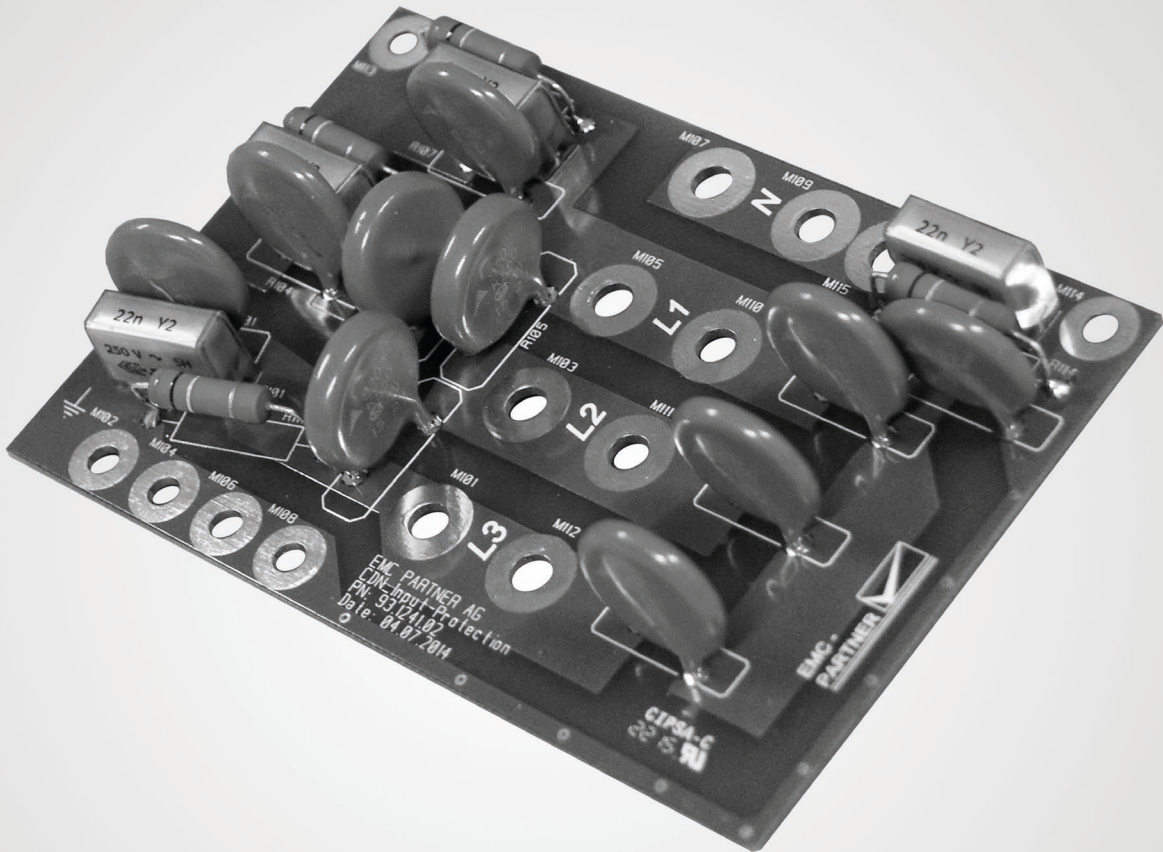



SPD, CAPACITORS AND MORE

# Component Testing

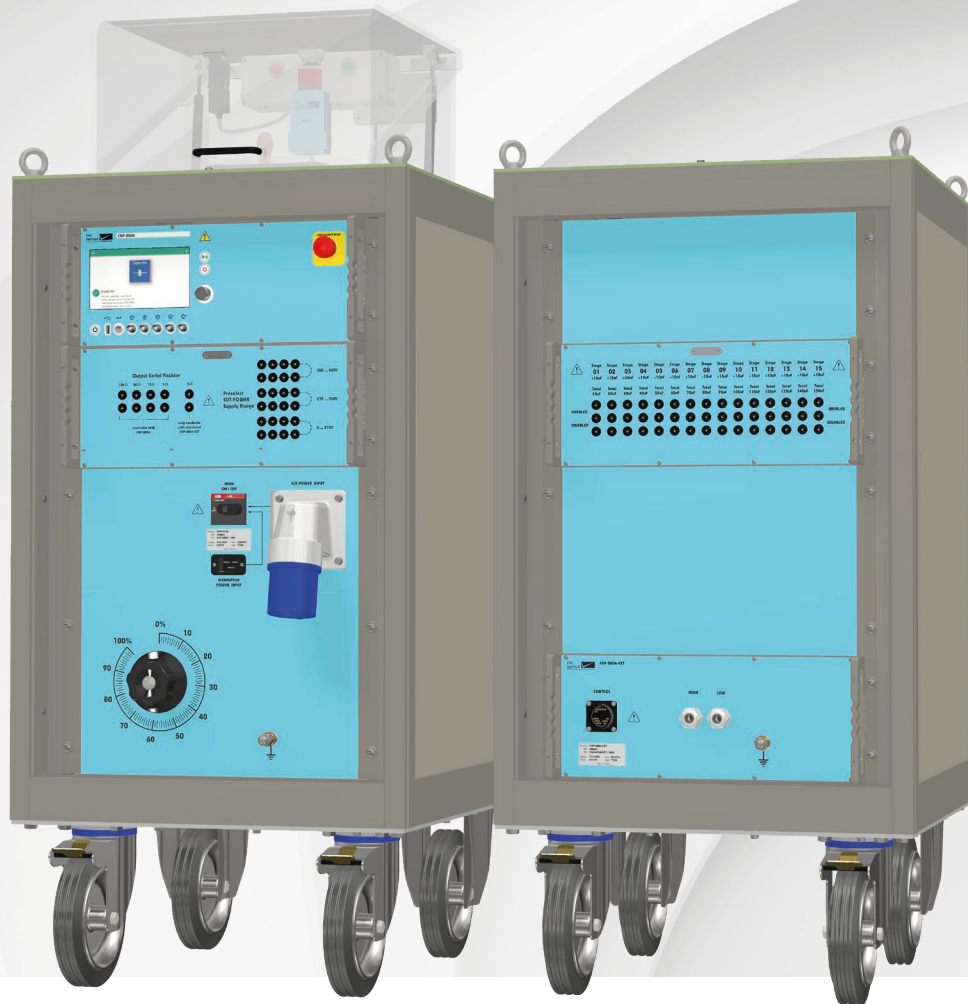


 This document has been  
optimized for electronic media



#### 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:

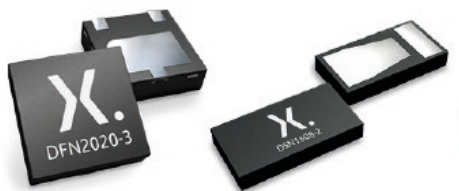
- › Surge Protection Devices (SPD)
- › Varistors (MOV)
- › Gas Discharge Tubes (GDT)
- › Capacitors
- › Resistors
- › Measuring relays
- › Circuit breakers

Expert instrumentation that provides product specific solutions.

# MANY APPLICATIONS ONLY ONE CHOICE

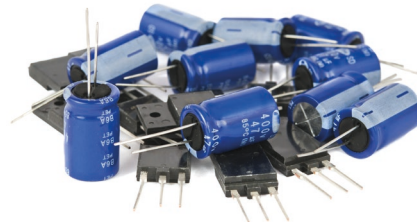
EMC PARTNER component testers are designed with the user in mind. Based on a tried and tested design concept, test instrumentation tailored to specific applications.

## 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 61051-1:** Varistors for use in electronic equipment - Part 1: Generic specification

**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 for household and similar uses (RCBOs)

**IEC 61008-1:** Residual current operated circuit breakers without integral overcurrent protection for 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

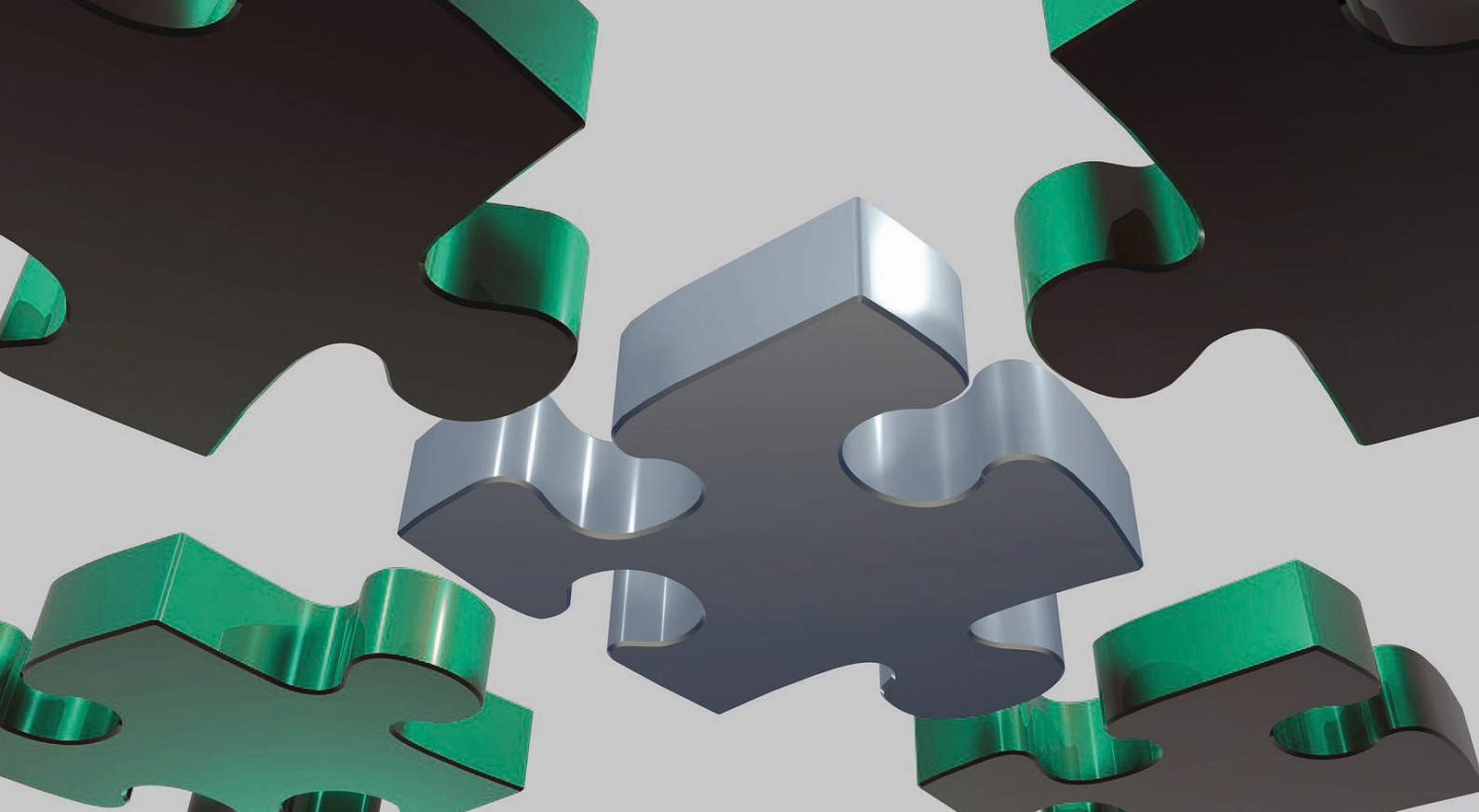
## Underwriters Laboratories (UL)

### 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



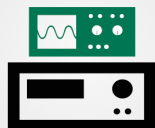
Solid state technology spanning a few Amps up to 100kA. Impulses including 8/20us, 10/350us, 10/1000us and many more.

### 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.

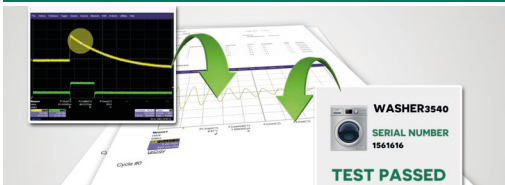




# TEMA3000 SOFTWARE SUITE

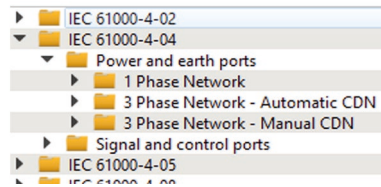
The best solution for professional EMC Test Labs enables comfortable test setups, easy parameter changes and customizable test reports and DSO integration.

## 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

# Technical Specifications



## CAPACITOR TESTING

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CAP-0804

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CAP-0804-EXT

---

MIG0603CAP

---

MIG1212CAP

---

MIG-EUT-SET

---

TC-ST-F + WARNING LAMP

---

MIG-CAP DUT-MUX

---

CN-MIG-SMD CAP

---

CAL-LOAD10nF

---

CAL-LOAD100nF

---

TC-ST + WARNING LAMP

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## SPD (SURGE PROTECTION DEVICE) TESTING

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MIG0603CLV1

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MIG0603CLV2

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CN-MIG-SMD CLV

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MIG0606

---

MIG0612

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MIG0624

---

MIG0624LP1

---

MIG1206SPD

---

MIG2412SPD

---

MIG1248

---

MIG1260

---

---

MIG12100

---

CDN 50kA-1P-1P

---

NW40-350

---

CTS-10350

---

CTS-101000-500

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CTS-101000-750

---

CTS-101000-1000

---

TC-ST + WARNING LAMP

---

## CIRCUIT BREAKER TESTING

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MIG0603CB

---

TC-ST + WARNING LAMP

---

## GENERAL ACCESSORIES

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TC-ST

---

WARNING LAMP

---

EMERGENCY-STOP

---

## PROTECTION RELAY TESTING

See Generators

- › IMU-MGx, DOW-CG1 in “Conducted Immunity Testing”
- › MIG1203STEP in “Insulation Testing”

# CAPACITOR TEST SYSTEMS

## CAP-0804

### CAP-0804 ACTIVE FLAMMABILITY CIRCUIT for $C_{EUT} \leq 1 \mu\text{F}$

<b>Standard</b>	IEC60384-14, UL 60384-14 latest active flammability test
<b>Impulse capacitance</b>	3 $\mu\text{F} \pm 5\%$ (suitable for EUTs up to 1 $\mu\text{F}$ )
<b>Energy at max. voltage</b>	96 joules
<b>Circuit diagram</b>	as in IEC60384-14 figure 8
<b>Adjustable charge voltage</b>	0.25 kV – 8 kV $\pm 10\%$
<b>Guaranteed output voltage</b>	5 kV at EUT terminals for EUTs up to 1 $\mu\text{F}$ 4 kV at EUT terminals for EUTs 1 -50 $\mu\text{F}$
<b>Pulse repetition rate</b>	1 / 1 s @ 0.25 kV, 1 / 5 s @ 8 kV
<b>Output impedance</b>	selectable: 5 $\Omega$ , 10 $\Omega$ , 40 $\Omega$ , 100 $\Omega$
<b>Voltage waveform</b>	amplitude as in IEC60384-14 figure 9



### CAP-0804-EXT CIRCUIT for $1 \mu\text{F} < C_{EUT} \leq 50 \mu\text{F}$ (optional)

<b>Application</b>	extends CAP-0804 for EUTs with higher C
<b>Extension controlled by</b>	CAP-0804
<b>Standard</b>	IEC60384-14, UL 60384-14 latest active flammability test
<b>Impulse capacitance</b>	10 – 150 $\mu\text{F} \pm 5\%$
<b>Suitable for EUTs</b>	$1 \mu\text{F} < C_{EUT} \leq 50 \mu\text{F}$
<b>Energy at max. voltage</b>	4800 joules
<b>Circuit diagram</b>	as in IEC60384-14 figure 8
<b>Adjustable charge voltage</b>	0.25 kV – 7 kV $\pm 10\%$
<b>Guaranteed output voltage</b>	4 kV at EUT terminals for EUTs up to 50 $\mu\text{F}$
<b>Pulse repetition rate</b>	1 / 2 s @ 2.4 kV, 1 / 5 s @ 6 kV (full compliant)
<b>Output impedance</b>	5 $\Omega$ for CEUT > 1 $\mu\text{F}$
<b>Voltage waveform</b>	amplitude as in IEC60384-14 figure 9
<b>Requires</b>	CAP-0804



### CAP-0804 EUT supply manual variac

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

Capacitor | SPD | Circuit Breaker | Protection Relay

### CAP-0804 control features

<b>Operating system</b>	EPOS proprietary firmware
<b>Languages</b>	8 menu languages, selectable
<b>User interface</b>	7" capacitive touch display
<b>Connectivity</b>	gigabit ethernet, USB, RS485
<b>Synchronization on signals</b>	40 – 800 Hz
<b>Synchronization source</b>	external, 50 – 280 V
<b>Synchronization angle</b>	0 – 359° ± 5°, 1° step
<b>Impulse polarity</b>	positive, negative, electronic switching
<b>Automatic ramp</b>	test level
<b>Trigger out</b>	BNC, max. 6 V
<b>EUT supply voltage waveform</b>	monitoring BNC output connector max. 15 V
<b>EUT supply current waveform</b>	monitoring BNC output connector max. 15 V
<b>Surge monitoring</b>	peak voltage and current on screen, waveform available at BNC outputs
<b>Surge voltage waveform</b>	monitoring BNC output connector max. 15 V
<b>Surge current waveform</b>	monitoring BNC output connector max. 15 V
<b>Programmable connectors</b>	2 BNC connectors (inputs/outputs) as follows
<b>Programmable input functions</b>	Trigger input, Start Test, Stop Test, EUT Fail, EUT Mark, Emergency Stop
<b>Programmable input max. voltage</b>	low range: 0 – 1.5 V, high range: 2.3 – 24 V
<b>Programmable output functions</b>	Running State, Safety Circuit State
<b>Programmable output max. U, I</b>	max. 24 V, max. 300 mA
<b>Safety features (standard)</b>	Emergency stop button on front panel red/yellow as per IEC 60947-5-5, IEC 60204-1, ISO 13850 Safety circuit

### CAP-0804 supply, weight, dimensions, climatic conditions

<b>Operating voltage</b>	115 / 230 V (50/60 Hz) ± 10%
<b>Power consumption</b>	
<b>CAP-0804</b>	ON < 300 VA, standby < 10 VA
<b>CAP-0804+EXT</b>	ON < 1800 VA

<b>Weight CAP-0804</b>	287 kg
<b>W x D x H</b>	60 x 72 x 127 cm
<b>Version</b>	19" rack (with wheels), 18 UH

<b>Weight EXT-COMP</b>	192 kg
<b>W x D x H</b>	60 x 65 x 123 cm
<b>Version</b>	19" rack (with wheels), 18 UH

<b>Temperature range</b>	5 – 35 °C
<b>Humidity</b>	25 – 80 % non-condensing
<b>Air pressure</b>	86 – 106 kPa

#### Included articles

<b>Power cord</b>	with country plug
<b>Supply connection</b>	3 cables x 2 m, banana plugs
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

### CAP-0804 optional accessories

<b>CAP-0804-EXT</b>	extends capability for testing up to 50 µF EUTs
<b>MIG-EUT-SET</b>	programmable switch matrix for up to 8 EUTs for EUTs up to maximum 1 µF
<b>Test cabinet &amp; lamp</b>	<a href="#">TC-ST-F</a> , <a href="#">WARNING-LAMP</a>
<b>Software</b>	TEMA3000: sequence, report, for Windows10

## MIG0603CAP

### MIG0603CAP circuit: tank capacitor $C_T = 250 \text{ nF}$

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



### MIG0603CAP circuit: tank capacitor $C_T = 20 \mu\text{F}$

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

### MIG0603CAP control features

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

### MIG0603CAP supply, weight, dimensions, climatic conditions

<b>Operating voltage</b>	115 / 230 V (50/60 Hz) $\pm 10\%$
<b>Power consumption</b>	ON < 400 VA, standby < 10 VA

<b>Weight</b>	28 kg
<b>W x D x H</b>	45 x 57 x 25 cm
<b>Version</b>	19" unit, 4 UH

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

#### Included articles

<b>Power cord</b>	with country plug
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

### MIG0603CAP optional accessories

<b>EUT fixture for 8 EUTs</b>	<a href="#">MIG-CAP DUT-MUX</a> programmable fixture
<b>Test cabinet</b>	<a href="#">TC-ST + WARNING LAMP</a>
<b>Software</b>	TEMA: sequence, report, for latest Windows



## MIG1212CAP

### MIG1212CAP circuit: tank capacitor $C_T = 250 \text{ nF}$

<b>Standards (impulse test)</b>	IEC60384-14, UL 60384-14, EN132400
<b>Impulse capacitance</b>	0.25 $\mu\text{F} \pm 10 \%$
<b>Energy at max. voltage</b>	18 joules
<b>Serial resistor</b>	selectable, 27, 45, 62 $\Omega \pm 10 \%$
<b>Adjustable voltage OC</b>	0.5 kV - 12 kV $\pm 10 \%$
<b>Calibrated level</b>	1 kV - 12 kV
<b>Voltage waveform</b>	in 10 nF: 1.7 $\mu\text{s} +50\%/-0\%$ , 46 $\mu\text{s} +50\%/-0\%$ in 100 nF: 1.6 $\mu\text{s} +50\%/-0\%$ , 47 $\mu\text{s} +50\%/-0\%$
<b>EUT range (wf in tolerance)</b>	0 - 27 nF
<b>Undershoot</b>	< 10 %
<b>Pulse repetition</b>	up to 1 / 10 s
<b>Polarity</b>	positive, negative, alternating
<b>Programmable ramps</b>	voltage



### MIG1212CAP circuit: tank capacitor $C_T = 20 \mu\text{F}$

<b>Standards (impulse test)</b>	IEC60384-14, UL 60384-14, EN132400
<b>Impulse capacitance</b>	20 $\mu\text{F} \pm 10 \%$
<b>Energy at max. voltage</b>	1440 joules
<b>Serial resistor</b>	selectable, 3, 5, 7, 9, 13, 25 $\Omega \pm 10 \%$
<b>Adjustable voltage OC</b>	0.5 kV - 12 kV $\pm 10 \%$ for EUT up to 120 nF 0.5 kV - 11 kV $\pm 10 \%$ for EUT up to 180 nF 0.5 kV - 10 kV $\pm 10 \%$ for EUT up to 10 $\mu\text{F}$
<b>Calibrated level</b>	1 kV - 12 kV
<b>EUT range</b>	27 nF - 10 $\mu\text{F}$
<b>Voltage waveform</b>	in 10 nF: 1.7 $\mu\text{s} +50\%/-0\%$ , 46 $\mu\text{s} +50\%/-0\%$ in 100 nF: 1.6 $\mu\text{s} +50\%/-0\%$ , 47 $\mu\text{s} +50\%/-0\%$
<b>Undershoot</b>	< 10 %
<b>Pulse repetition</b>	up to 1 / 30 s
<b>Polarity</b>	positive, negative, alternating
<b>Programmable ramps</b>	voltage

### MIG1212CAP circuit: induction test CWG, $C_T = 20 \mu\text{F}$

<b>Standards</b>	IEC60384-14, induction test
<b>Impulse capacitance</b>	20 $\mu\text{F} \pm 10 \%$
<b>Energy at max. voltage</b>	1440 joules
<b>Output impedance</b>	4 $\Omega \pm 10 \%$
<b>Adjustable voltage OC</b>	0.5 kV - 12 kV $\pm 10 \%$

<b>Calibrated level</b>	2 kV – 12 kV
<b>Voltage waveform</b>	1.2 $\mu$ s $\pm$ 30 % / 50 $\mu$ s $\pm$ 20 %
<b>Undershoot</b>	< 5 %
<b>Pulse repetition</b>	up to 1 / 30 s
<b>Polarity</b>	positive, negative, alternating
<b>Programmable ramps</b>	voltage

### MIG1212CAP control features

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

### MIG1212CAP supply, weight, dimensions, climatic conditions

<b>Operating voltage</b>	115 / 230 V (50/60 Hz) $\pm$ 10%
<b>Power consumption</b>	ON < 400 VA, standby < 10 VA

<b>Weight</b>	57 kg
<b>W x D x H</b>	45 x 60 x 43 cm
<b>Version</b>	19" unit, 8 UH

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

#### Included articles

<b>Power cord</b>	with country plug
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

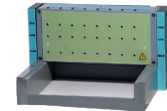
### MIG1212CAP optional accessories

<b>EUT fixture for 8 EUTs</b>	<a href="#">MIG-CAP DUT-MUX</a> programmable fixture
<b>Test cabinet</b>	<a href="#">TC-ST + WARNING LAMP</a>
<b>Software</b>	TEMA: sequence, report, for latest Windows

## ACCESSORIES TO CAPACITOR TEST SYSTEMS

### MIG-EUT-SET

<b>Standard</b>	IEC60384-14 latest
<b>Application</b>	auto-coupling switch matrix for 8 EUTs
<b>Outputs</b>	max. 8 capacitors connected at the same time
<b>EUT dim / volume available</b>	12 x 15 x 28 cm
<b>EUT connection</b>	via MC clips
<b>Active output signalisation</b>	8 LEDs indicating output status
<b>Flammability protection</b>	epoxy plate (reserve plate included in delivery)
<b>Insulation withstand</b>	pulse 1.2/50 $\mu$ s up to 6 kV
<b>Weight</b>	8.5 kg
<b>Dimensions</b>	32 x 41 x 31 cm
<b>Included</b>	control cable to generator, EUT clips
<b>Requires</b>	<a href="#">CAP-0804</a> , <a href="#">TC-ST-F</a> , <a href="#">WARNING LAMP</a>



### TC-ST-F

<b>Standard</b>	IEC60384-14 latest
<b>Application</b>	test cabinet for active flammability test
<b>EUT volume</b>	12 x 15 x 28 cm
<b>Warning lamps</b>	red and green (2 lamps), safety circuit
<b>Test cabinet material</b>	acrylic glass
<b>Flammability protection</b>	glass plate and box
<b>Insulation withstand</b>	pulse 1.2/50 $\mu$ s up to 36 kV
<b>Weight</b>	11 kg
<b>Dimensions</b>	43.5 x 47 x 25.4 cm
<b>Included</b>	control cable to generator
<b>Requires</b>	<a href="#">CAP-0804</a>



### MIG-CAP DUT-MUX

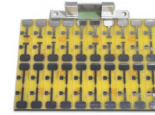
<b>Standard</b>	IEC60384-14 latest
<b>Application</b>	auto-coupling switch matrix for 8 EUTs
<b>Outputs</b>	max. 8 capacitors connected at the same time
<b>EUT dim / volume available</b>	10 x 10 x 30 cm
<b>EUT connection</b>	via MC clips
<b>Voltage measurement</b>	cables to generator, measurement at EUT port
<b>Active output signalisation</b>	8 LEDs indicating output status
<b>Insulation withstand</b>	pulse 1.2/50 $\mu$ s up to 12 kV
<b>Weight</b>	8.5 kg
<b>Dimensions</b>	36 x 20 x 10 cm
<b>Included</b>	control cable to generator, EUT clips
<b>Requires</b>	<a href="#">MIG1212CAP</a> , <a href="#">TC-ST</a> + <a href="#">WARNING LAMP</a>



Capacitor | SPD | Circuit Breaker | Protection Relay

## CN-MIG-SMD CAP

<b>Application</b>	set of fixtures for SMD capacitors
<b>Test level voltage</b>	max. 6 kV
<b>Test level current</b>	max. 6 kA
<b>CAP adapter sets (additional)</b>	10 PCBs x 20 capacitor mounts, different sizes adapter for 1 mount at a time
<b>Weight</b>	5 kg
<b>Dimensions</b>	32 x 22 x 10 cm
<b>Generators</b>	<a href="#">MIG0603CAP</a> , <a href="#">MIG1212CAP</a>



### CAL-LOAD10nF

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



### CAL-LOAD100nF

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



# SPD TESTING

## MIG0603CLV1



### MIG0603CLV1 circuit: 8/20 $\mu$ s current

<b>Standards</b>	IEC60060-1, IEC61643-11, CCITT K12 surge
<b>Application</b>	test of varistors VDR types 05Dx, 20Dx
<b>Impulse capacitance</b>	10 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	180 joules
<b>Output impedance</b>	10 $\Omega$ , 100 $\Omega$ , 1000 $\Omega$ $\pm$ 10 %
<b>Selectable voltage VCL</b>	up to 3300 V in different ranges
<b>Voltage waveform</b>	not defined
<b>Selectable current range Ip</b>	0.2 A – 300 A in different ranges
<b>Current waveform</b>	8 $\mu$ s $\pm$ 20 % / 20 $\mu$ s $\pm$ 20 %
<b>Pulse repetition</b>	highest repetition rate 1 pulse / 8 s
<b>Polarity</b>	positive, negative, alternating

### MIG0603CLV1 impedance ranges

MIG0603CLV1	Varistor characteristics			
ZOUT	Ip	min rd@VCL	max rd@VCL	max VCL
$\Omega$	A	$\Omega$	$\Omega$	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
	$\Omega$	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

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

## MIG0603CLV1 supply, weight, dimensions, climatic conditions

<b>Operating voltage</b>	115 / 230 V (50/60 Hz) $\pm 10\%$
<b>Power consumption</b>	ON < 400 VA, standby < 10 VA
<b>Weight</b>	22 kg
<b>W x D x H</b>	45 x 57 x 19 cm
<b>Version</b>	19" unit, 4 UH
<b>Temperature range</b>	10 – 35 °C
<b>Humidity</b>	< 80 % non-condensing

<b>Air pressure</b>	86 – 106 kPa
<b>Included articles</b>	
<b>Power cord</b>	with country plug
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

### MIG0603CLV1 optional accessories

<b>Test cabinet</b>	TC-ST + WARNING LAMP
<b>EUT fixture</b>	CN-MIG-SMD-CLV
<b>Software</b>	TEMA: sequence, report, for latest Windows

## MIG0603CLV2



### MIG0603CLV2 circuit: 8/20 $\mu$ s current

<b>Standards</b>	IEC60060-1, IEC61643-11, CCITT K12 surge
<b>Application</b>	test of varistors VDR types 05Dx, 20Dx
<b>Impulse capacitance</b>	9 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	180 joules
<b>Output impedance</b>	5, 10 $\Omega$ , 100 $\Omega$ , 1000 $\Omega$ $\pm$ 10 %
<b>Voltage VCL</b>	up to 3000 V in different ranges
<b>Voltage waveform</b>	not defined
<b>Selectable current range Ip</b>	0.2 A – 600 A in different ranges
<b>Current waveform</b>	8 $\mu$ s $\pm$ 20 % / 20 $\mu$ s $\pm$ 20 %
<b>Pulse repetition</b>	highest repetition rate 1 pulse / 8 s
<b>Polarity</b>	positive, negative, alternating

### MIG0603CLV2 impedance ranges

MIG0603CLV2	Varistor characteristics			
	ZOUT	Ip	min rd@VCL	max rd@VCL
$\Omega$	A	$\Omega$	$\Omega$	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

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

### MIG0603CLV2 supply, weight, dimensions, climatic conditions

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

### MIG0603CLV2 optional accessories

<b>Test cabinet</b>	TC-ST + WARNING LAMP
<b>EUT fixture</b>	CN-MIG-SMD-CLV
<b>Software</b>	TEMA: sequence, report, for latest Windows

### CN-MIG-SMD CLV

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

## MIG0606

### MIG0606 circuit: 8/20 $\mu$ s current

<b>Standards</b>	IEC60060-1, IEC61643-11, IEC61009-1
<b>Application</b>	test of protection devices for voltage < 1000 V
<b>Impulse capacitance</b>	20 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	375 joules
<b>Output impedance</b>	1 $\Omega$ $\pm$ 10 %
<b>Voltage waveform</b>	not defined
<b>Adjustable current range</b>	250 A – 6 kA
<b>Current waveform</b>	8 $\mu$ s $\pm$ 20 % / 20 $\mu$ s $\pm$ 20 %
<b>Undershoot</b>	< 20 %
<b>Pulse repetition</b>	highest repetition rate 1 pulse / 15 s
<b>Polarity</b>	positive, negative, alternating



### MIG0606 control features

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

### MIG0606 supply, weight, dimensions, climatic conditions

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

<b>Weight</b>	24 kg
<b>W x D x H</b>	45 x 57 x 25 cm
<b>Version</b>	19" unit, 4 UH

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

#### Included articles

<b>Power cord</b>	with country plug
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

### MIG0606 optional accessories

<b>Test cabinet</b>	TC-ST + WARNING LAMP
<b>Software</b>	TEMA: sequence, report, for latest Windows



## MIG0612

### MIG0612 circuit: 8/20 $\mu$ s current

<b>Standards</b>	IEC60060-1, IEC61643-11
<b>Application</b>	test of protection devices for voltage < 1000 V
<b>Impulse capacitance</b>	2 x 20 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	750 joules
<b>Output impedance</b>	0.5 $\Omega$ $\pm$ 10 %
<b>Voltage waveform</b>	not defined
<b>Adjustable current range</b>	250 A – 12 kA (250 A – 6 kA or 500 A – 12 kA)
<b>Current waveform</b>	8 $\mu$ s $\pm$ 20 % / 20 $\mu$ s $\pm$ 20 %
<b>Undershoot</b>	< 20 %
<b>Pulse repetition</b>	highest repetition rate 1 pulse / 30 s
<b>Polarity</b>	positive, negative, alternating



### MIG0612 control features

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

### MIG0612 supply, weight, dimensions, climatic conditions

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

<b>Weight</b>	36 kg
<b>W x D x H</b>	45 x 57 x 25 cm
<b>Version</b>	19" unit, 4 UH

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

#### Included articles

<b>Power cord</b>	with country plug
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

### MIG0612 optional accessories

<b>Test cabinet</b>	TC-ST + WARNING LAMP
<b>Software</b>	TEMA: sequence, report, for latest Windows

## MIG0624

### MIG0624 circuit: 8/20 $\mu$ s current

<b>Standards</b>	IEC60060-1, IEC61643-11
<b>Application</b>	test of protection devices for voltage < 1000 V
<b>Impulse capacitance</b>	4 x 20 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	1500 joules
<b>Output impedance</b>	0.25 $\Omega$ $\pm$ 10 %
<b>Voltage waveform</b>	not defined
<b>Adjustable current range</b>	250 A – 6 kA, impedance 1 $\Omega$ $\pm$ 10 %, or 500 A – 12 kA, impedance 0.5 $\Omega$ $\pm$ 10 %, or 1 kA – 18 kA, impedance 0.33 $\Omega$ $\pm$ 10 %, or 2 kA – 24 kA, impedance 0.25 $\Omega$ $\pm$ 10 %
<b>Current waveform</b>	8 $\mu$ s $\pm$ 20 % / 20 $\mu$ s $\pm$ 20 %
<b>Undershoot</b>	< 20 %
<b>Pulse repetition</b>	highest repetition rate 1 pulse / 30 s
<b>Polarity</b>	positive, negative, alternating

### MIG0624 control features

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

### MIG0624 supply, weight, dimensions, climatic conditions

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

### MIG0624 optional accessories

<b>Test cabinet</b>	TC-ST + WARNING LAMP
<b>Software</b>	TEMA: sequence, report, for latest Windows

## MIG0624LP1

### MIG0624LP1 circuit: 8/20 $\mu$ s current

<b>Standards</b>	IEC60060-1, IEC61643-11
<b>Application</b>	test of varistors (VDR), surge arresters
<b>Impulse capacitance</b>	4 x 20 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	1500 joules
<b>Output impedance</b>	0.25 $\Omega$ $\pm$ 10 %
<b>Voltage waveform</b>	not defined
<b>Adjustable current range</b>	250 A – 6 kA, impedance 1 $\Omega$ $\pm$ 10 %, or 500 A – 12 kA, impedance 0.5 $\Omega$ $\pm$ 10 %, or 1 kA – 18 kA, impedance 0.33 $\Omega$ $\pm$ 10 %, or 2 kA – 24 kA, impedance 0.25 $\Omega$ $\pm$ 10 %
<b>Current waveform</b>	8 $\mu$ s $\pm$ 20 % / 20 $\mu$ s $\pm$ 20 %
<b>Undershoot</b>	< 20 %
<b>Pulse repetition</b>	highest repetition rate 1 pulse / 30 s
<b>Polarity</b>	positive, negative, alternating



### MIG0624LP1 circuit: 10/1000 $\mu$ s current

<b>Standards</b>	IEC60060-1, IEC61643-11
<b>Application</b>	test of varistors (VDR), surge arresters
<b>Impulse capacitance</b>	8 x 10 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	1500 joules
<b>Output impedance</b>	25 $\Omega$ $\pm$ 10 %
<b>Voltage waveform</b>	not defined
<b>Adjustable current range</b>	5 A – 60 A, impedance 100 $\Omega$ $\pm$ 10 %, or 10 A – 120 A, impedance 50 $\Omega$ $\pm$ 10 %, or 15 A – 180 A, impedance 33 $\Omega$ $\pm$ 10 %, or 20 A – 240 A, impedance 25 $\Omega$ $\pm$ 10 %
<b>Current waveform</b>	10 $\mu$ s $\pm$ 20 % / 1000 $\mu$ s $\pm$ 20 %
<b>Undershoot</b>	< 20 %
<b>Pulse repetition</b>	highest repetition rate 1 pulse / 30 s
<b>Polarity</b>	positive, negative, alternating

### MIG0624LP1 control features

<b>User interface</b>	LCD and keypad, efficient menu structure
<b>Communication interface</b>	RS232 with (optional) adapter to USB
<b>Surge voltage monitor BNC</b>	10 V = 6 kV, accuracy $\pm 3\%$
<b>Surge current monitor BNC</b>	10 V = 24 kA, accuracy $\pm 3\%$ , for 8/20 $\mu\text{s}$ 10 V = 80, 160, 240, 320 A, for 10/1000 $\mu\text{s}$
<b>Surge voltage on display</b>	250 V – 6.6 kV, accuracy $\pm 3\%$
<b>Surge current on display</b>	250 A – 25 kA, accuracy $\pm 3\%$ , for 8/20 $\mu\text{s}$ 6 A – 320 A, accuracy $\pm 3\%$ , for 10/1000 $\mu\text{s}$
<b>Trigger out</b>	BNC, max. 12 V
<b>Trigger in</b>	auto, manual, external (BNC input)
<b>Impulse counter</b>	programmable up to 29'999
<b>Emergency stop</b>	Emergency Stop button, BNC input (EUT Fail)
<b>Internal memory</b>	up to 15 tests can be saved and recalled

### MIG0624LP1 supply, weight, dimensions, climatic conditions

<b>Operating voltage</b>	115 / 230 V (50/60 Hz) $\pm 10\%$
<b>Power consumption</b>	ON < 400 VA, standby < 10 VA
<b>Weight</b>	57 kg
<b>W x D x H</b>	45 x 57 x 43 cm
<b>Version</b>	19" unit, 8 UH
<b>Temperature range</b>	10 – 35 °C
<b>Humidity</b>	< 80 % non-condensing
<b>Air pressure</b>	86 – 106 kPa

### Included articles

<b>Power cord</b>	with country plug
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

### MIG0624LP1 optional accessories

<b>Test cabinet</b>	TC-ST + WARNING LAMP
<b>Software</b>	TEMA: sequence, report, for latest Windows



## MIG1206SPD

### MIG1206SPD: IEC61643-1 standard paragraphs 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	IEC61643-11, 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 $\mu$ s, 42 $\Omega$ , 12 kV

<b>Standards</b>	IEC61643-11, VDE0675-6
<b>Application</b>	test SPDs IEC class I and II (VDE class A,C)
<b>Impulse capacitance</b>	10 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	720 joules
<b>Output impedance</b>	40 + 2 $\Omega$ $\pm$ 10 %
<b>Adjustable voltage OC</b>	1 kV – 13.2 kV $\pm$ 10 %
<b>Calibrated level</b>	1 kV – 12 kV
<b>Voltage waveform</b>	1.2 $\mu$ s $\pm$ 30 % / 50 $\mu$ s $\pm$ 20 %
<b>Current waveform</b>	not defined
<b>Pulse repetition</b>	up to 1 / 5 s @ 1 kV, 1 / 30 s @ 12 kV
<b>Polarity</b>	positive, negative, alternating
<b>Synchronization</b>	0 – 360°, step 1°
<b>Programmable ramps</b>	voltage, synchronisation angle

### MIG1206SPD circuit: current impulse 8/20 $\mu$ s, < 2 $\Omega$ , 6 kA

<b>Standards</b>	IEC61643-11, VDE0675-6
<b>Application</b>	test SPDs IEC class I and II (VDE class A,C)
<b>Impulse capacitance</b>	10 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	720 joules
<b>Output impedance</b>	< 2 $\Omega$
<b>Voltage waveform</b>	not defined
<b>Adjustable current range</b>	250 A – 6.3 kA
<b>Calibrated level</b>	500 A – 6 kA
<b>Current waveform</b>	8 $\mu$ s $\pm$ 20 % / 20 $\mu$ s $\pm$ 20 %
<b>Undershoot</b>	< 20 %
<b>Pulse repetition</b>	up to 1 / 5 s @ 1 kA, 1 / 30 s @ 6 kA
<b>Polarity</b>	positive, negative, alternating

### MIG1206SPD control features

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

[Capacitor](#) | [SPD](#) | [Circuit Breaker](#) | [Protection Relay](#)

### MIG1206SPD supply, weight, dimensions, climatic conditions

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

### MIG1206SPD optional accessories

<b>Test cabinet</b>	TC-ST + WARNING LAMP
<b>Test cables</b>	CN-MIG4803, 1.2 m length (specs on request)
<b>Software</b>	TEMA: sequence, report, for latest Windows

## MIG2412SPD

### MIG2412SPD: IEC61643-11 standard paragraphs 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	IEC61643-11, 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 $\mu$ s, 42 $\Omega$ , 24 kV

<b>Standards</b>	IEC61643-11, VDE0675-6
<b>Application</b>	test SPDs IEC class I and II (VDE class A,C)
<b>Impulse capacitance</b>	10 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	3000 joules
<b>Output impedance</b>	40 + 2 $\Omega$ $\pm$ 10 %
<b>Adjustable voltage OC</b>	1 kV – 24.4 kV $\pm$ 10 %
<b>Calibrated level</b>	2 kV – 24 kV
<b>Voltage waveform</b>	1.2 $\mu$ s $\pm$ 30 % / 50 $\mu$ s $\pm$ 20 %
<b>Current waveform</b>	not defined
<b>Pulse repetition</b>	up to 1 / 9 s @ 1 kV, 1 / 30 s @ 24 kV
<b>Polarity</b>	positive, negative, alternating
<b>Synchronization</b>	0 – 360°, step 1°
<b>Programmable ramps</b>	voltage, synchronisation angle

### MIG2412SPD circuit: current impulse 8/20 $\mu$ s, 2 $\Omega$ , 12 kA

<b>Standards</b>	IEC61643-11, VDE0675-6
<b>Application</b>	test SPDs IEC class I and II (VDE class A,C)
<b>Impulse capacitance</b>	10 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	3000 joules
<b>Output impedance</b>	2 $\Omega$
<b>Voltage waveform</b>	not defined
<b>Adjustable current range</b>	500 A – 13 kA +10% / -0%
<b>Calibrated level</b>	1 kA – 12 kA
<b>Current waveform</b>	8 $\mu$ s $\pm$ 20 % / 20 $\mu$ s $\pm$ 20 %
<b>Undershoot</b>	< 20 %
<b>Pulse repetition</b>	up to 1 / 10 s @ 1 kA, 1 / 28 s @ 12 kA
<b>Polarity</b>	positive, negative, alternating

### MIG2412SPD control features

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

### MIG2412SPD supply, weight, dimensions, climatic conditions

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

<b>Weight</b>	225 kg
<b>W x D x H</b>	60 x 65 x 123 cm
<b>Version</b>	19" rack (with wheels), 18 UH

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

#### Included articles

<b>Power cord</b>	with country plug
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

### MIG2412SPD optional accessories

<b>Test cabinet</b>	TC-ST + WARNING LAMP
<b>Software</b>	TEMA: sequence, report, for latest Windows

## MIG1248

### MIG1248 circuit: 8/20 $\mu$ s current

<b>Standards</b>	IEC60060-1, IEC61643-11
<b>Application</b>	test of SPDs
<b>Impulse capacitance</b>	4 x 20 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	6000 joules
<b>Voltage waveform</b>	not defined
<b>Adjustable current range</b>	1 kA – 12 kA, impedance 1 $\Omega$ $\pm$ 10 %, or 2 kA – 24 kA, impedance 0.5 $\Omega$ $\pm$ 10 %, or 3 kA – 36 kA, impedance 0.33 $\Omega$ $\pm$ 10 %, or 4 kA – 48 kA, impedance 0.25 $\Omega$ $\pm$ 10 %
<b>Current waveform</b>	8 $\mu$ s $\pm$ 20 % / 20 $\mu$ s $\pm$ 20 %
<b>Undershoot</b>	< 20 %
<b>Pulse repetition</b>	1 pulse / 4 s @ 1 kA, 1 pulse / 30 s @ 48 kA
<b>Polarity</b>	positive, negative, alternating

### MIG1248 control features

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



### MIG1248 supply, weight, dimensions, climatic conditions

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

<b>Weight</b>	240 kg
<b>W x D x H</b>	60 x 65 x 184 cm
<b>Version</b>	19" rack (with wheels), 36 UH

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

#### Included articles

<b>Test cabinet</b>	max. EUT dimensions 160 x 300 x 100 mm
<b>Power cord</b>	with country plug
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

### MIG1248 optional accessories

<b>Software</b>	TEMA: sequence, report, for latest Windows
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## MIG1260

### MIG1260 circuit: 8/20 $\mu$ s current

<b>Standards</b>	IEC60060-1, IEC61643-11
<b>Application</b>	test of SPDs
<b>Impulse capacitance</b>	5 x 20 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	7200 joules
<b>Voltage waveform</b>	not defined
<b>Adjustable current range</b>	1 kA – 12 kA, impedance 1 $\Omega$ $\pm$ 10 %, or 2 kA – 24 kA, impedance 0.5 $\Omega$ $\pm$ 10 %, or 3 kA – 36 kA, impedance 0.33 $\Omega$ $\pm$ 10 %, or 4 kA – 48 kA, impedance 0.25 $\Omega$ $\pm$ 10 %, or 5 kA – 60 kA*, impedance 0.2 $\Omega$ $\pm$ 10 %
<b>Current waveform</b>	8 $\mu$ s $\pm$ 20 % / 20 $\mu$ s $\pm$ 20 %
<b>Undershoot</b>	< 20 %
<b>Pulse repetition</b>	1 pulse / 4 s @ 1 kA, 1 pulse / 30 s @ 60 kA
<b>Polarity</b>	positive, negative, alternating

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



### MIG1260 control features

<b>User interface</b>	LCD and keypad, efficient menu structure
<b>Communication interface</b>	RS232 with (optional) adapter to USB
<b>Surge voltage monitor BNC</b>	10 V = 12 kV, accuracy $\pm$ 3 %
<b>Surge current monitor BNC</b>	10 V = 60 kA, accuracy $\pm$ 3 %
<b>Surge voltage on display</b>	250 V – 13.2 kV, accuracy $\pm$ 3 %
<b>Surge current on display</b>	1 kA – 60 kA, accuracy $\pm$ 3 %
<b>Trigger out</b>	BNC, max. 12 V
<b>Trigger in</b>	auto, manual, external (BNC input)
<b>Synchro. source</b>	EUT power (with CDN 50kA-1P)
<b>Power synchro. on/off</b>	peak synchronisation, 0 – 360°, step 1°
<b>Impulse counter</b>	programmable up to 29'999
<b>Emergency stop</b>	Emergency Stop button, BNC input (EUT Fail)
<b>Internal memory</b>	up to 15 tests can be saved and recalled

### MIG1260 supply, weight, dimensions, climatic conditions

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

#### Rack 1 (generator)

<b>Weight</b>	260 kg
<b>W x D x H</b>	60 x 65 x 184 cm
<b>Version</b>	19" rack (with wheels), 36 UH

#### Rack 2 (controller)

<b>Weight</b>	120 kg
<b>W x D x H</b>	60 x 65 x 150 cm
<b>Version</b>	19" rack (with wheels), 18 UH

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

#### Included articles

<b>Power cord</b>	with country plug
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

### MIG1260 optional accessories

<b>Test cabinet</b>	TC-ST + WARNING LAMP
<b>CDN for powered EUTs</b>	CDN50 kA-1P, includes adjust. power source
<b>Extension for 40(10)/350 µs</b>	NW40-350 for 10 kA 40/350 µs current
<b>Software</b>	TEMA: sequence, report, for latest Windows

## MIG12100

### MIG12100 circuit: 8/20 $\mu$ s current

<b>Standards</b>	IEC60060-1, IEC61643-11
<b>Application</b>	test of SPDs
<b>Impulse capacitance</b>	10 x 20 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	14400 joules
<b>Voltage waveform</b>	not defined
<b>Adjustable current range</b>	1 kA – 12 kA, impedance 1 $\Omega$ $\pm$ 10 %, or 2 kA – 24 kA, impedance 0.5 $\Omega$ $\pm$ 10 %, or 3 kA – 36 kA, impedance 0.33 $\Omega$ $\pm$ 10 %, or 4 kA – 48 kA, impedance 0.25 $\Omega$ $\pm$ 10 %, or 5 kA – 60 kA*, impedance 0.2 $\Omega$ $\pm$ 10 %, or 48 kA – 100 kA*, impedance 0.1 $\Omega$ $\pm$ 10 %
<b>Current waveform</b>	8 $\mu$ s $\pm$ 20 % / 20 $\mu$ s $\pm$ 20 %
<b>Undershoot</b>	< 20 %
<b>Pulse repetition</b>	1 pulse / 4 s @ 1 kA, 1 pulse / 55 s @ 100 kA
<b>Polarity</b>	positive, negative, alternating

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



### MIG12100 control features

<b>User interface</b>	LCD and keypad, efficient menu structure
<b>Communication interface</b>	RS232 with (optional) adapter to USB
<b>Surge voltage monitor BNC</b>	10 V = 12 kV, accuracy $\pm$ 3 %
<b>Surge current monitor BNC</b>	10 V = 100 kA, accuracy $\pm$ 3 %
<b>Surge voltage on display</b>	250 V – 13.2 kV, accuracy $\pm$ 3 %
<b>Surge current on display</b>	1 kA – 100 kA, accuracy $\pm$ 3 %
<b>Trigger out</b>	BNC, max. 12 V
<b>Trigger in</b>	auto, manual, external (BNC input)
<b>Synchro. source</b>	EUT power (with CDN 50kA-1P)
<b>Power synchro. on/off</b>	peak synchronisation, 0 – 360°, step 1°
<b>Impulse counter</b>	programmable up to 29'999
<b>Emergency stop</b>	Emergency Stop button, BNC input (EUT Fail)
<b>Internal memory</b>	up to 15 tests can be saved and recalled

### MIG12100 supply, weight, dimensions, climatic conditions

<b>Operating voltage</b>	115 / 230 V (50/60 Hz) $\pm$ 10%
<b>Power consumption</b>	ON < 400 VA, standby < 10 VA

Rack 1 (generator)

<b>Weight</b>	260 kg
<b>W x D x H</b>	60 x 65 x 184 cm
<b>Version</b>	19" rack (with wheels), 36 UH

#### **Rack 2 (generator)**

<b>Weight</b>	260 kg
<b>W x D x H</b>	60 x 65 x 184 cm
<b>Version</b>	19" rack (with wheels), 36 UH

#### **Rack 3 (controller)**

<b>Weight</b>	210 kg
<b>W x D x H</b>	650 x 600 x 1500 mm
<b>Version</b>	19" rack, 18 UH

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

#### **Included articles**

<b>Power cord</b>	with country plug
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

#### **MIG12100 optional accessories**

<b>Test cabinet</b>	TC-ST + WARNING LAMP
<b>CDN for powered EUTs</b>	CDN50 kA-1P, includes adjust. Power source
<b>Extension for 40(10)/350 µs</b>	NW40-350 for 20 kA 40/350 µs current
<b>Software</b>	TEMA: sequence, report, for latest Windows

### CDN 50kA-1P

<b>Application</b>	CDN for powered EUTs
<b>Test level 8/20 <math>\mu</math>s current</b>	max. 5 x 10 kA
<b>Adjustable power source</b>	included, manual setting, voltage display
<b>Power source ranges</b>	0 – 230 V, 5 A 0 – 800 V, 5 A 0 – 1200 V, 3 A
<b>Decoupling to power line</b>	AC 2 x 1200 V
<b>Decoupling to generator</b>	max. 2 x 2 kV, 10 kA/path
<b>Weight</b>	120 kg
<b>Dimensions</b>	19" rack (with wheels), 18 UH
<b>Supply</b>	standard mains 230 V / 16 A
<b>Generators</b>	<a href="#">MIG1260</a> or <a href="#">MIG12100</a>
<b>Optional</b>	<a href="#">TC-ST + WARNING LAMP</a>



### NW40-350

<b>Application</b>	extension used to generate 40/350 $\mu$ s current
<b>Current waveform SC</b>	$t_{rise}$ (10 – 90 % * 1.25): 40 $\mu$ s $t_{duration}$ (50 – 50 %): 350 $\mu$ s
<b>Current amplitude SC</b>	max. 10 kA +10 / - 0 %, with MIG1260 max. 20 kA +10 / - 0 %, with MIG12100
<b>Weight</b>	100 kg
<b>Dimensions</b>	19" rack (with wheels), 18 UH
<b>Generators</b>	<a href="#">MIG1260</a> or <a href="#">MIG12100</a>
<b>Optional</b>	<a href="#">TC-ST + WARNING LAMP</a>



## CTS-10350

### CTS-10350 circuit: current 10/350 $\mu$ s, 5 kA

<b>Standards</b>	IEC62305-4, IEC61643-11, IEC61643-21, Ericsson 1/1528-HRB 105 102/1
<b>Impulse capacitance</b>	2 x 596 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	2 x 2000 joules
<b>Adjustable current (&lt;0.1 <math>\Omega</math>)</b>	(2 x) 0.1 kA – 2.7 kA $\pm$ 10 %, max. 5.4 kA
<b>Calibrated level</b>	0.1 – 2.5 kA / circuit, 0.2 kA– 5 kA for 2 circuits
<b>Current waveform</b>	rise time: 8 $\mu$ s $\pm$ 10 % ( 10 – 90 %)
<b>Current waveform</b>	half time: 350 $\mu$ s $\pm$ 10 %
<b>Output impedance</b>	1 $\Omega$ / circuit, 0.5 $\Omega$ / 2 parallel circuits
<b>Pulse repetition</b>	1 pulse / 12 s @ 0.5 kA, 1 pulse / 60 s @ 2.7 kA
<b>Polarity</b>	positive, negative
<b>Programmable ramp</b>	current



### CTS-10350 control features

<b>Operating system</b>	EPOS proprietary firmware
<b>Languages</b>	8 menu languages, selectable
<b>User interface</b>	7" capacitive touch display
<b>Connectivity</b>	gigabit ethernet, USB, RS485
<b>Impulse polarity</b>	positive, negative, electronic switching
<b>Automatic ramp</b>	test level
<b>Trigger out</b>	BNC, max. 6 V
<b>Surge monitoring</b>	peak voltage and current on screen, waveform available at BNC outputs
<b>Surge voltage waveform</b>	monitoring BNC output connector max. 15 V
<b>Surge current waveform</b>	monitoring BNC output connector max. 15 V
<b>Programmable connectors</b>	4 BNC connectors (inputs/outputs) as follows
<b>Programmable input functions</b>	Trigger input, Start Test, Stop Test, EUT Fail, EUT Mark, Emergency Stop
<b>Programmable input max. voltage</b>	low range: 0 – 1.5 V, high range: 2.3 – 24 V
<b>Programmable output functions</b>	Running State, Safety Circuit State
<b>Programmable output max. U, I</b>	max. 24 V, max. 300 mA
<b>Safety features (standard)</b>	Emergency stop button on front panel red/yellow as per IEC 60947-5-5, IEC 60204-1, ISO 13850 Safety circuit
<b>Safety accessories (optional)</b>	<a href="#">WARNING LAMP</a> (24 V, max. 2.4 W), <a href="#">TC-ST test cabinet</a> Remote <a href="#">EMERGENCY STOP</a> button

Capacitor | SPD | Circuit Breaker | Protection Relay

### CTS-10350 weight, dimensions, climatic conditions

<b>Operating voltage</b>	100 – 240 V (50/60 Hz) ± 10%
<b>Power consumption</b>	ON < 450 VA, standby < 15 VA
<b>Weight</b>	146 kg
<b>W x d x h</b>	60 x 650 x 124 cm
<b>Version</b>	19" rack on wheels, 18 UH
<b>Temperature range</b>	10 – 35 °C
<b>Humidity</b>	< 80 % non-condensing
<b>Air pressure</b>	86 – 106 kPa
<b>Included articles</b>	
<b>Power cord</b>	with country plug
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

### CTS-10350 optional accessories

<b>Test cabinet</b>	TC-ST, WARNING-LAMP
<b>Software</b>	TEMA3000: sequence, report, for Windows10

## CTS-101000-500

### CTS-101000-500 circuit: current 10/1000 µs, 500 A

<b>Standards</b>	IEC 61643-311, IEC 62475, ITU-T K.12, IEC 61051-1 ANSI C62.31 (only current waveform avail.)
<b>Application</b>	testing SPDs (2- or 3-terminals) with 10/1000 µs current impulse
<b>Impulse capacitance</b>	2 x 50 µF ± 10 %
<b>Energy at max. voltage</b>	2 x 1250 joules
<b>Output impedance</b>	2-terminals SPD >16 Ω, 3-terminals SPD >8 Ω
<b>Adjustable current SC</b>	8 A – 520 A, for 2-terminals SPD 2 x (8 A – 260 A), for 3-terminals SPD
<b>Calibrated level SC</b>	8 A – 520 A, for 2-terminals SPD 2 x (8 A – 260 A), for 3-terminals SPD
<b>Current waveform</b>	rise time 10 – 90 %: 8 µs + 20 % / -10% (0 – 100 %: 8 x 1.25 µs = 10 µs) Duration: 1000 µs ± 20%
<b>Pulse repetition</b>	1 / 60 s @ 260 / 520 A
<b>Polarity</b>	positive, negative, alternating
<b>Programmable ramp</b>	current
<b>Sel. clamping voltage</b>	0 – 4000 V
<b>Level @clamping voltage</b>	245A @250V, 172A @1500V (for 2-terminals SPD) 490A @250V, 344A @1500V (for 3-terminals SPD)



### CTS-101000-500 control features

<b>Operating System</b>	EPOS proprietary firmware
<b>Languages</b>	8 menu languages, selectable
<b>User interface</b>	7" capacitive touch display
<b>Connectivity</b>	gigabit ethernet, USB, RS485
<b>Impulse polarity</b>	positive, negative, electronic switching
<b>Automatic ramp</b>	test level
<b>Surge monitoring</b>	peak voltage and current on screen, waveform available at BNC outputs
<b>Surge voltage waveform</b>	BNC output 1 V = 800 V in 1 MΩ
<b>Surge current waveform</b>	BNC output 1 V = 250 A in 1 MΩ
<b>Trigger out</b>	BNC, max. 6 V
<b>Programmable connectors</b>	4 BNC connectors (input/output) as follows
<b>Programmable input functions</b>	Trigger Input, Start Test, Stop Test, EUT Fail, EUT Mark, Emergency Stop
<b>Programmable input max. voltage</b>	low range: 0 – 1.5 V, high range: 2.3 – 24 V
<b>Programmable output functions</b>	Running State, Safety Circuit State
<b>Programmable output max. U, I</b>	max. 24 V, max. 300 mA
<b>Safety features (standard)</b>	emergency stop button on front panel, red/yellow as per IEC 60947-5-5, IEC 60204-1, ISO 13850 safety circuit
<b>Safety accessories(optional)</b>	<b>WARNING LAMP</b> red/green (24 V, max. 2.4 W) TC-ST test cabinet Remote <b>EMERGENCY STOP</b> button

### CTS-101000-500 supply, weight, dimensions, climatic conditions

<b>Operating voltage</b>	100 – 240 (50/60 Hz) ± 10%
<b>Power consumption</b>	ON < 700 VA, standby < 15 VA
<b>Weight</b>	135 kg
<b>W x d x h</b>	60 x 65 x 123 cm
<b>Version</b>	19" rack, 18 UH with wheels, easy to move
<b>Temperature range</b>	10 – 35 °C
<b>Humidity</b>	< 80 % non-condensing
<b>Air pressure</b>	86 – 106 kPa



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**Included articles**

<b>Power cord</b>	with country plug
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

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**CTS-101000-500 optional accessories**

<b>Test cabinet &amp; lamp</b>	TC-ST, WARNING LAMP
<b>Software</b>	TEMA3000: sequence, report, for Windows 10

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**CTS-101000-750**

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**CTS-101000-750 circuit: current 10/1000  $\mu$ s, 750 A**

<b>Standards</b>	IEC 61643-311, IEC 62475, ITU-T K.12, IEC 61051-1 ANSI C62.31 (only current waveform avail.)
<b>Application</b>	testing SPDs (2- or 3-terminals) with 10/1000 $\mu$ s current impulse
<b>Impulse capacitance</b>	2 x 75 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	2 x 1838 joules
<b>Output impedance</b>	2-terminals SPD >12 $\Omega$ , 3-terminals SPD >6 $\Omega$
<b>Adjustable current SC</b>	8 A – 760 A, for 2-terminals SPD 2 x (8 A – 385 A), for 3-terminals SPD
<b>Calibrated level SC</b>	8 A – 760 A, for 2-terminals SPD 2 x (8 A – 385 A), for 3-terminals SPD
<b>Current waveform</b>	rise time 10 – 90 %: 8 $\mu$ s + 20 % / -10% (0 – 100 %: 8 x 1.25 $\mu$ s = 10 $\mu$ s) Duration: 1000 $\mu$ s $\pm$ 20%
<b>Pulse repetition</b>	1 / 60 s @ 385 / 760 A
<b>Polarity</b>	positive, negative, alternating
<b>Programmable ramp</b>	current
<b>Sel. clamping voltage</b>	0 – 4000 V
<b>Level @clamping Voltage</b>	363A @250V, 255A @1500V (for 2-terminals SPD) 726A @250V, 510A @1500V (for 3-terminals SPD)



### CTS-101000-750 control features

<b>Operating System</b>	EPOS proprietary firmware
<b>Languages</b>	8 menu languages, selectable
<b>User interface</b>	7" capacitive touch display
<b>Connectivity</b>	gigabit ethernet, USB, RS485
<b>Impulse polarity</b>	positive, negative, electronic switching
<b>Automatic ramp</b>	test level
<b>Surge monitoring</b>	peak voltage and current on screen, waveform available at BNC outputs
<b>Surge voltage waveform</b>	BNC output 1 V = 800 V in 1 MΩ
<b>Surge current waveform</b>	BNC output 1 V = 500 A in 1 MΩ
<b>Trigger out</b>	BNC, max. 6 V
<b>Programmable connectors</b>	4 BNC connectors (input/output) as follows
<b>Programmable input functions</b>	Trigger Input, Start Test, Stop Test, EUT Fail, EUT Mark, Emergency Stop
<b>Programmable input max. voltage</b>	low range: 0 – 1.5 V, high range: 2.3 – 24 V
<b>Programmable output functions</b>	Running State, Safety Circuit State
<b>Programmable output max. U, I</b>	max. 24 V, max. 300 mA
<b>Safety features (standard)</b>	emergency stop button on front panel, red/yellow as per IEC 60947-5-5, IEC 60204-1, ISO 13850 safety circuit
<b>Safety accessories (optional)</b>	<a href="#">WARNING LAMP</a> red/green (24 V, max. 2.4 W) <a href="#">TC-ST</a> test cabinet Remote <a href="#">EMERGENCY STOP</a> button

### CTS-101000-750 supply, weight, dimensions, climatic conditions

<b>Operating voltage</b>	100 – 240 (50/60 Hz) ± 10%
<b>Power consumption</b>	ON < 700 VA, standby < 15 VA
<b>Weight</b>	165 kg
<b>W x d x h</b>	60 x 65 x 123 cm
<b>Version</b>	19" rack, 18 UH with wheels, easy to move
<b>Temperature range</b>	10 – 35 °C
<b>Humidity</b>	< 80 % non-condensing
<b>Air pressure</b>	86 – 106 kPa

<b>Included articles</b>	
<b>Power cord</b>	with country plug
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

### CTS-101000-750 optional accessories

<b>Test cabinet &amp; lamp</b>	TC-ST , WARNING LAMP
<b>Software</b>	TEMA3000: sequence, report, for Windows 10

## CTS-101000-1000

### CTS-101000-1000 circuit: current 10/1000 $\mu$ s, 1000 A

<b>Standards</b>	IEC 61643-311, IEC 62475, ITU-T K.12, IEC 61051-1 ANSI C62.31 (only current waveform avail.)
<b>Application</b>	testing SPDs (2- or 3-terminals) with 10/1000 $\mu$ s current impulse
<b>Impulse capacitance</b>	2 x 100 $\mu$ F $\pm$ 10 %
<b>Energy at max. voltage</b>	2 x 2450 joules
<b>Output impedance</b>	2-terminals SPD >8 $\Omega$ , 3-terminals SPD >4 $\Omega$
<b>Adjustable current SC</b>	8 A – 1010 A, for 2-terminals SPD 2 x (8 A – 510 A), for 3-terminals SPD
<b>Calibrated level SC</b>	8 A – 1010 A, for 2-terminals SPD 2 x (8 A – 510 A), for 3-terminals SPD
<b>Current waveform</b>	rise time 10 – 90 %: 8 $\mu$ s + 20 % / -10% (0 – 100 %: 8 x 1.25 $\mu$ s = 10 $\mu$ s) Duration: 1000 $\mu$ s $\pm$ 20%
<b>Pulse repetition</b>	1 / 60 s @ 385 / 760 A
<b>Polarity</b>	positive, negative, alternating
<b>Programmable ramp</b>	current
<b>Sel. clamping voltage</b>	0 – 4000 V
<b>Level @clamping Voltage</b>	481A @250V, 336A @1500V (for 2-terminals SPD) 962A @250V, 672A @1500V (for 3-terminals SPD)



### CTS-101000-1000 control features

<b>Operating System</b>	EPOS proprietary firmware
<b>Languages</b>	8 menu languages, selectable
<b>User interface</b>	7" capacitive touch display
<b>Connectivity</b>	gigabit ethernet, USB, RS485
<b>Impulse polarity</b>	positive, negative, electronic switching
<b>Automatic ramp</b>	test level
<b>Surge monitoring</b>	peak voltage and current on screen, waveform available at BNC outputs
<b>Surge voltage waveform</b>	BNC output 1 V = 800 V in 1 M $\Omega$
<b>Surge current waveform</b>	BNC output 1 V = 500 A in 1 M $\Omega$
<b>Trigger out</b>	BNC, max. 6 V
<b>Programmable connectors</b>	4 BNC connectors (input/output) as follows
<b>Programmable input functions</b>	Trigger Input, Start Test, Stop Test, EUT Fail, EUT Mark, Emergency Stop
<b>Programmable input max. voltage</b>	low range: 0 – 1.5 V, high range: 2.3 – 24 V
<b>Programmable output functions</b>	Running State, Safety Circuit State
<b>Programmable output max. U, I</b>	max. 24 V, max. 300 mA
<b>Safety features (standard)</b>	emergency stop button on front panel, red/yellow as per IEC 60947-5-5, IEC 60204-1, ISO 13850 safety circuit
<b>Safety accessories (optional)</b>	<a href="#">WARNING LAMP</a> red/green (24 V, max. 2.4 W)
	<a href="#">TC-ST</a> test cabinet
	Remote <a href="#">EMERGENCY STOP</a> button

### CTS-101000-1000 supply, weight, dimensions, climatic conditions

<b>Operating voltage</b>	100 – 240 (50/60 Hz) ± 10%
<b>Power consumption</b>	ON < 700 VA, standby < 15 VA
<hr/>	
<b>Weight</b>	170 kg
<b>W x d x h</b>	60 x 65 x 123 cm
<b>Version</b>	19" rack, 18 UH with wheels, easy to move
<hr/>	
<b>Temperature range</b>	10 – 35 °C
<b>Humidity</b>	< 80 % non-condensing
<b>Air pressure</b>	86 – 106 kPa
<hr/>	
<b>Included articles</b>	
<b>Power cord</b>	with country plug
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

### CTS-101000-1000 optional accessories

<b>Test cabinet &amp; lamp</b>	TC-ST, WARNING LAMP
<b>Software</b>	TEMA3000: sequence, report, for Windows 10

# CIRCUIT BREAKER TESTING

## MIG0603CB

### MIG0603CB: standard 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 $\mu$ s, 50 and 500 $\Omega$ , 12 kV

Application	circuit breaker testing
Impulse capacitance	5 $\mu$ F $\pm$ 10 %
Energy at max. voltage	420 joules
Output impedance	50 $\Omega$ and 500 $\Omega$ , selectable
Adjustable voltage OC	0.5 kV – 13 kV - 0 % / +10 %
Calibrated level	1 kV – 12 kV
Voltage waveform	1.2 $\mu$ s $\pm$ 30 % / 50 $\mu$ s $\pm$ 20 %
Undershoot	< 5 %
Waveform in tolerance	50 $\Omega$ : R > 1 k $\Omega$ or C < 5 nF or L > 100 mH 500 $\Omega$ : R > 10 k $\Omega$ 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 $\mu$ s, 4 or 20 $\Omega$ , 3 kA

Application	circuit breaker testing
Impulse capacitance	10 $\mu$ F $\pm$ 10 %
Energy at max. voltage	180 joules
Voltage waveform	not defined
Adjustable current range	10 A – 290 A -0 % / +10 %, Zout = 20 $\Omega$ 125 A – 3200 A -0 % / +10 %, Zout = 4 $\Omega$
Calibrated level	50 A – 3000 A
Current waveform	8 $\mu$ s $\pm$ 10 % / 20 $\mu$ s $\pm$ 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

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

### MIG0603CB built-in single-phase CDN

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

### MIG0603CB control features

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

### MIG0603CB supply, weight, dimensions, climatic conditions

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

<b>Weight</b>	61 kg
<b>W x D x H</b>	45 x 57 x 61 cm
<b>Version</b>	19" unit, 12 UH

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

#### Included articles

<b>Power cord</b>	with country plug
<b>Supply connection</b>	5 cables x 2 m, banana plugs
<b>User manual</b>	with conformity declaration
<b>Calibration certificate</b>	factory calibration

### MIG0603CB optional accessories

<b>Test cabinet</b>	TC-ST + WARNING LAMP
<b>MIG1206 generator</b>	surge coupling paths 2, 12 Ω up to 12 kV
<b>Software</b>	TEMA: sequence, report, for latest Windows



# GENERAL ACCESSORIES

## TC-ST

<b>Standard</b>	multiple
<b>Application</b>	test cabinet with safety circuit
<b>Mounting</b>	on top of generator
<b>EUT volume</b>	20 x 20 x 30 cm
<b>Test cabinet material</b>	acrylic glass
<b>Insulation withstand</b>	pulse 1.2/50 $\mu$ s up to 30 kV
<b>Weight</b>	8 kg
<b>Dimensions</b>	43.5 x 47 x 25.4 cm
<b>Included</b>	control cable to generator
<b>For generators</b>	For all EMC PARTNER AG generators
<b>Accessories</b>	<a href="#">WARNING LAMP</a> , <a href="#">EMERGENCY-STOP</a>



## WARNING-LAMP

<b>Application</b>	red/green signalization lamp
<b>Protection class</b>	IP65, IEC 61140, VDE 0140-1
<b>Mounting support</b>	magnetic support, crewable bracket included
<b>Lamp type</b>	red and green (2 lamps), LED technology
<b>Weight</b>	0.3 kg
<b>Dimensions</b>	30x25x6cm
<b>Included</b>	control cable to TC-ST/generator
<b>For generators</b>	All EMC PARTNER AG generators



## EMERGENCY-STOP

<b>Application</b>	remote emergency stop button
<b>Colours</b>	standard red/yellow as in IEC 60947-5-5
<b>Mounting</b>	on table, magnetic support als included
<b>Weight</b>	0.5 kg
<b>Dimensions</b>	78 x 72 x 64 mm
<b>Included</b>	5m cable
<b>For generators</b>	All EMC PARTNER AG generators



# Tradition meets Technology

Over 25 years devoted to combining  
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EMC PARTNER

# PRODUCT APPLICATION RANGE

## CONSUMER & INDUSTRIAL ELECTRONICS

Transient Test Systems for conducted EMC tests on electronic equipment. ESD, EFT, surge, ring wave, DOW, dips, magnetic field, common and differential mode. Compliant to IEC, EN and ANSI standards.



## AEROSPACE ELECTRONICS

Impulse generators and couplers for avionic applications. Single stroke, multiple stroke and multiple burst according to RTCA / DO-160, EUROCAE / ED-14 and aircraft manufacturer standards.



## COMPONENT TESTING

Voltage and current Impulse generators for design and production testing of varistors, gas discharge tubes, surge protective devices, X / Y capacitors and specialist impulse generators for semiconductor tests.



## DEFENCE ELECTRONICS

Complete test solutions for MIL-STD-461 requirements CS06, CS106, CS115, CS116, CS117 and CS118.



## TELECOM & DATA LINE TESTING

Voltage and current impulse generators, CDNs, power contact, power induction equipment for exchange and customer equipment according to ITU, IEC, EN and ETSI requirements.



## ENERGY & UTILITY EQUIPMENT

High current CDNs combined with transient test equipment fulfil requirements to test renewable and classical energy distribution network and monitoring equipment.



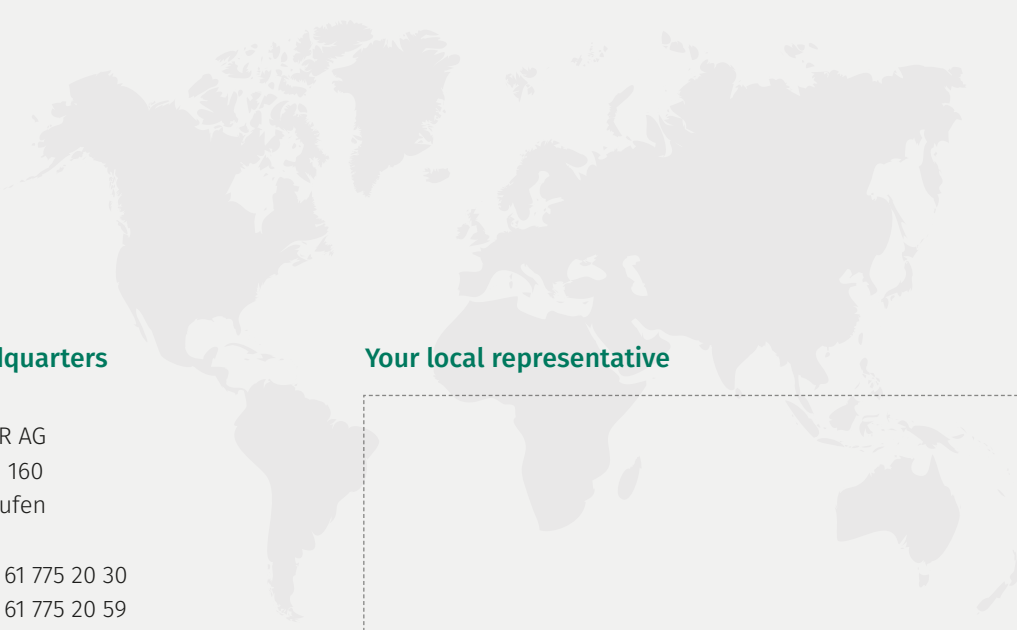
## CUSTOMER SERVICES

Customer support throughout an equipment's lifetime is central to the EMC PARTNER AG philosophy. Directly from our ISO accredited facility in Switzerland or through our network of services centres, we provide support wherever you are.



For further information please do not hesitate to contact your local EMC PARTNER AG representative.  
Visit our website for more information and contact details.

# [www.emc-partner.com](http://www.emc-partner.com)



## Swiss Headquarters

EMC PARTNER AG  
Baselstrasse 160  
CH - 4242 Laufen

Phone +41 61 775 20 30  
Fax +41 61 775 20 59  
Email [service@emc-partner.ch](mailto:service@emc-partner.ch)  
Web [www.emc-partner.com](http://www.emc-partner.com)

## Your local representative

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