



TRA- and MIG-System

# Magnetic Field Testers



I 1 MHz, 100 kHz Oscillatory

II 8/20  $\mu$ s Double Exponential

III 50/60 Hz Supply Frequency

IV Accessories, CDN, Stands



# General Information about the Different Magnetic Field Tests

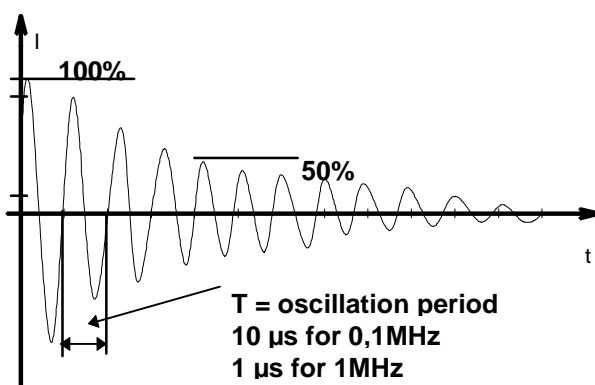
## Oscillatory Magnetic Field Tests

This phenomenon is representative of switching actions in HV/MV open air stations, and is particularly related to the switching of HV busbars. The oscillation frequency ranges from about 100 kHz to a few megahertz, depending on the length of the circuit and on the propagation time. The minimum repetition frequency, in respect of each phase, is twice the power frequency (100/s per phase for 50 Hz and 120/s per phase for 60 Hz). The repetition rate 40/s and 400/s represents a compromise of a three phase system.

Relevant standard  
IEC 61000-4-10

This standard relates to the immunity requirements of equipment under operational conditions, to damped oscillatory magnetic disturbances related to medium and high voltage substations.

Waveform definition



## 8/20 μs Magnetic Field Test

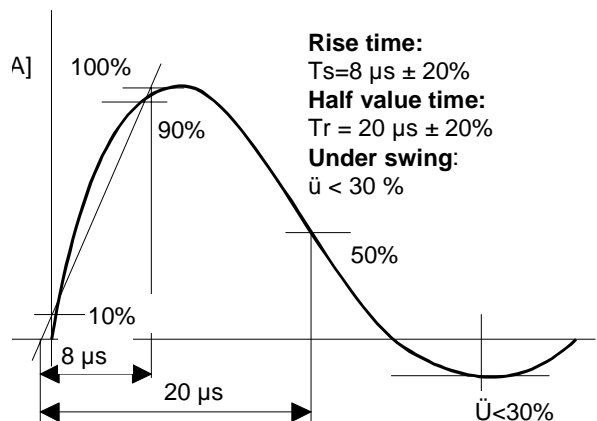
The CWG tester defined in the IEC 61000-4-5 can be used to perform the surge magnetic field test. The current waveform at short circuit is 8/20 μs.

Relevant standard  
IEC 61000-4-9

This standard relates to immunity requirements of equipment, only under operational conditions, to pulse magnetic disturbances mainly related to

- industrial installation and power plants,
- medium and high voltage substations.

Waveform definition



## 50/60 Hz Magnetic Field Test

Two types of tests can be accomplished:

- the current under normal operating conditions, which produces a steady magnetic field, with a comparatively small magnitude,
- the current under fault condition which can produce comparatively high magnetic fields of short duration, until protection devices operate (up to a few seconds).

Relevant standard  
IEC 61000-4-8

This standard relates to immunity requirements of equipment located in

- residential and commercial locations,
- industrial installation and power plants,
- medium and high voltage substations.

# MIG Testers for "Magnetic Field Waves" Tests

## Test Levels

The test levels are specified in the relevant IEC standards as follows:

### IEC 61000-4-10

Continuous tests "oscillatory"	
Level	A/m (peak)
1	not applicable
2	not applicable
3	10
4	30
5	100
X	special

### IEC 61000-4-9

Surge test	
Level	A/m (peak)
1	not applicable
2	not applicable
3	100
4	300
5	1000
X	special

### IEC 61000-4-8

Continuous test 50/60 Hz	
Level	A/m
1	1
2	3
3	10
4	30
5	100
X	special

Short time test 1 to 3 s. 50/60 Hz	
Level	A/m
1	n.a.
2	n.a.
3	n.a.
4	300
5	1000
X	special

According MIG testers

**MIG-OS-MF:** 100 kHz, 1 MHz  
IEC 61000-4-10 for  
1 x 1 m and 1 x 2.6 m  
antennas

**MIG0603-MF:** 100 kHz, 1 MHz and  
CWG 8/20, 3.3 kA  
IEC 61000-4-10 and  
IEC 61000-4-9 for  
1 x 1 m and 1 x 2.6 m  
antennas

**MIG0603-MF1:** 100 kHz, 1 MHz and  
CWG 8/20, 3.3 kA  
50/60 Hz, 150 A  
1000 A for 1 to 3 s  
IEC 61000-4-10,  
IEC 61000-4-9  
IEC 61000-4-8 for  
1 x 1 m and 1 x 2.6 m  
antennas



MIG0603-MF

## Control and Accessories

- Trigger: auto or manual
- Ramp: current
- Protocol: peak values, polarity, number of shots or test time
- Measurement: CWG, v and i

## MIG-OS-MF 1 MHz, 100 kHz

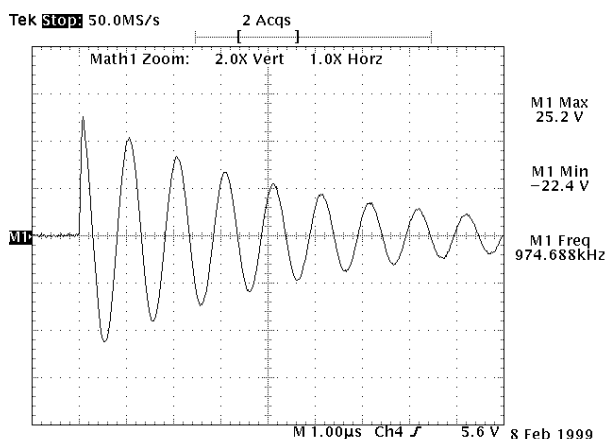
The MIG-OS-MF is suitable to carry out EMC magnetic field tests with 1 x 1 m and 1 x 2.6 m antenna with 1 MHz or 100 kHz burst.



MIG-OS-MF: 100 kHz, 1MHz

### High voltage circuit

- Oscillation frequencies:  
100 kHz  $\pm 10\%$  and 1 MHz  $\pm 10\%$
- Repetition rate maximum: 40/s for 0.1 MHz and 400/s for 1 MHz
- Decaying: 50% of the peak value between the third and sixth period
- Burst duration: 1 up to 99 s  $\pm 10\%$
- Range with MF1000-1 (1 x 1 m): 1 up to 120 A/m
- Range with MF1000-2 (1 x 2,6 m): 1 up to 75 A/m (for 100A/m a booster is needed)



## MIG0603-MF MIG-OS-MF plus 8/20 $\mu$ s

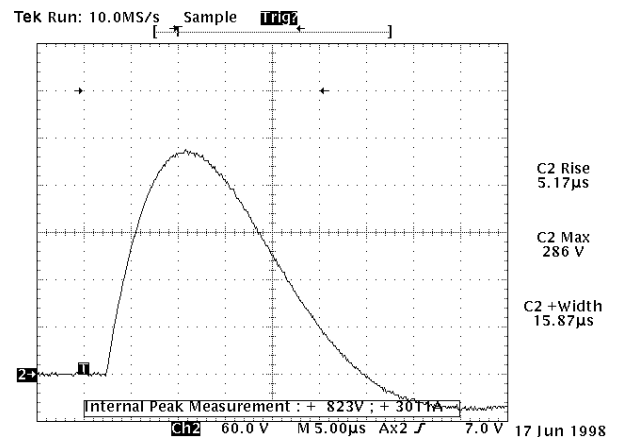
The MIG0603-MF is suitable to carry out in addition the CWG tests  $v = 1.2/50 \mu$ s into no load and  $i = 8/20 \mu$ s into short circuit up to 6 kV and 3 kA.



MIG0603-MF: current wave 8/20  $\mu$ s

### High voltage circuit

- Front time 10 to 90 % x 1.25  $8 \mu$ s  $\pm 20\%$
- Half value time, virtual zero to 50%:  $20 \mu$ s  $\pm 20\%$
- Repetition rate maximum: 10 impulses per minute
- Source impedance:  $2 W \pm 10\%$
- Range with MF1000-1 (1 x 1 m): 1 up to 1600 A/m
- Range with MF1000-2 (1 x 2,6 m): 1 up to 1200 A/m



## MIG0603MF1 MIG0603-MF plus 50/60 Hz

The MIG0603-MF1 is suitable to carry out additional 50/60 Hz magnetic field tests with 1x1 m and 1 x 2.6 m antenna.



MIG0603-MF1: 50/60 Hz frequency

### Test levels

Levels as specified in the standard IEC 61000-4-8:

Continuous test 50/60 Hz	
Level	A/m
1	1
2	3
3	10
4	30
5	100
X	special

Short time test 1 to 3 s. 50/60 Hz	
Level	A/m
1	n.a.
2	n.a.
3	n.a.
4	300
5	1000
X	special

With the accessory **MF1000-1**:  
50/60 Hz range up to 150 A and 120 A/m

With the accessory **MF1000-3**:  
Test 1 to 3 s range up to 1200 A and 1000 A/m

## Accessory MF1000 Antennas

### Antennas

**MF1000-1:** 1 x 1 m antenna for IEC 61000-4-8,-9,-10  
a.c. up to 150 A/m  
CWG up to 3000 A/m  
1 MHz up to 100 A/M

**MF1000-2:** 1 x 2,6 m antenna for IEC 61000-4-8,-9,-10  
a.c. up to 150 A/m  
CWG up to 3000 A/m  
1 MHz up to 100 A/M

**MF1000-3:** 1 x 1 m antenna  
a.c. up to 1000 A/m for short time 3 s



The standard types of antennas

### Stands

- MF1Stand for MF1000-1 antenna
- MF3Stand for MF1000-3 antenna

Both stands are designed to move the antenna in all three directions.

### Advantage of our antennas

The MF1000-1 and MF1000-2 can be used for all three types of waveshaps: surge, damped oscillatory and a.c. 50/60 Hz.

# Testers for "Conducted Damped Oscillatory Wave"-Tests Further Testers

Range of available testers

**MIG-OS-OS1:** 100 kHz, 1 MHz  
IEC 61000-4-12 oscillatory part

**MIG0603-OS1:** 100 kHz, 1 MHz and CWG 6.6 kV, 3.3 kA  
IEC 61000-4-12 oscillatory part and IEC 61000-4-5

**MIG0603-OSI:** 100 kHz, 1 MHz and CWG 6.6 kV, 3.3 kA  
IEC 61000-4-12 oscillatory part  
IEC 61000-4-5, 60255-5



## Frequency Option

The MIG-OS-OS1 can be extended with maximum two additional frequencies e.g. 2 MHz and 10 MHz. The additional rack with the frequencies will be placed on top of the MIG tester.

The technical data correspond to the 100 kHz and 1 MHz tester.

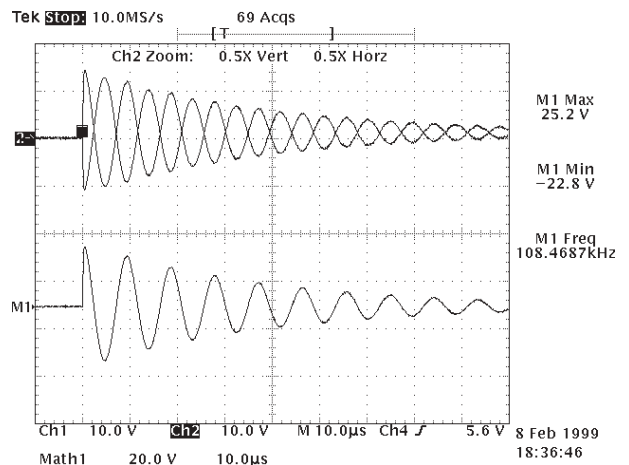
## Coupling filter CDN2000-06-25

The CDN2000-06-25 fulfils all the requirements of IEC 60255-22 and 61000-4-5.

- Power supply line: three-phase (420 V, 25 A)
- I/O lines: 4 paths

## Example waveform

In the graph below the two curves on the top show the symmetrical design of the source. Both outputs (BNC) have equal voltage curves to ground. The bottom curve shows the differentiated signal with a frequency of 100 kHz.



Further versions of MIG-MF and MIG-OS testers

**MIG-OS-OM:** 100 kHz, 1 MHz  
IEC 61000-4-12, -10, part 12 only oscillatory

**MIG0603-OM:** 100 kHz, 1 MHz, CWG 6.6 kV, 3.3 kA  
IEC 61000-4-12, -5, 9 part 12 only oscillatory

**MIG0603-OM1:** 100 kHz, 1 MHz, CWG 6.6 kV, 3.3 kA  
IEC 61000-4-12, -5, 9 part 12 only oscillatory  
IEC 61000-4-8  
50/60 Hz MF-test

**MIG0603-OMI:** 100 kHz, 1 MHz, CWG 6.6 kV, 3.3 kA  
IEC 61000-4-12, -5, 9 part 12 only oscillatory  
IEC 61000-4-8  
50/60 Hz test 0,5 J  
500 Ohm at 0,5, 1, 2.5, 5, 6 kV

# 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.

### The headquarters:



EMC PARTNER AG  
Baselstrasse 160  
CH - 4242 Laufen  
Switzerland

Phone: ++ 41 61 763 01 11  
Fax: ++ 41 61 763 01 15  
Email: sales@emc-partner.ch  
Web-Site: www.emc-partner.com

### 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](http://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