 Class 1
Interharmonics (1 50th)	0 20% of nom. voltage	IEC 61000-4-7 Class 1
Flicker	0.2 10	IEC 61000-4-15 Class F3
Mains signalling	0 15% of nom. voltage	IEC 61000-4-30 Class S
Unbalance	Voltage: 0.5 5.0% Current: 0.0 20%	
Temperature	-10 85 °C	±0.5 °C
Dips, Swell	10 150% of nom. voltage	±0.2 % of nominal voltage
	0 100 5	±1 cycle
Interrupts	0 10% of nom. voltage	±1 cycle
Recorders Memory	8GB microSD, up to 32GB supported	
	odb Microso, up to szab supporteu	
General recorder Integration period	1s 2h	
Recorded signals	> 1000 (voltages, currents, harmonics, power)	
Necolded signals	Minimal, maximal and average value per interval	
	- Voltage events	
	- Custom alarms	
Duration	> 1 year (depends on size of SD card)	
General		
Display	4.3 inch color TFT (480 x 272)	
Communication	USB	
Power supply	110 240 Vac or 6 x NiMh rechargable batteries, s	ize AA
Overvoltage category	CAT IV / 600 V or CAT III / 1000 V	
Weight	1 kg	
Dimensions	230 x 140 x 80 mm	

STANDARD SET

MI 2883 Euro set

- Instrument Energy Master
 1-phase flexible current clamps 3000 / 300 / 30 A (A 1227), 3 pcs
- Test probe, (brown, black, grey, blue), 4 pcs
- Crocodile clip, (brown, black, grey, blue), 4 pcs

 Voltage measurement lead, (brown, black, grey, blue), 4 pcs

 Library of the control of th
- Labels for color coding
- microSD memory card 8.0GB

- microSD card reader
- PC SW PowerView3
- USB cable
- Power supply adapter
 1.2 V NiMH rechargeable battery, 6 pcs
- Soft carrying bag
- · Instruction manual
- Calibration certificate

MI 2883 Standard set

• Without A 1227 1-phase flexible current clamps, 3 pcs



Power Quality Analysers

A 1500 / A 1565 / A 1577 Professional protective waterproof case



Extreme atmospheric conditions can wreak havoc on even the sturdiest of instruments, especially if left unprotected for some time. Still, many testing and measuring situations take place in outdoor environments, where there could be few appropriate shelters or the measured application itself is exposed to the weather. Power quality analysis or more specifically long-term recording of power parameters is one such example as it is performed over a longer period of time and often in more demanding environments. For such situations and for our line power quality analysers, we have developed the A 1565 Waterproof case for outdoor application and recordings (pylons, switchyards).

The A 1565 case, made from high-impact plastic, boasts an IP 65 level of protection and a lock to discourage potential theft. The inside is covered in soft, pliant foam with cut-out compartments for the PQA instrument, A 1479 Wide range power supply, A 1622 3G/Wi-Fi router and an A 1355 GPS receiver. To facilitate even greater level of protection, the connection leads, including current clamps, for the instrument are integrated into the case itself and extend to the lid mounted bag with enough additional room for current clamps and other miscellaneous accessories. For installation of pylons, the case has two suspension rings on the back, through which lanyards can be threaded. We also recognized the need of some of our users for a hard, more resistant case for carrying their PQA instrument and accessories when they travel to and between testing locations. The A 1500 Professional protective waterproof case is the answer as it as sturdy as the A 1565, but without the integrated test leads, the lock and suspension rings and with more room for accessories. In every other respect it is identical to aforementioned case and offers unprecedented protection against the elements and rough use. The

A 1577 Professional protective waterproof case has high IP67 rating and much more available and organized space for additional accessories, but with same robustness as A 1500 or A 1565. A 1577 case is equipped with a telescopic handle and smooth-running

wheels for easiest transport and offers excellent mobile protection for all of your equipment. Case is without the integrated test leads, the lock and suspension rings and offers unprecedented protection against the elements and rough use.



Outdoor pylon installation.



4.14 Accessories 4.18 Metrel Catalogue 2018

TECHNICAL DATA

0 x 430 x 265 mm
J X 430 X 203 IIIIII
3 Kg
T IV / 600 V or CAT III / 1000 V
67
) 80°C
lypropylene (PP)

APPLICATION

A 1577 Professional protective waterproof case is designed for storing and suitable for easy transfer of PQA instrument and all accessories needed on the testing field, like:

- A 1479 wide range power supply
- A 1622 3G/Wi-Fi router
- A 1355 GPS receiver
- Optional flexible or iron current clamps
- · Additional batteries, test voltage leads, crocodiles, test probes, storage devices, card reader, SD memory card
- · All optional accessories including optional current clamps







A 1577 Professional protective waterproof carrying case, rated as an IP67, made from high-impact plastic. It has an automatic pressure equalization valve to insure easy opening after altitude or temperature changes. Tough, yet lightweight, and entirely waterproof, this hard protective carrying case offer premium protection of Power Quality instruments.

A 1565 Waterproof case for outdoor application and recordings (pylons, switchyards), enabling installation of:

- PQA instrument
- A 1479 Wide range power supply
- A 1622 3G/Wi-Fi router
- A 1355 GPS receiver
- A 1227 Flexible current clamps







A 1565 Waterproof, portable case, rated as an IP 65, for outdoor application of PQ instruments. This portable lockable case is intended to be used in combination with PQA instruments. It is designed to be used with wide range power supply A 1479, 3G/WiFi-Router A 1622 and a GPS receiver A 1355. The case includes standard voltage measurement cables for all voltage connections and 4 current probe adapter current clamps, A 1227.

PC SOFTWARE PowerView3



PowerView3 software is a powerful platform for downloading, analysing recorded data and creation of power quality test reports. PC Software contains a package of functionalities needed for profound evaluation of power quality phenomena, data comparison and creation of complex test reports. It works in conjunction with Metrel new generation power quality analysers. For the instruments equipped with GPRS functionality PowerView3 enables remote control of the instrument as well.

KEY FEATURES

- User friendly interface: wide range of quick buttons, possibility to customize the environment by dragging, docking and resizing the window tabs.
- **Structure:** downloaded data is organized into Windows Explorer-like tree structure.
- "Drag and drop": downloaded data can be easily organized into multiple sites and sub-site locations.
- **Data filtering:** data in a structure can be grouped by quantity or by phase.
- Views: depending on selected record type, different views are available (Record Information view, Trend Chart view, Table view, Waveform Scope view, Voltage Quality view, etc.)
- EN 50160 analysis: automatic voltage quality analysis in compliance with custom or predefined EN 50160 Power Quality criteria and quick report printing.

- Chart zoom: chart can be zoomed depending on selected in a table value range.
- Remore control: via GPRS communication remote handling of the instrument and its data can be executed.
- GPS synchronization: simultaneous measurement on the different network points by using 2 or more synchronized instruments.
- On-line monitoring: when instrument is connected with PC, real-time observing of signals and parameters is possible via PowerView3 while instrument is measuring / recording in the background.
- Export of test results: test results can be filtered and exported to other programs (MS Excel, MS Word, CSV, TXT).
- Reports: automatic generation of test reports from the selected views and data with attached graphs according specific standards/national specification, like:

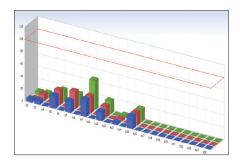
- IEEE 519, GOST 32144/33073, Energy report, Energy demand report
- **SW update:** PowerView3 checks for new versions of the application and downloads updates from the Internet if necessary.

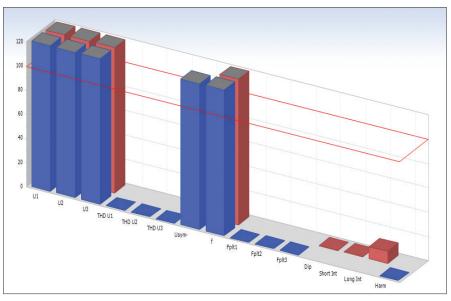
PC SW PowerView3 is compatible with:

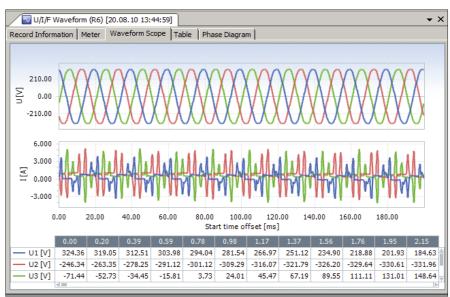
- MI 2892 Power Master
- MI 2885 Master Q4
- MI 2883 Energy Master

4.16 Accessories 4.18 Metrel Catalogue 2018

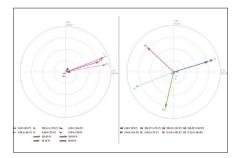
Logged data can be analysed according to custom or predefined EN 50160 Power Quality criteria



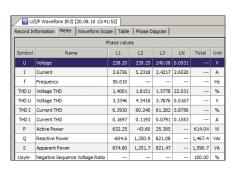


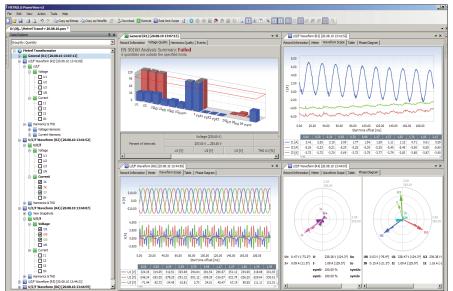


Results can be represented in both trend and table view simultaneously for easier analysis



Selected data can be organized into multiple tabs for easier interpretation





Selection Guide for PQA Accessories

Photo	Part number	Description	Target application	MI 2892	MI 2885	MI 2883
	A 1501	1-phase mini flexible current clamp 3000/300/30 A / 1V	Single phase flexible current clamp with three selectable measuring ranges (25 cm loop). Does not require external power supply as it is powered by the measuring instrument.	•	•	•
	A 1502	1-phase mini flexible current clamp 3000/300/30 A / 1V	Single phase flexible current clamp with three selectable measuring ranges (48 cm loop). Does not require external power supply as it is powered by the measuring instrument.	٠	•	•
and Control of the Co	A 1503	1-phase mini flexible current clamp 6000/600/60 A / 1V	Single phase flexible current clamp with three selectable measuring ranges (90 cm loop). Does not require external power supply as it is powered by the measuring instrument.	•	•	•
	A 1391 PQA	Current clamp 40/300 A / 1 V	AC + DC current clamp 40/300 A / 1 V with jaw opening 25 mm for power measurements. Battery Life, 66 hours typical (Alkaline).	•	٠	•
	A 1033	Current clamp 1000 A / 1 V	High accuracy current clamp 1000 A / 1 V with jaw opening 52 mm and fixed 1.5 m cable for power measurements with Metrel power quality analysers.	•	•	•
	A 1281	Current clamp 0,5/5/100/1000 A /1V	Four ranges current clamp for measuring alternating currents in low and medium power installations. Current clamp is automatically recognized by the instrument. Clamp does not require external power supply as it is powered by the instrument.	•	•	
	A 1588	Current clamp 0.5/5/50 A	High accuracy current clamp 0.5/5/50 A for precise current and power measurements including leakage current measurement	•	•	
P	A 1636	Current clamp: DC 2000 A ; AC: 1000 A	"DC current clamp 2000 A ; AC current clamp 1000 A with jaw opening 73 mm (fi 68 mm) for power measurements (photo voltaic) Battery operated (9V)"	•	•	
	A 1069	Mini current clamp 100 A / 1 V	Mini current clamp 100 A / 1 V with jaw opening 15 mm for power measurements. Requires A 1561 connection cable.	•	•	•
	A 1122	Mini current clamp 5 A / 1 V	Mini current clamp 5 A / 1 V with jaw opening 15 mm for power measurements. Requires A 1561 connection cable.	•	٠	•
	A 1561	Connection cable for current clamp	Connection cable for connecting current clamps A 1069 and A 1122, on Metrel power quality analysers.	•	•	•

• Option

4.18 Accessories 4.18 Metrel Catalogue 2018

Photo	Part numb	perDescription	Target application	MI 2892	MI 2885	MI 2883
	A 1227	1-phase flexible current clamp 3000/300/30 A / 1 V	Single phase flexible current clamp with three selectable measuring ranges. Current clamp is automatically recognized by the instrument. Clamp does not require external power supply as it is powered by the measuring instrument.	•	•	•
0	A 1445	1-phase flexible current clamp 3000/300/30 A / 1 V	Single phase flexible current clamp with three selectable measuring ranges. Current clamp is automatically recognized by the instrument. Clamp does not require external power supply as it is powered by the measuring instrument.	•	•	•
0,	A 1446	1-phase flexible current clamp 6000/600/60 A / 1 V	Single phase flexible current clamp with three selectable measuring ranges. Current clamp is automatically recognized by the instrument. Clamp does not require external power supply as it is powered by the measuring instrument.	•	•	•
	A 1287	1-phase flexible current clamp 3000/300/30 A / 1 V	Single phase flexible current clamp with three selectable measuring ranges. Powered by alkaline or rechargeable batteries.	•	•	•
On the second se	A 1037	Current transformer 5 A / 1 V	3-phase transformer for power measurements on distribution panels with 5 A nominal output current.	•	•	•
	A 1354	Temperature probe	Temperature probe can be used for monitoring and recording of temperature trend at measuring objects, such as capacitors, motors, transformers, etc.	•	•	•
	A 1479	Wide range power supply	Wide range power supply (Unom: 85V \div 650 Vac / 920 Vdc) provide power supply directly from voltage measuring terminals. Applicable when standard electrical sockets are not available on measurement site.	•	•	•
	A 1355	GPS receiver	The PQA instrument, current clamps, wide range power supply, 3G/WiFi-Router and GPS are not included in the set.	•	•	
	A 1622	3G / Wi-Fi Router	3G and Wi-Fi Router enables remote handling of the measuring instrument and its data. If the measuring instrument has to be located on distant or hardly accessible place, the 3G and Wi-Fi Router is the only practical solution for fast access to the instrument.	•	•	
>	A 1198	Magnetic contact probe	Test probe with magnetic contact provides reliable contact with metal surface during the measurement.	•	•	•
-	A 1014	Test probe, black	Test probe with fi 4 mm connection is suitable for performing measurements both in mains outlets and in situations when no schuko outlet is present.	•	•	•

[•] Option

Photo	Part numb	perDescription	Target application	MI 2892	MI 2885	MI 2883
	A 1015	Test probe, blue	Test probe with fi 4 mm connection is suitable for performing measurements both in mains outlets and in situations when no schuko outlet is present.	•	•	٠
-	A 1016	Test probe, red	Test probe with fi 4 mm connection is suitable for performing measurements both in mains outlets and in situations when no schuko outlet is present.	•	٠	٠
	A 1062	Test probe, green	Test probe with fi 4 mm connection is suitable for performing measurements both in mains outlets and in situations when no schuko outlet is present.	•	•	•
*	A 1013	Crocodile clip, black	Crocodile clip assures secure and permanent contact during the measurement on bus bars, fixing screws, etc.	•	•	•
***	A 1310	Crocodile clip, blue	Crocodile clip assures secure and permanent contact during the measurement on bus bars, fixing screws, etc.	•	•	•
*	A 1064	Crocodile clip, red	Crocodile clip assures secure and permanent contact during the measurement on bus bars, fixing screws, etc.	•	•	•
***	A 1309	Crocodile clip, green	Crocodile clip assures secure and permanent contact during the measurement on bus bars, fixing screws, etc.	•	•	•
	S 2014	Safety fuse adapter, 3 pcs	Fuse adapters protect the instrument and the user against current strike and overload.	•	•	•
	S 2015	Safety flat clamp, 4 pcs	Safety flat clamps assure good contact when connecting the test leads on busbars and other larger flat surfaces.	•	•	•
President of the Control of the Cont	A 1458	microSD card reader	Move data between your computer and memory card with memory card reader.	•	•	•
Эмене 1-5-1	S 2072	USB storage device (for backup of data)	USB stick enables you to backup your data to a USB drive. This is a practical backup solution as it allows you to store recorded data files to external device, offering increased portability.	•	•	•

• Option

4.20 Accessories 4.18 Metrel Catalogue 2018

Photo	Part numb	perDescription	Target application	MI 2892	MI 2885	MI 2883
	S 2086	4 x Mini current clamp A 1069, 100 A / 1 V	Mini current clamp 100 A / 1 V with jaw opening 15 mm for power measurements, including A 1561 connection cables.	•	•	
	S 2089	3 x Mini current clamp A 1069, 100 A / 1 V	Mini current clamp 100 A / 1 V with jaw opening 15 mm for power measurements, including A 1561 connection cables.			•
	S 2087	1 x Mini current clamp A 1069, 100 A / 1 V	Mini current clamp 100 A / 1 V with jaw opening 15 mm for power measurements, including A 1561 connection cable.	•	•	•
	S 2082	3 x Mini current clamp A 1122, 5 A / 1 V	Mini current clamp 5 A / 1 V with jaw opening 15 mm for power measurements, including A 1561 connection cables.			•
	S 2083	4 x Mini current clamp A 1122, 5 A / 1 V	Mini current clamp 5 A / 1 V with jaw opening 15 mm for power measurements, including A 1561 connection cables.	•	•	
	S 2088	1 x Mini current clamp A 1122, 5 A / 1 V	Mini current clamp 5 A / 1 V with jaw opening 15 mm for power measurements, including A 1561 connection cable.	•	•	•
	S 2094	4 pcs A 1501, 1-phase flexible current clamp 3000/300/30 A / 1 V	Set of 4 - single phase flexible current clamp with three selectable measuring ranges. Current clamp is automatically recognized by the instrument. Clamp does not require external power supply as it is powered by the measuring instrument.	•	•	
	S 2095	3 pcs A 1501, 1-phase flexible current clamp 3000/300/30 A / 1 V	Set of 3 - single phase flexible current clamp with three selectable measuring ranges. Current clamp is automatically recognized by the instrument. Clamp does not require external power supply as it is powered by the measuring instrument.			•
0000	S 2096	4 pcs A 1502, 1-phase flexible current clamp 3000/300/30 A / 1 V	Set of 4 - single phase flexible current clamp with three selectable measuring ranges. Current clamp is automatically recognized by the instrument. Clamp does not require external power supply as it is powered by the measuring instrument.	•	•	
	S 2097	3 pcs A 1502, 1-phase flexible current clamp 3000/300/30 A / 1 V	Set of 3 - single phase flexible current clamp with three selectable measuring ranges. Current clamp is automatically recognized by the instrument. Clamp does not require external power supply as it is powered by the measuring instrument.	•	٠	
	S 2098	4pcs A 1503, 1-phase flexible current clamp 6000/600/60 A / 1 V	Set of 4 - single phase flexible current clamp with three selectable measuring ranges. Current clamp is automatically recognized by the instrument. Clamp does not require external power supply as it is powered by the measuring instrument.	•	•	

[•] Option

Photo	Part numb	er Description	Target application	MI 2892	MI 2885	MI 2883
0000	S 2099	3pcs A 1503, 1-phase flexible current clamp 6000/600/60 A / 1 V	Set of 3 - single phase flexible current clamp with three selectable measuring ranges. Current clamp is automatically recognized by the instrument. Clamp does not require external power supply as it is powered by the measuring instrument.			•
	A 1459	Set of measuring leads, 5 x 2m	High quality measuring leads for use up to CAT III / 1000 V.	•	•	
BBBBB	A 1512	Set of measuring leads, 4 x 2m	High quality measuring leads for use up to CAT III / 1000 V.			•
	A 1020	Small soft carrying bag	Small soft carrying bag for transport and storage of test instrument or accessories.	•	•	•
(7 MINL	A 1006	Soft carrying bag	Large soft carrying bag for transport and storage of test instrument and belonging accessories.	•	•	•
филь	A 1500	Professional protective waterproof case	Professional protective waterproof carrying case, made from high-impact plastic. It also has an automatic pressure equalization valve to insure easy opening after altitude or temperature changes. Tough, yet lightweight, and entirely waterproof, this hard protective carrying case offer premium protection of Power Quality instruments.	•	•	•
ў менн.	A 1565	Waterproof case for outdoor application and recordings (pylons, switchyards)	Waterproof, portable case, rated as an IP 65, for outdoor application of PQ instruments. This portable lockable case is intended to be used in combination with PQA instruments. It is designed to be used with wide range power supply A 1479, 3G/WiFi-Router A 1622 and a GPS receiver A 1355. The case includes standard voltage measurement cables for all voltage connections and 4 current clamps, A 1227.	•	•	•
	A 1577	Professional protective waterproof case with a telescopic handle and smooth- running wheels	Professional protective waterproof carrying case with telescopic handle and smooth-running wheels, made from high-impact plastic intended for easiest transportation to testing place. Huge volume enables storage of all needed accessories. It also has an automatic pressure equalization valve to insure easy opening after altitude or temperature changes.	•	•	•
	A 1160	Fast charger for 8 AA batteries with a set of 6 NiMH bat., type AA	Fast battery charger for up to 8 pieces of AA rechargeable batteries, and a set of 6 pcs NiMH rechargeable batteries, type AA.	•	٠	•
11.11	A 1169	Fast charger for AA, C, D and 9 V block batteries	Fast battery charger for up to 12 pcs AA, 6 pcs C or D rechargeable batteries, 4 pcs 9 V block batteries.	•	٠	•

• Option

4.22 Accessories 4.18 Metrel Catalogue 2018

Content

Equipment for laboratories and Schools

Electrical Installation Safety High Voltage Diagnostics Appliance / Machine / Switchboard Safety Power Quality Analysis EQUIPMENT FOR LABORATORIES AND SCHOOLS Digital Multimeters / Clamp Meters / Voltage and Continuity Testers	1.1 - 1.60 2.1 - 2.40 3.1 - 3.42 4.1 - 4.22 5.1 - 5.12 6.1 - 6.34
DEMONSTRATION BOARD ML 2000 Flortying Sefety and Quality Application Trainer	7.1 - 7.05
MI 3399 Electrical Safety and Quality Application Trainer MI 3088 PV Demonstration Board	5.02 5.04
MA 2067 Demonstration Board	5.05
MI 3099 Demonstration Board	5.06
MI 2166 Demonstration Board MI 3300 Portable Appliance Simulation Board	5.07 5.08
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Demonstration boards

MI 3399 Electrical Safety & Quality Application Trainer



The MI 3399 Electrical Safety & Quality Application Trainer is a 3D simulator of real-life safety and quality situation's with many adjustable risks and errors. The model is designed as a stand-alone unit for demonstrations, trainings and educational purposes. The MI 3399 is ideally suited for training and education of larger groups of people as well as for independent practice. Due to various integrated electrical elements the model enables complete testing and troubleshooting of power quality analysis as well as LV electrical installations, lightning systems, earthing systems, PV systems, appliances, equipment, machines or switchboards by using modern methods, testing procedures and instruments.

KEY FEATURES

- · Insulation resistance;
- Continuity of PE conductors;
- Line impedance;
- · Loop impedance;
- RCD testing (Contact voltage, trip-out tome, trip-out current, Autotest);
- IMD, ELM, RCM leakage and insulation monitors adjustment and test;
- Earth resistance (4-wire, 3-wire, 2-wire, two current clamps);
- Specific earth resistance;
- Lightning protection loops and legs resistance;
- · Surge protector test;
- · Leakage current;
- Phase rotation;
- Voltage;
- · Frequency;
- AUTO SEQUENCE [®] procedure for TN, TT or IT earthing system;
- · Power quality.

More than 65 different measurements and testing methods could be demonstrated all in accordance to IEC 61557 and IEC 60364-6. The most significant elements are integrated: RCDs of different types, Fuses, PE equalization bars, 1-phase and 3-phase sockets, various grounding systems (TT,

TN, IT), Surge protector, IMD insulation monitor and more.

APPLICATION

- Trainings and seminars for gaining theoretical knowledge and for performing practical exercises;
- For conducting exams when upgrading the professional's competence level;
- Educational and practical training of electrical contractors about safety procedures, measuring methods and knowledge;
- Demonstration on how to use different measurement instruments and testers.

MODULES AND COURSES

- LV Electrical Installation Safety Trainer Module;
- TN / TT / IT Earthing Systems Trainer Module;
- Lightning Protection Trainer, Surge Protection Trainer Module;
- Special Installations and Locations Safety Trainer Module;
- Vehicles and Mobile Units Safety Trainer Module.

Additionally there are several optional modules available:

- Power and Voltage Quality Trainer Module;
- Appliances and Machines Safety Trainer Module:
- Photovoltaic Systems Trainer Module.

All modules are supported with Handbooks, Posters, Charts, Presentations, Exercises, Catalogue of Knowledge and Catalogue of Exams. Approved certificates may be issued when localizing modules to meet the required country's regulation.

More than 30 different errors can be simulated all of which enable the trainee to practice analysis and troubleshooting procedures.

STANDARDS

Functionality

• IEC 61557

Safety

• IEC 60364-6

5. 2 Metrel Catalogue 2018

MI 3399 APPLICATION TRAINER SET MODULES

AD1 MI 3399 - EIS ELECTRICAL INSTALLATION SAFETY TRAINER

Module includes the following equipment:

- MI 3152 ST Eurotest XC Multifunctional Installation Tester
- MI 3110 EurotestIM Special Installation Tester
- MI 3242 MicroOhm 2A-Earth Bonding 4-wire
- MI 3121H 2,5 kV HV Insulation Analyser
- MI 3123 Smartec Earth/Clamp Tester
- MI 2014 Cable Scanner LAN Cable Tester
- MD 9272 Leakage Clamp TRMS with Power & Harmonics
- A 1018 Current Clamp (low range, leakage)
- A 1019 Current Clamp

- S 2009 Test lead set, 2m, 4pcs
- 25 pcs Guide for testing and verification of low voltage installations
- 25 pcs Guide for measurements on IT power installation
- 25 pcs Chart Verification on Low-voltage electrical installations
- Poster Verification on Low-voltage electrical installations
- Poster Medical Sites





AD2 MI 3399 - PQA POWER AND VOLTAGE **OUALITY TRAINER**

Module includes the following equipment:

- MI 2892 Power Master Power Quality Analyser
- 25 pcs Guide for modern Power Quality Analysing Techniques
- 25 pcs Chart Power Quality Analysing and troubleshooting procedures



AD3 MI 3399 - GT APPLIANCES & MACHINES SAFETY TRAINER

Module includes the following equipment:

- MI 3309 BT DeltaGT
- A 1488 BT Label Printer Able (with battery charger and one role of labels)
- 25 pcs Guide for verification of electrical safety of machines
- · 25 pcs Guide for Electrical Equipment Testing
- 25 pcs Chart Testing and verification of Electrical Equipment
- · 25 pcs Poster Portable appliances and electrical equipment testing



Picture of AD3 MI 3399

AD4 MI 3399 - PV PHOTOVOLTAIC SYSTEMS TRAINER

Module includes the following equipment:

- MI 3109 PS EurotestPV Pro Set
- 25 pcs Guide for measurements on PV systems



Demonstration boards MI 3088 PV Demonstration Board



Demonstration board MI 3088 simulates typical photovoltaic (PV) system with one PV module and DC/AC inverter. It represents a typical installation that consist of PV string, DC switch box, DC/AC inverter and one phase connection to the power grid. It is intended for use preferably by sales personnel for demonstration of the measuring methods and procedures on DC and partially on AC side of a PV system.

KEY FEATURES

- With this demo board all electrical tests according to EN 625446 can be demonstrated: continuity, isolation, open circuit voltage Uoc, short circuit current lsc and polarity.
- It simulates an I/V characteristic of a PV module/string.
- Simulated output of the irradiance and temperature sensor.
- Simulation of a DC/AC inverter with one DC input and single phase output.

APPLICATION

- Presentation of testing of a PV system;
- Demonstration of PV test equipment by sales personnel.

STANDARDS

Functionality

• EN 62446

Electromagnetic compatibility

• IEC/EN 61326

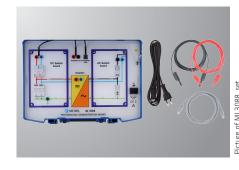
Safety

• EN 61010 -1

STANDARD SET

MI 3088

- Demonstration board
- Mains cable
- PS2 male / male adapter
- Test lead 1.5 m, black
- Test lead 1.5 m, red
- User manual

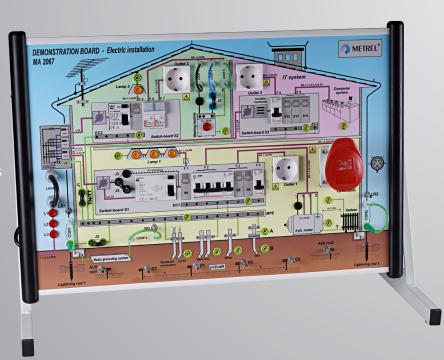


TECHNICAL DATA

Power supply	115 V/ 230 V, 50 Hz / 60 Hz
Overvoltage category	CAT II / 300 V
Dimensions	450 × 330 × 110 mm
Weight	12.5 kg

5.4 Metrel Catalogue 2018

Demonstration boards MA 2067 Demonstration Board



KEY FEATURES

- 65 different measurements in accordance to EN 61557 are possible (insulation resistance, continuity of PE conductors, earth resistance, specific earth resistance, line and loop impedance, phase rotation, leakage current, RCD testing, voltage and frequency).
- 19 different errors can be selected on a lockable distributor.
- Different types of RCD are integrated for measurement of trip-out time, trip-out current and contact voltage
- Simulation of TT, TN and IT earth systems.
- Possibility of connection to single phase or 3-phase supply system.
- · Booklet with theory and exercises for schools and training centres is included in a standard set.

APPLICATION

- Education of students of electro technical specialities:
- · Education and practical training of electrical contractors about measurements on low voltage electro installations;
- Demonstration on how to use different measurement instruments by sales personnel.

STANDARDS

Electromagnetic compatibility

• IEC/EN 61326

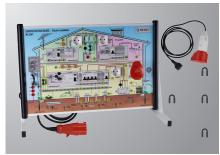
Safety

• IEC/EN 61010 -1;

STANDARD SET

MA 2067

- · Demonstration board
- Jumper, 4 pcs
- Board support for vertical use
- Three phase to one phase adapter
- 1-phase mains cable
- · Instruction manual
- · Booklet with exercises
- · Calibration certificate



Picture of MA 2067 set

TECHNICAL DATA

Power supply	230 V / 400 V, 50 Hz	
Dimensions	680 x 450 mm (w x h)	
Weight	12.5 kg	

Demonstration boards MI 3099 Demonstration Board



simulates typical electrical installation usually met in individual houses or apartments with important elements on switchboard and on circuit site. Demonstration board is intended for use preferably by sales personnel when demonstrating operation of electrical installation test equipment, especially the new Metrel's electrically installations safety testers with built-in AUTOSEQUENCE procedure.

KEY FEATURES

- The board contains real elements of electrical installation like RCD, mains switch, automatic fuses, switches, lamps, 1-phase and 3-phase mains test outlet, N and PE collector.
- All standardised testing methods can be presented.
- TN or TT system with or without RCD can be simulated.
- Possibility of connection to single phase or 3-phase supply system.
- Various Autosequence test procedures are supported for demonstration of testing safety by new EurotestAT and EurotestXA.
- Demonstration board is put in the strong rugged case with a handle for comfortable carrying.

APPLICATION

- Presentation of complete testing of any electrical installation;
- Demonstration of electrical installation test equipment operation by sales personnel.

STANDARDS

Functionality

• EN 62446

Electromagnetic compatibility

• IEC/EN 61326

Safety

• EN 61010 -1

STANDARD SET

MI 3099

- Demonstration board
- Jumper
- Special probe, 3 pcs
- · Mains cable
- Three phase to one phase adapter
- Instruction manual
- · Calibration certificate



TECHNICAL DATA

Power supply	230 V / 400 V, 50 Hz	
Overvoltage category	CAT II / 300 V	
Dimensions	480 × 387 × 136 mm	
Weight	5 kg	

5.6 Metrel Catalogue 2018

Demonstration boards MI 2166 Demonstration Board

board is to be used preferably by sales personnel when demonstrating



KEY FEATURES

- A number of different measurements in accordance to EN 61557 are possible (insulation resistance, continuity of PE conductors, earth resistance (four-lead and two clamp methods), specific earth resistance, line and loop impedance, phase rotation, load current, RCD testing, contact voltage, etc.).
- Real elements of electrical installation are placed on the front panel like RCD, ON/OFF switch with lamp, mains test outlet and connection terminals.
- All standardised testing methods can be presented.
- 5 different errors can be pre-set by »fault« switches.
- TN or TT system can be simulated.
- Demonstration board is put in the strong rugged case with a handle for comfortable carrying.

APPLICATION

- Presentation of complete testing of any electrical installation;
- Demonstration of electrical installation test equipment operation by sales personnel.

STANDARDS

Electromagnetic compatibility

• IEC/EN 61326

Safety

• IEC/EN 61010 -1;

STANDARD SET

MI 2166

- · Demonstration board
- Jumper, 2 pcs
- · Mains cable
- Instruction manual
- · Calibration certificate



TECHNICAL DATA

Power supply	230 V, 50 Hz	
Dimensions	450 × 330 × 110 mm	
Weight	3.56 kg	

Demonstration board

MI 3300 Portable Appliance Simulation Board



excellent instrument for teaching or demonstrating GT testing. The MI 3300 simulates a wide variety of portable equipment in normal operation or in fault conditions with the simple flick of a switch. The strong rugged portable case with detachable lid allows the unit to be easily moved between sites. The ability of the unit to simulate unlimited number of different equipment and the possibility to set fault conditions make the GT Demoboard the ideal unit for teaching or assessing learning in classrooms, training sessions, demonstration sessions, seminars and on GT training courses.

KEY FEATURES

TECHNICAL DATA

- Practically unlimited number of different equipment (portable appliances, machines and switchgears) can be simulated by using different tables (eight are included in a standard set).
- On demand the demonstration board can be simply upgraded with new tables.
- Normal and fault situations can be switched on and off, offering fault conditions for the assessment of learning.
- Demoboard simulates the following faults: PE continuity faults, insulation

- resistance faults, leakage and touch leakage faults, polarity and functional faults.
- The demonstration board is built into a strong rugged case with a handle and detachable lid for storing leads, adapters and manuals.

APPLICATION

- Presentation of complete safety testing of any portable appliance, machine or switchgear;
- Demonstration of PAT test equipment operation by sales personnel.

STANDARDS

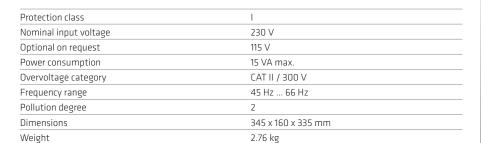
Safety

• EN 61010-1

STANDARD SET

MI 3300

- Instrument GT Demoboard
- 8 demonstration tables (iron, receiver, IEC cord, extension drum, coffee machine, washing machine, switchgear)
- Jumper
- IEC cord
- Mains cable
- Class I mains cable
- Class II mains cable
- Test cable for discharge time testingCarrying bag for demonstration tables
- Handbook "Electrical Equipment Testing" on storage media
- Instruction manual
- Calibration certificate





ure of MI 3300 set

5.8 Metrel Catalogue 2018

Demonstration board MI 3299 HV demo BOX

The MI 3299 High voltage
Demonstration Box 10 kV has
been developed for demonstration
purposes at high voltage insulation
diagnostics. It simulates typical
electrical insulation usually met
in the industrial environment. It is
equipped with high quality resistors
in different ranges, high voltage
capacitors and a discharge facility to
simulate a breakdown phenomenon
in gases. Additionally measurements
of polarization index (PI), dielectric
discharge (DD) and dielectric
absorption ratio (DAR) can be
demonstrated. Packed with all these
features the demonstration box is
also well suited for basic calibration
of DC high voltage insulation
resistance measuring instruments.



KEY FEATURES

- 10 kV rated resistors with very low voltage coefficient.
- Resistive decade with 200 k Ω , 500 M Ω , 200 G Ω and 2 T Ω resistors.
- HV capacitors in 2.5 μF and 5 nF range.
- Built-in spark gap and gas discharge tube.
- Demonstration of insulation breakdown in gases is possible.
- Two models of insulation material (good and bad cables) enable the demonstration of real insulation behaviour under high DC voltage.
- Demonstration box is put in the strong rugged case with handle for comfortable carrying.

APPLICATION

- Demonstration of insulation diagnostics measurement with DC test voltage;
- Demonstration of functionality of HV insulation measuring instruments;
- Training centres, schools, laboratories;
- Basic calibration of DC high voltage insulation testers.

STANDARDS

Safety

• EN 61010 -1

STANDARD SET

MI 3299

- HV demo BOX 10 kV
- HV test leads, 2 pcs
- Instruction manual
- · Handbook on storage media
- Calibration certificate



Picture of MI 3.

TECHNICAL DATA

Dimensions	440 × 320 × 110 mm	
Weight	4 kg	

Demonstration Board MI 2891 Power Simulator



The MI 2891 Power Simulator is a multi-purpose three phase powe simulator for simulating typical situations in low voltage power supply systems.

It is an excellent tool for training, demonstration purposes, or as an electrical didactic tool. The simulator has some pre-programmed scenarios, and also the option of a complete manual mode. The user can decide between different load character adjustments, adjustable current and voltage level with a simulation of varios different faulty conditions

SIMULATING FUNCTIONS

- Voltage;
- Current;
- Frequency;
- Harmonics (U,I);
- Phase angle (U,I);
- · Flicker;
- Load character;
- Network type (Load/Generator);
- Unbalance (U,I);
- Phase sequence (U,I).

KEY FEATURES

- Simple and powerful waveform generator with various settings.
- 4 voltage channels with wide simulation range: up to 350 Vrms.
- 4 current channels with current clamps simulation up to 2 kA.
- Simultaneous voltage and current (8 channels) simulation, 16 bit DA conversion for accurate signal generation,
- Dip, swell, interrupt, signalling, transient and inrush events simulation.
- Voltage and current harmonics waveform simulation.
- Unbalanced voltage and current waveform simulation.
- · Square flicker simulation.
- Various character load/character type combination simulation.
- Thorough signal parameters settings.
- Saving current system settings on power off
- 4.3" TFT colour display.

APPLICATION

- · Training purposes;
- Demonstration of PQA testing equipment by sales personnel;
- Education of students of electro technical specialities.

STANDARDS

Safety:

• EN 61010-1: 2010

Electromagnetic compatibility (EMC):

• EN 61326-2-2: 2013

5.10 Metrel Catalogue 2018

TECHNICAL DATA

Fundamental RMS voltage output			
Output voltage AC	Resolution	Accuracy	
50 300 V	10V	± 0.1 %	
Event RMS voltage output			
Output voltage AC	Resolution	Accuracy	
0 350 V	10V	± 0.1 %	
Fundamental RMS current	0	0	
Range	Output voltage 100 mV 1 V	Overall current acci	ıracy
A 1033 (100 A 2000 A)	100 mv 1 v	±0.1 %	
Inrush RMS current output			
Inrush current	Accuracy	Crest factor	
Range 1: 2.0 mVRMS 200.0 mVRMS	± 0.5 % · URMS	1.5	
Range 2: 20.0 mVRMS 2.0000 VRMS	± 0.5 % · URMS	1.5	
Frequency			
Output range	Resolution	Accuracy	
45 Hz 70 Hz	1 Hz	± 10 mHz	
Eliekove			
Flickers	Mongueing range	Docalistics	Accuracy:*
Flicker type Pst	Measuring range 0.5 5.0	Resolution 0.1	Accuracy* ± 1 %
Fot	0.5 5.0	0.1	⊥ 1 /0
Voltage harmonics			
Measuring range	Resolution	Accuracy	
UhN 1 % 100 % of fundamental output voltage	1%	± 5 % of UhN	
UhN:	generated harmonic voltage		
N:	harmonic component 2nd 50th		
	·		
Current harmonics and THD			
Measuring range	Resolution	Accuracy	
IhN 1 % 100 % of fundamental current	1%	± 5 % of IhN	
IhN:	measured harmonic current		
N:	harmonic component 2th 50th		
Unbalance			
Olipalatice			Assurasy
	Unhalance range	Decolution	
II-	Unbalance range	Resolution	Accuracy + 0.15 %
<u>u-</u>	Unbalance range 0.5 % 5.0 %	Resolution 0.1 %	± 0.15 %
uO	0.5 % 5.0 %	0.1 %	± 0.15 %
uO	0.5 % 5.0 %	0.1 %	± 0.15 %
u0 i- i0	0.5 % 5.0 %	0.1 %	± 0.15 %
u0 j-	0.5 % 5.0 %	0.1 %	± 0.15 % ± 1 %
u0 i- i0 Overdeviation and Underdeviation	0.5 % 5.0 % 0.0 % 20 % Measuring range	0.1 % 0.1 % Resolution	± 0.15 % ± 1 % Accuracy
u0 i- i0 Overdeviation and Underdeviation U0ver	0.5 % 5.0 % 0.0 % 20 % Measuring range 0 50 % UNom	0.1 % 0.1 % Resolution 0.001 %	± 0.15 % ± 1 % Accuracy ± 0.15 %
u0 i- i0 Overdeviation and Underdeviation	0.5 % 5.0 % 0.0 % 20 % Measuring range	0.1 % 0.1 % Resolution	± 0.15 % ± 1 % Accuracy
u0 i- i0 Overdeviation and Underdeviation U0ver UUnder	0.5 % 5.0 % 0.0 % 20 % Measuring range 0 50 % UNom 0 90 % UNom	0.1 % 0.1 % Resolution 0.001 %	± 0.15 % ± 1 % Accuracy ± 0.15 %
u0 i- i0 Overdeviation and Underdeviation U0ver	0.5 % 5.0 % 0.0 % 20 % Measuring range 0 50 % UNom 0 90 % UNom	0.1 % 0.1 % Resolution 0.001 %	± 0.15 % ± 1 % Accuracy ± 0.15 % ± 0.15 %
u0 i- i0 Overdeviation and Underdeviation U0ver UUnder	0.5 % 5.0 % 0.0 % 20 % Measuring range 0 50 % UNom 0 90 % UNom	0.1 % 0.1 % Resolution 0.001 % 0.001 %	± 0.15 % ± 1 % Accuracy ± 0.15 % ± 0.15 %
u0 i- i0 Overdeviation and Underdeviation UOver UUnder Event duration and recorder time-stamp and uncert	0.5 % 5.0 % 0.0 % 20 % Measuring range 0 50 % UNom 0 90 % UNom ainty Measuring Range	0.1 % 0.1 % Resolution 0.001 % 0.001 % Resolution	± 0.15 % ± 1 % Accuracy ± 0.15 % ± 0.15 %
u0 i- i0 Overdeviation and Underdeviation U0ver UUnder Event duration and recorder time-stamp and uncert Event Duration Record and Event Time stamp	0.5 % 5.0 % 0.0 % 20 % Measuring range 0 50 % UNom 0 90 % UNom ainty Measuring Range 10 ms 7 days	0.1 % 0.1 % Resolution 0.001 % 0.001 % Resolution 1 ms	± 0.15 % ± 1 % Accuracy ± 0.15 % ± 0.15 % Error ± 1 cycle
u0 i- i0 Overdeviation and Underdeviation UOver UUnder Event duration and recorder time-stamp and uncert Event Duration Record and Event Time stamp General	0.5 % 5.0 % 0.0 % 20 % Measuring range 0 50 % UNom 0 90 % UNom ainty Measuring Range 10 ms 7 days N/A	0.1 % 0.1 % Resolution 0.001 % 0.001 % Resolution 1 ms	± 0.15 % ± 1 % Accuracy ± 0.15 % ± 0.15 % Error ± 1 cycle
u0 i- i0 Overdeviation and Underdeviation UOver UUnder Event duration and recorder time-stamp and uncert Event Duration Record and Event Time stamp General Measuring category	0.5 % 5.0 % 0.0 % 20 % Measuring range 0 50 % UNom 0 90 % UNom ainty Measuring Range 10 ms 7 days N/A CAT I / 300 V	0.1 % 0.1 % Resolution 0.001 % 0.001 % Resolution 1 ms	± 0.15 % ± 1 % Accuracy ± 0.15 % ± 0.15 % Error ± 1 cycle
u0 i- i0 Overdeviation and Underdeviation UOver UUnder Event duration and recorder time-stamp and uncert Event Duration Record and Event Time stamp General Measuring category Dimensions	0.5 % 5.0 % 0.0 % 20 % Measuring range 0 50 % UNom 0 90 % UNom ainty Measuring Range 10 ms 7 days N/A CAT I / 300 V 23 cm x 14cm x 8 cm	0.1 % 0.1 % Resolution 0.001 % 0.001 % Resolution 1 ms	± 0.15 % ± 1 % Accuracy ± 0.15 % ± 0.15 % Error ± 1 cycle
u0 i- i0 Overdeviation and Underdeviation UOver UUnder Event duration and recorder time-stamp and uncert Event Duration Record and Event Time stamp General Measuring category Dimensions Weight (with batteries)	0.5 % 5.0 % 0.0 % 20 % Measuring range 0 50 % UNom 0 90 % UNom ainty Measuring Range 10 ms 7 days N/A CAT I / 300 V 23 cm x 14cm x 8 cm 1,34 kg	0.1 % Resolution 0.001 % 0.001 % Resolution 1 ms 1 ms	± 0.15 % ± 1 % Accuracy ± 0.15 % ± 0.15 % Error ± 1 cycle
u0 i- i0 Overdeviation and Underdeviation U0ver UUnder Event duration and recorder time-stamp and uncert Event Duration Record and Event Time stamp General Measuring category Dimensions Weight (with batteries) Display	0.5 % 5.0 % 0.0 % 20 % Measuring range 0 50 % UNom 0 90 % UNom ainty Measuring Range 10 ms 7 days N/A CAT I / 300 V 23 cm x 14cm x 8 cm 1,34 kg Colour 4.3 TFT liquid crystal display (LCD) with	0.1 % Resolution 0.001 % 0.001 % Resolution 1 ms 1 ms 1 ms	± 0.15 % ± 1 % Accuracy ± 0.15 % ± 0.15 % Error ± 1 cycle
u0 i- i0 Overdeviation and Underdeviation UOver UUnder Event duration and recorder time-stamp and uncert Event Duration Record and Event Time stamp General Measuring category Dimensions Weight (with batteries)	0.5 % 5.0 % 0.0 % 20 % Measuring range 0 50 % UNom 0 90 % UNom ainty Measuring Range 10 ms 7 days N/A CAT I / 300 V 23 cm x 14cm x 8 cm 1,34 kg	0.1 % Resolution 0.001 % 0.001 % Resolution 1 ms 1 ms 1 ms	± 0.15 % ± 1 % Accuracy ± 0.15 % ± 0.15 % Error ± 1 cycle

STANDARD SET

MI 2891

- Instrument Power SimulatorVoltage measurement lead, (brown, black, grey, green, blue), 5 pcs
- Current measurement leads, 4pcs
- Labels for color coding
- Power supply adapter1.2 V NiMH rechargeable battery, 6 pcs
- Soft carrying bagUSB cable
- Instruction manual



Power Supplies / R-L-C Decade Power Supplies

R-L-C Decade





MA 4804, MA 4852 AND MA 4853

The MA 4804, MA 4852 and MA 4853 are power supply units with the built-in variable transformers permitting a continuous voltage adjustment within the limits of declared specifications.

The transformers have separate primary and secondary windings resulting in galvanic isolation of the mains circuit from output circuit. This is frequent requirement for energizing specific electrical devices.

The power supply units are equipped with V-meter and A-meter, which allow a permanent control over output voltage and current. They are overload-protected with a circuit-breaker which disconnects the secondary circuits when a short-circuit condition occurs at the output.

Field Application

The MA 4804, MA 4852 and MA 4853 power supply units are used in electronic industry (electrical and control labs), in service workshops, in technical education, etc., briefly everywhere adjustable supply voltage is needed, or where for technical or safety reasons the power supply source has to be galvanically insulated from the mains. Test voltage of 4 kV AC. rms between input and output enables using the units in CAT III / 300 V environment.

Technical specification			
Part No.	HSM 230	HSM 260	HSM 260
Power s supply:	230 V	230 V	230 V
Output voltage:	0 V 260 V		
AC		0 V 33 V	0 V 33 V
DC		0 V 46 V	0 V 46 V
Permissible permanent current:	3.1 A	6 A	6 A

MA 2405, MA 2705 AND MA 2115

MA 2405 Decade capacitor is intended for all application areas where capacitance variation/selection by hand is required. It is all passive electric device housed in metallic case and with internal guarding. It consists of 3 decades for selection of the capacitance in range of 100 pF up to 100 nF. Set value is directly visible on decade's dials. MA 2405 Decade Capacitor uses high quality polypropylene capacitors providing accuracy of 5 %. Very good DC insulation resistance of the capacitors enables the application also in DC circuits, insulation materials also provide low dissipation factor at the frequencies of 500 kHz and up.

MA 2705 Decade inductance is intended for all application areas where inductance variation/selection by hand is required. It is passive electric device housed in metallic case. It consists of 3 decades for selection of the inductance in range of 0 mH up to 999 mH. Set value is directly visible on decade's dials. MA 2705 Decade inductance uses ferrite chokes providing accuracy of 5 % at 50% of rated current.

MA 2115 and **MA 2115 S** Decade resistors are intended for all application areas where resistances variation/selection by hand are required. It is passive electric device housed in metallic case. Each consist of 7 decades with each own rotary switch with range multiplier from 0 to 9, and ∞ . Safety 4 mm sockets are connected to each resistance chain that it could be individually accessible. It is also possible to split resistance chain into two or more independent insulated groups by selection of rotary switch position ∞ .

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Good to know Multimeter/Clamp/Voltage and Continuity Testers

Find out more about DMMs and Clamp Meters.

Handheld digital multimeters (DMM) are among the most widely used instruments for equipment testing when it comes to servicing, repairing, and installing applications.

A DMM is a digital meter that is capable of making various types of measurement. It may have any number of special features, but mainly a DMM measures volts, ohms, and amperes. DMMs are used to troubleshoot electrical problems in a wide array of industrial and household devices such as batteries, motor controls, appliances, power supplies, and wiring systems.

Metrel DMMs are appropriate for testing under tough conditions and can be tossed into tool cases.

When choosing a clamp meter not only look at specifications, but also pay attention to features, functions, and the overall value represented by a meter's design:

- Choose a clamp meter that gives accurate and repeatable results.
- For precise measurements choose a clamp meter which reports TRMS reading. Otherwise noise from everything from a variable frequency drive to compact fluorescent bulbs can result in a less accurate reading.
- Make sure that the clamp meter is specified to work in the environment you do and that are rugged enough to continue to give reliable results even in case they drop from ladders or bouncing in your tool case.
- Be sure the clamp meter display has large, easy to read characters.

RMS (Root Mean Square) value

When an AC supply is placed onto a circuit, it produces heat. The RMS value is the equivalent DC supply that would produce the same amount of thermal heat as the actual AC supply.

TRMS (True RMS) value

TRMS is a specific method of measuring the RMS value of a signal. With inductive and capacitive systems distorting the sinusoidal wave of the mains supply, this method provides the most accurate RMS value regardless of the shape of the waveform.

Resolution

Resolution is the smallest possible change in a signal that would produce a change in the value on the screen of the test instrument. For example, if the DMM has a resolution of 1 mV on the 4 V range, it is possible to see a change of 1 mV (1/1000 of a volt) while reading 1 V.

Accuracy

Accuracy is a value to show how accurately an instrument can read a specific value. This is usually written as a percentage (e.g. $5 \text{ V} \pm 5 \text{ \%}$). An accuracy of one percent of reading means that for a displayed reading of 100 volts, the actual value of the voltage could be anywhere between 99 volts and 101 volts.

Number of Counts

The number of divisions into which a given measuring range is divided. This can be used to evaluate the resolution of an instrument.

The basics of measurements

DC and AC voltage

One of the most basic tasks of a DMM is measuring voltage. A typical DC voltage source are the batteries while AC voltage is usually created by a generator. The wall outlets are common sources of AC voltage.

Testing for proper supply voltage is usually the first step when troubleshooting a circuit. If there is no voltage present, or if it is too high or too low, the voltage problem should be corrected before investigating further.

A DMM's ability to measure AC voltage can be limited by the frequency of the signal. Most DMMs can accurately measure AC voltages with frequencies from 50 Hz to 500 Hz, but a DMMs AC measurement bandwidth may be hundreds of kilohertz wide. Such a meter may read a higher value because it is capable to see more of a complex ac signal. DMM accuracy specifications for AC voltage and AC current should state the frequency range along with the range's accuracy.

Frequency is measured in hertz (Hz) the number of times per second a waveform repeats. Maintaining the right frequency is crucial for devices that rely on AC voltage and current.

Crest factor

The crest factor describes the ratio of the peak value to the RMS value of an electrical variable (AC voltage and AC current). High crest factors cause distortion of the reactive power and harmonics in the supply network, and so are undesirable.

Resistance

Resistance values can vary greatly, from a few milliohms ($m\Omega$) for contact resistance to billions of ohms for insulators. Most DMMs measure from 0.1 Ω , up to 300 $M\Omega$. At Metrel DMM display is infinite resistance (open circuit) read as "OL" and means that the resistance is greater than the meter can measure. Resistance measurements must be made with the circuit power off – otherwise, the meter or circuit could be damaged.

Continuity

Continuity is a quick "go/no-go" resistance test that distinguishes between an open and a closed circuit. A DMM with a continuity beeper allows you to complete many continuity tests easily and quickly. The DMM will beep if there is good continuity, or a good path that allows current to flow. If there is no continuity, the DMM won't beep.

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Diode test

This mode measures and displays the actual voltage drop across a junction. A silicon junction should have a voltage drop less than 0.7 V when applied in the forward direction and an open circuit when applied in the reverse direction. When the red (+) lead is connected to the anode and the black (-) to the cathode, the diode should conduct and the meter will display a value (usually the voltage across the diode in mV, 1000mV = 1V). After reversing the connections the diode should not conduct this way so the meter will display "OL".

Capacitance

To test capacitance, set the dial on the DMM to the capacitance function and plug in your leads. After ensuring that the capacitor has been discharged, connect the test leads to the capacitor terminals and take a reading. If the measurement is similar to the rating listed on the capacitor, the capacitor is good. A significant variation from the rating indicates the capacitor should be replaced.

DC and AC current

Current measurements are different from other DMM measurements. Current measurements taken with the DMM alone require placing the meter in series with the circuit being measured. This means opening the circuit and using the DMM test leads to complete the circuit. This way all the circuit current flows through the DMMs circuitry.

Current with Clamp Meter

Today's clamp meters are capable of measuring both AC and DC current. Typical current measurements are taken on various branch circuits of an electrical distribution system. By taking current measurements along the run of a branch circuit, it can be easily determined how much each load along the branch circuit is drawing from the distribution system.





Digital multimeters Selection Guide for Multimeters

Part No.:	MD 9070 Digital multimeter	MD 9060 Digital multimeter	MD 9050 Digital multimeter	MD 9040 Digital multimeter
			0055 = - = -	0 62
True RMS	•	•	•	•
DC current range (A)	0,6	10	10	10
Basic accuracy (%)	0,5	0.15	0.2	0.2
Maximum resolution (μA) AC current range (A)	0,6	0.1	0.1	0.1
Basic accuracy (%)	1,5	0.5	0.6	0.6
Maximum resolution (μA)	10	0.1	0.1	0.1
DC voltage range (V)	1000 V	1000	1000	1000
Basic accuracy (%)	0.2	0.02	0.06	0.06
Maximum resolution (μV)	1000	10	10	10
AC voltage range (V)	1000 V	1000	1000	1000
Basic accuracy (%)	1000	0.3	0.5	0.5
Maximum resolution (μV) Resistance measurement (ΜΩ)	1000 60	10 50	10	10 60
Basic accuracy (%)	0.9	0.07	0.1	0.1
Maximum resolution (mΩ)	100	100	100	100
Acoustic continuity test	•	•	•	•
Diode test	•	•	•	•
Capacitance		•	•	•
Frequency measurement	•	•	•	•
Frequency of digital signals		•	•	•
Temperature measurement (Type K sensor)		T1 & T2	T1 & T2	
Earth continulity test	•	(temperature comparison)	(temperature comparison)	
Insulation resistance	•			
Insulation resistance compare	•			
PI / DAR	•			
Autocheck° V / Ω			•	
Conductance (nS)		•	•	
IP-RPM (Inductive pickup type)				
IG-RPM (Contact signal type)				
Dwell - Angle function		•		
Duty cycle (%) Fuel injection – ms detector		•		
100 kHz Voltage Bandwidth		•		
Variable frequency drive	•	•		
Dual data display	•			
Count	6000 (MV, μ/M/A, Ω , F)	50.000 (fast mode) 500.000 (DCV) 99.999 (Hz)	9999 (AC/DCV, Hz, nS) 6000 (mV, μ/m/A, Ω , F)	9999 (AC/DCV, Hz, πS) 6000 (mV, μ/m/A, Ω , F)
Backlight	•	44	44	44 .
Analogue bar-graph	•	41 segment	41 segment	41 segment
IR, RS232 interface Automatic and manual range selection	•	•	•	•
Automatic switch off	•	•	•	•
Non-contact electrical field detection (EF)			•	
MAX hold		•		
Peak hold		•	•	
Data hold	•	•	•	•
Recording (MAX / MIN / AVG)	•	•	•	•
Relative value Compensation for test leads		•	•	•
Overvoltage category	CAT IV / 600 V CAT III / 1000 V	CAT IV / 1000 V	CAT IV / 1000 V	CAT IV / 1000 V
Dimensions with holster (mm)	208 x 103 x 64.5	208 x 103 x 64.5	208 x 103 x 64.5	208 x 103 x 64.5
Weight with holster (g)	635	635	635	635
IP	IP 40	IP 54	IP 54	IP 54
CE mark	•	•	•	•

6.4 Metrel Catalogue 2018 Accessories 6.34

MD 9035	MD 9030	MD 9020	MD 9016	MD 9010
Digital multimeter				
NED			ON THE WORLD	Participants A strict
10	10	10	8	0.002
0.7	1.2	1.2	0.5	1.2
0.1	0.1	0.1	0.1	0.1
10	10	10	8	0.002
2.2	1.5	1.5	1.0	1.5
0.1	0.1	0.1	0.1	0.1
1000	1000	1000	1000	600
0.4	0.3	0.3	0.4	0.5
10	100	100	10	1000
1000	1000 1.5	1000	1000 1.0	600 1.5
2.0 10	100	1.5 100	1.0	1000
60	40	40	60	6
0.5	0.6	0.6	0.5	1
100	100	100	100	100
•	•	•	•	•
•	•	•	•	•
•	•	•	•	•
•	•	•	•	•
			•	
T1	T1	T1	T1	
•				•
6000	4000	4000	6000	6000
• 24 segment	•		24 sagment	
24 segment			24 segment •	
•	•	•	•	Auto
•	•	•	•	•
			•	•
	•	•	•	
•	•	•	•	
	•	•	•	
CAT II / 1000 V	CAT IV / 300 V	CAT IV / 300 V	CAT IV / 300 V	CAT III / 300 V
, .000 v	CAT III / 600 V	CAT III / 600 V	CAT III / 600 V	CAT II / 600 V
	CAT II / 1000 V	CAT II / 1000 V	CAT II / 1000 V	·
161 x 80 x 50	198 x 97 x 55	198 x 97 x 55	161 x 80 x 50	113 x 53 x 10.2
340	396	396	340	78
IP 40				
•	•	•	•	•

MD 9070 TRMS Insulation / Continuity Digital Multimeter



The MD 9070 is a high accuracy insulation and continuity multimeter which may be used in a CAT IV / 600 V environment. It's dual digital display provides all needed data to the operator while it's size ensures that it can be operated single handedly. The instrument is equipped with a built-in VFD feature that makes the instrument capable of measuring true RMS values in accordance with frequency, performing PI/DAR measurements and diode test. The MD 9070 has a wide range of extra features, including data hold, memory, min / max, differential, auto power off, auto-ranging, frequency filter, lock feature, reset, relative function and more

MEASURING FUNCTIONS

- TRMS measurement:
- Insulation resistance measurement;
- Earth continuity measurement;
- Resistance measurement;
- Diode test;
- Mains supply frequency measurement;
- Frequency of digital signals measurement.

KEY FEATURES

- **TRMS:** accurate readings on sinusoidal and non-sinusoidal signals.
- VFD: feature makes the instrument capable of measuring the true values in accordance with frequency.
- Auto-ranging: user can switch between auto and manual ranging.

- Relative zero mode: relative function for comparing the difference between signals or removing background noise.
- MAX/MIN: recording of maximum, minimum and average values.
- **Data Hold:** data hold feature freezes the display for later view.
- PI/DAR: feature.
- Safety: CAT IV / 600 V and CAT III / 1000 V overvoltage protection.
- Backlight: working in dark conditions.

APPLICATION

- Insulation and earth continuity tester for preventive maintenance;
- High level industrial testing;
- High level electronic fault finding;
- Field servicing:
- Heavy duty electrical testing.

STANDARDS

- CAN/CSA-C22.2 No. 61010-1-12 Ed. 3.0
- EN61326-1:2006
- EN55022
- EN61000-3-2
- EN61000-3-3
- EN61000-4-2
- EN61000-4-3EN61000-4-4
- EN61000-4-5
- EN61000-4-6
- EN61000-4-8
- EN61000-4-11
- IEC/UL/EN61010-1 Ed. 3.0
- IEC/EN61010-2-030 Ed. 1.0
- IEC/EN61010-2-033 Ed. 1.0
- IEC/UL/EN61010-031 Ed. 1.1
- IEC/EN61557-1
- IEC/EN61557-2

Directives

- 2004/108/EC EMC
- 2006/95/EC LVD

6.6 Accessories 6.34 Metrel Catalogue 2018

FUNCTION	Range	Accuracy
TRMS AC Voltage (50 Hz 5 kHz)	6.000 V 1000 V	From ±(1.0% of reading + 3 digits) to ±(4.0% of reading + 5 digits)
VFD AC Voltage (10 Hz 440 Hz)	600.0 V	From ±(4.0% of reading + 5 digits) to ±(7.0% of reading + 5 digits)
DC Voltage	6.000 V 1000 V	From ±(0.2% of reading + 3 digits) to ±(0.3% of reading + 3 digits)
DC Current	60 mA 600 mA	From ±(0,5% of reading + 3 digits)
AC Current (50 Hz 1 kHz)	60 mA 600 mA	to $\pm(1,5\%$ of reading + 3digits)
Ohms	600.0 Ω 60.00 ΜΩ	From ±(0.9% of reading + 2 digits) to ±(3.0% of reading + 6 digits)
Audible Continuity Tester	between 20 Ω and 200 Ω	Response time < 30 ms
Diode Tester	2.000 V	±(1.5% of reading + 4 digits)
Earth Continuity Test	0.015 Ω 2.199 Ω at ltest > 200 mA 0.15 Ω 21.99 Ω at ltest > 90 mA	±(1.5% of reading + 3 digits) ±(1.5% of reading + 3 digits)
Hz Line Level Frequency	10 Hz 440 Hz; range VFD 600 V 10 Hz 20 kHz; range 6 V 1000 V	±(0.02% of reading + 4 digits) ±(0.02% of reading + 4 digits)
Insulation Resistance	3.000 MΩ 55.0 MΩ at 50 V 3.000 MΩ 110.0 MΩ at 100 V 3.000 MΩ 275.0 MΩ at 250 V 3.000 MΩ 550.0 MΩ at 500 V 3.000 MΩ 300.0 MΩ at 1000 V 3000 MΩ at 1000 V 25.0 GΩ at 1000 V	<pre>±(1.5% of reading + 5 digits) ±(1.5% of reading + 5 digits) ±(2.0% of reading + 5 digits) ±(1.0.0% of reading + 5 digits)</pre>
Sensing	AC, True RMS.	
Overload Protections	Insulation Resistance: 0.4 A / 1 KV, IR 30 kA or Earth Continuity Test: 0,25 A /1 KV, IR 30 kA or V: 1100 Vrms. mV, Ω & Others: 1000 Vrms.	
Power Supply	Four Alkaline AA batteries (IEC LR6).	
Power Consumption	4.5mA typical	
Dimension (L x W x H)	208 x 103 x 64,5 mm with holster.	
Weight	635 g with holster.	

STANDARD SET

MD 9070

- Multimeter MD 9070 with rubber holster
 Test lead with probe, 2 pcs
 Insulated crocodile clip, 2 pcs

- Insulation/Continuity test lead with probe, 1 pcs
 1,5 V AA battery (IEC LR6), 4 pcs
 Instruction manual
 Warranty



MD 9060 TRMS, 100 kHz Voltage Bandwidth Heavy Duty Industrial Multimeter



Metrel MD 9060 is equipped with a

- TRMS AC, DC voltage measurement;
 TRMS AC, DC current measurement;
- Capacitance measurement;
- Resistance measurement;
- · Diode test:
- Duty Cycle;
- Mains supply frequency measurement;
 Frequency of digital signals measurement;
- Continuity test (acoustic signalling);
- Conductance measurement;
- · Temperature measurement

- TRMS: accurate readings on sinusoidal and non-sinusoidal signals.

 VFD: feature makes the instrument
- capable of measuring the true values in accordance with frequency. **Duty cycle**: measure digital logic level
- · Auto-ranging: user can switch between auto and manual ranging.
- Temperature measurement: measures T1, T2 and T1 + T2 temperature in Celsius and in Fahrenheit.
- Lead alert: incorrect lead connection alert.
- **Relative zero mode:** relative function for comparing the difference between
- signals or removing background noise.
 MAX/MIN/AVG: recording of maximum, minimum and average values.
 Data Hold: data hold feature freezes the
- display for later view.
- Peak Hold: Crest (instantaneous peak) apture mode.
- PC Link: test results can be downloaded to the computer via the optional PC software. **Safety:** CAT IV / 1000 V overvoltage
- protection.

• Backlight: large bright 4 digits 500.000 counts dual LCD display with backlight for working in dark conditions.

- High level industrial testing;
- High level electronic fault finding;
- Field servicing; Heavy duty electrical testing.

STANDARD SET

MD 9060

- Multimeter MD 9060 with rubber holster
- Test lead with probe, 2 pcs
- Thermocouple probe, type K
- Instruction manual
- · Warranty

FUNCTION	Range	Accuracy
TRMS AC and AC+DC voltage	500.00 mV 1000.0 V	from ±(0.45% of reading + 40 digits)
(20 Hz 40kHz)		to ±(4.0% of reading + 40 digits)
DC Voltage	500.00 mV 1000.0 V	from ±(0.02% of reading + 2 digits)
		to \pm (0.15% of reading + 2 digits)
AC Voltage	500.00 mV 1000.0 V	from ±(0.3% of reading + 20 digits)
(20 Hz 100 kHz)		to ±(4.0% of reading + 40 digits)
DC Current	500.00 μA 10.000 A	from ±(0.15% of reading + 20 digits)
		to $\pm (0.5\%$ of reading + 20 digits)
TRMS AC and AC+DC Current	600.0 μA 10.00 A	from ±(0.5% of reading + 50 digits)
(40 Hz 100 kHz)		to ±(5.0% of reading + 50 digits)
Diode Test	2.0000 V	±(1.0% of reading + 1 digit)
	Open-circuit voltage < 3.5 V	DC, Test current 0.4 mA
Resistance	500.00 Ω 50.000 MΩ	from ±(0.07% of reading + 10 digits)
		to ±(2.0% of reading + 6 digits)
Conductance	99.99 nS	±(2.0% of reading + 10 digits)
Capacitance	50.00 nF 25.00 mF	from ±(0.8% of reading + 3 digits)
		to ±(6.5% of reading + 5 digits)
Temperature	-50.0 °C 1000.0 °C	±(0.3% of reading + 1.5 °C)
	-58.0 °F 1832.0 °F	±(0.3% of reading + 3.0 °F)
Variable Frequency Drive AC	5 Hz 440 Hz	from ±(2.0% of reading + 50 digits)
		to ±(6.0% of reading + 80 digits)
Frequency of digital equipment	5.000 Hz 1.0000 MHz	±(0.002% of reading + 4 digits)
Mains frequency	10 Hz 200 kHz	±(0.02% of reading + 4 digits)
Power supply	9V battery (NEDA1604G, JIS	006P, or IEC6F22)
Overvoltage category	CAT IV / 1000 V	
Dimensions	208 x 103 x 64.5 mm	
Weight	635 g	

6.8 Accessories 6.34 Metrel Catalogue 2018

MD 9050 TRMS Heavy Duty Industrial Digital Multimeter



- TRMS AC, DC voltage measurement;
 TRMS AC, DC current measurement;
- Capacitance measurement; · Resistance measurement;
- Diode test;
- Mains supply frequency measurement;
- Frequency of digital signals measurement;
- Continuity test (acoustic signalling);
- Conductance measurement;
- Electric field detection:
- · Temperature measurement.

- TRMS: accurate readings on sinusoidal and non-sinusoidal signals.
- Autocheck function: automatic detection
- of AC voltage, DC voltage or resistance.

 Auto-ranging: user can switch between auto and manual ranging.
- Temperature measurement: measures T1. T2 and T1 + T2 temperature in Celsius and in Fahrenheit.
- **EF detection**: non-contact and probecontact electric field detection.
- Lead alert: incorrect lead connection alert.
- Relative zero mode: relative function for comparing the difference between signals or removing background noise.
- MAX/MIN/AVG: recording of maximum, minimum and average values
- Data Hold: data hold feature freezes the display for later view.
- Peak Hold: Crest (instantaneous peak) cupture mode.
- PC Link: test results can be downloaded to the computer via the optional PC software.
 • Safety: CAT IV / 1000 V overvoltage protection.

• Backlight: large bright 4 digits 9999 counts dual LCD display with backlight for working in dark conditions.

- · High level industrial testing;
- High level electronic fault finding;
- Field servicing;
- Heavy duty electrical testing.

STANDARD SET

MD 9050

- Multimeter MD 9050 with rubber holster
- Test lead with probe, 2 pcs
- · Thermocouple probe, type K
- 9 V battery
- · Instruction manual
- · Warranty

FUNCTION	Range	Accuracy
TRMS AC and AC+DC voltage	60.00 mV 999.9 V	from ±(0.5 % of reading + 3 digits)
(40 Hz 20 kHz)		to ±(3.0 % of reading + 4 digits)
Autocheck (ACV)	9.999 V 999.9 V	±(1.0 % of reading + 4 digits)
DC voltage	60.00 mV 999.9 V	from ±(0.06 % of reading + 2 digits)
		to ±(0.12 % of reading + 2 digits)
Autocheck (DCV)	9.999 V 999.9 V	± (0.5 % of reading + 3 digits)
DC current	600.0 μA 10.00 A	±(0.2 % of reading + 4 digits)
TRMS AC and AC+DC current	600.0 μA 10.00 A	from ±(0.6 % of reading + 3 digits)
(40 Hz 1 kHz)		to ±(1.0 % of reading + 4 digits)
Diode test	2.000 V	±(1.0 % of reading + 1 digit)
	Open-circuit voltage < 3.5 \	VDC, test current 0.4 mA
Resistance	600.0 Ω 60.00 MΩ	from $\pm(0.1\%)$ of reading + 3 digits)
		to ±(1.5 % of reading + 5 digits)
Conductance	99.99 nS	±(0.8 % of reading + 10 digits)
Autocheck (resistance)	600.0 Ω 60.00 MΩ	from ± (0,5 % of reading + 4 digits)
		to ±(2 % of reading + 5 digits)
Mains frequency	15.00 Hz 50.00 kHz	±(0.04 % of reading + 4 digits)
Frequency of digital equipment	5.00 Hz 1.000 MHz	±(0.004 % of reading + 4 digits)
Capacitance	60.00 nF 25.00 mF	from $\pm (0.8 \% \text{ of reading} + 3 \text{ digits})$
		to ±(6.5 % of reading + 5 digits)
Temperature	-50 °C +1000 °C	\pm (0.3 % of reading +2 °C)
Power supply	9 V battery (NEDA1604G,	JISOO6P, or IEC6F22)
Overvoltage category	CAT IV / 1000 V	
Dimensions	208 x 103 x 64.5 mm	
Weight	635 g	

MD 9040 TRMS Industrial Digital Multimeter



CAT IV / 1000 V overvoltage category and TRMS measurement of AC current and voltage are key features of the MD 9040. That's why it is particularly suitable for performing measurements on power supply sources in the most demanding applications in the industrial sector. Its high accuracy, 2-line LCD display, diverse measurement functions, fast one-handed operation and outstanding value for money open up

MEASURING FUNCTIONS

- TRMS AC, DC voltage measurement;
- TRMS AC, DC current measurement;
- Capacitance measurement;
- Resistance measurement;
- Diode test:
- Mains supply frequency measurement;
- Frequency of digital signals measurement;
- Continuity test (acoustic signalling).

KEV FEATURES

- **TRMS:** accurate readings on sinusoidal and non-sinusoidal signals.
- Lead alert: incorrect lead connection alert.
- **Auto-ranging:** user can switch between auto and manual ranging.
- Relative zero mode: relative function for comparing the difference between signals or removing background noise.
- MAX/MIN/AVG: recording of maximum, minimum and average values.
- **Data Hold:** data hold feature freezes the display for later view.
- **PC Link:** test results can be downloaded to the computer via the optional PC software.
- Frequency measurement: up to 1 MHz.
- **Safety:** CAT IV / 1000 V overvoltage protection.
- Easy to read: large bright 4 digits 9999 counts dual LCD display.

APPLICATION

- · High level industrial testing;
- High level electronic fault finding;
- Field servicing;
- · Heavy duty electrical testing.

STANDARD SET

MD 9040

- Multimeter MD 9040 with rubber holster
- Test lead with probe, 2 pcs
- 9 V battery
- Instruction manual
- Warranty

TECHNICAL DATA

FUNCTION	Range	Accuracy
TRMS AC voltage (40 Hz 20 kHz)	60.00 mV 999.9 V	from ±(0.5 % of reading + 3 digits) to ±(3.0 % of reading + 4 digits)
DC voltage	60.00 mV 999.9 V	from ±(0.06 % of reading + 2 digits) to ±(0.12 % of reading + 2 digits)
DC current	600.0 μA 10.00 A	±(0.2 % of reading + 4 digits)
TRMS AC current (40 Hz 1 kHz)	600.0 μA 10.00 A	from ±(0.6 % of reading + 3 digits) to ±(1.0 % of reading + 4 digits)
Diode test	2.000 V	±(1.0 % of reading + 1 digit)
	Open-circuit voltage <3.5 VDC, Test current 0.4 mA	
Resistance	600.0 Ω 60.00 ΜΩ	from ±(0.1 % of reading + 3 digits) to ±(1.5 % of reading + 5 digits)
Mains frequency	15.00 Hz 50.00 kHz	±(0.04 % of reading + 4 digits)
Frequency of digital equipment	5.00 Hz 1.000 MHz	±(0.004 % of reading + 4 digits)
Capacitance	60.00 nF 25.00 mF	from ±(0.8 % of reading + 3 digits) to ±(6.5 % of reading + 5 digits)
Power supply	9 V battery (NEDA1604G	, JIS006P, or IEC6F22)
Overvoltage category	CAT IV / 1000 V	
Dimensions	208 x 103 x 64.5 mm	
Weight	635 g	

6.10 Accessories 6.34 Metrel Catalogue 2018

MD 9035 Automotive Multimeter Designed to Work On Real-World Car Signals



- AC, DC voltage measurement;AC, DC current measurement;
- Capacitance measurement;
- Resistance measurement;
- · Diode test:
- Both IP (inductive) & IG (contact) RPM;
- Ms Fuel-injection on time;
- Duty Cycle;
- Dwell angle;
- Line-Level Hz (ACV, DCV);
- · Frequency measurement;
- Continuity test (acoustic signalling);
- · Electric field detection;
- Temperature measurement.

- Line-Level: measures frequency from 10 Hz to 50 kHz.
- Auto-ranging: user can switch between auto and manual ranging.
- · Hold: data hold function freezes the display for later view.
- Pickup clip: Inductive pickup clip accessory for IP-RPM Function.
- accessory for IP-RPM Function.
 4 Selectable Trigger-Levels: For IP-RPM, IG-RPM, Dwell, %-Duty and ms Functions.
 Selectable Trigger: Positive (+) or Negative (-) Trigger for %-Duty and ms Functions.
 Selectable Cylinders: 1, 2, 3, 4, 5, 6, 8, 10 or 12 Cylinders for Dwell and IG-RPM functions.
 Safe: CAT II / 1000 V, overvoltage protection.

- Automotive industry;High level industrial testing;High level electronic fault finding;
- Field servicing;Heavy duty electrical testing.

STANDARD SET

- Multimeter MD 9035 with rubber holster
 Test lead with probe, 2 pcs

- Thermocouple probe, type K
- Inductive pickup clip
 1.5 V battery, type AAA, 2 pcs
 Instruction manual
- Warranty

TECHNICAL DATA				
FUNCTION	Range	Accuracy		
DC Voltage	60.00 mV 1000 V	From ±(0.4% of		
		to ±(0.7% of rea	ding + 3 digits	
AC Voltage	60.00 mV 1000 V	From ±(2.0% of	reading + 5 die	its)
(50 Hz 500 Hz)		to ±(2.2% of rea	ding + 5 digits	
DC Current	600.0 μA 10.00 A	From $\pm(0.7\% \text{ of})$	reading + 3 dig	its)
	'	to ±(0.5% of rea	ıding + 3 digits) ,
AC Current	600.0 μA 10.00 A	From ±(2.2% of	reading + 5 dig	its)
(50 Hz 500 Hz)	'	to ±(1.2% of rea		
Diode Test	1.000 V	±(1.0% of reading		
	Open-circuit voltage < 1.6 V DO	. Test current 0.5	0 mA	
Resistance	600.0 Ω 60.00 MΩ	From ±(0.5% of	reading + 6 dig	its)
		to ±(1.5% of rea	ding + 5 digits)	,,
Capacitance	6.000 µF2000 µF	From ±(2.0% of	reading + 5 dig	its)
	5.555 p2555 p.	to ±(4.0% of rea		
Temperature	-50 °C1000 °C	±(0.5% of readir	ng + 3 digits)	
	-58 °F1832 °F	±(0.5% of readir	ng + 6 digits)	
IP-RPM	RPM 4 (24020000 RPM)	±(2RPM)	.5 5 /	
	RPM 2 (12010000 RPM)	(2::::://		
	RPM 2M (605000 RPM)			
IG-RPM	RPM 4 (6020000 RPM)	±(2RPM)		
	RPM 2 (3010000 RPM)	(2::::://		
	RPM 2M (155000 RPM)			
Dwell	0.0 ° 360.0 °	±(1.2 °/krpm + 1	digit)	
2116.1	0.0 %100.0 %	±(0.04% /krpm		
Fuel injection-ms detector	PFL / Multi Point Injection	_(0.0 1 70 / 10 p111	/ c / · · · · · a · g · c · /	
,	PFI / Multi Point Injection 0.05 ms 250.0 ms	±(0.05 ms + 1 di	git)	
	0.0 % 100.0 %	±(0.04 % /krpm	+ 2 digits)	
	TBI / Single Point Injection	_(0.0 : 70 / Ki piii	. 2 4151137	
	0.05 ms 250.0 ms	±(0.05 ms + 1 di	git)	
	0.0 % 100.0%	±(0.04 % /krpm	/cvl + 2 digits)	
Function	0.0 /0 100.0 /0	Range	Sensitivity	Accuracy
. director.		50	(Sin RMS)	riccaracy
Hz (Line-level) ∞	6 V	10 Hz10 kHz	0.5 V	±(0.1%
ACV & DCV	60 V	10 Hz50 kHz	5 V	+ 3 digits)
	600 V		50 V	
	1000 V	45 Hz1 kHz	500 V	
Power supply	2 x 1.5 V batteries, type AAA			
Overvoltage category	CAT II / 1000 V			
Dimensions	161 x 80 x 50 mm			
Weight	340 g			

MD 9030 TRMS General Purpose Digital Multimeter



- TRMS AC, DC voltage measurement;
- TRMS AC, DC current measurement;
- Capacitance measurement;
- Resistance measurement;
- Diod test:
- Frequency measurement;
- · Continuity test (acoustic signalling);
- Temperature measurement.

- TRMS: accurate readings on sinusoidal and non-sinusoidal signals.
- Temperature measurement: measures temperature in Celsius up to 300 °C and in Fahrenheit up to 572 °F.
- Frequency measurement: up to 1 MHz.
- Lead alert: incorrect lead connection alert.
- Auto-ranging: user can switch between auto and manual ranging
- Relative zero mode: relative function for comparing the difference between signals or removing background noise.
- Data Hold: data hold feature freezes the display for later view.
- MAX Hold: MAX hold feature freezes the maximum measured value.

 Safe: CAT IV / 300 V, CAT III / 600 V and
- CAT II / 1000 V overvoltage protection.
- **Backlight:** large bright 3-3/4 digits, 4000 counts LCD display with backlight for working in dark conditions.

- · Mid level electrical testing;
- Mid level electronic fault finding;
- · Field servicing;
- · General purpose.

STANDARD SET

MD 9030

- Multimeter MD 9030 with rubber holster
- Test lead with probe, 2 pcs
- 1.5 V battery, type AAA, 2 pcs
- Instruction manual
- Warranty

FUNCTION	Range	Accuracy
DC voltage	400.0 mV 1000 V	from ±(0.3 % of reading + 4 digits) to ±(1.0 % of reading + 4 digits)
TRMS AC voltage (50 500 Hz)	400.0 mV 1000 V	from ±(1.5 % of reading + 5 digits) to ±(4.0 % of reading + 5 digits)
DC current	400.0 μA 10.00 A	from ±(1.2 % of reading + 3 digits) to ±(2.0 % of reading + 5 digits)
TRMS AC current	400.0 μA 10.00 A	from ±(1.5 % of reading + 4 digits) to ±(2.0 % of reading + 6 digits)
Diode test	Open-circuit voltage <1.6	VDC, Test current 0.25 mA
Resistance	400.0 $Ω$ 40.00 $ΜΩ$	from $\pm (0.6 \% \text{ of reading} + 4 \text{ digits})$ to $\pm (2.0 \% \text{ of reading} + 4 \text{ digits})$
Temperature	-20 °C 300 °C	±(2.0 % of reading + 3 °C)
Frequency	50.00 Hz 1.000 MHz	±(0.5 % of reading + 4 digits)
Capacitance	500.0 nF 3000 μF	±(3.5 % of reading + 6 digits)
Power supply	2 x 1.5 V batteries, type A	AA
Overvoltage category	CAT IV / 300 V; CAT III / 6	000 V; CAT II / 1000 V
Dimensions	198 x 97 x 55 mm	
Weight	396 g	

6.12 Accessories 6.34 Metrel Catalogue 2018

Digital multimeters MD 9020 General Purpose Digital Multimeter

The MD 9020 is a high-quality digital multimeter, designed for everyday use in the laboratory and for maintenance and repair work in the field and in the industrial sector as well.



MEASURING FUNCTIONS

- AC, DC voltage measurement;
- AC, DC current measurement;
- Capacitance measurement;
- Resistance measurement;
- Diod test;
- Frequency measurement;
- Continuity test (acoustic signalling);
- Temperature measurement.

KEY FEATURES

- Temperature measurement: measures temperature in Celsius up to 300 °C and in Fahrenheit up to 572 °F.
- Frequency measurement: up to 1 MHz.
- **Lead alert:** incorrect lead connection alert.
- **Auto-ranging:** user can switch between auto and manual ranging.
- **Relative zero mode:** relative function for comparing the difference between signals or removing background noise.
- **Data Hold:** data hold feature freezes the display for later view.
- MAX Hold: MAX hold feature freezes the maximum measured value.
- **Safe:** CAT IV / 300 V, CAT III / 600 V and CAT II / 1000 V overvoltage protection.

ΔΡΡΙ ΙΓΑΤΙΩΝΙ

- Mid level electrical testing;
- Mid level electronic fault finding;
- Field servicing;
- General purpose.

STANDARD SET

MD 9020

- Multimeter MD 9020 with rubber holster
- Test lead with probe, 2 pcs
- 1.5 V battery, type AAA, 2 pcs
- Instruction manualWarranty

TECHNICAL DATA

FUNCTION	Range	Accuracy	
DC voltage	400.0 mV 1000 V	from ±(0.3 % of reading + 4 digits) to ±(1.0 % of reading + 4 digits)	
AC voltage (50 500 Hz)	400.0 mV 1000 V	from ±(1.5 % of reading + 5 digits) to ±(4.0 % of reading + 5 digits)	
DC current	400.0 μA 10.00 A	from ±(1.2 % of reading + 3 digits) to ±(2.0 % of reading + 5 digits)	
AC current	400.0 μA 10.00 A	from ±(1.5 % of reading + 4 digits) to ±(2.0 % of reading + 6 digits)	
Diode test	Open-circuit voltage <1.6	Open-circuit voltage <1.6 VDC, Test current 0.25 mA	
Resistance	400.0 $Ω 40.00 ΜΩ$	from \pm (0.6 % of reading + 4 digits) to \pm (2.0 % of reading + 4 digits)	
Temperature	-20 °C 300 °C	±(2.0 % of reading + 3 °C)	
Frequency	50.00 Hz 1.000 MHz	±(0.5 % of reading + 4 digits)	
Capacitance	500.0 nF 3000 μF	±(3.5 % of reading + 6 digits)	
Power supply	2 x 1.5 V batteries, type A	2 x 1.5 V batteries, type AAA	
Overvoltage category	CAT IV / 300 V; CAT III / 6	00 V; CAT II / 1000 V	
Dimensions	198 x 97 x 55 mm	198 x 97 x 55 mm	
Weight	396 g		

MD 9016 Electrical Field Service Multimeter



The digital multimeter MD 9016 is a perfect combination of size, Innovative functions and built-in PC communication. It is capable to detect and diagnose most electrical and electro technical problems. Display with large easy-to-read figures and one-handed operation make MD 9016 an extremely easy-to-use. This compact instrument combines a high level of functionality and small size and nortability

MEASURING FUNCTIONS

- AC, DC voltage measurement;
- AC, DC current measurement;
- Capacitance measurement;
- · Resistance measurement;
- Diode test:
- Frequency measurement;
- · Continuity test (acoustic signalling);
- Electric field detection:
- Temperature measurement.

KEY FEATURES

- Auto-ranging: user can switch between auto and manual ranging.
- **EF detection:** non-contact and probe contact electric field detection.
- Relative zero mode: relative function for comparing the difference between signals or removing background noise.
- **Hold:** data hold function freezes the display for later view.
- **PC Link:** test results can be downloaded to the computer via the optional PC software.
- Safe: CAT II / 1000 V, CAT III / 600 V and CAT IV / 300 V overvoltage protection.

APPLICATION

- HVAC (heating, ventilation and air conditioning) troubleshooting;
- Low level electrical testing;
- Low level electronic fault finding;
- · Basic field servicing;
- · Hobby work.

STANDARD SET

MD 9016

- Multimeter MD 9016 with rubber holster
- Test lead with probe, 2 pcs
- Thermocouple probe, type K
- 1.5 V battery, type AAA, 2 pcs
- Instruction manual
- Warranty

TECHNICAL DATA

FUNCTION	Range	Accuracy
DC Voltage	60.00 mV 1000 V	from ±(0.4% of reading + 5 digits)
		to $\pm (0.2\%$ of reading + 3 digits)
AC Voltage (50 Hz 500 Hz)	60.00 mV 1000 V	±(1.0% of reading + 5 digits)
DC Current	600.0 μA 8.00 A	from ±(0.5% of reading + 5 digits)
		to ±(1.8% of reading + 6 digits)
AC Current	600.0 μA 8.00 A	from ±(1.0% of reading + 3 digits)
(50 Hz 400 Hz)		to ±(1.8% of reading + 6 digits)
Diode Test	1.000 V	±(1.0% of reading + 3 digits)
	Open-circuit voltage < 1.8	V DC, Test current 0.56 mA
Resistance	600.0 Ω 60.00 MΩ	from ±(0.5% of reading + 4 digits)
		to ±(1.2% of reading + 4 digits)
Capacitance	60.00 nF 3000 μF	from ±(1.5% of reading + 5 digits)
		to ±(2.0% of reading + 5 digits)
Temperature	-50 °C 1000 °C	±(0.3% of reading + 3 digits)
	-58 °F 1832 °F	±(0.3% of reading + 6 digits)
Frequency of digital equipment	5.00 Hz 1.000 MHz	±(0.003% of reading + 2 digits)
Mains frequency	10 Hz 50 kHz	±(0.003% of reading + 3 digits)
Power supply	2 x 1.5 V batteries, type A	AA
Overvoltage category	CAT IV / 300 V; CAT III / 6	00 V; CAT II / 1000 V
Dimensions	161 x 80 x 50 mm	
Weight	340 g	

6.14 Accessories 6.34 Metrel Catalogue 2018

Digital multimeters MD 9010 General Purpose Autocheck Digital Multimeter

The MD 9010 is one of the smallest and lightest of our digital multimeters. The MD 9010 unit can be used for a wide variety of applications. The high accuracy, LCD display and features including non-contact voltage detection and an autocheck function make the multimeter extremely versatile and great value for money.



MEASURING FUNCTIONS

- AC, DC voltage measurement;
- AC, DC current measurement;
- Capacitance measurement;
- Resistance measurement;
- Diode test;
- Frequency measurement;
- Continuity test;
- Electric field detection.

KEV FEATURES

- Autocheck function: automatic detection of AC voltage, DC voltage or resistance.
- Auto-ranging: no need of manual ranging.
- Pocket-sized: small, thin, ergonomic design.
- Lightweight: 78 g only.
- Acoustic signalling on continuity test.
- **EF detection**: non-contact and probecontact electric field detection.
- Safe: protected against wrong connection and overvoltage (CAT III / 300 V and CAT II / 600 V).
- Easy to read: LCD display, 3-5/6 digits, 6000 counts.

ΔΡΡΙΙΓΑΤΙΩΝ

- · Low level electrical testing;
- Low level electronic fault finding;
- Basic field servicing;
- · Hobby work.

STANDARD SET

MD 9010

- Multimeter MD 9010 with rubber holster
- Test lead with probe, 2 pcs
- Battery
- Instruction manual
- Warranty

TECHNICAL DATA

FUNCTION	Range	Accuracy
DC voltage	6.000 V 600.0 V	from ±(0.5 % of reading + 3 digits)
		to ±(2.0 % of reading + 5 digits)
AC voltage (50 60 Hz)	6.000 V 600.0 V	±(1.5 % of reading + 5 digits)
DC current	400.0 μΑ	±(1.5 % of reading + 3 digits)
	2000 μΑ	±(1.2 % of reading + 3 digits)
AC current	400.0 μΑ	±(2.0 % of reading + 3 digits)
	2000 μΑ	±(1.5 % of reading + 3 digits)
Diode test	Open-circuit voltage <1.6 V	DC
Resistance	600.0 Ω 6.000 MΩ	from ±(1.0 % of reading + 4 digits)
		to ±(2.0 % of reading + 6 digits)
Frequency	10.00 Hz 30.00 kHz	±(0.5 % of reading + 4 digits)
Capacitance	100.0 nF 2000 μF	±(3.5 % of reading + 6 digits)
Power supply	3 V button battery (IEC-CR	2032)
Overvoltage category	CAT III / 300 V; CAT II / 600) V
Dimensions	113 x 53 x 10.2 mm	
Weight	78 g	

Clamp Meters Selection Guide for Clamp Meters

Part No.:	MD 9272 Current Meter	MD 9250 Current Meter	MD 9240 Current Meter	MD 9235 Current Meter
	127			
True RMS	•	•	•	•
DC current range (A)		2000 A		
Basic accuracy (%)		2.0		
AC current range (A)	100 A	2000 A	1000 A	600 A
Basic accuracy (%)	0.8	2.0	1	1
DC voltage range (V)		1000 V	600 V	600 V
Basic accuracy (%)		0.5	0.5	0.5
AC voltage range (V)	600 V	1000 V	600 V	600 V
Basic accuracy (%)	0.5	1	0.5	0.5
Resistance range		40.00 ΜΩ	999.9 Ω	999.9 Ω
Basic accuracy (%)		0.5	1	1
Acoustic continuity test		•	•	•
Diode test		•		
Capacitance measurement		•		
Frequency measurement		•	•	•
Temperature measurement (Type K probe)		•	•	
Autocheck® V-Ω		•	Auto V-A	
Variable frequency drive		•		
Lo-Z (low input impedance)		•		
Power measurement (W, VA, VAR)	•		•	•
Energy measurement (kWh)				•
3-Phase Power measurement 3-wire/4-wire			•	•
Count	3000	6000	4000, 6000, 9999	6000
Backlight	•	•	•	•
Flashlight				
COM port (data transfer)		•	•	•
Automatic and manual range selection	Auto	•	Auto	Auto
Automatic switch off	•	•	•	
Non-contact electrical field detection		•		
MAX hold	•	•		
Peak value	•	•	•	•
Data hold	•	•	•	•
Relative value		•		
Jaw opening	31 mm	55 mm	45 mm	26 mm
Overvoltage category	* CAT IV / 300 V CAT III / 600 V	CAT IV / 1000 V	* CAT IV / 300 V CAT III / 600 V	* CAT IV / 300 V CAT III / 600 V
Dimensions (mm)	190 x 60 x 13	264 x 97 x 43	224 x 78 x 40	189 x 78 x 40
Weight (g)	255	608	224	192
CE mark	•	•	•	•
IP	IP40	IP40	IP40	IP40

6.16 Metrel Catalogue 2018 Accessories 6.34

MD 9231 Current Meter	MD 9226 Current Meter	MD 9225 Current Meter	MD 9222 Current Meter	MD 9221 Current Meter	MD 9210 Current Meter
**************************************	io R		Parameter and the parameter an		
	•	•	•		
0 A 1000 A	60 A 600 A	400 A			
5 1.8	2.0	1			
0 A 1000 A	60 A 600 A	400 A	60 A 1000 A	60 A 600 A	600 A
5 1.8	1.5 1.8	1	1.5 1.8	1.5 1.8	1.5
00 V 1000 V	600 V	600 V	600 V 1000 V	600 V	600 V
.8	1.2	0.3	0.8	1.0	0.3
00 V 1000 V	600 V	600 V	600 V 1000 V	600 V	600 V
.8	1.0	1	0.8	1.0	1.5
00 Ω 60 kΩ	600 Ω 60 kΩ	40.00 ΜΩ	600 Ω 60 kΩ	600 Ω 60 kΩ	40.00 ΜΩ
	1	0.8	1	1	0.6
	•	•	•	•	•
	•	•	•	•	•
	•	•	•	•	•
	•	•	•	•	•
	<u> </u>	•		•	
		Auto V-A			
	•	Auto V-A	•	•	
	•		•	<u> </u>	
000	5000	4000	5000	5000	4000
000	6000	4000	6000	6000	4000
	•	•	•	•	
uto	Auto	Auto	Auto	Auto	Auto
	•	•	•	•	•
	•		•	•	
	•	•	•	•	•
	•			•	
	•	•	•	•	•
	•	•	•	•	•
1mm	35mm	26 mm	51mm	30mm	26 mm
AT IV / 600 V	CAT IV / 300 V	* CAT IV / 300 V	CAT IV / 600 V	CAT IV / 300 V	* CAT IV / 300 V
AT III / 1000 V	CAT III / 600 V	CAT III / 600 V	CAT III / 1000 V	CAT III / 600 V	CAT III / 600 V
58 x 94 x 44	223 x 76 x 37	188 x 63 x 40	258 x 94 x 44	217 x 76 x 37	190 x 63 x 32
92	234	192	312	186	139
	•	•	•	•	•
940	IP40	IP40	IP40	IP40	IP40

*Note: The instrument with declared measurement category 600 V CAT III is safe and applicable in measurement category 300 V CAT IV, even if it is not marked.

Anyway, safety requirements form instrument manual must be followed.

Clamp Meters

MD 9272 Leakage Clamp TRMS Meter with Power Functions



The MD 9272 is a unique earth leakage clamp meter. It not just has the ability to accurately read the TRMS AC leakage current of a system, it can also detect losses in the system and suggest possible reasons for the loss. The voltage, power, harmonic, power factor (PF), total harmonic distortion (THD) and crest factor measurements make this instrument suitable for any electrician and engineer

MEASURING FUNCTIONS

- TRMS AC voltage measurement;
- TRMS AC current measurement;
- Frequency measurement;
- Power parameters measurement.

KEY FEATURES

- TRMS: accurate measurements on sinusoidal and non-sinusoidal signals.
- Jaw size: 28 mm.
- **Shielded Jaw:** shielded jaw allows the clamp meter to be used in the noisiest environments.
- 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.
- Power: measures various power parameters (active, reactive, apparent power, THD, PF, phase displacement).
- Intelligent loss analysis: complex algorithms detect loss and allow determining possible reasons for current loss.
- Harmonics: measures current or voltage harmonic components and a percentage value of a harmonic up to the 19th.
- THD and PF: dual display allows readings to be displayed along with Total Harmonic Distortion (THD) or Power Factor (PF).
- Peak value: the peak value of the waveform or crest factor can be displayed.
- MAX/MIN/HOLD mode: displays maximum, minimum or average measured value

APPLICATION

- Load and leakage current measurement;
- System maintenance:
- Power system checking;
- RCD fault finding;
- Process engineering.

STANDARD SET

MD 9016

- Current clamp MD 9272
- Test lead with probe, 2 pcs
- 1.5 V battery, type AAA, 2 pcs
- Pouch
- · Instruction manual
- Warranty

TECHNICAL DATA

FUNCTION	Range	Accuracy
AC current	40.00 mA, 400.0 mA, 4000 mA	±(0.8 % of reading + 3 digits)
//c current	40.00 A	±(1.0 % of reading + 3 digits)
	100.0 A	±(1.2 % of reading + 3 digits)
Mains frequency	45.0 Hz 500.0 Hz	±(0.5% of reading ± 1 digit)
AC/DC voltage	40.0 V	±(0.5 % of reading + 4 digits)
	400.0 V, 600.0 V	±(0.5 % of reading + 2 digits)
THD	0 99.9 %	±(2.0 % of reading + 3 digits)
	100 999 %	±(2.0 % of reading + 3 digits)
Crest Factor	1.00 2.99	±(2.0 % of reading + 2 digits)
	3.00 9.99	±(3.0 % of reading + 5 digits)
Peak value	40.00 100.0 A	±(3.0 % of reading + 3 digits)
	40.00 600.0 V	±(3.0 % of reading + 3 digits)
Power factor (PF)	0.00 1.00	± 5 digits
Phase	-180.0° +180.0°	± 10 digits
Power (W, Var, VA)	0 9999	±(1 % of reading + 30)
Power (kW, kVar, kVA)	10.00 99.99	±(2 % of reading + 30)
Power supply	2 x 1.5 V batteries, type AAA	
Overvoltage category	CAT IV / 300 V; CAT III / 600 V	
Dimensions	190 x 60 x 43 mm	
Weight	255 g	

6.18 Accessories 6.34 Metrel Catalogue 2018

Clamp meters

MD 9250 Industrial TRMS AC/DC CAT IV /1000 V

transfer (via optical interface), non-



- TRMS AC, DC voltage measurement; TRMS AC, DC current measurement;
- Capacitance measurement; Resistance measurement;
- Diode test;

- Frequency measurement; Electric field detection; Continuity test (acoustic signalling);
- Temperature measurement

- Large jaws: for measuring on 55mm size conductors.
- TRMS: accurate measurements on sinusoidal and non-sinusoidal signals.
 • VFD: feature makes the instrument
- VFD: feature makes the instrument capable of measuring the true values in accordance with frequency.
 High current: 2000 A DC & AC clamp on measurement.
 Lo-Z: AutoCheck® mode provides low (rampup) input impedance to drain ghost voltages.
 Auto-check function: automatic detection of AC voltage, DC voltage or resistance.
 Auto-ranging: user can switch between auto and manual ranging.
 Transient protection: it protects user in case of

- Transient protection: it protects user in case of lightning strike or switching surge up to 12 kV.
 Relative zero mode: relative function for
- Relative zero mode: relative function for comparing the difference between signals or removing background noise.
 PC Link: test results can be downloaded to the computer via the optional PC software.
 In-rush: fast 5ms Crest-MAX mode to capture in-rush currents.

- Temperature: measures temperature in Celsius up to 1000 °C and in Fahrenheit up to 1832 °F.
 Hold: data hold function freezes the
- Hold: Udta Hold Talletton Heezes and display for later view.
 Backlight: large bright 3-5/6 digits 6,000 counts + 1,999 counts dual LCD display with backlight for working in dark conditions.
 Safe: CAT IV / 1000 V overvoltage protection.

- Solar and wind power system testing;
- UPS system testing;
 Utility scale battery system testing;
 High level industrial testing;
- High level electrical testing

STANDARD SET

MD 9250 Current clamp MD 9250

- Test lead with probe, 2 pcs
- Thermocouple probe, type K
- Pouch
- 1.5 V battery, type AAA, 2 pcs
- Instruction manual
- Warrantv

FUNCTION	Range	Accuracy
DC Voltage	6.000 V 1000 V	±(0.5% of reading + 5 digits)
Autocheck (DCV)	6.000 V 1000 V	±(1.3% of reading + 5 digits)
AC Voltage (50 Hz 400 Hz)	6.000 V 1000 V	±(1.2% of reading + 5 digits)
AC+DC Voltage (DC, 50Hz 400 Hz)	6.000 V 1000 V	±(1.4% of reading + 7 digits)
Autocheck (ACV)	6.000 V 1000 V	±(1.5% of reading + 5 digits)
Variable Frequency Drive AC	10 Hz 400 Hz	from ±(4.0% of reading + 80 digits) to ±(7.0% of reading + 80 digits)
DC Current	200.0 A 2000 A	from ±(2.0% of reading + 5 digits) to ±(2.5% of reading + 5 digits)
AC Current (50 Hz 400 Hz)	200.0 A 2000 A	from ±(2.0% of reading + 5 digits) to ±(3.5% of reading + 5 digits)
Diode Test	1.000 V	±(1.0% of reading + 3 digit)
	Open-circuit voltage < 1	.8 V DC, Test current 0.56 mA
Resistance & Autocheck	600.0 Ω 40.00 MΩ	from ±(0.5% of reading + 5 digits) to ±(2.3% of reading + 5 digits)
Capacitance	60.00 nF 2000 μF	from ±(2.0% of reading + 5 digits) to ±(4.0% of reading + 5 digits)
Temperature	-50 °C 1000 °C	±(0.3% of reading + 4 digits)
	-58 °F 1832 °F	±(0.3% of reading + 6 digits)
Mains frequency	10 Hz 1999 Hz	±(0.1% of reading + 4 digits)
Power supply	2 x 1.5 V batteries, type	AA
Overvoltage category	CAT IV / 1000 V	
Dimensions	264 x 97 x 43 mm	
Weight	608 g	

Clamp Meters MD 9240 TRMS Power Clamp Meter



The MD 9240 is a high-quality and extremely easy to handle power clamp meter. The MD 9240 enables TRMS AC current measurement up to 1000 A, AC and DC voltage measurement, single-phase power analysis, temperature measurement and more. As a result the current clamp meter is suitable for maintenance and checking of distribution systems, switchboards and motors or systems where the supply network is heavily contaminated with harmonics

MEASURING FUNCTIONS

- TRMS AC, DC voltage measurement;
- TRMS AC current measurement;
- Frequency measurement;
- Resistance measurement;
- Continuity test;
- Temperature measurement;
- Power parameters measurement.

KEY FEATURES

- **TRMS:** accurate measurements on sinusoidal and non-sinusoidal signals.
- **Jaw size:** 45 mm.
- High current: measures up to 1000 A AC.
- Autocheck function: automatic detection of AC voltage, DC voltage or AC current.
- Power: measures various power parameters (active, reactive, apparent power, PF).
- Temperature: measures temperature in Celsius up to 300 °C and in Fahrenheit up to 572 °F.
- **PC Link:** test results can be downloaded to the computer via the optional PC software.
- Data Hold: data hold feature freezes the display for later view.
- Peak Hold: peak hold feature displays maximum RMS value of surge voltage or current.

APPLICATION

- System maintenance;
- Power system checking;
- High level Industrial testing;
- High level electrical testing.

STANDARD SET

MD 9240

- Current clamp MD 9240
- Test lead with probe, 2 pcs
- Thermocouple probe, type K1.5 V battery, type AAA, 2 pcs
- Pouch
- Instruction manual
- Warranty

TECHNICAL DATA

FUNCTION	Range	Accuracy
DC voltage	600.0 V	±(0.5 % of reading + 5 digits)
AC voltage (50 60 Hz; 45 500	600.0 V	from ±(0.5 % of reading + 5 digits),
Hz; 500 Hz 3.1 kHz)		to ±(2.5 % of reading + 5 digits)
AC current (50 60 Hz)	40.00 A, 400.0 A, 1000 A	±(1.0 % of reading + 5 digits)
AC current (45 500 Hz)	40.00 A, 400.0 A,	±(2.0 % of reading + 5 digits)
	1000 A	±(2.5 % of reading + 5 digits)
AC current (500 Hz 3.1 kHz)	40.00 A, 400.0 A,	±(2.5 % of reading + 5 digits)
	1000 A	±(3.0 % of reading + 5 digits)
Temperature	-50 °C 300 °C	±(2.0 % of reading + 3 °C)
Resistance	999.9 Ω	±(1.0 % of reading + 6 digits)
Continuity test	10 300 Ω	
Frequency	5.00 Hz 500.0 Hz	±(0.5 % of reading + 4 digits)
Power factor (PF)	0.10 0.99	±(3 digits), H from 1. to 21.
		±(5 digits), H from 22. to 51.
Apparent power	0 600.0 kVA	±(2.0 % of reading + 6 digits), H 1./10.
		±(3.5 % of reading + 6 digits), H 11./46.
		±(5.5 % of reading + 6 digits), H 47./51.
Active power, reactive power	0 600.0 kW, kVar	from ±(2.0 % of reading + 6 digits)
Power supply	2 x 1.5 V batteries, type	2 AAA
Overvoltage category	CAT IV / 300 V; CAT III ,	/ 600 V
Dimensions	224 x 78 x 40 mm	
Weight	224 g	

6.20 Accessories 6.34 Metrel Catalogue 2018

Clamp meters

MD 9235 TRMS Power Clamp Meter, 3-Phase, Unbalanced-Load

The MD 9235 is a Slim-Jaw current clamp meter with ability to measure 3-Phase Unbalanced-Load + kWHr recording. The MD 9235 enables TRMS AC current measurement up to 600 A, single and 3-phase power analysis, total power factor and resistance measurement. Display with large easy-to-read figures and one-handed operation make MD 9235 an extremely easy-to-use. This compact instrument combines a high level of functionality, small size and portability. All built-in features make MD 9235 a perfect tool for advanced Power applications.



MEASUDING FUNCTIONS

- TRMS AC, DC voltage measurement;
- TRMS AC current measurement;
- Resistance measurement;
- Frequency measurement;
- Continuity test (acoustic signalling);
- Power parameters measurement.

KEV FEATURE

- **Slim-Jaws**: ultra-slim jaws to access tight nlaces
- **TRMS:** accurate measurements on sinusoidal and non-sinusoidal signals.
- **kWHr:** Kilo-Watt-Hour recording function (with memory recall).
- Peak Hold: peak hold feature displays maximum RMS value of surge voltage or current.
- **Jaw size:** 26 mm.
- Transient protection: it protects user in case of lightning strike or switching surge up to 6.5 kV.
- PC Link: test results can be downloaded to the computer via the optional PC software.
- **Hold:** data hold function freezes the display for later view.
- Safe: CAT IV / 300 V, CAT III / 600 V overvoltage protection.

ΔΡΡΙΙΓΑΤΙΩΝ

- Power system checking;
- High level industrial testing;
- High level electrical testing.

STANDARD SET

MD 9235

- Current clamp MD 9235
- Test lead with probe, 2 pcs
- Pouch
- 1.5 V battery, type AAA, 2 pcs
- Instruction manual
- Warranty

TECHNICAL DATA

FUNCTION	Range	Accuracy
DC Voltage	600.0 V	±(0.5% of reading + 5 digits)
AC Voltage	600.0 V	from ±(0.5% of reading + 5 digits)
(50 Hz 3.1 kHz)		to ±(2.5% of reading + 5 digits)
AC Current	40.00 A 600 A	from ±(1.0% of reading + 5 digits)
(40 Hz 3.1 kHz)		to ±(3.0% of reading + 5 digits)
Resistance	999.9 Ω	±(1.0% of reading + 6 digits)
Apparent power	0 kVA 600.0 kVA	±(2.0% of reading + 6 digits), H 1./10.
		±(3.5% of reading + 6 digits), H 11./46.
		±(5.5% of reading + 6 digits), H 46./51.
Active power, reactive power	0 kVA 600.0 kW, kVar	from ±(2.0% of reading + 6 digits)
		to ±(10.0% of reading + 6 digits), H 1./10.
		from ±(3.5% of reading + 6 digits)
		to ±(10.0% of reading + 6 digits), H 11./25.
		from ±(4.5% of reading + 6 digits)
		to ±(15.0% of reading + 6 digits), H 26./45.
		from ±(10.0% of reading + 6 digits)
		to ±(15.0% of reading + 6 digits), H 46./51.
Power factor (PF)	0.10 0.99	±(3 digits), H 1./21.
		±(5 digits), H 22./51.
Mains frequency	5 Hz 500 Hz	±(0.5% of reading + 4 digits)
Power supply	2 x 1.5 V batteries, type AA	AA
Overvoltage category	CAT IV / 300 V, CAT III / 60	00 V
Dimensions	189 x 78 x 40 mm	
DITTETISIONS	103 X 70 X 10 111111	

Clamp Meters

MD 9231 Industrial TRMS AC/DC Current Clamp Meter



The MD 9231 is an industrial TRMS AC and DC current clamp meter with a wide jaw opening and is capable of measuring currents up to 1000 A. It has the ability to measure capacitance and frequency and is equipped with a built-in VFD feature that makes the instrument capable of measuring the true values in accordance with frequency. The MD 9231 has a wide range of extra features, including peak value, data and MAX hold functions, auto power off, auto-ranging and a relative zero function. It uses state-of-the-art measurement technology and is housed in a sturdy industrial-grade case. It also has a flashlight for work in dark conditions.

MEASURING FUNCTIONS

- DC and TRMS AC voltage measurement up to 1000 V;
- DC and TRMS AC current measurement up to 1000 A;
- Resistance measurement;
- Acoustic continuity test;
- · Diode test;
- Frequency measurement;
- Capacitance measurement.

KEY FEATURES

- · Auto-ranging.
- LCD display with **backlight**, 3-5/6 digit, 6000 count.
- · Flashlight.
- AmpTip[™] Low current & Hz: clamp tip for measuring AC and DC current up to 60 A.
- Automatic, non-contact detection of electromagnetic fields to locate and trace live conductors.
- · Data hold function.
- MIN/MAX/AVG function.
- Relative zero.
- 51 mm jaw opening.
- CAT IV / 600 V, CAT III / 1000 V overvoltage categories.

APPLICATION

- System maintenance:
- Power system checking;
- High level industrial testing;
- High level electrical testing.

STANDARD SET

MD 9231

- Current clamp MD 9231
- Test lead, 2 pcs

Battery, 2 pcs

- Pouch
- Instruction manual
- Warranty

TECHNICAL DATA

FUNCTION	Range	Accuracy	
DC Voltage	600.0 V 1000.0 V	±(0.8% of reading + 5 digits)	
AC Voltage	600.0 V 1000.0 V	from ±(0.8% of reading + 5 digits) to	
(50 Hz 400 Hz)		±(10% of reading + 5 digits)	
DC+AC Voltage	600.0 V 1000.0 V	from ±(1.0% of reading + 7 digits) to	
(DC, 50 Hz 400 Hz)		±(12% of reading + 7 digits)	
PEAK-rms (ACV & ACA)	Response: 80 ms to > 90%.		
CREST (Peak-Hold)	Accuracy: Add 250 digits to spe	cified accuracy for changes > 5ms	
Audible Continuity Tester	Audible Threshold: At between 10	Ω and 250 Ω . Response time: 32 ms approx.	
<u>Ohm</u>	600.0 Ω, 6.000 kΩ, 60.00 kΩ	±(1.0% of reading + 5 digits)	
Capacitance	200.0 μF, 2500 μF	±(2.0% of reading + 4 digits)	
Diode Tester	2.000 V	±(1.5% of reading + 5 digits)	
AmpTip™ clamp-on DCA	00.00 A 60.00 A	from ±(1.5% of reading + 5 digits) to	
		±(3.0% of reading + 5 digits)	
AmpTip [™] clamp-on ACA	00.00 A 60.00 A	from ±(1.5% of reading + 5 digits) to	
(40 Hz 400 Hz)		±(3.0% of reading + 5 digits)	
AmpTip [™] clamp-on DC+ACA	00.00 A 60,00 A	from ±(2.0% of reading + 7 digits) to	
(DC, 40 Hz 400 Hz)		±(3.0% of reading + 7 digits)	
Regular Clamp-on DCA	60.00 A 1000 A	±(1.8% of reading + 5 digits)	
Regular Clamp-on ACA	60.00 A 1000 A	from ±(1.8% of reading + 5 digits) to	
(40 Hz 400 Hz)		±(2.2% of reading + 5 digits)	
Regular Clamp-on DC+ACA	60.00 A 1000 A	from ±(2.2% of reading + 7 digits) to	
(DC. 40 Hz 400 Hz)		±(2.5% of reading + 7 digits)	
Hz Line Level Frequency	5.00 Hz 999.9 Hz	±(1.0% of reading + 5 digits)	
Non-Contact EF-Detection	20 V 440 V	Tolerance: 10 V 1000 V	
Detection Frequency	50/60Hz		
Transient Protection	8.0 kV (1.2/50 µs surge)		
Overload Protections	Current & Hz functions via jaws	: 1000 ADC/AAC rms at < 400 Hz	
	Other functions via terminals: 1	.000 VDC/VAC rms	
Power Supply	2 x 1.5 V batteries, type AAA		
Power Consumption	Typical 13 mA for Current functions		
Dimension (L x W x H)	258 x 94 x 44 mm		
Weight	392 g		
law opening & Conductor diameter	51 mm max		

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Clamp meters MD 9226 TRMS AC/DC Current Clamp Meter

hold functions, auto power off,



- DC and TRMS AC voltage up to 600 V;
- TRMS AC current measurement up to
- Resistance measurement;
- Acoustic continuity test;
- Diode test;
- Frequency measurement;
- Capacitance measurement;
- Temperature measurement.

- · Auto-ranging.
- LCD display with backlight, 3-5/6 digit, 6000 count.
- . AmpTip™ Low current & Hz: clamp tip for measuring AC and DC current up to 60 A.
- · Automatic, non-contact detection of electromagnetic fields to locate and trace live conductors.
- · Data hold function.
- MIN/MAX/AVG function.
- · Peak value.
- Relative zero.
- 35 mm jaw opening.
- CAT IV / 300 V, CAT III / 600 V overvoltage categories.

- System maintenance:
- Power system checking;
- · High level industrial testing;
- High level electrical testing.

STANDARD SET

MD 9226

- Current clamp MD 9226
- Test lead, 2 pcs

- · Battery, 2 pcs
- Pouch
- Instruction manual
- · Warranty

FUNCTION	Range	Accuracy
DC Voltage	600.0 V	±(1.0% of reading + 5 digits)
AC Voltage (50 Hz 60 Hz)	600.0 V	±(1.0% of reading + 5 digits)
DC+AC Voltage (DC, 50 Hz 60 Hz)	600.0 V	±(1.2% of reading + 7 digits)
PEAK-rms (ACV & ACA)	Response: 80 ms to > 90%	
Audible Continuity Tester	Audible Threshold: At between 10	Ω and 250 Ω . Response time: 32ms approx.
<u>Ohm</u>	600.0 Ω, 6.000 kΩ, 60.00 kΩ	±(1.0% of reading + 5 digits)
Capacitance	200.0 ΩF, 2500 ΩF	±(2.0% of reading + 4 digits)
Diode Tester	2.000 V	±(1.5% of reading + 5 digits)
AmpTip™ clamp-on ACA	60.00 A	±(1.5% of reading + 5 digits)
(50 Hz 60 Hz)		
AmpTip [™] clamp-on DCA	60.00 A	±(2.0% of reading + 5 digits)
AmpTip™ clamp-on DC+ACA	60.00 A	±(2.0% of reading + 7 digits)
(DC, 50 Hz 60 Hz)		
Regular Clamp-on ACA	60.00 A 600.0 A	from ±(1.8% of reading + 5 digits) to
(50 Hz 400 Hz)		±(2.0% of reading + 5 digits)
Regular Clamp-on DCA	60.00 A 600.0 A	±(2.0% of reading + 5 digits)
Regular Clamp-on DC+ACA	60.00 A 600.0 A	from ±(2.2% of reading + 7 digits) to
(DC, 50 Hz 400 Hz)		±(2.7% of reading + 7 digits)
Hz Line Level Frequency	5.00 Hz 999.9 Hz	±(1.0% of reading + 5 digits)
Non-Contact EF-Detection	20 V 440 V	Tolerance: 10 V 600 V
Detection Frequency	50/60 Hz	
Transient Protection	6.0 kV (1.2/50 μs surge)	
Overload Protections	Current & Hz functions via jaws:	600 A DC/ A AC rms at < 400 Hz
	Other functions via terminals: 6	00 V DC / V AC rms
Power Supply	2 x 1.5 V batteries, type AAA	
Power Consumption	13 mA	
Dimension (L x W x H)	223 x 76 x 37 mm	
Weight	234 g	
Jaw opening & Conductor diameter	35 mm	

Clamp meters

MD 9225 Most Complete Industrial TRMS AC/DC Current Clamp Meter



The MD 9225 is a versatile current clamp meter with perfect combination of size and builtin functions. It measures AC/DC current and voltage, capacitance, temperature, full range resistance and captures In-rush current. Display with large easy-to-read figures and one-handed operation make MD 9225 an extremely easy-to-use. This compact instrument combines a high level of functionality, small size and portability. All built-in features make MD 9225 a perfect tool for advanced applications

MEASURING FUNCTIONS

- TRMS AC, DC voltage measurement;
- TRMS AC, DC current measurement;
- Capacitance measurement;
- Resistance measurement;
- Diode test;
- Frequency measurement;
- Continuity test (acoustic signalling);
- Temperature measurement.

KEY FEATURES

- Clamp on + Full Multimeter ranges: measures current up to 400 A AC/DC.
- Jaw size: 26 mm.
- In-rush: fast 30 ms Crest-MAX mode to capture in-rush currents.
- Temperature: measures temperature in Celsius up to 537 °C and in Fahrenheit up to 999 °F.
- Transient protection: it protects user in case of lightning strike or switching surge up to 6.5 kV.
- **High resolution:** 4000 counts enable fast measurements.
- Relative zero mode: relative function for comparing the difference between signals or removing background noise.
- **Hold:** data hold function freezes the display for later view.
- Safe: CAT IV / 300 V, CAT III / 600 V overvoltage protection.

APPLICATION

- · Solar and wind power system testing;
- UPS system testing;
- Utility scale battery system testing;
- Working in small enclosures.

STANDARD SET

MD 9225

- Current clamp MD 9225
- Test lead with probe, 2 pcs
- Thermocouple probe, type K
- Pouch
- 1.5 V battery, type AAA, 2 pcs
- Instruction manual
- Warranty

TECHNICAL DATA

FUNCTION	Range	Accuracy
DC Voltage	400.0 mV 600 V	From ±(0.3% of reading + 3 digits)
		to ±(1.0% of reading + 4 digits)
AC Voltage	4.000 V 600 V	From ±(1.0% of reading + 4 digits)
(50 Hz 500 Hz)		to ±(2.0% of reading + 4 digits)
DC Current	0.0 A 400.0 A	From ±(1.0% of reading + 4 digits)
		to ±(2.5% of reading + 5 digits)
AC Current	0 A 400 A	From ±(1.0% of reading + 6 digits)
(40 Hz 400 Hz)		to ±(2.5% of reading + 5 digits)
Diode Test	Open-circuit voltage < 1.6 V D	C, Test current 0.4 mA
Resistance	400.0 Ω 40.00 MΩ	From ±(0.8% of reading + 6 digits)
		to ±(2.0% of reading + 4 digits)
Capacitance	500.0 nF 3000 μF	±(3.5% of reading + 6 digits)
Temperature	-20 °C 537 °C	From ±(2.0% of reading + 3 digits)
		to ±(3.0% of reading + 3 digits)
	-4 °F 1000 °F	From ±(2.0% of reading + 6 digits)
		to ±(3.0% of reading + 6 digits)
Mains frequency	5 Hz100 kHz	±(0.5% of reading + 4 digits)
Power supply	2 x 1.5 V batteries, type AAA	
Overvoltage category	CAT IV / 300 V, CAT III / 600 V	
Dimensions	188 x 63 x 40 mm	
Weight	218 g	

6.24 Accessories 6.34 Metrel Catalogue 2018

Clamp Meters MD 9222 TRMS AC Current Clamp Meter

The MD 9222 is a professional TRMS AC current clamp meter with a wide jaw opening and is capable of measuring currents up to 1000 A. It has the ability to measure capacitance and frequency and is equipped with a built-in VFD feature that makes the instrument capable of measuring the true values in accordance with frequency. The MD 9222 has a wide range of extra features, including data and MAX hold functions, auto power off, auto-ranging and a relative zero function. It uses state-of-the-art measurement technology and is housed in a sturdy industrial-grade case.



MEASHDING FUNCTIONS

- DC and TRMS AC voltage up to 1000 V;
- TRMS AC current measurement up to 1000 A;
- Resistance measurement;
- Acoustic continuity test;
- Diode test;
- Frequency measurement;
- Capacitance measurement.

KEY FEATURES

- · Auto-ranging.
- LCD display with backlight, 3-5/6 digit, 6000 count.
- Automatic, non-contact detection of electromagnetic fields to locate and trace live conductors.
- Data hold function.
- MIN/MAX/AVG function.
- · Relative zero.
- 51 mm jaw opening.
- CAT IV / 600 V, CAT III / 1000 V overvoltage categories.

APPLICATION

- System maintenance;
- · Power system checking;
- · High level industrial testing;
- High level electrical testing.

STANDARD SET

MD 9222

- Current clamp MD 9222
- Test lead, 2 pcs

Battery, 2 pcs

- PouchInstruction manual
- Warranty

TECHNICAL DATA

FUNCTION	Range	Accuracy
DC Voltage	600.0 V 1000.0 V	±(0.8% of reading + 5 digits)
AC Voltage (50 Hz 400 Hz)	600.0 V 1000.0 V	from \pm (0.8% of reading + 5 digits) to \pm (10% of reading + 5 digits)
CREST (Peak-Hold)	Accuracy: Add 250 digits to spe	cified accuracy for changes > 5ms
Audible Continuity Tester	Audible Threshold: At between Response time: 32 ms approx.	10 Ω and 250 Ω
Ohm	600.0 Ω, 6.000 kΩ, 60.00 kΩ	±(1.0% of reading + 5 digits)
Capacitance	200.0 μF, 2500 μF	±(2.0% of reading + 4 digits)
Diode Tester	2.000 V	±(1.5% of reading + 5 digits)
AmpTip [™] clamp-on ACA (40 Hz 400 Hz)	00.00 A 60.00 A	from $\pm (1.5\%$ of reading + 5 digits) to $\pm (3.0\%$ of reading + 5 digits)
Regular Clamp-on ACA (40 Hz 400 Hz)	60.00 A 1000 A	from ±(1.8% of reading + 5 digits) to ±(2.2% of reading + 5 digits)
Hz Line Level Frequency	5.00 Hz 999.9 Hz	±(1.0% of reading + 5 digits)
Non-Contact EF-Detection	20 V 440 V	Tolerance: 10 V 1000 V
Detection Frequency	50/60Hz	
Transient Protection	8.0 kV (1.2/50 μs surge)	
Overload Protections	Current & Hz functions via jaws: 1000 ADC/AAC rms at < 400 Hz Voltage & 3-Phase Rotation functions via terminals: 1100 VDC/VAC rms Other functions via terminals: 1000 VDC/VAC rms	
Power Supply	2 x 1.5 V batteries, type AAA	
Power Consumption	4.3 mA	
Dimension (LxWxH)	258 x 94 x 44 mm	
Weight	312 g	
Jaw opening & Conductor diameter	51 mm max	

Clamp Meters

MD 9221 TRMS AC Current Clamp Meter



- DC and TRMS AC voltage up to 600 V;
- TRMS AC current measurement up to 600 A;
- 3-phase rotation function;
- Resistance measurement;
- Acoustic continuity test;
- Diode test;
- · Frequency measurement;
- Capacitance measurement;
- · Temperature measurement.

- · Auto-ranging.
- LCD display with backlight, 3-5/6 digit, 6000 count.
- Automatic, non-contact detection of electromagnetic fields to locate and trace live conductors.
- · Data hold function.
- MIN/MAX/AVG function.
- · Peak value.
- Relative zero.
- 30 mm jaw opening.
 CAT IV / 300 V, CAT III / 600 V overvoltage categories.

- · System maintenance;
- Power system checking;
- · High level industrial testing;
- High level electrical testing.

STANDARD SET

MD 9221

- · Current clamp MD 9221
- Test lead, 3 pcs

• Insulated crocodile clip, 3 pcs

- Type K temperature sensor
- Battery, 2 pcs
- Pouch
- Instruction manual
- Warranty

FUNCTION	Range	Accuracy
DC Voltage	600.0 V	±(1.0% of reading + 5 digits)
AC Voltage (50 Hz 60 Hz)	600.0 V	±(1.0% of reading + 5 digits)
PEAK-rms (ACV & ACA	Response: 80 ms to > 90%	
Audible Continuity Tester	Audible Threshold: At between 10 (1 and 250 Ω. Response time: 32ms approx.
Ohm	600.0 Ω, 6.000 ΚΩ, 60.00 ΚΩ	±(1.0% of reading + 5 digits)
Capacitance	200.0 ΩF, 2500 ΩF	±(2.0% of reading + 4 digits)
Diode Tester	2.000 V	±(1.5% of reading + 5 digits)
DCμA	200.0 ΩΑ, 2000 ΩΑ	±(1.0% of reading + 5 digits)
Temperature	-40.0 ΩC 400 ΩC	from ±(1.0% of reading + 0.8 °C) to
		±(1.0% of reading + 1 °C)
	-40,0 °F 752 °F	from ±(1.0% of reading + 1,5 °F) to
		±(1.0% of reading + 2 °F)
AmpTip [™] clamp-on	60.00 A	±(1.5% of reading + 5 digits)
ACA (50 Hz 60 Hz)		
Regular Clamp-on	60.00 A 600,0 A	From ±(1.8% of reading + 5 digits) to
ACA (50 Hz 400 Hz)		±(2.0% of reading + 5 digits)
Hz Line Level Frequency	5.00 Hz 999.9 Hz	±(1.0% of reading + 5 digits)
Non-Contact EF-Detection	20 V 440 V	Tolerance: 10 V 600 V
Detection Frequency	50/60Hz	
Transient Protection	6.0 kV (1.2/50 µs surge)	
Overload Protections	Current & Hz functions via jaws:	600 A DC/ A AC rms at < 400 Hz
	Voltage & 3-Phase Rotation function	ns via terminals: 660 V DC / 920 V AC rms
	Other functions via terminals: 60	00 V DC / V AC rms
Power Supply	2 x 1.5 V batteries, type AAA	
Power Consumption	4.3 mA	
Dimension (L x W x H)	217 x 76 x 37 mm	
Weight	186 g	
Jaw opening & Conductor diameter	30 mm	

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Clamp meters MD 9210 Mini Clamp Meter

Versatility, sturdy case, high accuracy and lots of measurement functions are key features of the current clamp MD 9210. This universal current clamp offers good value for money.



MEASURING FUNCTIONS

- AC, DC voltage measurement;
- AC current measurement;
- Frequency measurement;
- Resistance measurement;
- · Continuity testing;
- Capacitance measurement;
- Diode test.

KEY FEATURES

- **Jaw size:** 26 mm.
- Lightweight: 139 g only.
- **High specification:** readings up to 600 A with excellent accuracy.
- **Auto-ranging:** no need of manual ranging.
- **Relative zero mode:** relative function for comparing the difference between signals or removing background noise.
- **Data Hold:** data hold feature freezes the display for later view.
- MAX Hold: MAX hold feature freezes the maximum measured value.
- Easy to read: large bright 3-3/4 digits 4000 counts LCD display.

ΔΡΡΙΙΓΑΤΙΩΝ

- Working in small enclosures;
- General purpose;
- 3-phase machinery testing.

STANDARD SET

MD 9210

- Current clamp MD 9210
- Test lead with probe, 2 pcs
- 3 V battery
- Pouch
- Instruction manual
- Warranty

TECHNICAL DATA

FUNCTION	Range	Accuracy
DC voltage	400.0 mV	±(0.3 % of reading + 4 digits)
	4.000 V, 40.00 V, 400.0 V	±(0.5 % of reading + 3 digits)
	600 V	±(1.0 % of reading + 4 digits)
AC voltage (50 Hz 500 Hz)	4.000 V, 40.00 V, 400.0 V	±(1.5 % of reading + 5 digits)
	600 V	±(2.0 % of reading + 5 digits)
AC current (50 / 60 Hz)	40.00 A, 400.0 A, 600 A	±(1.5 % of reading + 8 digits)
Resistance	400.0 Ω	±(0.8 % of reading + 8 digits)
	$4.000 \text{ k}\Omega$, $40.00 \text{ k}\Omega$, $400.0 \text{ k}\Omega$	±(0.6 % of reading + 4 digits)
	4.000 ΜΩ	±(1.0 % of reading + 4 digits)
	40.00 ΜΩ	±(2.0 % of reading + 4 digits)
Diode test	Open-circuit voltage <1.6 VDC, test	current 0.25 mA
Frequency	10 Hz 100 kHz	±(0.5 % of reading + 4 digits)
Capacitance	500.0 nF 3000 μF	±(3.5 % of reading + 6 digits)
Power supply	3 V battery (IEC-CR2032)	
Overvoltage category	CAT IV / 300 V; CAT III / 600 V	
Dimensions	190 x 63 x 32 mm	
Weight	139 g	

Voltage and continuity testers Selection Guide for Voltage and Continuity Testers

Part No.:	MD 1160 LCD Voltage / Continuity Tester	MD 1060 LCD Voltage / Continuity Tester
AC VOLTAGE		
Test Range	12 V 690 V	12 V 690 V
Operation time		
Response Time	<1s	<1s
requency Range	16 400 Hz	16 400 Hz
DC VOLTAGE		
Test Range	12 V 690 V	12 V 690 V
Operation time		
Response Time	<1s	<1s
RESISTANCE & CONTINUITY TEST		
ndication	Acoustical and LED indication	Acoustical and LED indication
Resistance range		
Continuity test (Acoustic)	0 500 kΩ +50%	0 500 kΩ +50%
Test current	3.5 mA	3.5 mA
RCD TRIGGER TEST		
RCD fault test		
Phase TESTING		
Phase Testing	Single-Pole Phase testing	Single-Pole Phase testing
Phase Sequence	Two-Pole Phase Sequence testing	Two-Pole Phase Sequence testing
Phase indication	>100 V AC	>100 V AC
DISPLAY		
уре	LC display	LED display
Tolerance	0 V 690 V ± (3% ± 5dgt)	12 V, 24 V, 50 V, 120 V, 230 V, 400 V, 690 V
TORCH LAMP	LED	LED
SAFETY & PROTECTION		
Overload Category	CAT IV 600 V	CAT IV 600 V
Compliant to standards	IEC/EN 61243-3:2014, DIN VDE 0411, IEC 61010, GS38	IEC/EN 61243-3:2014, DIN VDE 0411, IEC 61010, GS38
Protection degree	IP64 For outdoor use: Water jet and dust tight protection	IP64 For outdoor use: Water jet and dust tight protection
TEMPERATURE RANGE	-15 55 °C	-15 55 °C
POWER SUPPLY		
Battery type	2 x 1,5 V Type AAA Micro	2 x 1,5 V Type AAA Micro
DIMENSIONS	••	**
Dimensions	240 x 60 x 20 mm	240 x 60 x 20 mm
Weight	200 g	200 g

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Voltage and continuity testers MD 1160 LCD Voltage / Continuity Tester

A two-pole voltage detector is a basic tool kit for electricians. High quality rubber construction make this the professional's choice. Both models support Voltage measurement, Continuity measurement, Single pole test, Phase rotating field test and a torch function via a white LED for working in dark areas. The products are built in accordance to the latest voltage tester standard IEC/EN 61243-3:2014 and are GS approved by TÜV test lab.



MEASURING FUNCTIONS

- AC, DC voltage testing;
- Phase testing;
- Rotary field testing;
- Continuity testing.

KEY FEATURES

- Voltage testing up to 690 V;
- Automatic AC/DC recognition;
- Continuity buzzer and led to indicate resistances below 500 $k\Omega;$
- Phase & Rotating Field Test;
- Auto Power Off;
- LCD display (MD 1160);
- Optical and Acoustic indication of Protective Extra Low Voltage.

APPLICATION

- Mid-level electrical testing;
- Mid-level electronic fault finding;
- Field servicing;
- General purpose.

STANDARD SET

MD 1160

- Voltage tester MD 1160
- 1.5 V battery, type AAA, 2 pcs
- Plastic probe guard (in accordance with GS38)
- Instruction manual
- Warranty

ΤΕΓΗΝΙΓΔΙ ΠΔΤΔ

FUNCTION	Range
Nominal voltage range	12 V 690 V AC TRMS (automatic range selection)
Nominal voltage range	12 V 690 V DC (automatic range selection)
Frequency range	16 400 Hz
Continuity test (Acoustic)	0 500 kΩ
RCD test current	3.5 mA
Phase indication	>100 VAC
Phase rotation determination	2-pole
Reaction time	< 0.1 s
Display	LC display
Power supply	2 x 1.5 V batteries, type AAA
Overvoltage category	CAT IV / 600 V
Dimensions	240 x 60 x 20 mm
Weight	200 g

Voltage and continuity testers MD 1060 LCD Voltage / Continuity Tester



MEASURING FUNCTIONS

- · AC, DC voltage testing;
- Phase testing;
- Rotary field testing;
- Continuity testing.

KEY FEATURES

- Voltage testing up to 690 V;
- Automatic AC/DC recognition;
- Continuity buzzer and led to indicate resistances below 500 $k\Omega;$
- Phase & Rotating Field Test;
- Auto Power Off;
- LED display (MD 1060);
- Optical and Acoustic indication of Protective Extra Low Voltage.

APPLICATION

- Mid-level electrical testing;
- · Mid-level electronic fault finding;
- · Field servicing;
- · General purpose.

STANDARD SET

MD 1060

- Voltage tester MD 1060
- 1.5 V battery, type AAA, 2 pcs
- Plastic probe guard (in accordance with GS38)
- · Instruction manual
- Warranty

TECHNICAL DATA

FUNCTION	Range
Nominal voltage range	12 V 690 V AC TRMS (automatic range selection)
Nominal voltage range	12 V 690 V DC (automatic range selection)
Frequency range	16 400 Hz
Continuity test (Acoustic)	0 500 kΩ
RCD test current	3.5 mA
Phase indication	>100 VAC
Phase rotation determination	2-pole
Reaction time	< 0.1 s
Display	LED bargraph
Power supply	2 x 1.5 V batteries, type AAA
Overvoltage category	CAT IV / 600 V
Dimensions	240 x 60 x 20 mm
Weight	200 g

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Non contact voltage detectors Selection Guide for Non Contact Voltage Detector

Part No.:	MD 116	MD 106
	Non Contact Voltage Detector	Non Contact Voltage Detector
Measurement range	12 1000 V AC	90 1000 V AC
Frequency Range	40 400 Hz	50 60 Hz
Current consumption	80 mA	80 mA
Duty cycle	Continuous	Continuous
DISPLAY		
Optical	•	•
Acoustical	•	•
Vibrating	•	
Overvoltage category	CAT IV / 1000 V	CAT IV / 1000 V
Degree of protection	IP 65	IP 65
POWER SUPPLY		
Battery type	2 x 1,5 V LR03 batteries (type AAA)	2 x 1,5 V LR03 batteries (type AAA)
DIMENSIONS		
Dimensions	155 x 25 x 23 mm	155 x 25 x 23 mm
Weight	58 g	58 g

Non contact voltage detectors MD 116 Non Contact Voltage Detector



The MD 116 is a non-contact voltage tester that features an optical, acoustical and a vibrating indicator. It comes complete with a pocket clip. It is easy to operate and is an essential tool for both home handymen and professionals. The MD 116 can detect live-voltage wires in splices, cable plugs, cable drums, sockets, switches and junction boxes. The operation of the MD 116 is self-tested automatically after power up. No extra button required. It supports switching between low and high sensitivity (12 / 90 V AC) and has an integrated LED flashlight for working in dark conditions. The Metrel MD 116 uses a capacitive measuring process. In contrast to inductive measurements, no flow of current is

MEASURING FUNCTIONS

- Non-contact voltage detection from 12 V ΔC·
- High performance LED flashlight;
- Optical, acoustical and vibrating indication in case of power.

KEV FEATURES

- 12 V ... 1000 V AC measurement range.
- Optical, acoustical and vibrating indication.
- CAT IV / 1000 V overvoltage protection.

APPLICATION

- General purpose.
- · Low level electrical testing.
- · Hobby work.

STANDARD SET

MD 116

- Non-contact voltage detector MD 116
- 1.5 V battery test, type AAA, 2 pcs
- Instruction manual
- Warranty

TECHNICAL DATA

FUNCTION	Range	
Display	Optical, acoustical, vibrating	
Overvoltage category	CAT IV / 1000 V	
Measurement range	12 1000 V AC	
Frequency range	40 400 Hz	
Temperature range	0 40°C, < 80% relative humidity	
Current consumption	80 mA	
Duty cycle	Continuous	
Power supply	2 x 1,5 V LR03 batteries (type AAA)	
Degree of protection	IP 65	
Dimensions	155 x 25 x 23 mm	
Weight	Annrox, 58 g	

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Non contact voltage detectors MD 106 Non Contact Voltage Detector

The MD 106 is a basic non-contact voltage tester that features an optical and acoustical indicator. It comes complete with a pocket clip. It is easy to operate and is an essential tool for both home handymen and professionals. The MD 106 can detect live-voltage wires in splices, cable plugs, cable drums, sockets, switches and junction boxes. The operation of the MD 106 can be verified with the self-test button. The Metrel MD 106 uses a capacitive measuring process. In contrast to inductive measurements, no flow of current is required.



MEASUDING FUNCTIONS

- Non-contact voltage detection from 90 V AC.
- Optical and acoustical indication in case of power.

KEY FEATURES

- 90 V ... 1000 V AC measurement range.
- Optical and acoustical indication.
- CAT IV / 1000 V overvoltage protection.

APPLICATION

- General purpose.
- Low level electrical testing.
- Hobby work.

STANDARD SET

MD 106

- Non-contact voltage detector MD 106
- 1.5 V battery test, type AAA, 2 pcs
- Instruction manual
- Warranty

TECHNICAL DATA

FUNCTION	Range	
Display	Optical, acoustical	
Overvoltage category	CAT IV / 1000 V	
Measurement range	90 1000 V AC	
Frequency range	50 60 Hz	
Temperature range	-10°C+50°C, < 75% relative humidity	
Current consumption	80 mA	
Duty cycle	Continuous	
Power supply	2 x 1,5 V LRO3 batteries (type AAA)	
Degree of protection	IP 65	
Dimensions	155 x 25 x 23 mm	
Weight	Annrox, 56 g	

Selection Guide for DMM Accessories

Photo	Part number	Description	Target application	MD 9070	MD 9060	MD 9050	MD 9040	MD 9035	MD 9030	MD 9020	MD 9016	MD 9250	MD 9235	MD 1060
	AMD 9027	Remote probe	Probe with switch for starting insulation or continuity test.	•										
Ħ	AMD 9028	Alligator clip	Insulated test lead accessory for gripping the measured item.	•	•	•	•	•	•	•	•	٠	•	
% %	AMD 9026	Test lead with probe, 2 pcs	Test lead with probe, 2 pcs.	•	•	•	•	•	•	•	•			
	AMD 1190	Probe caps and metal pins	Probe caps and metal pins.											•
	AMD 9023	Thermocouple probe, type K	Probe for contact temperature measurement.		•	•		•	•	•	•			
	AMD 9024	Adapter for thermocouple probe AMD 9023	Adapter is intended to connect the thermocouple probe with a multimeter.		•	•		•	•	•	•			
~ • • • • • • • • • • • • • • • • • • •	AMD 9025	PC Software for MD 9016 with RS232 cable	Basic downloading software supplied on CD and RS232 communication cable.								•			
ه کا		USB interface set	Communication set contains USB adapter, USB and RS232 drivers and PC software on CD.		•	•	•							
on I	AMD 9240	PC interface set for MD 9240	PC interface set enables data transferring to the PC. Set contains optical adapter, cable and PC software on CD.					•					•	
	AMD 9250	PC interface set for MD 9250										•		
	AMD 9022	Magnetic Hanging Strap	The universal hanger allows you to hang your meter on metal surfaces.	•	•	•	•	٠			•			
	AMD 9100	Soft carrying pouch	Soft carrying pouch for digital mulitmeter storage. Dimensions: 220 x 125 x 70 mm.	•	•	•	•							
Option														

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Content

Variable transformers

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Good to know

Variable transformers

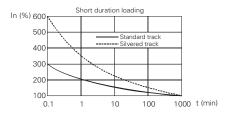
METREL is well known producer of variable transformers and power supplies which are widely accepted in laboratories, industry, schools.

The competitiveness of these products is based on a good price/performance ratio. They are robust in construction, they have low magnetizing current, low operating torque and no distortion or harmonics added. Copper winding is precision wound on a toroidal core. Tradition with 50 years of experience in continuous production, product control, testing, safety, permanent improvements and, customer service are fil rouge in the production of METREL variable transformers. Complete information on variable transformers and complete instrument product groups of METREL can be found on www.metrel.si.

METREL variable transformers are available as:

- Single or poly phase types;
- Autotransformer or insulated variable transformer;
- Manual or motor driven variable transformer;
- Open / panel mount or enclosed construction;
- Air-cooled, optional oil-cooled variable transformer.

METREL variable transformers provide continuously adjustable voltage from zero to 100% or 113% of the line voltage. Their operation is simple and efficient. Cooper wire is wound on a toroidal core by using high precision winding machines. Sliding trace of the winding is properly smoothed to provide low resistance and long wearing track for the carbon brush. Some models are silver plated, providing lower output impedance. The core is made of strip-wound oriented silicon steel for low electrical losses and high magnetic densities. The coil is insulated from the core by means of a special insulation support that also prevents movement of coil turns. Variable transformers are wound in a manner to ensure that voltage between the two turns is small enough to avoid harmful sparking or excessive heating of shorted turns.



METREL variable transformers provide an output voltage waveform that is a precise reproduction of the applied input voltage waveform. Slider is mounted on shaft but electrically insulated from it. With a brush holder, it serves also as a heat sink. Only standard METREL variable transformers are listed in this catalogue.

Technical regulation

Three general regulations serve as a base for function, quality and safety of METREL variable transformers: European Low voltage directive 2006/95/EC (2014/35), International standard IEC 61558-1:2005+A1:2009 and IEC 61158-2-14:2012.

Applications

METREL variable transformers are applied to various products or applications including the following:

- Power supplies;
- Laboratory and test equipment;
- · Speed control devices;
- Computer peripheral equipment;
- Welding controls:
- Variable speed devices for large machinery;
- Electroplating and anodising;
- High-voltage electronic tube circuits;
- Spare supply regulators in broadcast transmitters;
- Voltage stabilizers:
- High voltage test set;
- · Meter test bench;
- Hydro generation plants;
- Battery chargers;
- DC motor controls;
- Plastic blow moulding machines;
- Control of furnace transformers;
- Lightening regulation;
- Laboratory stirrers;
- AC, DC brush motors:
- High current motorized voltage regulators:
- · High current plastic plating operations.

TECHNICAL PERFORMANCES

High reliability

METREL variable transformers are practically maintenance free. Long-life operation is assured with:

- Precision winding;
- Surface forming of winding;
- Tight tolerances in preparing sliding track;
- Deep varnishing and baking also for fixing winding structure;
- A spring-loaded solid carbon brush.

Power factor

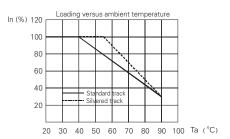
Power factor of load has very little effect on the operation of a METREL variable transformer in the range from 0.5 lagging to 0.5 leading. Like any transformer, the METREL variable transformer reflects the load power factor to the line with very little change. Only for very light loads, possibly under 10%, will the lagging power factor of the METREL variable transformer become significant due to magnetizing current.

High efficiency

METREL variable transformers have low electrical losses under all load conditions. Efficiency is 98.5 percent at maximum output voltage selected. This efficiency remains high, even at greatly reduced load voltage.

Ambient temperature

METREL variable transformers are designed for continuous operation in ambient of 0 °C to 40 °C, at full rated load. When operated above 40 °C, the output power must be rated in accordance with diagram 1. For example, when operating model HSH 230/4 in a 60 °C ambient, rated output current would be: 70 % x 4 A = 2.8 A.



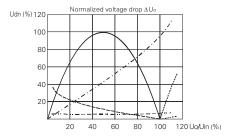
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Frequency

All METREL variable transformers are designed for operation at 50/400 Hz. They may be operated at higher frequencies, without derating, however regulation becomes poorer. Units listed for 230 V operations may be applied on 115 V at 25 Hz, however rated currents remain the same

Linear output voltage

METREL variable transformers have the advantage of providing output voltage that varies linearly in proportion to the angle of rotation of the output voltage selector. Because of the large number of increments of output voltage selection with the slider, the output voltage is practically steeples.



______ΔUo/ΔUo max for autotransformer / Uo max = Uin
_____ΔUo/ΔUo max for autotransformer / Uo max > Uin
_____ΔUo/ΔUo (at Uo = Uin) for separate secondary
_____ΔUo/Uo for separate secondary
_____ΔUo/Uo for autotransformer / Uo max = Uin
_____ΔUo/Uo for autotransformer / Uo max > Uin

Installation guidelines

For safety and reliable operation of METREL variable transformers the following requirements need to be fulfilled:

- good venting;
- appropriate wiring;
- over current protection;
- avoiding corrosive, high humidity and dust places or protection against these environmental conditions;
- preventing short circuits on axis;
- appropriate design and construction of equipment with built-in variable transformers.

Venting of power devices reduces their heating and thus rated performances can be applied. Power lines must have high enough cross-section, be fixed and secured with good contact to prevent overheating and additional voltage drops. Primary

overcurrent breaking device must be properly selected and use of load protection fuses is recommended. Fuses / residual circuit breakers (RCD) prevent excessive heating due to overload and prevent fire generation as a result of overheating.

Regardless if the variable transformers are designed for harsh environment, it is best for reliable operation and long lifetime to keep them in non-aggressive environment. The axis is on one side connected to metal base. If the other side of axis is electrically connected to the same base (through the housing), this will present a short circuit coil of the transformer with increasing power consumption, overheating, and even generating high leakage currents and stray magnetic fields.

It is important that the brushes are not leaving in one spot for extended periods to avoid gradually increase contact resistance and eventual overheating and damage of the variable transformer unit.

OPTIONS

Parallel connections

METREL has a solution for paralleling two single-phase transformers. Output current can be doubled by using the balancing choke and mechanical paralleling of sliders on common shaft

Serial connections

Serial connection is intended for application of variable transformers in installations with higher input voltage than rated. Two variable transformers of the same type are connected in series and enable operation with double voltage of rated for one.

Dual voltage tap slides

This possibility enables generating variable differential voltage with the same or opposite phase related to input voltage. Typical applications are boosting regulators.

Shaft modifications

The shaft provided with each model accommodates the METREL transformer's voltage selector knob when mounted on panels not exceeding the thickness shown in dimension data. Modification to the shaft, either in length or end diameter, is available for both manual and motoroperated units.

Product groups

- a) Open variable transformer types (subassemblies for panel mount or other built-in equipment) HSG; HST; HTG; HSM; HTM with Accessories (Buttons, Scales, Motor drives).
- b) Desk top variable transformer types (HSN, HTN).
- c) Power supplies (MA 4804, MA 4852, MA 4853).

Technical specification	-
Frequency range:	50 Hz 400 Hz
Mechanical angle:	340, core size up to M200 320, other core sizes
Protection class:	I
Pollution degree:	2
Protection degree:	IP 20
Altitude (operation):	2000 m
Test voltage (input to metallic accessible parts):	2500 VAC RMS, 50 Hz, 2 s
Test voltage (input/output, HST):	4000 VAC RMS, 50 Hz, 2 s
Operating temperature range:	-5 °C 40°C
Operating humidity range:	90 % RH (40 °C), non-condensing
Storage temperature range:	-15 °C 70 °C

Variable transformers

1-phase Built-in



2-phase Built-in



HSG - AUTOTRANSFORMERS

The HSG series voltage transformers are often built in test equipment or permanent installations. Output voltage is controlled with a large, slip-protected knob. Output voltage is increased linearly as the knob is turned clockwise. The user is required to add adequate external over-current protection device like fuse or circuit breaker. All models are suitable for 50 Hz / 60 Hz frequency range. Single- and three-phase models are available with various current ratings. Output voltage is precisely controlled. Autotransformer design allows optional voltage boost. Because of demanding applications all Metrel variacs are designed to exhibit superior resistance to high temperature, humidity and mechanical shocks/ vibrations. Used in hardwired, permanent installations wherever operational or performance points need to be varied.

Technical specific	cation	
1-phase	HSG 230	HSG 260
Input	230 V	230 V
Output	0 V 230 V	0 V 260 V
Current*	1 A 32 A	0.8 A 30 A
Power	230 VA 7360 VA	208 VA 7800 VA

^{*} Maximum current range depends on model type

HST - SEPARATING TRANSFORMERS

Variable, coupled with insulation transformers are utilized for personnel safety in addition to provide variable voltages for testing purposes. In general they are equally suitable for any of the testing, engineering or control function like ordinary variacs based on autotransformer design. Additionally they can isolate sensitive equipment from interference and ground noise.

HTG - AUTOTRANSFORMERS

METREL three-phase transformers are suitable for connection to either delta or star connected incoming power sources or loads. They are always star connected and have a neutral connection accessible. A common shaft rotates all output voltage sliders in parallel.

3-phase METREL transformers with 3-wire connection to 3-phase supply system can be used to feed 3-wire, 3-phase balanced loads. In this case the common connection (or "virtual neutral") of the METREL unit should not be used. Less than 10% of rated current of variable transformers flowing into virtual neutral would keep unbalance of three-phase output in reasonable limits.

With a three phase, 4-wire system input, the system neutral should be solidly connected to the common or "neutral" point of the METREL unit. This will prevent neutral shift and possible damage or failure of the unit. Full-range voltage control cannot be obtained from a three-phase METREL unit consisting of three single-phase units connected in closed delta. Outside the factory, it is not practical to convert multiple single-phase models to balanced three-phase applications because of associated mechanical problems.

Technical specification		
3-phase	HTG 400	HTG 450
Input	400 V	400 V
Output	0 V 400 V	0 V 450 V
Current*	1 A 32 A	0.8 A 30 A
Power	690 VA 22080 VA	624 VA 23400 VA

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Motor driven



Desktop



HSM 1-PHASE AND HTM 3-PHASE

METREL motor-operated units differ from manual types primarily in the means used to rotate the shaft to vary output voltage. A synchronous motor is used to position the slider. The motor is reversible by means of a SPDT switch (not supplied) and operates on 230 V, 50 / 400 Hz. Integrated limit switches prevent overriding the winding edges.

Typical methods for controlling METREL motor-operated units include:

- Manual increase/decrease switch consists of either momentarycontact push-button or lever-type toggle switch.
- Relays and contactors control the increase/decrease power to the motor as a result of low-level signals from external circuitry. Example: photoelectric cells or thermostat signals can provide the input.
- Process control instrumentation can be used for closed-loop, precise control, and more sophisticated circuitry to provide the raise-fall switching for the motor.

Technical specification					
1-phase	HSM 230	HSM 260			
Input	230 V	230 V			
Output	0 V 230 V	0 V 260 V			
Current*	3 A 32 A	2.5 A 30 A			
Power	690 VA 7360 VA	650 VA 7800 VA			
3-phase	HTM 400	HTM 450			
Input	400 V	400 V			
Output	0 V 400 V	0 V 450 V			
Current*	3 A 32 A	2.5 A 30 A			
Power	2070 VA 22080 VA	1930 VA 23400 VA			

^{*} Maximum current range depends on model type

HSN 1-PHASE AND HTN 3-PHASE

The HSN and HTN series voltage transformers are fully housed, thus providing protection from physical accidents, and other hazards. Generally they are used wherever adjustable AC voltage is required. Output voltage is precisely controlled.

Output voltage is controlled with a large, slip-protected knob. Output voltage is increased linearly as the knob is turned clockwise. All models are equipped with power cord, illuminated on/off switch and external PE terminal and optional with appropriate plug connector. They are marked with output voltage in volts (corresponding to nominal input voltage).

They can be conveniently moved around laboratory, production or equipment service area to provide adjustable voltage.

All models are suitable for 50 Hz / 400 Hz frequency range. Singleand three-phase models are available with various current ratings.

Technical specification		
1-phase:	HSN 260	
Input voltage:	230 V	
Output voltage:	0 V 260 V	
Current:*	4.5 A 30 A	
Power:	1170 VA 7800 VA	
3-phase:	HTN 450	
Input voltage:	400 V	
Output voltage:	0 V 450 V	
Current:*	8 A 30 A	
Power:	6240 VA 23400 VA	

Notes

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METREL d.d.

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