

Lightning Tests

EMC -
PARTNER



MIG-System

Telecom Testers



I ITU, ETSI: 10/700, 1.2/50

II FCC: 10/160, 10/560, 2/10

III Bellcore: 10/1000, 10/360

IV IEC, CENELEC: CWG



General Information about the Disturbance Sources and the Different Electrical Tests

ITU: International Telecommunication Union

The relevant ITU recommendations for impulse tests:

K.12 (05/95) Characteristics of gas discharge tubes for protection of telecommunication installation

K.17 (11/88) Test on power-fed repeaters using solid state devices in order to check the arrangement for protection from external interference.

K.20 (02/00) Resistibility of telecommunication equipment installed in a telecommunication centre to overvoltages and overcurrents

K.21 (10/96) Resistibility of subscriber's terminal to overvoltages and overcurrent waveform

K.44 (02/00) Resistibility tests for telecommunication equipment exposed to overvoltages and overcurrents - Basic Recommendation

Waveforms: $i+v$ 10/700 μs , i 8/20 μs , v 1.2/50 μs , $i+v$ 2/10 μs

ETSI: European Telecommunication Standards Institute

ETSI is a non profit making organization, whose mission is to determine and produce the telecommunication standard that will be used for decades to come.

EN 300 386-1 EMC Standard for telecommunication network equipment

Part 1 product family overview, compliance criteria and test levels.

EN 300 386-2 EMC Standard for telecommunication network equipment

Part 2 product family standard

EN 300 046 Standard for ISDN Integrated Service Digital Network

Part 1 General, Part 2 Safety, Part 3 Protection

EN 300 047 Standard for ISDN Integrated Service Digital Network

Safety and protection, Wave shapes: Fig B.2 10/700 Fig B1 1.2/50

FCC: Federal Communication Commission

The relevant FCC recommendations which defines impulse tests:

Part 68 - Connection of Terminal Equipment to the telephone network (Edition 10-1-00)

Part 68.302 Environment simulation

Waveforms: $v+i$ 9/720, $v+i$ 10/160, $v+i$ 10/560, $v+i$ 2/10 μs

Bellcore: Bell Communication Research

This Generic Requirement (GR) document of Bell Communications Research (Bellcore) informs the industry of Bellcore's view of proposed generic requirements for Electromagnetic Compatibility and Safety on Network Telecommunication Equipment.

The relevant Bellcore requirements which defines impulse tests:

GR-1089-CORE (1999) 4.3 Lightning

Waveforms: 10/1000, 10/360
1.2/50, 8/20 with CDN

GR-1089-CORE (1999) 4.6.5 Outside plant R4-45

Waveforms: 8/20 up to 20 kA

IEC - CENELEC

These two standardisation organizations specify standards of products connecting to telecommunication networks.

IEC 60870 Telecontrol equipment

Section 1 Power supply EMC

IEC 61000-4-5 Surge Immunity Test

EN 60950 Safety on information technology equipment

EN 41003 Particular safety requirements for equipment to be connected to telecommunication networks.

MIG0603T Basic Level

The MIG0603T is suitable to carry out 10/700 μ s tests with 15 or 40 Ohm serial resistors. Complies with: ITU-T K44. Applicable for: ITU-T **K.17, K.20, K.21**.



High voltage circuit 10/700 μ s

- Voltage (oc): 10/700 μ s
- Current (cs): 4/300 μ s, 40 Ohm
- Repetition rate maximum: 4/min
- Impulse capacitance: 20 μ F
- Source energy: 360 Joule at 6 kV
- V_{peak} range: 0.25 up to 6 kV \pm 10%
- I_{peak} range: 0.125 up to 3 kA \pm 10%
- Measurement accuracy: \pm 3%
- Damping resistor: 25 Ohm
- Serial resistor: 15 Ohm

Basic data

Dimensions: 450 x 500 x 190 mm

Weight: approx. 25 kg

Power supply: 230 V or 115 V, 400 VA

Option CWG to MIG1206T

- Voltage (oc): 1.2/50 μ s
- Current (cs): 8/20 μ s
- Impulse capacitance: 10 μ F
- V_{peak} range: 0.25 up to 6 kV \pm 10%
- I_{peak} range: 0.125 up to 3 kA \pm 10%
- Z_{source} : 2 Ohm

Accessory I/O and data line coupling kit



CDNKIT1000T for ISDN balanced lines

MIG1203T Enhanced Levels

The MIG1203T is suitable to carry out 10/700 μ s and 1.2/50 μ s tests up to 12 kV and CWG up to 6 kV. Complies with ITU-T K.44. Applicable for: ITU-T **K.17, K.20, K.21**. For CWG enhanced levels the MIG1206 up to 12 kV is necessary.



High voltage circuit 10/700 μ s

- Voltage (oc): 10/700 μ s
- Current (cs): 4/300 μ s, 40 Ohm
- Repetition rate maximum: 2/min
- Impulse capacitance: 20 μ F
- Source energy: 1'440 J at 12 kV
- V_{peak} range: 0.5 up to 12 kV \pm 10%
- I_{peak} range: 0.250 up to 3 kA \pm 10%
- Measurement accuracy: \pm 3%
- Damping resistor: 25 Ohm
- Serial resistor: 15 Ohm

Basic Data

Dimensions: 450 x 500 x 190 mm

Weight: approx. 55 kg

Power supply: 230 V or 115 V, 400 VA

Option 1.2/50 μ s 1 μ F to MIG1203T

- Voltage (oc): 1.2/50 μ s
- Impulse capacitance: 1 μ F
- V_{peak} range: 0.5 up to 12 kV \pm 10%
- Parallel resistor: 76 Ohm
- Serial resistor: 13 Ohm

Option CWG to MIG1203T

- Voltage (oc): 1.2/50 μ s
- Current (cs): 8/20 μ s
- Impulse capacitance: 10 μ F
- V_{peak} range: 0.25 up to 6 kV \pm 10%
- I_{peak} range: 0.125 up to 3 kA \pm 10%
- Z_{source} : 2 Ohm

MIG0603FCC FCC Part 68 D

The MIG0603FCC complies with the new defined waveforms in open circuit and short circuit condition (Edition 10-1-00).



The MIG0603FCC is a generator with a voltage and current waveshapes as specified in FCC part 68 subpart D (Edition 10-1-00) and a waveshape 10/700 μ s defined in the recommendation ITU (CCITT) K.44 and a combination wave specified in IEC 61000-4-5. 10/700, 10/160, 10/560, 1.2/50, 8/20 and 2/10 with CDN single phase I max 16 A and Vmax. 250V

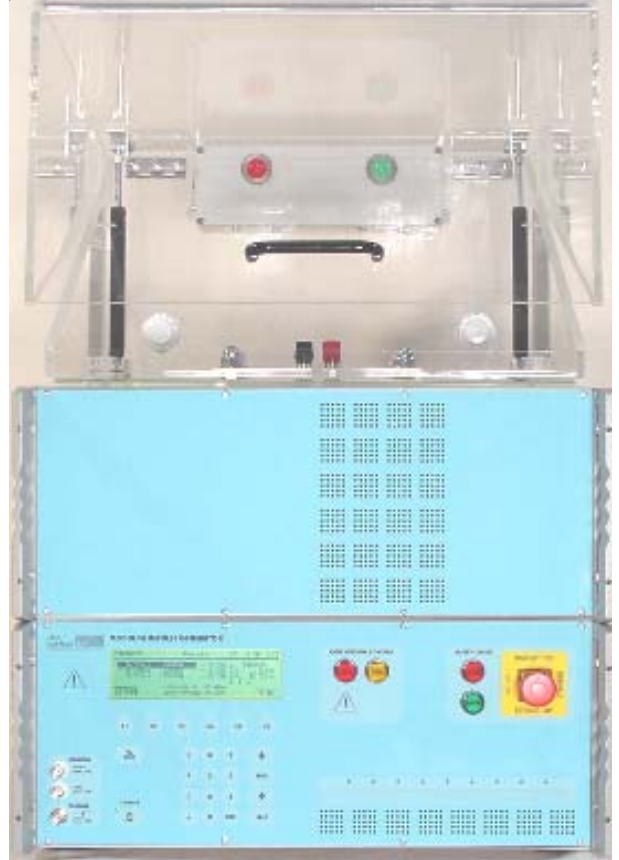
waveforms	v, i ranges
v, 9/720 i, 5/320 μ s	250 V up to 6'300 V 6.25 - 157A
v, 10/160 i, 10/160	250 V up to 2'000 V 33 up to 266 A
v, 10/560 i, 10/560	250 V up to 1'000 V 31 up to 125 A
v, 2/10 i, 2/10	250 V up to 3'000 V 100 up to 1'200 A
v, 1.2/50 i, 8/20	250 V up to 6'000 V 125 up to 3'000 A

Basic data

Dimensions: 450 x 500 x 390 mm
Weight: approx. 42 kg
Power supply: 230 V or 115 V, 400 VA

MIG0624-R45 Bellcore GR-1089-CORE

The MIG0624-R45 generates a 8/20 μ s current into a short circuit up to 24 kA for outside plant testing R4-45.



MIG0624-R45 technical data

The MIG0624-R45 consists of four circuits. Each circuit has the following technical data: 1 Ohm Source impedance, Umax. 6kV, max. 6 kA.

The outputs can be connected in parallel to provide currents up to 24 kA without changes of the current waveform 8/20 μ s.

The maximum EUT load is: R = < 0.02 Ohm and L = < 0.2 μ H.

Option: External resistor box

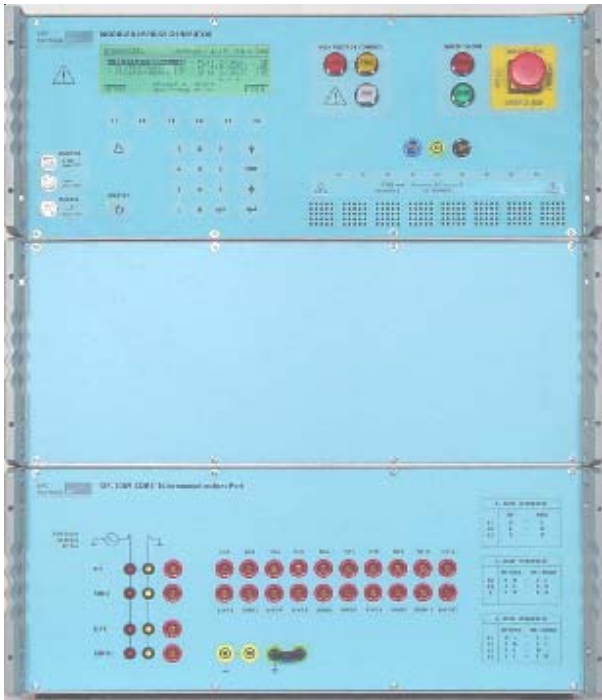
Resistor values : 3, 8, 12 Ohm can be used with one 6kV / 3 kA circuit.

Basic data

Dimensions: 450 x 500 x 390 mm
Weight: approx. 52 kg
Power supply: 230 V or 115 V, 400 VA

MIG0603BEL Bellcore GR-1089-CORE

The MIG0603BEL generates all waveshapes of GR-1089-Core.



Basic data

Dimensions: 450 x 500 x 580 mm

Weight: approx. 65 kg

Power supply: 230 V or 115 V, 400 VA

Software general display

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MIG0603BEL Version: 1.19 SIN: 200
- FL1:10/1000us 6E - FL4: 2/10us 5E
- FL2:10/360us 10E - FL5:10/360us 40E
- FL3:10/1000us 10E - SL1: 2/10us 10E
                        ↓ ↓ ↓
[SETUP] choose a shape and press enter [MAIN]

MIG0603BEL Version: 1.19 SIN: 200
↑↑↑FL5:10/360us 40E - IB2: 2/10us 15E
- SL1: 2/10us 10E - FL1 AC-power: CWG
- IB1: 2/10us 8E - SL1 AC-power: CWG
[SETUP] choose a shape and press enter [MAIN]
    
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All different surge levels, waveshapes, voltage/current amplitudes and impedances are programmed and can be activated line by line. Explanation of abbreviations:
 FL = First Level (Telecom Port)
 1 = Lightning Surge Level
 SL = Second Level (Telecom Port)
 IB = Intra Building (Telecom Port)
 FL1 or SL1 = a.c. Power Port

Example: FL1 600 V 10/1000 μ s

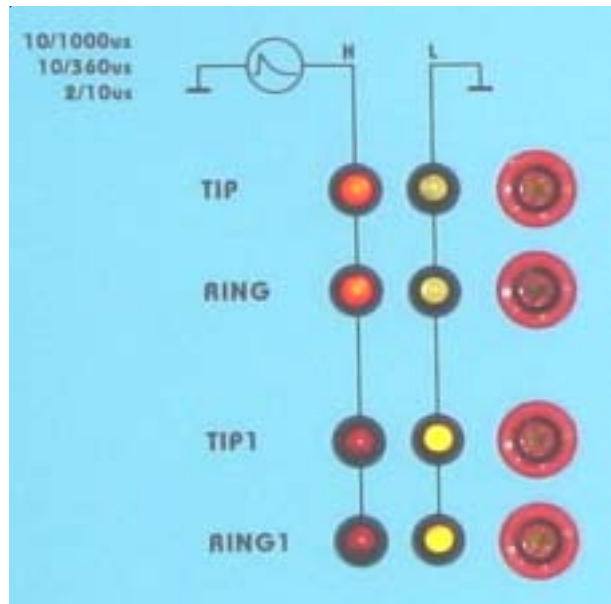
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Main 2 FL1:10/1000us 6E
Coupling Surge to Port: Telecom
HL-..:on HH-LL:off HL-LL:off LLLH:off
LH-..:on LL-HH:off LH-LL:off
HH-..:on HH-HH:off LL-HL:off
[SETUP] [SHAPE] [MAIN] [RAMP] [Menu] [More]
    
```

Coupling paths are programmed in accordance with FL1 for two wires connections.

2 - WIRE INTERFACES			
	TIP		RING
A1	H	-	L
A2	L	-	H
A3	H	-	H

Coupling paths are programmed in accordance with FL1 for two wires connections.



The TIP and RING outputs can be connected simultaneously or sequentially without the necessity of unplugging hardware and re-configuring the test setup.

Further information is available on our website or in the specific Technical Specifications of the MIG0603BEL.

MIG0603K12 10/700, 10/350, 8/20 μ s

The MIG 0603 K12 is a dual output surge current generator for testing protective elements like varistors, arrestors, or transzorbe diodes with different waveforms.



The dual output allows testing of three electrode elements. The current ranges are: for 8/20 μ s up to 5000 A, for 10/700 μ s waveshape up to 120 A and for 10/350 μ s up to 120 A. For two electrode elements the outputs of the generator can be connected in parallel, to increase the current capability up to 240 A on 10/700 μ s and 10/350 μ s or 10 kA on 8/20 μ s.

waveforms	v, i ranges
<i>i, 8/20 dual</i>	2 x 250 A - 6'000 A
<i>i, 8/20 single</i>	1 x 500 A - 12'000 A

<i>i, 10/700</i>	2 x 10 A - 120 A
<i>i, 10/700</i>	2 x 20 A - 240 A

<i>i, 10/350</i>	2 x 20 A - 240 A
<i>i, 10/350</i>	1 x 40 A - 480 A

Repetition max:	4 impulses/min
Voltage max:	6 kV
Impulse C:	2 x 20 μ F
Energy max.:	2 x 360 Joule
Set-up memory:	up to 23 memory places
Remote control:	RS232
Counter:	1 to 29'999

Basic data

Dimensions: 450 x 500 x 190 mm
Weight: approx. 37 kg
Power supply: 230 V or 115 V, 400 VA

Accessories

The MIG0603EN is suitable to carry out CWG, 10/700 μ s and 1.2/50 μ s tests with tank capacitance of 20 μ F and 1 μ F. The MIG0603EN complies with EN 60950.



The MIG0603EN includes three different waveforms: 1.2/50 μ s defined in ITU-T K.44; 10/700 μ s as described in ITU-T K.44 and CWG (1.2/50, 8/20 μ s) in accordance with IEC 61000-4-5.

The MIG0603EN is a surge generator for simulation of indirect lightning on telecom, process and measurements lines. The 10/700 μ s pulse cannot be superimposed on power lines. A separate output exists for the 10/700 μ s impulse. The other two pulses can be superimposed on the power line.

waveforms	v, i ranges
<i>v, 1.2/50</i>	500 V - 6'000 V
<i>i, 8/20</i>	300 A - 3'000 A

<i>v, 10/700</i>	500 V - 6'000 V
<i>i, 4/300</i>	12.5 A - 150 A
CT = 20 μ F, Rp = 50, Rs = 15 Ohm	

<i>v, 1.2/50</i>	500 V - 6'000 V
CT = 1 μ F, Rp = 76, Rs = 13 Ohm	

Repetition max:	4 impulses/min
Set-up memory:	up to 23 memory places
Remote control:	RS232
Counter:	1 to 29'999

Basic data

Dimensions: 450 x 500 x 190 mm
Weight: approx. 25 kg
Power supply: 230 V or 115 V, 400 VA

EMC PARTNER's Product Range

Immunity Tests



The TRA2000 performs all of the following transient tests on electronic equipment that are required for the CE-mark up to full levels: **ESD, EFT, surge, dips, a.c. magnetic field, surge magnetic field and common mode tests**. A large range of accessories for different applications is available: MF antennas, three phase couplers, verification sets, coupling kits, etc. The TRA2000 complies with IEC 61000-4-2, -4, -5, -8, -9, -11, -12p, -16, -29p.



The Modular Impulse Generator (MIG) performs **damped oscillatory tests**: 100 kHz, 1 MHz, voltage and magnetic field tests. The MIG complies with IEC 61000-4-8, -9, -10, -12 as well as with IEC 60255-4, -5, -22.



The HAR1000 with the Immunity software performs the following tests: **harmonics, voltage variation and ripple on d.c.** The HARMONICS-1000 complies with IEC 61000-4-13, -14, -17, -29p.

Lightning Tests

EMC PARTNER offers a wide range of testers in accordance with FCC 68 part D, ITU K.44, ETS 300 046, Bellcore and RTCA DO-160D, etc. for telecom, aircraft and military electronic equipment testing.



Component Tests



EMC PARTNER offers a wide range of modular impulse generators (MIG) for transient component testing on: varistors, arresters, surge protective devices (SPD), capacitors, circuit breakers, watt-hour meters, protection relays, insulation material, suppressor diodes, connectors, chokes, fuses, resistors, emc-gaskets, cables, etc.

EMC PARTNER has the largest range of impulse generators in the range up to 100 kV and 100 kA. Below is an example for an insulation tester up to 24 kV.



Emission Measurements



One unit performs all measurements on the power supplies of electronic equipment and products for the CE-Mark. The HAR1000 includes an amplifier for a clean power source, a line impedance network, the measurement systems Harmonics and Flicker. Accessories: three phase extension, "Immunity" and "ANASIM" software. Complies with IEC 61000-3-2 and -3.

We look forward to working with you

For more detailed information please contact our representative in your area or EMC PARTNER in Switzerland. For information on further products please visit also our website.

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We have representatives in:

America: Canada, Mexico, USA, ...

Asia: China, Hong Kong, Israel, Japan, Malaysia, South Korea, Taiwan, ...

Australia: Australia, New Zealand

Europe: Austria, Belgium, France, Germany, Great Britain, Hungary, Ireland, Italy, Netherlands, Scandinavia, Spain, ...

You will find contact information for all representatives at EMC PARTNER's website www.emc-partner.com.

Your local representative:

EMC PARTNER offers the largest range of impulse test equipment up to 100 kA and 100 kV in the areas of:

Immunity Tests

Lightning Tests

Component Tests

Emission
Measurements