EMC PARTNER

SPD, VARISTORS AND MORE

Component Testing

This document has been
optimized for electronic media

Accredited Calibration

Quality at EMC PARTNER is based on an ISO 9001 management system. This is the foundation for an ISO 17025 accreditation verified by the Swiss Calibration Service (SCS). SCS No. 146 is the accreditation number of EMC PARTNER AG. Locally accredited but recognized worldwide through affiliation with the ILAC organisation

COMPONENT TEST SYSTEMS

MANY REQUIREMENTS ONE SUPPLIER

To maintain the quality of lightning and surge protection components used in the power industry, production and batch testing is applied. This requires specialist test equipment with high reliability and reproducible test impulses.

EMC PARTNER have an extensive range of impulse test equipment for:

- Surge Protection Devices (SPD)
- Varistors (MOV)
- Gas Discharge Tubes (GDT)
- Capacitors
- Resistors
- Measuring relays
- Circuit breakers

Expert instrumentation that provides product specific solutions.

MANY APPLICATIONS ONLY ONE CHOICE

EMC PARTNER component testers are designed with the user in mind. Based on a tried and tested design concept, test instrumentation tailored to specific applications.

SURGE PROTECTION DEVICES

- Clamping voltage testers
- Surge withstand pulses
- Energy absorption
- Combination Wave tests
- Duty cycle testing

X-Y CAPACITORS

- Impulse voltage tests
- Active flammability tests

CIRCUIT BREAKERS

- Insulation against an Impulse
- Unwanted tripping
- Current Surge Test

MEASURING RELAY TESTERS

- Combination Wave tests
- Lightning Surge tests

A WORLDWIDE STANDARD

International Electrotechnical Committee (IEC) / CENELEC (EN)

Surge Protection Devices

IEC 61643-11: Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods.
IEC 61643-12: Low-voltage surge protective devices - Part 12: Surge protective devices connected to low-voltage power distribution systems - Selection and application principles.
IEC 61051-21: Varistors for use in electronic equipment - Part 2: Blank detail specification for zinc oxide surge suppression varistors.
IEC 60099-4: Surge arresters - Part 4: Metal-oxide surge arresters without gaps for a.c. systems.

Circuit Breakers

IEC 61009-1: Residual current operated circuit breakers with integral overcurrent protection f0r household and similar uses (RCBOs)
IEC 61008-1: Residual current operated circuit breakers without integral overcurrent protection f0r household and similar uses (RCCBs)
IEC 61543-1: Residual current-operated protective devices (RCDs) for household and similar use - Electromagnetic compatibility
IEC 60947-1: Low-voltage switchgear and control gear - Part 2: Circuit-breakers
IEC 62271-1: High-voltage switchgear and control gear - Part 1: Common specifications for alternating current switchgear and control gear.

Measuring relays

IEC 60255-26: Measuring relays and protection equipment - Part 26: Electromagnetic compatibility requirements

Capacitors

IEC 60384-14 Ed 4.0: Fixed capacitors for use in electronic equipment - Part 14: Sectional specification - Fixed capacitors for electromagnetic interference suppression and connection to the supply mains

International Telecommunications Union (ITU)

The same standards are applicable as for IEC (see above).
ITU-T K.12: Characteristics of gas discharge tubes for the protection of telecommunications installations
ITU-T K.44: Resistibility tests for telecommunication equipment exposed to overvoltages and overcurrents – Basic Recommendation

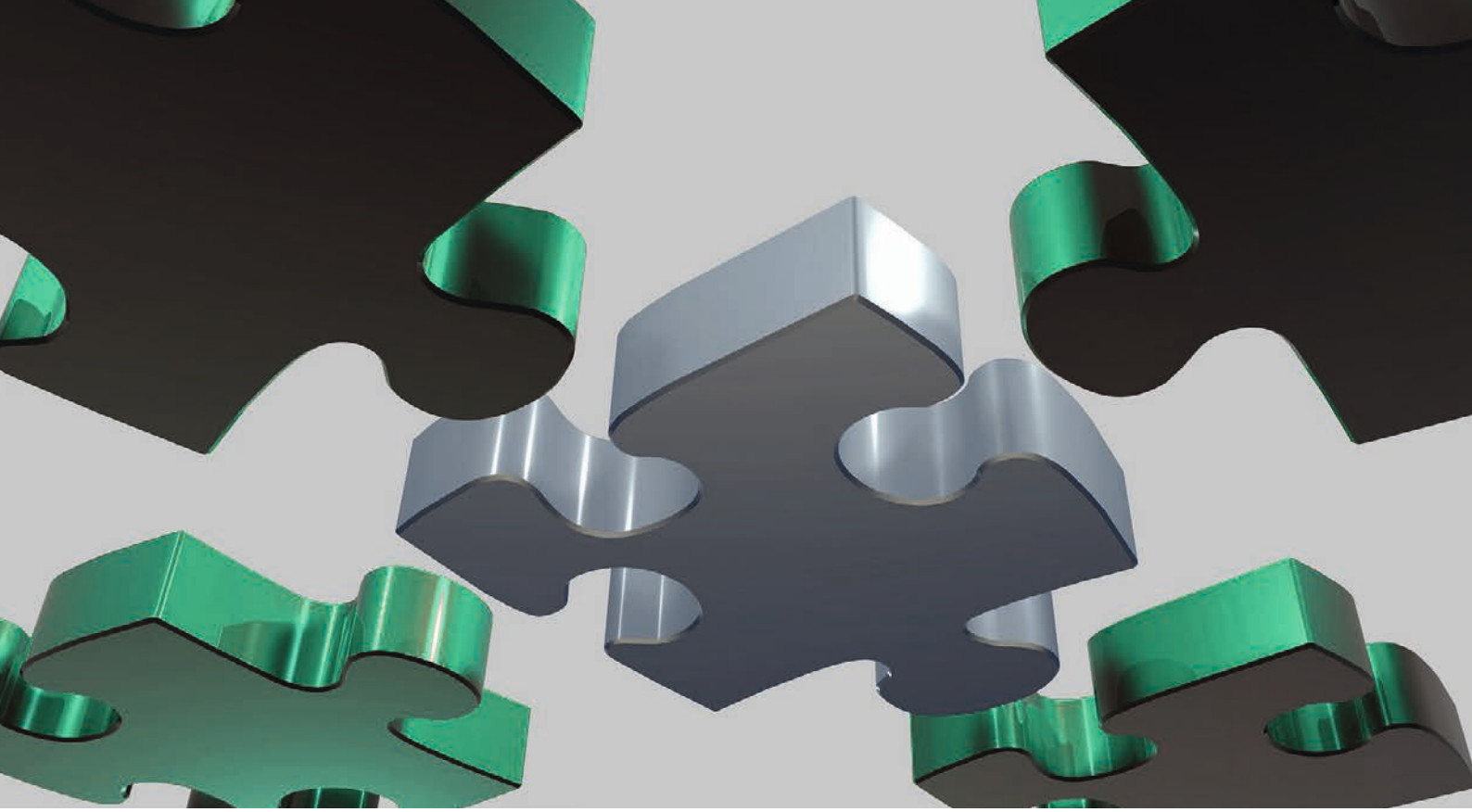
Underwriters Laboratories (UL)

Surge Protection Devices

UL 1449: Standard for Safety. Surge Protective Devices

Capacitors

UL 60384-14: Safety Requirements for Fixed Capacitors for Use in Electronic Equipment - Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains



UNIQUE FEATURES

Robust test equipment that gets the job done.

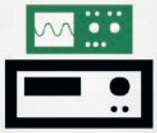
Largest current range

Solid state technology spanning a few Amps up to 100kA. Impulses including 8/20us, 10/350us, 10/1000us and many more.

Impulse wave shapes

Tailored to meet a wide range of applications. Lightning voltage impulses through mains switching surges.

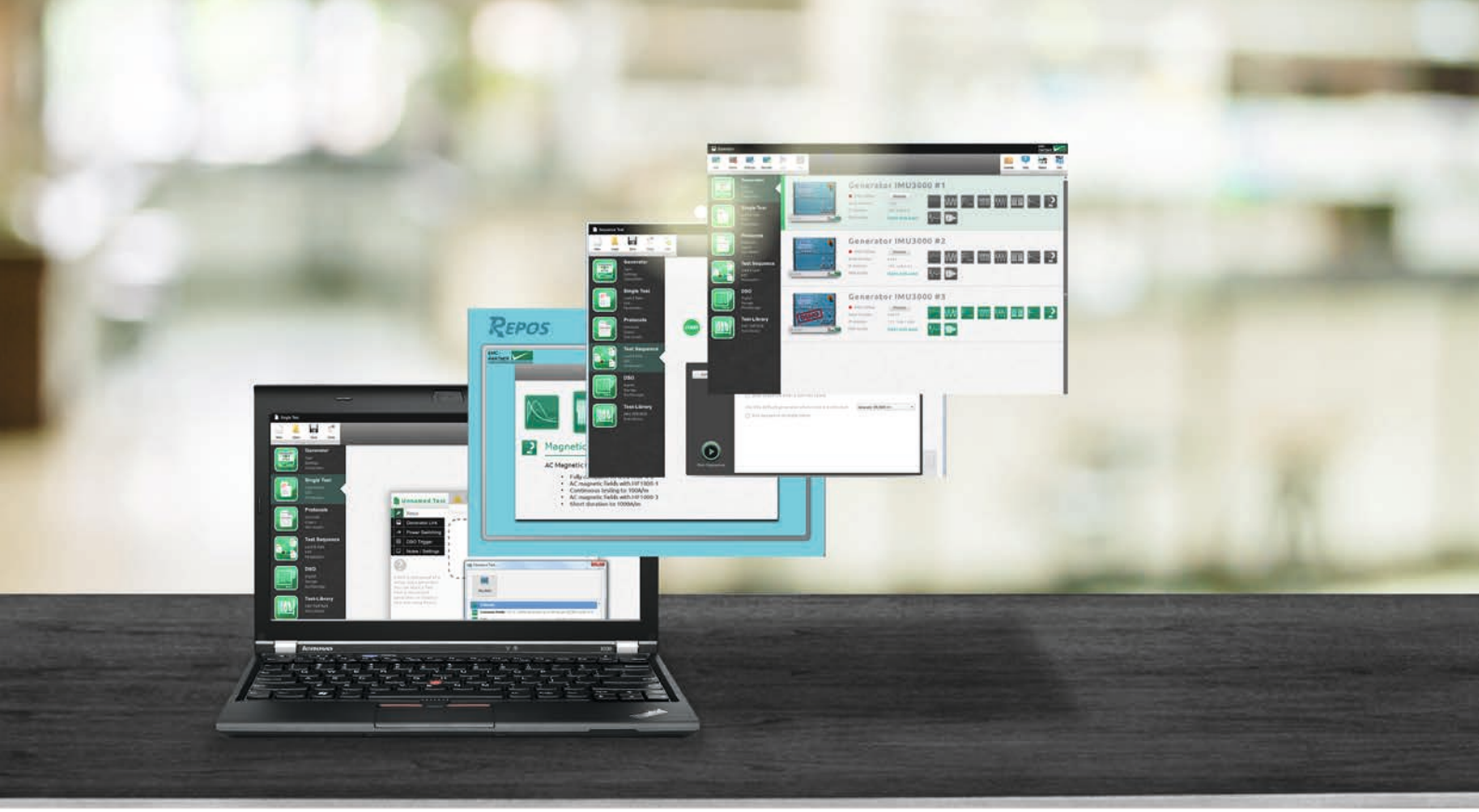
Reliable and reproducible



20 years experience guarantees high reliability. Identical pulses from start to finish.

Accurate measurements

Reaction to an impulse measured in the generator. User programmable to determine Pass or Fail.



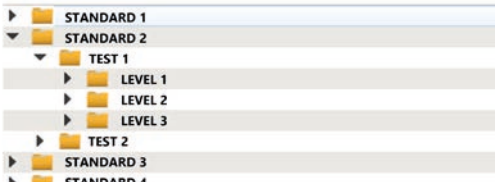
TEMA3000 SOFTWARE SUITE

The best solution for professional EMC Test Labs enables comfortable test setups, easy parameter changes and customizable test reports and DSO integration.

Customizable test reports

- Customize & edit protocols
- Export to multiple file formats
- Integrate DSO measurements

Manage tests and sequences



- Predefined test setups
- Save and load tests and sequences

Productive workflow

- Minimal learning time
- Integrated assistant function

Smart connectivity

- Transfer tests / reports to PC
- Remote control from computer

Tradition meets Technology

Over 20 years devoted to combining latest technologies into the best products.

100% Swiss made products

Technical Specifications

CAPACITOR TESTING

- COMP0804CAP
- EXT-COMP0804CAP
- MIG0603CAP
- MIG1212CAP
- MIG-EUT-SET
- TC-MIG24F
- MIG-CAP DUT-MUX
- CN-MIG-SMD CAP
- TC-MIG24
- CAL-LOAD10nF
- CAL-LOAD100nF

SPD (SURGE PROTECTION DEVICE) TESTING

- MIG0603CLP
- CN-MIG-SMD CLP
- MIG0603CLV1
- MIG0603CLV2
- CN-MIG-SMD CLV
- MIG0606
- MIG0612
- MIG0612UL
- MIG0624
- MIG0624LP1
- MIG1206SPD
- MIG2412SPD
- MIG1248
- MIG1260
- MIG12100
- CDN50kA-1P
- NW40-350

CIRCUIT BREAKER TESTING

- MIG0603CB

PROTECTION RELAY TESTING

- MIG0603OS2

CAPACITOR TEST SYSTEMS

COMP0804CAP

COMP0804CAP ACTIVE FLAMMABILITY CIRCUIT for C_{EUT} ≤ 1 µF

Standard	IEC60348-14, UL 60384-14 latest active flammability test
Impulse capacitance	3 µF ± 5 % (suitable for EUTs up to 1 µF)
Energy at max. voltage	96 joules
Circuit diagram	as in IEC60384-14 figure 1
Adjustable charge voltage	0.25 kV – 8 kV ± 10 %
Guaranteed output voltage	5 kV at EUT terminals for EUTs up to 1 µF
	4 kV at EUT terminals for EUTs 1 -50 µF
Pulse repetition rate	1 / 1 s @ 0.25 kV, 1 / 5 s @ 8 kV
Output impedance	selectable: 5 Ω, 10 Ω, 40 Ω, 100 Ω
Voltage waveform	as in IEC60384-14 figure 2

EXT-COMP0804CAP CIRCUIT for 1 µF < C_{EUT} ≤ 50 µF

Application	extends COMP0804CAP for EUTs with higher C
Extension controlled by	COMP0804CAP
Standard	IEC60348-14, UL 60384-14 latest active flammability test
Impulse capacitance	10 – 150 µF ± 5 %
Suitable for EUTs	1 µF < C_{EUT} ≤ 50 µF
Energy at max. voltage	4800 joules
Circuit diagram	as in IEC60384-14 figure 1
Adjustable charge voltage	0.25 kV – 7 kV ± 10 %
Guaranteed output voltage	4 kV at EUT terminals for EUTs up to 50 µF
Pulse repetition rate	1 / 2 s @ 2.4 kV, 1 / 5 s @ 6 kV (full compliant)
Output impedance	5 Ω for CEUT > 1 µF
Voltage waveform	as in IEC60384-14 figure 2
Requires	COMP0804CAP

COMP0804CAP EUT supply manual variac

Power input	L-N 230 V / 64 A for 230V mains
	L1-L2 / 64 A for 115 V mains
Voltage output (to EUT)	50 – 800 V, adjustable, 1V step
Maximum output current	16 A, see manual for voltage characteristic
Voltage control	(manually) adjustable variac
Voltage display	digital voltmeter, ± 3 % accuracy
Protection fuse	63 A, slow blow

COMP0804CAP control features

User interface	touchscreen display with EPOS op. system
Communication interface	ethernet, USB (form memory stick)
Surge voltage monitor BNC	max. 15 V, accuracy ± 3%, ratio displayed
Surge current monitor BNC	max. 15V, accuracy ± 3%, ratio displayed
Surge voltage on display	charge voltage 0.250 – 8 kV, accuracy ± 3%
Surge voltage on display	voltage at EUT terminals, accuracy ± 3%
Surge current on display	0.25 – 2 kA, accuracy ± 3%
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Synchro. source	EUT power
Power synchro. on/off	0 – 360°, 1° step
EUT input power	ON/OFF button on front panel
Impulse counter	programmable up to 29'999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)

COMP0804CAP supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	
COMP0804CAP	ON < 300 VA, standby < 10 VA
COMP0804CAP+EXT	ON < 1800 VA
Weight COMP0804CAP	287 kg
W x d x h	60 x 72 x 127 cm
Version	19" rack (with wheels), 18 UH
Weight EXT-COMP	192 kg
W x d x h	60 x 65 x 123 cm
Version	19" rack (with wheels), 18 UH
Temperature range	5 – 35 °C
Humidity	25 – 80 % non-condensing
Air pressure	86 – 106 kPa
Included articles	
Power cord	with country plug
Supply connection	3 cables x 2 m, banana plugs
User manual	with conformity declaration
Calibration certificate	factory calibration

COMP0804CAP optional accessories

EXT-COMP0804CAP	extends capability for testing up to 50 µF EUTs
MIG-EUT-SET	programmable switch matrix for up to 8 EUTs

	for EUTs up to maximum 1 µF
Test cabinet	TC-MIG24F
Software	TEMA3000: sequence, report, for Windows10

MIG0603CAP

MIG0603CAP circuit: tank capacitor C_T = 250 nF

Standards (impulse test)	IEC60384-14, UL 60384-14, EN132400 up to 6 kV
Impulse capacitance	0.25 µF ± 10 %
Energy at max. voltage	4.5 joules
Serial resistor	selectable, 27, 45, 62 Ω ± 10 %
Adjustable voltage OC	0.25 kV - 6 kV ± 10 %
Calibrated level	0.5 kV – 6 kV
Voltage waveform	in 10 nF: 1.7 µs +50%/-0%, 46 µs +50%/-0%
	in 100 nF: 1.6 µs +50%/-0%, 47 µs +50%/-0%
EUT range (wf in tolerance)	0 – 27 nF
Undershoot	< 5 %
Pulse repetition	up to 1 / 15 s
Polarity	positive, negative, alternating
Programmable ramps	voltage

MIG0603CAP circuit: tank capacitor C_T = 20 µF

Standards (impulse test)	IEC60384-14, UL 60384-14 , EN132400 up to 6 kV
Impulse capacitance	20 µF ± 10 %
Energy at max. voltage	360 joules
Serial resistor	selectable, 3, 5, 7, 9, 13, 25 Ω ± 10 %
Adjustable voltage OC	0.25 kV - 6 kV ± 10 % for EUT up to 120 nF
	0.25 kV – 5.7 kV ± 10 % for EUT up to 180 nF
	0.25 kV – 5.4 kV ± 10 % for EUT up to 10 µF
Calibrated level	0.5 kV – 6 kV
EUT range 1	27 – 120 nF
Voltage waveform	in 10 nF: 1.7 µs +50%/-0%, 46 µs +50%/-0%
	in 100 nF: 1.6 µs +50%/-0%, 47 µs +50%/-0%
Undershoot	< 10 %
EUT range 2	120 nF – 10 µF
Voltage waveform	in 10 nF: 1.7 µs +50%/-0%, 46 µs +50%/-0%
	in 100 nF: 1.6 µs +50%/-0%, 47 µs +50%/-0%
Undershoot	> 10 %
Pulse repetition	up to 1 / 15 s
Polarity	positive, negative, alternating
Programmable ramps	voltage

MIG0603CAP control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Pulse voltage monitor BNC	10 V = 6 kV, accuracy ± 3%
Pulse current monitor BNC	10 V = 3 kA, accuracy ± 3%
Pulse voltage on display	0.250 – 6.6 kV, accuracy ± 3%
Pulse current on display	0.125 – 3.3 kA, accuracy ± 3%
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Impulse counter	programmable up to 29'999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG0603CAP supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA
Weight	28 kg
W x d x h	45 x 57 x 25 cm
Version	19" unit, 4 UH
Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa
Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG0603CAP optional accessories

EUT fixture for 8 EUTs	MIG-CAP DUT-MUX programmable fixture
Test cabinet	TC-MIG24 with warning lamps
Software	TEMA: sequence, report, for latest Windows

MIG1212CAP

MIG1212CAP circuit: tank capacitor C_T = 250 nF

Standards (impulse test)	IEC60384-14, UL 60384-14, EN132400
Impulse capacitance	0.25 µF ± 10 %

Energy at max. voltage	18 joules
Serial resistor	selectable, 27, 45, 62 Ω ± 10 %
Adjustable voltage OC	0.5 kV - 12 kV ± 10 %
Calibrated level	1 kV – 12 kV
Voltage waveform	in 10 nF: 1.7 µs +50%/-0%, 46 µs +50%/-0%
	in 100 nF: 1.6 µs +50%/-0%, 47 µs +50%/-0%
EUT range (wf in tolerance)	0 – 27 nF
Undershoot	< 10 %
Pulse repetition	up to 1 / 10 s
Polarity	positive, negative, alternating
Programmable ramps	voltage

MIG1212CAP circuit: tank capacitor C_T = 20 µF

Standards (impulse test)	IEC60384-14, UL 60384-14, EN132400
Impulse capacitance	20 µF ± 10 %
Energy at max. voltage	1440 joules
Serial resistor	selectable, 3, 5, 7, 9, 13, 25 Ω ± 10 %
Adjustable voltage OC	0.5 kV - 12 kV ± 10 % for EUT up to 120 nF
	0.5 kV – 11 kV ± 10 % for EUT up to 180 nF
	0.5 kV – 10 kV ± 10 % for EUT up to 10 µF
Calibrated level	1 kV – 12 kV

EUT range	27 nF – 10 µF
Voltage waveform	in 10 nF: 1.7 µs +50%/-0%, 46 µs +50%/-0%
	in 100 nF: 1.6 µs +50%/-0%, 47 µs +50%/-0%
Undershoot	< 10 %
Pulse repetition	up to 1 /30 s
Polarity	positive, negative, alternating
Programmable ramps	voltage

MIG1212CAP circuit: induction test CWG, C_T = 20 µF

Standards	IEC60384-14, induction test
Impulse capacitance	20 µF ± 10 %
Energy at max. voltage	1440 joules
Output impedance	4 Ω ± 10 %
Adjustable voltage OC	0.5 kV - 12 kV ± 10 %
Calibrated level	2 kV – 12 kV
Voltage waveform	1.2 µs ± 30 % / 50 µs ± 20 %
Undershoot	< 5 %
Pulse repetition	up to 1 / 30 s
Polarity	positive, negative, alternating
Programmable ramps	voltage

MIG1212CAP control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Pulse voltage monitor BNC	10 V = 12 kV, accuracy ± 3%
Pulse current monitor BNC	10 V = 3 kA, accuracy ± 3%
Pulse voltage on display	0.250 – 12 kV, accuracy ± 3%
Pulse current on display	0.125 – 3.3 kA, accuracy ± 3%
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Impulse counter	programmable up to 29'999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG1212CAP supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA
Weight	57 kg
W x d x h	45 x 60 x 43 cm
Version	19" unit, 8 UH
Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa
Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG1212CAP optional accessories

EUT fixture for 8 EUTs	MIG-CAP DUT-MUX programmable fixture
Test cabinet	TC-MIG24 with warning lamps
Software	TEMA: sequence, report, for latest Windows

ACCESSORIES TO CAPACITOR TEST SYSTEMS

MIG-EUT-SET

Standard	IEC60384-14 latest
Application	auto-coupling switch matrix for 8 EUTs
Outputs	max. 8 capacitors connected at the same time
EUT dim / volume available	12 x 15 x 28 cm
EUT connection	via MC clips
Active output signalisation	8 LEDs indicating output status
Flammability protection	epoxy plate (reserve plate included in delivery)
Insulation withstand	pulse 1.2/50 µs up to 6 kV
Weight	8.5 kg
Dimensions	32 x 41 x 31 cm
Included	control cable to generator, EUT clips
Requires	COMP0804CAP, TC-MIG24F

TC-MIG24F

Standard	IEC60384-14 latest
Application	test cabinet for active flammability test
EUT volume	12 x 15 x 28 cm
Warning lamps	red and green (2 lamps), safety circuit
Test cabinet material	acrylic glass
Flammability protection	glass plate and box
Insulation withstand	pulse 1.2/50 µs up to 36 kV
Weight	11 kg
Dimensions	43.5 x 47 x 25.4 cm
Included	control cable to generator
Requires	COMP0804CAP

MIG-CAP DUT-MUX

Standard	IEC60384-14 latest
Application	auto-coupling switch matrix for 8 EUTs
Outputs	max. 8 capacitors connected at the same time
EUT dim / volume available	10 x 10 x 30 cm
EUT connection	via MC clips
Voltage measurement	cables to generator, measurement at EUT port
Active output signalisation	8 LEDs indicating output status
Insulation withstand	pulse 1.2/50 µs up to 12 kV
Weight	8.5 kg
Dimensions	36 x 20 x 10 cm
Included	control cable to generator, EUT clips
Requires	MIG1212CAP, TC-MIG24

CN-MIG-SMD CAP

Application	set of fixtures for SMD capacitors
Test level voltage	max. 6 kV
Test level current	max. 6 kA
Delivery	25 PCBs x 20 capacitor mounts, different sizes
	adapter for 1 mount at a time
Weight	5 kg
Dimensions	32 x 22 x 10 cm
Generators	MIG0603CAP, MIG1212CAP

TC-MIG24

Standard	multiple
Application	test cabinet with safety circuit
EUT volume	20 x 20 x 30 cm
Warning lamps	red and green (2 lamps)
Test cabinet material	acrylic glass, cover position adjustable
Insulation withstand	pulse 1.2/50 µs up to 36 kV
Weight	8.5 kg
Dimensions	43.5 x 47 x 25.4 cm
Included	control cable to generator
Requires	MIG generator up to 36 kV

CAL-LOAD10nF

Standard	IEC60384-14
Application	calibration load for MIG0603CAP, MIG1212CAP
Capacitance	10 nF ± 2%
Expected impulse charact.	rise time tr: 1.7 µs - 0 % / + 50 %
	duration td: 46 µs - 0 % / + 50 %
Max. voltage 1.2/50 µs	12 kV
Weight	1.2 kg
Dimensions	24 x 8 x 8 cm

CAL-LOAD100nF

Standard	IEC60384-14
Application	calibration load for MIG0603CAP, MIG1212CAP
Capacitance	100 nF ± 2%
Expected impulse charact.	rise time tr: 1.6 µs - 0 % / + 50 %
	duration td: 47 µs - 0 % / + 50 %
Max. voltage 1.2/50 µs	12 kV
Weight	1.2 kg
Dimensions	24 x 8 x 8 cm

SPD TESTING

MIG0603CLP

MIG0603CLP circuit: 8/20 µs current

Standards	IEC61051-1 (varistors)
Impulse capacitance	10 µF ± 10 %
Energy at max. voltage	220 joules
Output impedance	0 – 100 Ω
Adjustable voltage OC	150 V – 3 kV ± 10 %, 1 V steps
	for clamping voltages up to 1 kV
Voltage waveform OC	not defined
Adjustable current SC	range 1: 0.15 A – 3.6 A ± 10 %
	range 2: 1.5 A – 36 A ± 10 %
	range 3: 15 A – 360 A ± 10 %
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Undershoot	< 20 %
Pulse repetition	highest repetition rate 1 pulse / 8 s
Polarity	positive, negative, alternating
Programmable ramps	voltage

MIG0603CLP circuit: 10/1000 µs current

Standards	IEC61051-1
Impulse capacitance	80 µF ± 10 %
Energy at max. voltage	1760 joules
Output impedance	0 – 100 Ω
Adjustable voltage OC	500 V – 6 kV ± 10 %, 1 V steps
	for clamping voltages up to 1 kV
Voltage waveform OC	not defined
Adjustable current SC	range 1: 0.5 A – 6 A ± 10 %
	range 2: 5 A – 60 A ± 10 %
	range 3: 50 A – 360 A ± 10 %
Current waveform	10 µs ± 20 % / 1000 µs ± 20 %
Undershoot	< 20 %
Pulse repetition	highest repetition rate 1 pulse / 30 s
Polarity	positive, negative, alternating
Programmable ramps	voltage

MIG0603CLP circuit: surge CWG 1.2/50 µs & 8/20 µs

Standards	IEC61000-4-5
Impulse capacitance	10 µF ± 10 %
Energy at max. voltage	220 joules
Output impedance	2 Ω
Adjustable voltage OC	500 V – 6.3 kV ± 10 %, 1 V steps
Calibrated level	500 V – 6 kV
Voltage waveform OC	1.2 µs ± 30 % / 50 µs ± 20 %
Current SC	0.25 kA – 3.15 kA ± 10 %
Calibrated level	0.25 kA – 3 kA
	range 2: 5 A – 60 A ± 10 %
	range 3: 50 A – 360 A ± 10 %
Current waveform	10 µs ± 20 % / 1000 µs ± 20 %
Undershoot	< 20 %
Pulse repetition	highest repetition rate 1 pulse / 8 s
Polarity	positive, negative, alternating
Power synchro. on/off	0 – 359°, 1° step
Programmable ramps	voltage, synchronisation angle

MIG0603CLP

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Surge voltage monitor	10 V = 6 kV only for CWG
Surge current monitor BNC	10 V = 6 A or 60 A or 600 A, accuracy ± 3%
	for CWG: 10 V = 3 kA
Surge voltage on display	0.5 – 6.3 kV, accuracy ± 3%, only for CWG
Surge current on display	0.25 – 3.15 kA, accuracy ± 3%, only for CWG
Trigger in	auto, manual, external (BNC input)
Synchro. source	EUT power, direct out
Power synchro. on/off	0 – 360°, 1° step
Impulse counter	programmable up to 29'999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG0603CLP supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA
Weight	58 kg
W x d x h	45 x 57 x 55 cm

Version	19“ unit, 12 UH

Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa

Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG0603CLP optional accessories

Test cabinet	TC-MIG24 with warning lamps
EUT fixture	CN-MIG-SMD CLP
Software	TEMA: sequence, report, for latest Windows

CN-MIG-SMD CLP

Application	set of fixtures for SMD varistors
Test level voltage	max. 6 kV
Test level current	max. 6 kA
Delivery	25 PCBs x 20 varistor mounts (different sizes)
	adapter for 1 mount at a time, to MIG0603CLP
Dimensions	32 x 22 x 10 cm
Weight	5 kg

MIG0603CLV1

MIG0603CLV1 circuit: 8/20 µs current

Standards	IEC60060-1, IEC61643-1, CCITT K12 surge
Application	test of varistors VDR types 05Dx, 20Dx
Impulse capacitance	10 µF ± 10 %
Energy at max. voltage	180 joules
Output impedance	10 Ω, 100 Ω, 1000 Ω ± 10 %
Selectable voltage VCL	up to 3300 V in different ranges
Voltage waveform	not defined
Selectable current range Ip	0.2 A – 300 A in different ranges
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Pulse repetition	highest repetition rate 1 pulse / 8 s
Polarity	positive, negative, alternating

MIG0603CLV1 impedance ranges

MIG0603CLV1	Varistor characteristics			
ZOUT	**Ip**	**min rd@VCL**	**max rd@VCL**	**max VCL**
Ω	A	Ω	Ω	V
1000	1	10	100	500
1000	2.5	10	100	500
100	5	10	100	1300
100	10	5	50	1500
100	25	5	50	2000
10	50	3	30	3000
10	100	1	10	3000
10	200	1	10	1800

MIG0603CLV1 measuring ranges

Selection	ZOUT	VCL max	Ipk	Range
	Ω	**V**	**A**	
<1000V;<2.5A	1000	1000	1A; 2.5A	10V=5A; 10V=1000V
<300V;<2.5A	1000	300	1A; 2.5A	10V=5A; 10V=300V
<100V;<2.5A	1000	100	1A; 2.5A	10V=5A; 10V=100V
<3000V;<25A	100	3000	5A; 10 A; 20A; 25 A	10V=25A; 10V=3000V
<1000V;<25A	100	1000	5A; 10 A; 20A; 25 A	10V=25A; 10V=1000V
<300V;<25A	100	300	5A; 10 A; 20A; 25 A	10V=25A; 10V=300V
<100V;<25A	100	100	5A; 10 A; 20A; 25 A	10V=25A; 10V=100V
<3000V;<200A	10	3000	50A; 100A; 200A	10V=200A;10V=3000V
<1000V;<200A	10	1000	50A; 100A; 200A	10V=200A;10V=1000V
<300V;<200A	10	300	50A; 100A; 200A	10V=200A; 10V=300V
<100V;<200A	10	100	50A; 100A; 200A	10V=200A; 10V=100V

MIG0603CLV1 control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Surge voltage monitor BNC	see table measuring ranges, accuracy ± 5 %
Surge current monitor BNC	see table measuring ranges, accuracy ± 5 %
Surge voltage on display	see table measuring ranges, accuracy ± 5 %
Surge current on display	see table measuring ranges, accuracy ± 5 %
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Impulse counter	programmable up to 29'999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG0603CLV1 supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA
Weight	22 kg
W x d x h	45 x 57 x 19 cm
Version	19“ unit, 4 UH
Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa
Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG0603CLV1 optional accessories

Test cabinet	TC-MIG24 with warning lamps
EUT fixture	CN-MIG-SMD-CLV
Software	TEMA: sequence, report, for latest Windows

MIG0603CLV2

MIG0603CLV2 circuit: 8/20 µs current

Standards	IEC60060-1, IEC61643-1, CCITT K12 surge
Application	test of varistors VDR types 05Dx, 20Dx
Impulse capacitance	9 µF ± 10 %
Energy at max. voltage	180 joules
Output impedance	5, 10 Ω, 100 Ω, 1000 Ω ± 10 %
Voltage VCL	up to 3000 V in different ranges
Voltage waveform	not defined
Selectable current range Ip	0.5 A – 500 A in different ranges
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Pulse repetition	highest repetition rate 1 pulse / 8 s
Polarity	positive, negative, alternating

MIG0603CLV2 impedance ranges

MIG0603CLV1	Varistor characteristics			
ZOUT	Ip	min rd@VCL	max rd@VCL	max VCL
Ω	A	Ω	Ω	V
1000	1	10	100	500
1000	2.5	10	100	500
100	5	10	100	1300
100	10	5	50	1500
100	25	5	50	2000
10	50	3	30	3000
10	100	1	10	3000
10	200	1	10	1800
5	250	0.2	2	2500
5	500	0.2	2	1500

MIG0603CLV2 measuring ranges

Selection	ZOUT	VCL max	Ipk	Range
	Ω	V	A	
<1000V;<2.5A	1000	1000	1A; 2.5A	10V=5A; 10V=1000V
<300V;<2.5A	1000	300	1A; 2.5A	10V=5A; 10V=300V
<100V;<2.5A	1000	100	1A; 2.5A	10V=5A; 10V=100V
<3000V;<25A	100	3000	5A; 10 A; 20A; 25 A	10V=25A; 10V=3000V
<1000V;<25A	100	1000	5A; 10 A; 20A; 25 A	10V=25A; 10V=1000V
<300V;<25A	100	300	5A; 10 A; 20A; 25 A	10V=25A; 10V=300V
<100V;<25A	100	100	5A; 10 A; 20A; 25 A	10V=25A; 10V=100V
<3000V;<200A	10	3000	50A; 100A; 200A	10V=200A;10V=3000V
<1000V;<200A	10	1000	50A; 100A; 200A	10V=200A;10V=1000V
<300V;<200A	10	300	50A; 100A; 200A	10V=200A; 10V=300V
<100V;<200A	10	100	50A; 100A; 200A	10V=200A; 10V=100V
<3000V;<500A	5	3000	250A; 500A	10V=1000A;10V=3000V
<1000V;<500A	5	1000	250A; 500A	10V=1000A;10V=1000V
<300V;<500A	5	300	250A; 500A	10V=1000A; 10V=300V
<100V;<500A	5	100	250A; 500A	10V=1000A; 10V=100V

MIG0603CLV2 control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Surge voltage monitor BNC	see table measuring ranges, accuracy ± 5 %
Surge current monitor BNC	see table measuring ranges, accuracy ± 5 %
Surge voltage on display	see table measuring ranges, accuracy ± 5 %
Surge current on display	see table measuring ranges, accuracy ± 5 %
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Impulse counter	programmable up to 29'999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG0603CLV2 supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA
Weight	23 kg
W x d x h	45 x 57 x 19 cm
Version	19“ unit, 4 UH
Temperature range	0 – 35 °C
Humidity	25 – 80 % non-condensing
Air pressure	86 – 106 kPa
Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG0603CLV2 optional accessories

Test cabinet	TC-MIG24 with warning lamps
EUT fixture	CN-MIG-SMD-CLV
Software	TEMA: sequence, report, for latest Windows

CN-MIG-SMD CLV

Application	set of fixtures for SMD varistors
Test level voltage	max. 6 kV
Test level current	max. 6 kA
Delivery	25 PCBs x 20 varistor mounts (different sizes)
	adapter for 1 mount at a time, to MIG0603CLVx
Weight	5 kg
Dimensions	32 x 22 x 10 cm

MIG0606

MIG0606 circuit: 8/20 µs current

Standards	IEC60060-1, IEC61643-1, IEC61009-1
Application	test of protection devices for voltage < 1000 V
Impulse capacitance	20 µF ± 10 %
Energy at max. voltage	375 joules
Output impedance	1 Ω ± 10 %
Voltage waveform	not defined
Adjustable current range	250 A – 6 kA
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Undershoot	< 20 %
Pulse repetition	highest repetition rate 1 pulse / 15 s
Polarity	positive, negative, alternating

MIG0606 control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Surge voltage monitor BNC	10 V = 6 kV, accuracy ± 3 %
Surge current monitor BNC	10 V = 6 kA, accuracy ± 3 %
Surge voltage on display	250 V – 6.6 kV, accuracy ± 3 %
Surge current on display	250 A – 6.6 kA, accuracy ± 3 %
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Impulse counter	programmable up to 29’999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG0606 supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA

Weight	24 kg
W x d x h	45 x 57 x 25 cm
Version	19“ unit, 4 UH

Temperature range	0 – 35 °C
Humidity	25 – 80 % non-condensing
Air pressure	86 – 106 kPa

Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG0606 optional accessories

Test cabinet	TC-MIG24 with warning lamps
Software	TEMA: sequence, report, for latest Windows

MIG0612

MIG0612 circuit: 8/20 µs current

Standards	IEC60060-1, IEC61643-1
Application	test of protection devices for voltage < 1000 V
Impulse capacitance	2 x 20 µF ± 10 %
Energy at max. voltage	750 joules
Output impedance	0.5 Ω ± 10 %
Voltage waveform	not defined
Adjustable current range	250 A – 12 kA (250 A – 6 kA or 500 A – 12 kA)
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Undershoot	< 20 %
Pulse repetition	highest repetition rate 1 pulse / 30 s
Polarity	positive, negative, alternating

MIG0612 control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Surge voltage monitor BNC	10 V = 6 kV, accuracy ± 3 %
Surge current monitor BNC	10 V = 12 kA, accuracy ± 3 %
Surge voltage on display	250 V – 6.6 kV, accuracy ± 3 %
Surge current on display	250 A – 12.5 kA, accuracy ± 3 %
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Impulse counter	programmable up to 29'999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG0612 supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA
Weight	36 kg
W x d x h	45 x 57 x 25 cm
Version	19“ unit, 4 UH
Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa
Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG0612 optional accessories

Test cabinet	TC-MIG24 with warning lamps
Software	TEMA: sequence, report, for latest Windows

MIG0612UL

MIG0612UL circuit: 8/20 µs current

Standards	UL 1449, UL 943
Application	test of protection devices for voltage < 1000 V
Impulse capacitance	40 µF ± 10 %
Energy at max. voltage	880 joules
Output impedance	0.5 Ω ± 10 %
Adjustable voltage OC	250 V – 6.3 kV
Calibrated level	500 V – 6 kV + 10 % / - 0 %
Current range	500 A – 12 kA + 10 % / - 0 %
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Undershoot	< 30 %
Pulse repetition	highest repetition rate 1 pulse / 30 s
Polarity	positive, negative, alternating

MIG0612UL built-in CDN

CDN type	manual, single-phase
EUT power input	AC 480V L-N, 480 V L/N-PE, 16 A
EUT supply	max. 280 V ac between “low” and earth
Internal CDN freq. range	50 Hz, 60 Hz
Coupling surge	2 Ω: L-L, L-N, L-PE
Decoupling	as in IEC61000-4-5

MIG0612UL control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Surge voltage monitor BNC	10 V = 6 kV, accuracy ± 3 %
Surge current monitor BNC	10 V = 12 kA, accuracy ± 3 %
Surge voltage on display	250 V – 6.6 kV, accuracy ± 3 %
Surge current on display	500 A – 12.5 kA, accuracy ± 3 %
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Synchro. source	EUT power, direct out
Power synchro. on/off	peak synchronisation
Impulse counter	programmable up to 29’999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG0612UL supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA
Weight	41 kg
W x d x h	45 x 57 x 43 cm
Version	19“ unit, 8 UH
Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa
Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG0612UL optional accessories

Test cabinet	TC-MIG24 with warning lamps
Software	TEMA: sequence, report, for latest Windows

MIG0624

MIG0624 circuit: 8/20 µs current

Standards	IEC60060-1, IEC61643-1
Application	test of protection devices for voltage < 1000 V
Impulse capacitance	4 x 20 µF ± 10 %
Energy at max. voltage	1500 joules
Output impedance	0.25 Ω ± 10 %
Voltage waveform	not defined
Adjustable current range	250 A – 6 kA, impedance 1 Ω ± 10 %, or
	500 A – 12 kA, impedance 0.5 Ω ± 10 %, or
	1 kA – 18 kA, impedance 0.33 Ω ± 10 %, or
	2 kA – 24 kA, impedance 0.25 Ω ± 10 %
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Undershoot	< 20 %
Pulse repetition	highest repetition rate 1 pulse / 30 s
Polarity	positive, negative, alternating

MIG0624 control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Surge voltage monitor BNC	10 V = 6 kV, accuracy ± 3 %
Surge current monitor BNC	10 V = 24 kA, accuracy ± 3 %
Surge voltage on display	250 V – 6.6 kV, accuracy ± 3 %
Surge current on display	250 A – 25 kA, accuracy ± 3 %
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Impulse counter	programmable up to 29'999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG0624 supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA

Weight	57 kg
W x d x h	45 x 57 x 43 cm
Version	19“ unit, 8 UH

Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa

Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG0624 optional accessories

Test cabinet	TC-MIG24 with warning lamps
Software	TEMA: sequence, report, for latest Windows

MIG0624LP1

MIG0624LP1 circuit: 8/20 µs current

Standards	IEC60060-1, IEC61643-1
Application	test of varistors (VDR), surge arresters
Impulse capacitance	4 x 20 µF ± 10 %
Energy at max. voltage	1500 joules
Output impedance	0.25 Ω ± 10 %
Voltage waveform	not defined
Adjustable current range	250 A – 6 kA, impedance 1 Ω ± 10 %, or
	500 A – 12 kA, impedance 0.5 Ω ± 10 %, or
	1 kA – 18 kA, impedance 0.33 Ω ± 10 %, or
	2 kA – 24 kA, impedance 0.25 Ω ± 10 %
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Undershoot	< 20 %
Pulse repetition	highest repetition rate 1 pulse / 30 s
Polarity	positive, negative, alternating

MIG0624LP1 circuit: 10/1000 µs current

Standards	IEC60060-1, IEC61643-1
Application	test of varistors (VDR), surge arresters
Impulse capacitance	8 x 10 µF ± 10 %
Energy at max. voltage	1500 joules
Output impedance	25 Ω ± 10 %
Voltage waveform	not defined
Adjustable current range	5 A – 60 A, impedance 100 Ω ± 10 %, or
	10 A – 120 A, impedance 50 Ω ± 10 %, or
	15 A – 180 A, impedance 33 Ω ± 10 %, or
	20 A – 240 A, impedance 25 Ω ± 10 %
Current waveform	10 µs ± 20 % / 1000 µs ± 20 %
Undershoot	< 20 %
Pulse repetition	highest repetition rate 1 pulse / 30 s
Polarity	positive, negative, alternating

MIG0624LP1 control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Surge voltage monitor BNC	10 V = 6 kV, accuracy ± 3 %
Surge current monitor BNC	10 V = 24 kA, accuracy ± 3 %, for 8/20 µs
	10 V = 80, 160, 240, 320 A, for 10/1000 µs
Surge voltage on display	250 V – 6.6 kV, accuracy ± 3 %
Surge current on display	250 A – 25 kA, accuracy ± 3 %, for 8/20 µs
	6 A – 320 A, accuracy ± 3 %, for 10/1000 µs

Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Impulse counter	programmable up to 29'999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG0624LP1 supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA

Weight	57 kg
W x d x h	45 x 57 x 43 cm
Version	19" unit, 8 UH

Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa

Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG0624LP1 optional accessories

Test cabinet	TC-MIG24 with warning lamps
Software	TEMA: sequence, report, for latest Windows

MIG1206SPD

MIG1206SPD: IEC61643-1 norm paragraphs covered

Covered	
7.1.2 Class I and II	nominal discharge current test
7.1.3 Class I and II	voltage impulse test
7.1.4 Class III	surge combination wave test
7.5.1	determination of a switching (crowbar) in SPD
7.5.2	measur. of residual voltage with 8/20 pulses
7.5.3	measur. of spark-over impulse voltage
7.5.4	measur. of limiting voltage with CWG

Not covered	
7.5.5	alternate test to CWG test
7.6	operating duty tests

MIG1206SPD circuit: CWG / Surge 2 Ω, coupling 18 µF, 12 kV

Standards	IEC61643-1, VDE0675-6
Application	test IEC class III (VDE class D) SPDs
Impulse capacitance	10 µF ± 10 %
Energy at max. voltage	720 joules
Output impedance	2 Ω ± 10 %
Adjustable voltage OC	1 kV – 13.2 kV ± 10 %
Calibrated level	1 kV – 12 kV
Voltage waveform	1.2 µs ± 30 % / 50 µs ± 20 %
Calibrated current SC	0.5 kA – 6 kA ± 10 %
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Undershoot	< 30 %
Pulse repetition	up to 1 / 5 s @ 1 kV, 1 / 30 s @ 12 kV
Polarity	positive, negative, alternating
Synchronization	0 – 360°, step 1°
Programmable ramps	voltage, synchronisation angle

MIG1206SPD built-in manual CDN

Test level surge	12 kV
EUT power input	AC 250 V L-N, 50, 60 Hz, 16 A
EUT power input	max. 260 V ac between “low” and earth
EUT overcurrent protection	CDN input fuse 16 A, super slow
Coupling L-N	2 Ω, 18 µF
Coupling L-PE, N-PE	12 Ω, 9 µF
Decoupling	as in IEC61000-4-5

MIG1206SPD circuit: voltage impulse 1.2/50 µs, 42 Ω, 12 kV

Standards	IEC61643-1, VDE0675-6
Application	test SPDs IEC class I and II (VDE class A,C)
Impulse capacitance	10 µF ± 10 %
Energy at max. voltage	720 joules
Output impedance	40 + 2 Ω ± 10 %
Adjustable voltage OC	1 kV – 13.2 kV ± 10 %
Calibrated level	1 kV – 12 kV
Voltage waveform	1.2 µs ± 30 % / 50 µs ± 20 %
Current waveform	not defined
Pulse repetition	up to 1 / 5 s @ 1 kV, 1 / 30 s @ 12 kV
Polarity	positive, negative, alternating
Synchronization	0 – 360°, step 1°
Programmable ramps	voltage, synchronisation angle

MIG1206SPD circuit: current impulse 8/20 µs, < 2 Ω, 6 kA

Standards	IEC61643-1, VDE0675-6
Application	test SPDs IEC class I and II (VDE class A,C)
Impulse capacitance	10 µF ± 10 %
Energy at max. voltage	720 joules
Output impedance	< 2 Ω
Voltage waveform	not defined
Adjustable current range	250 A – 6.3 kA
Calibrated level	500 A – 6 kA
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Undershoot	< 20 %
Pulse repetition	up to 1 / 5 s @ 1 kA, 1 / 30 s @ 6 kA
Polarity	positive, negative, alternating

MIG1206SPD control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Surge voltage monitor BNC	10 V = 12 kV, accuracy ± 3%
Surge current monitor BNC	10 V = 6 kA, accuracy ± 3%
Surge voltage on display	0.5 – 13.2 kV, accuracy ± 3%
Surge current on display	0.25 – 6.6 kA, accuracy ± 3%
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Synchro. source	EUT power, direct out
Power synchro. on/off	0 – 360°, 1° step
Impulse counter	programmable up to 29'999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG1206SPD supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA
Weight	66 kg
W x d x h	45 x 57 x 43 cm
Version	19“ unit, 8 UH
Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa
Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG1206SPD optional accessories

Test cabinet	TC-MIG24 with warning lamps
Test cables	CN-MIG4803, 1.2 m length
Software	TEMA: sequence, report, for latest Windows

MIG2412SPD

MIG2412SPD: IEC61643-1 norm paragraphs covered

Covered	
7.1.2 Class I and II	nominal discharge current test
7.1.3 Class I and II	voltage impulse test
7.1.4 Class III	surge combination wave test
7.5.1	determination of a switching (crowbar) in SPD
7.5.2	measur. of residual voltage with 8/20 pulses
7.5.3	measur. of spark-over impulse voltage
7.5.4	measur. of limiting voltage with CWG
Not covered	
7.5.5	alternate test to CWG test
7.6	operating duty tests

MIG2412SPD circuit: CWG / Surge 2 Ω, 24 kV

Standards	IEC61643-1, VDE0675-6,
	IEC61000-4-5 latest edition, ANSI C62.41
Application	test IEC class III (VDE class D) SPDs
Impulse capacitance 1	10 µF ± 10 %, 200 joules, 6 kV
Impulse capacitance 2	10 µF ± 10 %, 3000 joules, 24 kV
Output impedance	2 Ω ± 10 %
Adjustable voltage OC	200 V – 24.4 kV ± 10 %, in two ranges
Calibrated level	250 V – 24 kV
Voltage waveform	1.2 µs ± 30 % / 50 µs ± 20 %
Calibrated current SC	250 A – 12 kA ± 10 %, in two ranges
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Undershoot	< 30 %
Pulse repetition	up to 1 / 7 s @ 2 kV, 1 / 30 s @ 24 kV
Polarity	positive, negative, alternating
Synchronization	0 – 360°, step 1°
Programmable ramps	voltage, synchronisation angle

MIG2412SPD built-in manual CDN

Test level surge	24 kV
EUT power input	AC 440 V L-N, 50, 60 Hz, 16 A
	AC 280 V L-PE, N-PE
EUT overcurrent protection	CDN input fuse 2 x 16 A, super slow
Coupling L-N	2 Ω, 18 µF
Coupling L-PE, N-PE	12 Ω, 9 µF
Decoupling	as in IEC61000-4-5

MIG2412SPD circuit: voltage impulse 1.2/50 µs, 42 Ω, 24 kV

Standards	IEC61643-1, VDE0675-6
Application	test SPDs IEC class I and II (VDE class A,C)
Impulse capacitance	10 µF ± 10 %
Energy at max. voltage	3000 joules
Output impedance	40 + 2 Ω ± 10 %
Adjustable voltage OC	1 kV – 24.4 kV ± 10 %
Calibrated level	2 kV – 24 kV
Voltage waveform	1.2 µs ± 30 % / 50 µs ± 20 %
Current waveform	not defined
Pulse repetition	up to 1 / 9 s @ 1 kV, 1 / 30 s @ 24 kV
Polarity	positive, negative, alternating
Synchronization	0 – 360°, step 1°
Programmable ramps	voltage, synchronisation angle

MIG2412SPD circuit: current impulse 8/20 µs, 2 Ω, 12 kA

Standards	IEC61643-1, VDE0675-6
Application	test SPDs IEC class I and II (VDE class A,C)
Impulse capacitance	10 µF ± 10 %
Energy at max. voltage	3000 joules
Output impedance	2 Ω
Voltage waveform	not defined
Adjustable current range	500 A – 13 kA +10% / -0%
Calibrated level	1 kA – 12 kA
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Undershoot	< 20 %
Pulse repetition	up to 1 / 10 s @ 1 kA, 1 / 28 s @ 12 kA
Polarity	positive, negative, alternating

MIG2412SPD control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Surge voltage monitor BNC	10 V = 24 kV, accuracy ± 3%
Surge current monitor BNC	10 V = 12 kA, accuracy ± 3%
Surge voltage on display	0.25 – 26.4 kV, accuracy ± 3%
Surge current on display	0.25 – 13.2 kA, accuracy ± 3%
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Synchro. source	EUT power, direct out
Power synchro. on/off	0 – 360°, 1° step
Impulse counter	programmable up to 29’999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG2412SPD supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA

Weight	225 kg
W x d x h	60 x 65 x 123 cm
Version	19“ rack (with wheels), 18 UH

Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa

Included articles

Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG2412SPD optional accessories

Test cabinet	TC-MIG24 with warning lamps
Software	TEMA: sequence, report, for latest Windows

MIG1248

MIG1248 circuit: 8/20 µs current

Standards	IEC60060-1, IEC61643-1
Application	test of SPDs
Impulse capacitance	4 x 20 µF ± 10 %
Energy at max. voltage	6000 joules
Voltage waveform	not defined
Adjustable current range	1 kA – 12 kA, impedance 1 Ω ± 10 %, or
	2 kA – 24 kA, impedance 0.5 Ω ± 10 %, or
	3 kA – 36 kA, impedance 0.33 Ω ± 10 %, or
	4 kA – 48 kA, impedance 0.25 Ω ± 10 %
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Undershoot	< 20 %
Pulse repetition	1 pulse / 4 s @ 1 kA, 1 pulse / 30 s @ 48 kA
Polarity	positive, negative, alternating

MIG1248 control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Surge voltage monitor BNC	10 V = 12 kV, accuracy ± 3 %
Surge current monitor BNC	10 V = 48 kA, accuracy ± 3 %
Surge voltage on display	250 V – 13.2 kV, accuracy ± 3 %
Surge current on display	1 kA – 48.7 kA, accuracy ± 3 %
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Impulse counter	programmable up to 29'999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG1248 supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA
Weight	240 kg
W x d x h	60 x 65 x 184 cm
Version	19“ rack (with wheels), 36 UH
Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa
Included articles	
Test cabinet	max. EUT dimensions 160 x 300 x 100 mm
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG1248 optional accessories

Software	TEMA: sequence, report, for latest Windows

MIG1260

MIG1260 circuit: 8/20 µs current

Standards	IEC60060-1, IEC61643-1
Application	test of SPDs
Impulse capacitance	5 x 20 µF ± 10 %
Energy at max. voltage	7200 joules
Voltage waveform	not defined
Adjustable current range	1 kA – 12 kA, impedance 1 Ω ± 10 %, or
	2 kA – 24 kA, impedance 0.5 Ω ± 10 %, or
	3 kA – 36 kA, impedance 0.33 Ω ± 10 %, or
	4 kA – 48 kA, impedance 0.25 Ω ± 10 %, or
	5 kA – 60 kA*, impedance 0.2 Ω ± 10 %
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Undershoot	< 20 %
Pulse repetition	1 pulse / 4 s @ 1 kA, 1 pulse / 30 s @ 60 kA
Polarity	positive, negative, alternating

*Isc is guaranteed only in the calibration setup, contact sales for more info

MIG1260 control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Surge voltage monitor BNC	10 V = 12 kV, accuracy ± 3 %
Surge current monitor BNC	10 V = 60 kA, accuracy ± 3 %
Surge voltage on display	250 V – 13.2 kV, accuracy ± 3 %
Surge current on display	1 kA – 60 kA, accuracy ± 3 %
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Synchro. source	EUT power (with CDN50kA)
Power synchro. on/off	peak synchronisation, 0 – 360°, step 1°
Impulse counter	programmable up to 29'999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG1260 supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA
Rack 1 (generator)	
Weight	260 kg
W x d x h	60 x 65 x 184 cm
Version	19" rack (with wheels), 36 UH
Rack 2 (controller)	
Weight	120 kg
W x d x h	60 x 65 x 150 cm
Version	19" rack (with wheels), 18 UH
Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa
Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG1260 optional accessories

Test cabinet	TC-MIG24 with warning lamps
CDN for powered EUTs	CDN50 kA-1P, includes adjust. power source
Extension for 40(10)/350 µs	NW40-350 for 10 kA 40/350 µs current
Software	TEMA: sequence, report, for latest Windows

MIG12100

MIG12100 circuit: 8/20 µs current

Standards	IEC60060-1, IEC61643-1
Application	test of SPDs
Impulse capacitance	10 x 20 µF ± 10 %
Energy at max. voltage	14400 joules
Voltage waveform	not defined
Adjustable current range	1 kA – 12 kA, impedance 1 Ω ± 10 %, or
	2 kA – 24 kA, impedance 0.5 Ω ± 10 %, or
	3 kA – 36 kA, impedance 0.33 Ω ± 10 %, or
	4 kA – 48 kA, impedance 0.25 Ω ± 10 %, or
	5 kA – 60 kA*, impedance 0.2 Ω ± 10 %, or
	48 kA – 100 kA*, impedance 0.1 Ω ± 10 %
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Undershoot	< 20 %
Pulse repetition	1 pulse / 4 s @ 1 kA, 1 pulse / 55 s @ 100 kA
Polarity	positive, negative, alternating

*Isc is guaranteed only in the calibration setup, contact sales for more info

MIG12100 control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Surge voltage monitor BNC	10 V = 12 kV, accuracy ± 3 %
Surge current monitor BNC	10 V = 100 kA, accuracy ± 3 %
Surge voltage on display	250 V – 13.2 kV, accuracy ± 3 %
Surge current on display	1 kA – 100 kA, accuracy ± 3 %
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Synchro. source	EUT power (with CDN50kA)
Power synchro. on/off	peak synchronisation, 0 – 360°, step 1°
Impulse counter	programmable up to 29'999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG12100 supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA
Rack 1 (generator)	
Weight	260 kg
W x d x h	60 x 65 x 184 cm
Version	19“ rack (with wheels), 36 UH
Rack 2 (generator)	
Weight	260 kg
W x d x h	60 x 65 x 184 cm
Version	19“ rack (with wheels), 36 UH
Rack 3 (controller)	
Weight	210 kg
W x d x h	650 x 600 x 1500 mm
Version	19“ rack, 18 UH
Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa
Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG12100 optional accessories

Test cabinet	TC-MIG24 with warning lamps
CDN for powered EUTs	CDN50 kA-1P, includes adjust. Power source
Extension for 40(10)/350 µs	NW40-350 for 20 kA 40/350 µs current
Software	TEMA: sequence, report, for latest Windows

CDN50kA-1P

Application	CDN for powered EUTs
Test level 8/20 µs current	max. 5 x 10 kA
Adjustable power source	included, manual setting, voltage display
Power source ranges	0 – 230 V, 5 A
	0 – 800 V, 5 A
	0 – 1200 V, 3 A
Decoupling to power line	AC 2 x 1200 V
Decoupling to generator	max. 2 x 2 kV, 10 kA/path
Weight	120 kg
Dimensions	19" rack (with wheels), 18 UH
Supply	normal mains 230 V / 16 A
Generators	MIG1260 or MIG12100
Optional	TC-MIG24 (highly recommended)

NW40-350

Application	extension used to generate 40/350 µs current
Current waveform SC	t_{rise} (10 – 90 % * 1.25): 40 µs
	$t_{duration}$ (50 – 50 %): 350 µs
Current amplitude SC	max. 10 kA +10 / - 0 %, with MIG1260
	max. 20 kA +10 / - 0 %, with MIG12100
Weight	100 kg
Dimensions	19" rack (with wheels), 18 UH
Generators	MIG1260 or MIG12100
Optional	TC-MIG24 (highly recommended)

CIRCUIT BREAKER TESTING

MIG0603CB

MIG0603CB: norm paragraphs covered (circuit breaker testing)

IEC60947-2:2003	B 8.6.1, B 8.6.2
IEC61008-1: 1996	9.19.1, 9.19.2, 9.20
IEC61009-1:1996	9.19.1, 9.19.2, 9.20

MIG0603CB circuit: voltage impulse 1.2/50 µs, 50 and 500 Ω, 12 kV

Application	circuit breaker testing
Impulse capacitance	5 µF ± 10 %
Energy at max. voltage	420 joules
Output impedance	50 Ω and 500 Ω, selectable
Adjustable voltage OC	0.5 kV – 13 kV - 0 % / +10 %
Calibrated level	1 kV – 12 kV
Voltage waveform	1.2 µs ± 30 % / 50 µs ± 20 %
Undershoot	< 5 %
Waveform in tolerance	50 Ω: R > 1 kΩ or C < 5 nF or L > 100 mH
	500 Ω: R > 10 kΩ or C < 0.5 nF or L > 200 mH
Current waveform	not defined
Pulse repetition	up to 1 / 5 s @ 1 kV, 1 / 15 s @ 12 kV
Polarity	positive, negative, alternating
Synchronization	0 – 360°, step 1°
Programmable ramps	voltage, synchronisation angle

MIG0603CB circuit: surge current impulse 8/20 µs, 4 or 20 Ω, 3 kA

Application	circuit breaker testing
Impulse capacitance	10 µF ± 10 %
Energy at max. voltage	180 joules
Voltage waveform	not defined
Adjustable current range	10 A – 290 A -10% / +0%, Zout = 20 Ω
	125 A – 3200 A +10% / -0%, Zout = 4 Ω
Calibrated level	50 A – 3000 A
Current waveform	8 µs ± 10 % / 20 µs ± 10 %
Undershoot	< 7 %
Pulse repetition	up to 1 / 5 s @ 0.25 kA, 1 / 14 s @ 3 kA
Polarity	positive, negative, alternating

MIG0603CB circuit: ring wave current impulse, 30 Ω, 250 A

Application	circuit breaker testing
Impulse capacitance	0.5 µF ± 10 %
Energy at max. voltage	10 joules
Output impedance	30 Ω, according to circuit in the standard
Voltage waveform	not defined
Adjustable current range	10 A – 290 A ± 10 %
Calibrated current level	10 A – 250 A
Current waveform	ring wave 0.5 µs (± 30 %) / 100 kHz (± 20 %)
Current waveform decay	second to first amplitude 60 % (-0 % / +50 %)
Pulse repetition	up to 1 / 10 s @ 10 A, 1 / 14 s @ 250 A
Polarity	positive, negative, alternating

MIG0603CB built-in single-phase CDN

Test level 8/20 µs surge	max. 3.2 kA
Test level 0.5/100 ring wa.	max. 290 A
EUT power input	L1, L2 (or N), PE max. AC 440 V, 16 A
EUT overcurrent protection	2 x 16 A, L1 and L2 (or N)
Internal CDN freq. range	50 Hz, 60 Hz
Coupling surge and ring	only L1 – L2 (or N), no PE coupling possible
Decoupling	1.8 mH

MIG0603CB control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Surge voltage monitor BNC	10 V = 12 kV, accuracy ± 3%, for 1.2/50 µs
Surge current monitor BNC	10 V = 30 or 300 A, acc. ± 3%, for 1.2/50 µs
	10 V = 0.3 or 3 kA, acc. ± 3%, for 8/20 µs
	10 V = 300 A, acc. ± 3%, for 0.5/100 ring
Surge voltage on display	0.1 – 13 kV, accuracy ± 3%, for 1.2/50 µs
Surge current on display	10 A – 330 A, accuracy ± 3%, for 1.2/50 µs
	10 A – 3.3 kA, accuracy ± 3%, for 8/20 µs
	10 A – 330 A, accuracy ± 3%, for 0.5/100 ring
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Synchro. source	EUT power, direct out
Power synchro. on/off	0 – 360°, 1° step
Impulse counter	programmable up to 29'999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG0603CB supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA
Weight	61 kg
W x d x h	45 x 57 x 61 cm
Version	19“ unit, 12 UH
Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa
Included articles	
Power cord	with country plug
Supply connection	5 cables x 2 m, banana plugs
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG0603CB optional accessories

Test cabinet	TC-MIG24 with warning lamps
MIG1206 generator	surge coupling paths 2, 12 Ω up to 12 kV
Software	TEMA: sequence, report, for latest Windows

PROTECTION RELAY TESTING

MIG0603OS2

MIG0603OS2 circuit: voltage impulse 1.2/50 µs, 500 Ω, 0.5 J, 6 kV

Standard	IEC60255-5
Application	test protection relays
Energy	0.5 joules at test levels 0.5, 1, 3, 5 kV
Output impedance	500 Ω ± 10 %
Adjustable voltage OC	250 V – 6.3 kV, automatic capacitance switch
Calibrated levels	0.5 kV, 1 kV, 3 kV, 5 kV (0.5 J pulse energy)
Voltage waveform	1.2 µs ± 30 % / 50 µs ± 20 %
Current waveform	not defined
Pulse repetition	up to 1 / 4 s @ 0.5 kV, 1 / 7 s @ 5 kV
Polarity	positive, negative, alternating
Programmable ramp	voltage

MIG0603OS2 circuit: CWG / Surge 2 Ω, 6 kV

Standard	IEC61000-4-5 latest edition
Application	test protection relays (requires external CDN)
Impulse capacitance	10 µF ± 10 %
Energy at max. voltage	220 joules
Output impedance	2 Ω ± 10 %
Adjustable voltage OC	250 V – 6.3 kV ± 10 %
Calibrated level	0.5 kV – 6 kV
Voltage waveform	1.2 µs ± 30 % / 50 µs ± 20 %
Calibrated current SC	0.25 kA – 3 kA ± 10 %
Current waveform	8 µs ± 20 % / 20 µs ± 20 %
Undershoot	< 30 %
Pulse repetition	up to 1 / 4 s @ 0.5 kV, 1 / 8 s @ 6 kV
Polarity	positive, negative, alternating
Synchronization	0 – 360°, step 1°, with external CDN
Programmable ramps	voltage, synchronisation angle

MIG0603OS2 control features

User interface	LCD and keypad, efficient menu structure
Communication interface	RS232 with (optional) adapter to USB
Surge voltage monitor BNC	10 V = 6 kV, accuracy ± 3%
Surge current monitor BNC	10 V = 3 kA, accuracy ± 3%
Surge voltage on display	0.25 – 6.6 kV, accuracy ± 3%
Surge current on display	125 A – 3.3 kA, accuracy ± 3%
Trigger out	BNC, max. 12 V
Trigger in	auto, manual, external (BNC input)
Synchro. source	EUT power, direct out
Power synchro. on/off	0 – 360°, 1° step, for CWG, with external CDN
Impulse counter	programmable up to 29'999
Emergency stop	Emergency Stop button, BNC input (EUT Fail)
Internal memory	up to 15 tests can be saved and recalled

MIG0603OS2 supply, weight, dimensions, climatic conditions

Operating voltage	115 / 230 V (50/60 Hz) ± 10%
Power consumption	ON < 400 VA, standby < 10 VA
Weight	24 kg
W x d x h	45 x 57 x 19 cm
Version	19“ unit, 4 UH
Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa
Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

MIG0603OS2 optional accessories

Test cabinet	TC-MIG24 with warning lamps
CDN for CWG surge	CDN2000-06-25, 3-phase 415 V, 25 A / phase
Software	TEMA: sequence, report, for latest Windows

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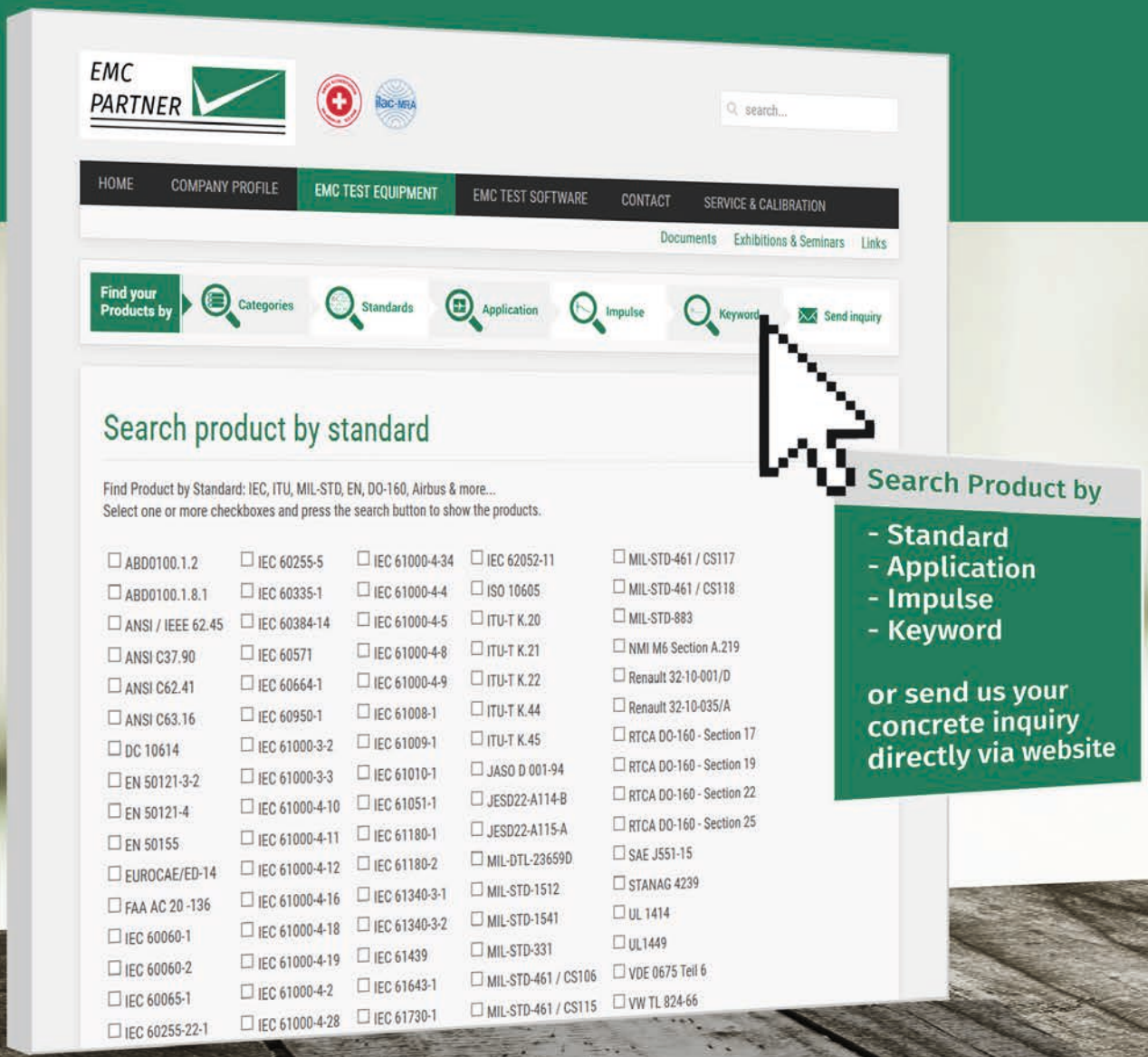

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