EMC PARTNER

CONDUCTED SUSCEPTIBILITY

Military & Aerospace Testing

This document has been
optimized for electronic media

Smart navigation through technical
specifications. Click the green links.

WHEN GETTING RESULTS MATTERS

THERE IS ONLY ONE CHOICE

Military and avionic testing is all about quality and precision. MIL-MG3 brilliantly fulfills these requirements.

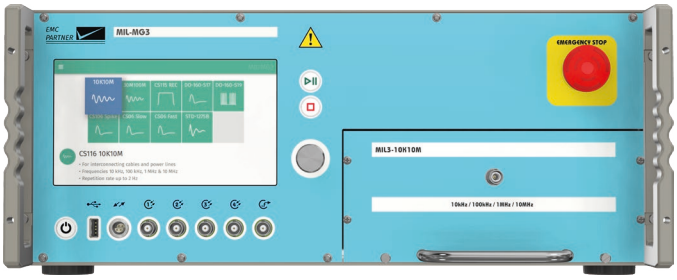
A flexible solution that includes:

- MIL-STD-461C CS06 spikes, power leads
- MIL-STD-461 CS106 transients, power leads
- MIL-STD-461 CS115 bulk cable injection
- MIL-STD-461 CS116 damped sinusoidal transients
- MIL-STD-1275 Imported spikes
- DO-160 section 17 Voltage spikes
- DO-160 section 19 Inductive switching transients

Ease of use, predefined test routines and large aperture couplers make MIL-MG3 the most efficient and technically advanced instrument in this category.

FLEXIBLE SOLUTION

MIL-MG3 modular test system is the first of its kind to employ touch screen technology. An enhanced user interface and choice of couplers allow easy expansion to a test suite for MIL-STD and DO-160 impulse requirements



MIL-MG3 TEST SYSTEM

- MIL-MG3 Mainframe Unit

Available Plug-Ins

- MIL3-REC (CS115)
- MIL3-10K10M (CS116)
- MIL3-30M100M (CS116)
- MIL3-CS116 CUSTOM FREQUENCY
- MIL3-SPIKE (CS106, CS06)
- MIL3-SPIKE-SLOW (CS06)
- MIL3-SPIKE-FAST (CS06)
- MIL3-1275
- MIL3-DO-160 S17
- MIL3-DO-160 S19

Accessories for MIL-STD-461

- **CN-BT6**
  Only one coupler for CS115 and CS116 testing. No change of EUT cables position. Aperture diameter (50mm)
- **VERI-MIL3**
  Includes all neccessary calibration and measurement loads.

Included Benefits

Stable	Pulse reproducibility during test cycle
Precise	Repeatable test results over long time
Reliable	Evolution of established technology
Fast	Minimum setup and calibration time
Polarity	Maintain test integrity by electronic switching
Automated	Save and repeat test routines

AVAILABLE PLUG-INS

Modules are available for MIL-MG3 system to cover the CS115, CS116, CS106, CS06, DO-160 section 17 and 19 test requirements. Select modules for specific test and later add new modules to enhance the system capability. New modules are automatically recognised and controlled by the system firmware.

MIL3-REC — **MIL-STD-461 / CS115**

- Bulk cable injection impulse
- Rise & fall time < 2ns pulse duration 30ns

MIL3-10K10M — **MIL-STD-461 / CS116**

- Damped sinusoidal transients
- Oscillation frequencies 10kHz, 100kHz, 1MHz, 10MHz.

MIL3-30M100M — **MIL-STD-461 / CS116**

- Damped sinusoidal transient
- Oscillation frequencies 30MHz, 100MHz.

MIL3-CS116 CUSTOM FREQUENCY — **MIL-STD-461 / CS116**

- Choose any CS116 frequency in the range 10kHz to 30MHz
- Module examples: 6 MHz, 20 MHz

MIL3-SPIKE — **MIL-STD-461 / CS106**

- Transients, power leads
- Rise time 1.5us and pulse duration 5us

MIL3-SPIKE -SLOW & FAST — **MIL-STD-461C / CS06**

- Spikes, power leads
- Pulse duration 10us and 0.15us

MIL3-1275 — **MIL-STD-1275**

- Imported spike
- Oscillation frequency 100kHz

MIL3-DO-160-S17 — **DO-160 SECTION 17**

- Voltage spikes
- Rise time 2us and pulse duration 10us

MIL3-DO-160-S19 — **DO-160 SECTION 19**

- Inductive switching transients
- Burst duration > 150us and spike frequency 250kHz

Enhanced safety is standard

Red/Yellow Emergency Stop button on front panel of generator can be complemented with remote option.

Add warning lamps and a test cabinet for enhanced test place safety.

UNIQUE FEATURES

Leading technology - New designs take advantage of latest innovations.

Latest generation, solid state, precise technology

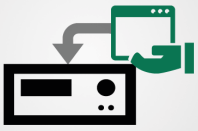
Fast and stable

No generator or coupler adjustments required. System is ready for calibration or testing in less than 30 seconds.

Test reporting

Generate test reports via USB interface or built in webserver as csv, html and pdf formats.

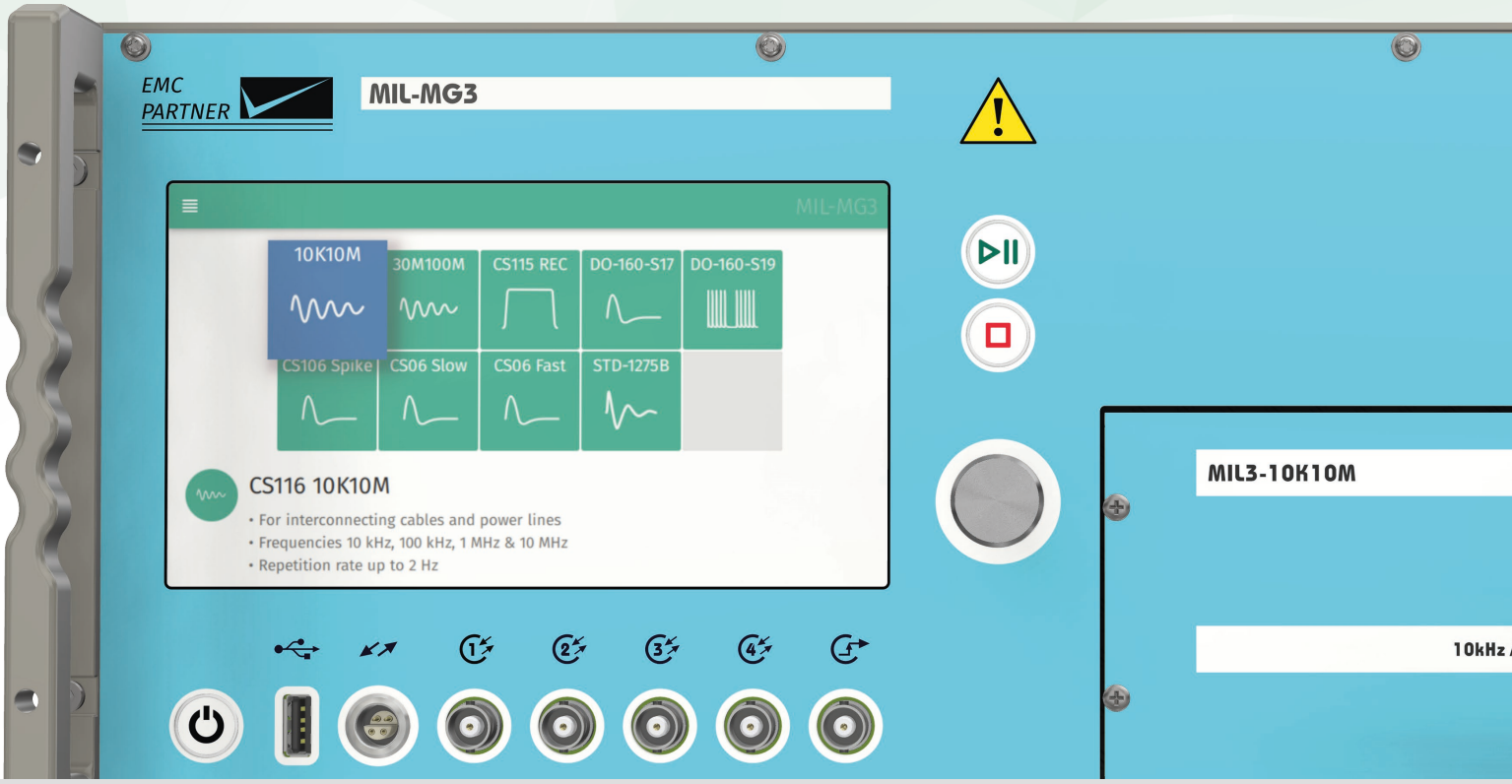
Always up to date



Firmware download from internet directly into the instrument.

Extend testing capability

Modular, on site upgradeable system based on plugin technology.



EPOS – TOUCH THE FUTURE

EMC PARTNER Operating System (EPOS) is an independent software with free-of-charge updates for lifetime. EPOS is based on a full colour graphic interface and easy to follow on-screen graphics. Pop-up help gives information when needed, directly during the setting process. EPOS is full of features found only in top of the range instrumentation.

Integrated Web Server

Use any browser to access test reports from the generator.

Simple touch screen navigation

Save time with the latest in intuitive menu structures.

Interactive Interface

User interface adapted to specific modules.

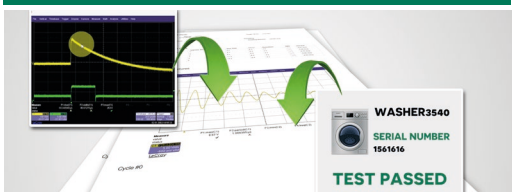
We speak your language

Select between English, German, French, Italian, Spanish, Russian, Chinese (traditional and simplified).

TEMA3000 SOFTWARE SUITE

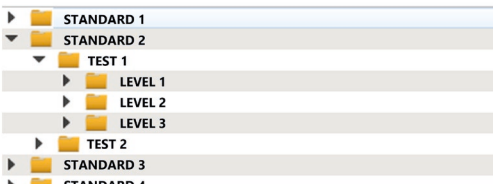
The best solution for professional EMC Test Labs enables comfortable test setups, easy parameter changes and customizable test reports and DSO integration.

Customizable test reports



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

Manage tests and sequences

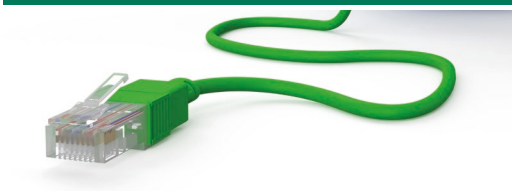


- Predefined test setups
- Save and load own tests and sequences

Productive workflow

- Minimum learning time
- Integrated assistant function

Smart connectivity



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

Technical Specifications

PLUGINS

MIL-MG3	Main frame	MIL3-REC	MIL3-10K10M	MIL3-30M100M	MIL3-CS116 CUSTOM	MIL3-SPIKE	MIL3-SPIKE-SLOW	MIL3-SPIKE-FAST	MIL3-DO-160-S17	MIL3-DO-160-S19	MIL3-1275B
MIL-461G CS115	✓	✓									
MIL-461G CS116	✓		✓	✓	✓						
MIL-461C CS06	✓					✓	✓	✓			
MIL-461F CS106	✓					✓					
NASA GP 11461	✓					✓					
MIL-1275B	✓										✓
DO-160 S17	✓								✓		
DO-160 S19	✓									✓	
ECSS-E-ST-20-07C rev1.							✓	✓			

ACCESSORIES

MIL-MG3	Main frame	MIL3-REC	MIL3-10K10M	MIL3-30M100M	MIL3-CS116 CUSTOM	MIL3-SPIKE	MIL3-SPIKE-SLOW	MIL3-SPIKE-FAST	MIL3-DO-160-S17	MIL3-DO-160-S19	MIL3-1275B
CN-BT6	✓	✓	✓	✓	✓						
VERI-MIL3	✓	✓	✓	✓	✓						
CN-MIG-BT5	✓					✓	✓		✓		
DC-S17CL	✓					✓	✓	✓	✓		
VERI5	✓					✓	✓	✓			
SHUNT0E1	✓						✓				
VERI01 OSI	✓							✓			
VERI50	✓								✓		
20dB ATTEN. 10kHz	✓		✓								
20dB ATTEN. 100kHz	✓		✓								
I-PROBE-CS	✓	✓	✓	✓	✓						
TEMA3000	✓	opt	opt	opt	opt	opt	opt	opt	opt	opt	opt

1. MIL-MG3 MAINFRAME AND PLUGINS

1.1. TECHNICAL SPECIFICATIONS

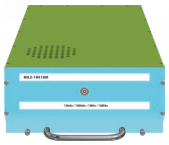
MIL-MG3 Mainframe

Operating system	EPOS propietary firmware
Languages	8 menu languages, selectable
User interface	7“ capacitive touch display
Connectivity	gigabit ethernet, USB, RS485
Synchronization on signals	40 – 800 Hz
Synchronization source	external, 50 – 280 V
Synchronization angle	0 – 359° ± 5°, 1° step
Impulse polarity	positive, negative, electronic switching
Automatic ramp	test level
Trigger out	BNC, max. 6 V
Programmable connectors	6 BNC connectors (inputs/outputs) as follows
Programmable input functions	Trigger input, Start Test, Stop Test, EUT Fail, EUT Mark, Emergency Stop
Programmable input max. voltage	low range: 0 – 1.5 V, high range: 2.3 – 24 V
Programmable output functions	Running State, Safety Circuit State
Programmable output max. U, I	max. 24 V, max. 300 mA
Safety features (standard)	Emergency stop button on front panel red/yellow as per IEC 60947-5-5, IEC 60204-1, ISO 13850
	Safety circuit
Safety accessories (optional)	WARNING LAMP (24 V, max. 2.4 W),
	TC-ST test cabinet
	Remote EMERGENCY STOP button

MIL3-REC

Standard	MIL-STD-461, CS115
Test level into 100 Ω	1 – 10 A ± 10 % , adjustable
Waveform	rectangular pulse
Z_{out}	50 Ω
Pulse rise and fall time	< 2 ns
Pulse duration	≥ 30 ns
Repetition rate	max. 33 Hz
Requires	CN-BT6, VERI-MIL3
Optional	I-PROBE-CS

MIL3-10K10M



Standard	MIL-STD-461, CS116 (10 kHz – 10 MHz)
Test level into 100 Ω	@ 10 kHz: 0.02 – 0.22 A ± 10 %, adjustable
Test level into 100 Ω	@ 100 kHz: 0.2 – 2.0 A ± 10 %, adjustable
Test level into 100 Ω	@ 1 MHz: 1 – 12 A ± 10 %, adjustable
Test level into 100 Ω	@ 10 MHz: 2 – 12 A ± 10 %, adjustable
Waveform	damped oscillation@10k,100k,1MHz,10MHz ±10%
Z_{out}	≤ 100 Ω
Damping factor (Q)	15 ± 5 for all frequencies
Repetition rate	max. 2 Hz for all frequencies
Coupler for all frequencies	CN-BT6
Calibration fixture all freq.	VERI-MIL3
Optional	I-PROBE-CS, 20dB ATTENUATOR

MIL3-30M100M

Standard	MIL-STD-461, CS116 (30 MHz – 100 MHz)
Test level into 100 Ω	@ 30 MHz: 2 – 12 A ± 10 %, adjustable
Test level into 100 Ω	@ 100 MHz: 1 – 6 A ± 10 %, adjustable
Waveform	damped oscillation@30MHz,100MHz ±10%
Z_{out}	≤ 100 Ω
Damping factor (Q)	15 ± 5 for all frequencies
Repetition rate	max. 2 Hz for all frequencies
Coupler for all frequencies	CN-BT6
Calibration fixture all freq.	VERI-MIL3
Optional	I-PROBE-CS

MIL3-CS116 CUSTOM FREQUENCY

Standard	MIL-STD-461, CS116
Test level into 100 Ω	according to Fig. CS116-2
Frequency	choose any frequency from 10 kHz to 30 MHz
Module examples	6 MHz, 20MHz
Waveform	damped oscillation
Z_{out}	≤ 100 Ω
Damping factor (Q)	15 ± 5 for all frequencies
Repetition rate	max. 2 Hz for all frequencies
Coupler for all frequencies	CN-BT6
Calibration fixture all freq.	VERI-MIL3
Optional	I-PROBE-CS

MIL3-SPIKE

Standard	MIL-STD-461F CS106, MIL-STD-461C CS06
	NASA GP 11461
Output impedance	< 2 Ω
Test level into 5 Ω	50 – 600 V ± 10 % , adjustable
Waveform	voltage spike
Pulse rise time	1.5 µs ± 0.5 µs
Pulse front time	3.5 µs ± 0.5 µs
Pulse duration	5 µs ± 22 %
Voltage sag amplitude	≤ 120 V @ 400 V test level
Voltage sag duration	≤ 20 µs @ 400 V test level
Repetition rate	max. 10 Hz
Synchronization	0 – 359° ± 5°, 1° step
Requires	CN-MIG-BT5, VERI5, DC-S17CL

MIL3-SPIKE-SLOW

Standard	MIL-STD-461C CS06, ECSS-E-ST-20-07C Rev. 1 CS, power leads, transients
Waveform duration	10 µs ± 20 %
Polarity	positive and negative
Repetition rate	0.1 – 60 s
Synchronization	0 – 359° ± 5°
Synchronization input	50 – 280 V, 40 – 800 Hz

Serial injection	
Test level	20 – 300 V ± 10 %
Z_{out}	< 1 Ω
EUT current serial inj.	max. 1280A @50Hz, 160A @400Hz, 80A @800Hz
Requires	CN-MIG-BT5, VERI5
Optional	DC-S17CL (see EUT supply limits)

Parallel injection	
Test level	20 – 500 V ± 10 %
Z_{out}	< 2 Ω
EUT voltage parallel inj.	max. 250V @DC - 60Hz, 60V @60 - 400Hz, 30V @400 - 800Hz
Requires	VERI5, SHUNT0E1

Optional	DC-S17CL (see EUT supply limits)

MIL3-SPIKE-FAST

Standard	MIL-STD-461C CS06, ECSS-E-ST-20-07C Rev. 1 CS, power leads, transients
Waveform duration	0.15 µs ± 20%
Polarity	positive and negative
Repetition rate	0.1 – 60 s
Synchronization	0 – 359° ± 5° up to 400 Hz
Synchronization input	50 – 280 V, 40 – 800 Hz

Serial injection	
Test level	20 – 400 V ± 10 %
Z_{out}	< 5 Ω @ standard test level
EUT current serial inj.	max. 32 A @ DC – 800 Hz
Requires	VERI5
Optional	DC-S17CL (see EUT supply limits)

Parallel injection	
Test level	20 – 400 V ± 10 %
Z_{out}	< 5 Ω @ standard test level
EUT voltage parallel inj.	max. 250 V @ DC – 800 Hz
Requires	VERI5, VERI01 OSI
Optional	DC-S17CL (see EUT supply limits)

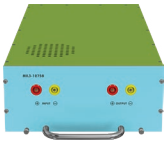
MIL3-DO-160-S17

Standard	DO-160 Section 17
Output impedance	50 Ω ± 10 %
Test level OC	50 – 1200 V ± 10 % , adjustable
Waveform	voltage spike
Pulse rise time	1 – 2 µs ± 30 %
Pulse duration	> 10 µs
Repetition rate	max. 2 Hz
Synchronization	0 – 359° ± 5°, 1° step input 50 - 250 V / 40 - 800 Hz
EUT supply parallel injection	250 V / DC - 60 Hz 60 V / 60 - 400Hz 30 V / 400 - 800Hz current limited only by decoupling
Requires	CN-MIG-BT5, VERI50, DC-S17CL

MIL3-DO-160-S19

Standard	DO-160 Section 19 – fig. 19-6, inductive switching trasient
Resistance	175 Ω ± 10 %

Inductance	1.5 H ± 10 %
Test level	≥ 600 V
Waveform	voltage spikes/burst
Spike repetition period	in the range 0.2 – 10 µs
Burst total duration	in the range 50 - 1000 µs
Event repetition	0.1 – 60 s, adjustable
Test duration	1 – 65535 s
Included	cables for coupling 0.5 m, 1.0 m, 2.0 m



MIL3-1275B

Standard	MIL-STD-1275 versions A to E, imported voltage spikes
Test level	100 – 1000 V ±10 %, in open circuit
Waveform	ring wave
Rise time 10 – 90 %	< 50 ns
Oscillation frequency	100 – 500 kHz
Pulse repetition	max. 2 Hz
Max. EUT power	
DC	28 V / 30 A
AC	230 V / 10 A or 115 V / 25 A @ 50/60 Hz

1.2. POWER, CLIMATIC CONDITIONS, SHIPPING WEIGHT, DIMENSIONS

MIL-MG3 mainframe

Mains adapter	100 – 240 V ± 10 % (50/60 Hz)
Power consumption	ON < 150 VA, standby < 15 VA

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

Mainframe weight	17 kg
W x d x h	45 x 57 x 19 cm
Version	19“ unit, 4 UH

Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration for each plugin ordered
Ethernet cable	1 piece

2. ACCESSORIES FOR MIL-MG3

2.1. TECHNICAL SPECIFICATIONS

CN-BT6

Standard	MIL-STD-461 CS115 and CS116
Application	injection probe
Frequency range CS115	usable rise time from 1 ns
Frequency range CS116	10 kHz – 100 MHz
EUT supply	max. 150A@50/60Hz, 20A@400Hz, 10A@800Hz
Aperture	5 cm diameter
Dimensions l x h x w	25 x 17 x 15 cm
Weight	5 kg
Included	50 Ω termination, 1 m cable, 2 m cable
Requires	CS115 and/or CS116 modules, VERI-MIL3

VERI-MIL3

Application	calibration fixture for CN-BT6 (CS115, CS116)
Weight	4.5 kg
Dimensions l x h x w	34 x 13 x 15 cm
Included	2 x 20 dB N-type, 2 x 20 dB BNC, 1 m cable

CN-MIG-BT5

Standards	MIL-STD-461F CS106, MIL-STD-461C CS06, DO-160 Section 17 serial injection
Application	injection probe
Frequency range	10 kHz – 10 MHz
EUT supply	CS106: max. 150A@50/60Hz, 20A@400Hz, 10A@800Hz
	CS06 SLOW: max. max. 1280A @50Hz, 160A @400Hz, 80A @800Hz
	Section 17, serial injection: max. 1000A@50/60Hz, 160A@400Hz, 80A@800Hz
Aperture	8 x 7 cm
Dimensions l x h x w	22 x 22 x 20 cm
Weight	13 kg
Included	1 m cable, 1 turn calibration loop
Requires	CS106 or CS06 modules or S17 module, DC-S17CL

DC-S17CL

Standards	MIL-STD-461F CS106, MIL-STD-461C CS06 DO-160 Section 17
Application	decoupling units for power supply side
For serial injection	4 x decoupling capacitors, in 2 boxes
Decoupling capacitance	10 µF
EUT voltage	max. 250V, DC - 800Hz
EUT current	not limited by decoupling capacitors

For parallel injection	2 x decoupling inductors
Decoupling inductance	1.8 mH
EUT voltage	max. 250V, DC - 800Hz
EUT current	max. 16 A

Weight	7 kg, all 4 modules and acc. in carrying case
Dimensions	34 x 28 x 17 cm (carrying case)
Included	connection cables, carrying case

SHUNT0E1

Application	calibration of MIL3-SPIKE-SLOW SC current, parallel injection
Input impedance	0.1 Ω ± 2 %
Transfer ratio	1V / 20 A in 50 Ω, 1V / 10A in 1 M Ω ± 2 %
Maximum setting MIL-MG3	MIL3-SPIKE-SLOW: 500 C
Weight	0.15 kg
Dimensions	12 x 2.5 x 2.5 cm
Requires	MIL-MG3, MIL-SPIKE-SLOW

VERI01 OSI

Application	calibration of MIL3-SPIKE-FAST SC current, parallel injection
Input impedance	0.1 Ω ± 2 %
Maximum setting MIL-MG3	MIL3-SPIKE-FAST: 400 V
3 dB bandwidth	> 400 MHz
Power dissipation	max. 3 W, max. 1000 spikes/s @ 4.4 kV
Transfer ratio	1V / 20 A in 50 Ω, 1V / 10 A in 1 M Ω ± 2 %
Dimensions	8.5 x 2.5 x 2.5 cm
Weight	0.1 kg
Requires	MIL-MG3, MIL-SPIKE-FAST

VERI5

Standard	MIL-STD-461F CS106, MIL-STD-461C CS06
Application	non-inductive calibration load
Input impedance	5 Ω ± 2 %
Power dissipation	max. 10 W
Maximum setting MIL-MG3	MIL3-SPIKE: 600 V
Transfer ratio	DSO 1MΩ: 1:50 (34dB); DSO 50 Ω: 1:100 (40dB)
Weight	0.2 kg
Dimensions	12 x 2.5 x 2.5 cm
Included	factory calibration report

VERI50

Standard	DO-160 Section 17
Application	non-inductive calibration load
Input impedance	50 Ω ± 2 %
Power dissipation	max. 10W
Maximum setting MIL-MG3	MIL3-DO-160-S17: 1200 V
Transfer ratio	DSO 1MΩ: 1:50 (34dB); DSO 50 Ω: 1:100 (40dB)
Weight	0.2 kg
Dimensions	12 x 2.5 x 2.5 cm
Included	factory calibration report

20dB ATTENUATOR 10kHz

Application	att. reducing test level with MIL3-10K10M
Level with 20 dB (10 kHz)	for ex: 22 mA @ gen. setting 220 mA
Weight	0.1 kg
Dimensions	11 x 2.5 x 2.5 cm
Included	factory calibration report

20dB ATTENUATOR 100kHz

Application	att. reducing test level with MIL3-10K10M
Level with 20 dB (100 kHz)	for ex: 0.2 A @ gen. setting 2 A
Weight	0.1 kg
Dimensions	11 x 2.5 x 2.5 cm
Included	factory calibration report

I-PROBE-CS

Standards	MIL-STD-461G: CS115, CS116
Application	current probe for test level and rise time meas.
Output connector	N (adapter for BNC optional, ask sales)
Frequency range	10 kHz – 400 MHz
Usable rise time	1 ns
Aperture	50.8 mm (excellent for CN-BT6)
Input level	max. 4 A r.m.s., 15 A peak
Transfer impedance	- 6 dBΩ
Current time product	max. 0.6 mAs
Weight	1 kg
Dimensions	14.7 x 12.7 x 3.2 cm
Included	carrying case

TEMA3000

Application	modular control software for MIL-MG3 system
License	1 license for 1 generator

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

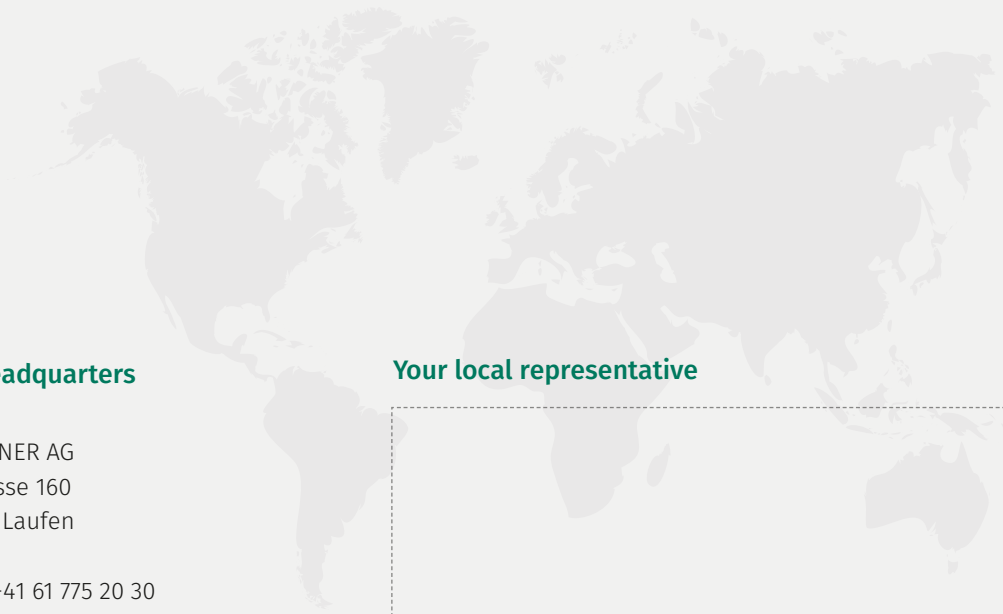
High current CDNs combined with transient test equipment fulfil requirements to test renewable and classical energy distribution network and monitoring equipment.

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



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