EMC PARTNER

DO-160 & MIL-STD-461G

Indirect Lightning Test System

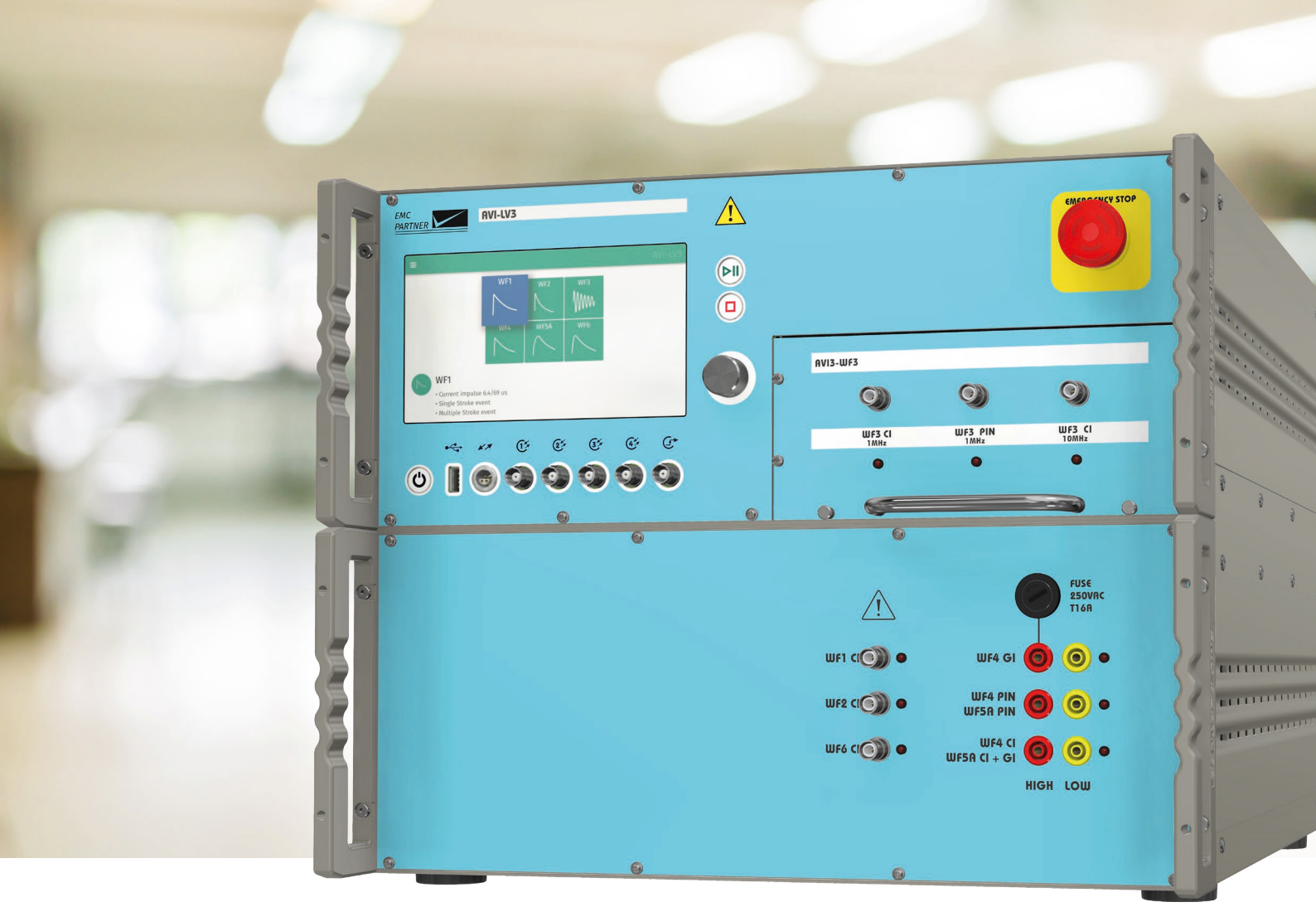
AVI-LV3

This document has been
optimized for electronic media

Smart navigation through technical
specifications. Click the green links.

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



WHEN GETTING RESULTS MATTERS

THERE IS ONLY ONE CHOICE

Military and avionic testing is all about quality and precision. AVI-LV3 brilliantly fulfills these requirements.

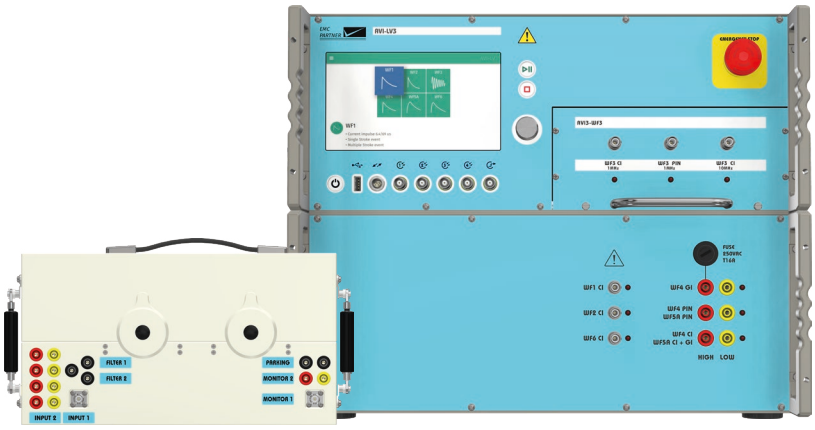
A flexible solution that includes:

- MIL-STD-461: CS117, Level 1 (internal equipment)
- RTCA DO-160: SECTION 22, Level 3
- EUROCAE ED-14: SECTION 22, Level 3

Ease of use, compact size and large aperture coupler makes AVIL-LV3 the most efficient and technically advanced instrument in this category.

MULTI TALENTED SOLUTION

The first System to fully integrate all waveforms from MIL-STD-461G and DO-160. Combined with a single coupler where the EUT cable passes only once, AVI-LV3 is a compact and resourceful solution to indirect lightning testing needs.



AVI-LV3 Test System

- AVI-LV3 compact unit

Test Accessories

- **CN-BT8**
  Only one couplter for all 5 waveforms. No change of the EUT cable. Aperture (55x80mm)

- **CN-GI-CI-V**
  Voltage coupler for WF4 cable bundle testing. Aperture (60x120mm)

Included Benefits

Stable	Pulse reproducibility during test cycle
Precise	Repeatable test results over long time
Fast	Minimum setup and calibration time
Flexible	User selectable MS and MB timing
Polarity	Maintain test integrity by electronic switching
Automated	Save and repeat test routines.

Pre-programmed Multiple Stroke (MS) and Multiple Burst (MB) functions

AVAILABLE CIRCUITS

AVI-LV3 is a compact unit that includes all waveforms for RTCA DO-160: Section 22 and MIL-STD-461G: CS117 testing. All event types are available: PIN Injection, Cable Injection and Ground Injection

Waveform 1 (6.4/69µs) — MIL-STD-461 / CS117

Current Impulse

- Cable Bundle Single Stroke
- Cable Bundle Multiple Stroke

Waveform 2 (0.1 and 0.3/6.4µs) — RTCA DO-160 / S.22, MIL-STD-461 / CS117

Voltage Impulse

- Cable Bundle Single Stroke
- Cable Bundle Multiple Stroke

Waveform 3 (1MHz & 10MHz) — RTCA DO-160 / S.22, MIL-STD-461 / CS117

Voltage & Current Impulse

- PIN injection
- Cable Bundle Single Stroke
- Cable Bundle Multiple Stroke
- Cable Bundle Multiple Burst

Waveform 4 (6.4/69µs) — RTCA DO-160 / S.22, MIL-STD-461 / CS117

Voltage Impulse

- PIN Injection
- Ground Injection Single Stroke
- Ground Injection Multiple Stroke

Waveform 5A (40/120µs) — RTCA DO-160 / S.22, MIL-STD-461 / CS117

Current Impulse

- PIN Injection
- Cable Bundle Single Stroke
- Cable Bundle Multiple Stroke

Waveform 6 (0.25/4µs) — RTCA DO-160 / S.22, MIL-STD-461 / CS117

Current Impulse

- Cable Bundle Multiple Burst

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.

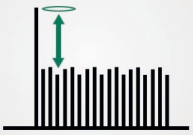
Fast and stable

No generator or coupler adjustments required. System is ready for calibration and long duration testing.

State of the art

Latest technology used in electronic circuits and coupler design.

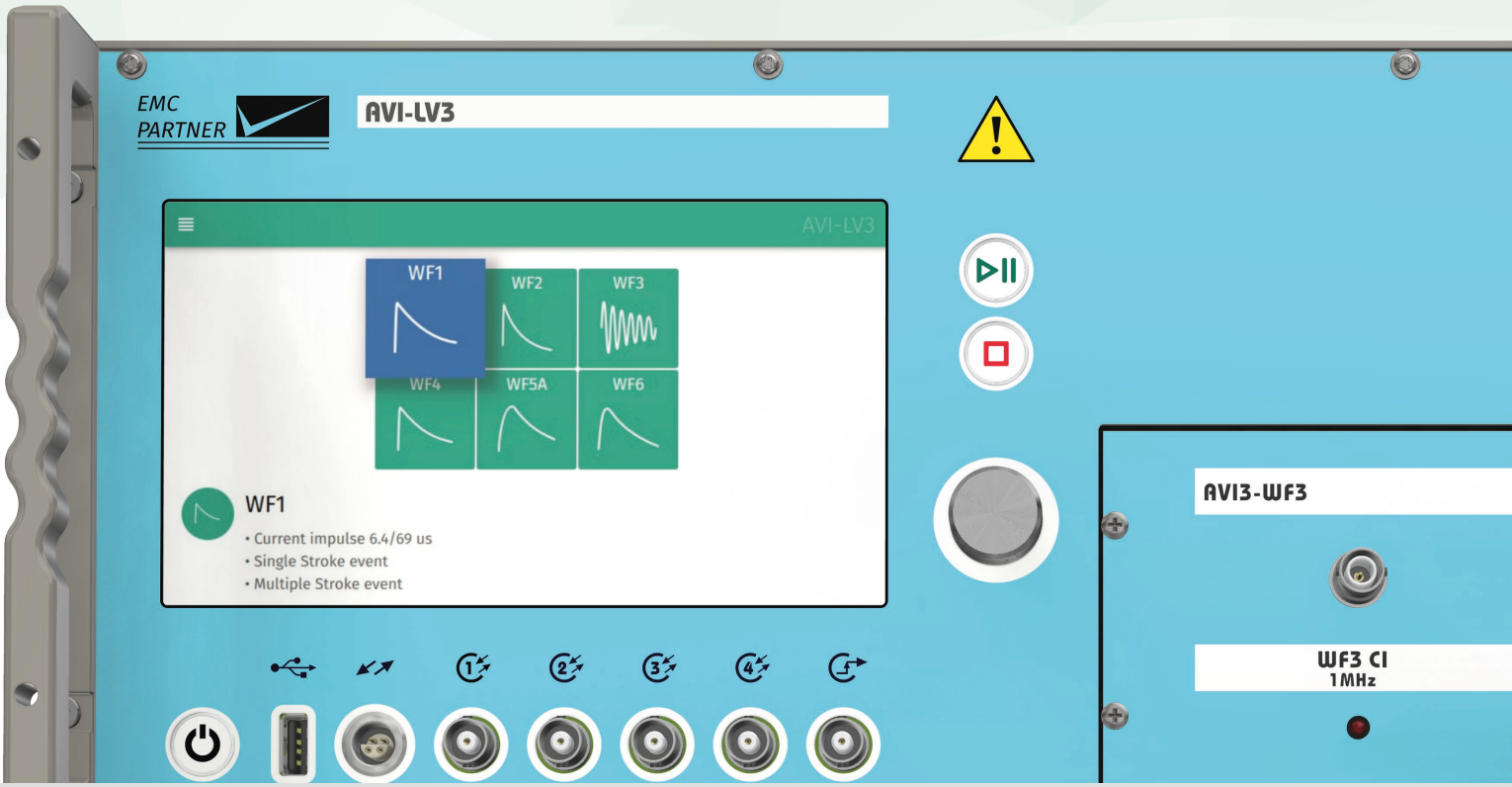
Adjust pulse



Multiple Stroke adjustment for DO-160 and MIL-STD-461.

Integrated decouplers

No external couplers needed to decouple powered EUTs for PIN Injection or ground injection testing.



EPOS – TOUCH THE FUTURE

EMC PARTNER Operating System (EPOS) is an independant 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 via ethernet.

Simple touch screen navigation

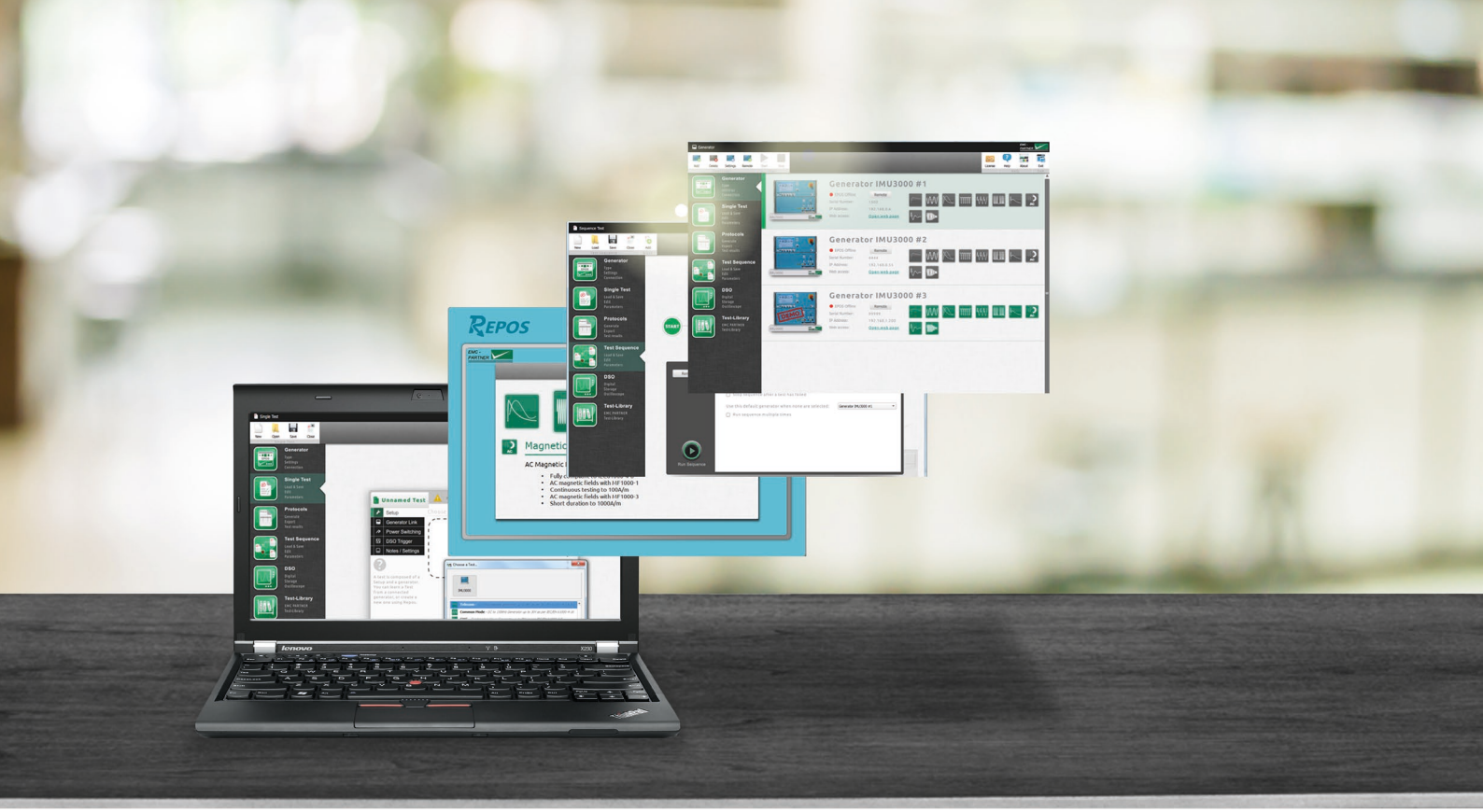
Save time with the latest in intuitive menu structures.

Interactive interface

User interface adapted to specific circuits.

We speak your language

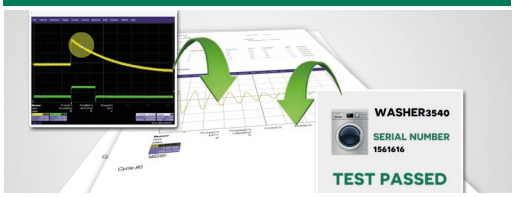
Select between English, German, French, Italian, Spanish, Russian, Chinese (simplified + traditional)



TEMA3000 SOFTWARE SUITE

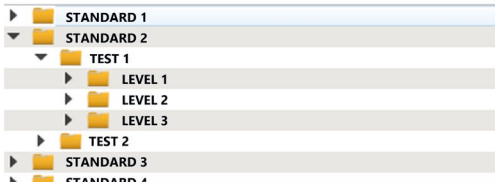
The best solution for professional EMC Test Labs enables comfortable test setups, easy parameter changes and customizable test reports and DSO integration.

Customizable test reports



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

Manage tests and sequences

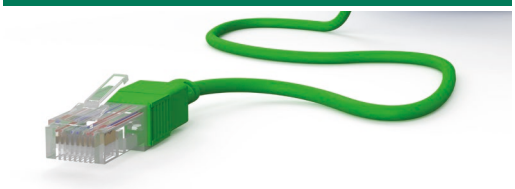


- Predefined test setups
- Save and load own tests and sequences

Productive workflow

- Minimal learning time
- Integrated assistant function

Smart connectivity



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

Other systems for indirect lightning PIN injection & Cable bundle tests

DO-160 section 22

MIL-STD-461 CS117

Aircraft OEM specific standards

Established worldwide

www.emc-partner.com

Technical Specifications

TEST SYSTEM

DO-160 G SECTION 22 LEVEL 3 & MIL-STD-461G CS117 LEVEL 1 (INTERNAL EQUIPMENT)

Test equipment	DO-160G Section 22 level 3	MIL-STD-461G CS117 level 1 (internal equip.)	Manufacturers (Airbus, Boeing, etc)
AVI-LV3	✓	✓	✓
Accessories & coupling devices			
LISN-5U-32	✓	✓	✓
LISN-50U-32		✓	✓
EXT-LISN-DC-270	✓	✓	✓
SHUNT0E1	✓	✓	✓
V-PROBE-SI	✓	✓	✓
I-PROBE-MB-P1	✓	✓	✓
CN-BT8	✓	✓	✓
CN-GI-CI-V	optional	✓	optional
WARNING-LAMP	optional	optional	optional
EMERGENCY-STOP	optional	optional	optional
Software			
TEMA3000 & Modules	✓	✓	✓
ETHERNET-OPT-LINK	✓	✓	✓

TEST SYSTEM

1. AVI-LV3 TEST SYSTEM

AVI-LV3 circuit: WF1 cable induction

Standards	DO-160G S22, MIL-STD-461G CS117, other
Coupling mode	Cable Induction (CI)
Current waveform WF1	6.4 µs ± 20 % / 69 µs ± 20 %
Test level	specified at coupler output
Test level single stroke	25 A – 900 A +20%, -0%
Test level multiple stroke	25 A – 900 A +20%, -0% (first stroke)
	20 A – 300 A +50%, -0% (subsequent stroke)
Pulse repet. single stroke	up to 2 / 1 s @ 25 A, 1 / 7 s @ 900 A
Polarity	positive, negative, alternating
Programmable ramp	current
Requires	CN-BT8

AVI-LV3 circuit: WF2 cable induction

Standards	DO-160G S22, MIL-STD-461G CS117, other
Coupling mode	Cable Induction (CI)
Voltage waveform WF2	rise time: < 100 ns or < 340 ns selectable
	pulse duration: 6.4 µs ± 20 %
Test level	specified at coupler output
Test level single stroke	25 V – 1600 V +20%, -0%
Test level multiple stroke	25 V – 700 V +20%, -0% (first stroke)
	25 V – 350 V +50%, -0% (subsequent stroke)
Pulse repet. single stroke	up to 2 / 1 s @ 25 V, 1 / 1.5 s @ 1600 V
Polarity	positive, negative, alternating
Programmable ramp	voltage
Requires	CN-BT8

AVI-LV3 circuit: WF3, 1 MHz, pin injection

Standards	DO-160G S22, other
Coupling mode	pin injection / direct application
Output impedance	25 Ω
Voltage, current WF3	frequency: 1 MHz ± 20 %
	damping: 25 – 75 % (1st to 5th peak)
Test level	specified at application point
Test level single stroke	50 V – 750 V +10%, -0%
	2 A – 30 A +10%, -0% in short circuit
	100 V – 750 V +10%, -0%
	4 A – 30 A +10%, -0% in short circuit
Pulse repet. single stroke	up to 2 / 1 s @ 100 V – 750 V
Polarity	positive, negative, alternating
Synchronization	automatic on power peak or 0 – 359°, step 1°
Programmable ramp	voltage
EUT max. AC-voltage	230 V

EUT max. supply frequency	800 Hz
EUT max. DC-voltage	± 50 V

AVI-LV3 circuit: WF3, 1 MHz, cable induction

Standards	DO-160G S22, MIL-STD-461G CS117, other
Coupling mode	Cable Induction (CI)
Voltage, current WF3	frequency: 1 MHz ± 20 %
	damping: 25 – 75 % (1st to 5th peak)
Test level	specified at coupler output
Test level single stroke	10 V – 1900 V +20%, -0%
Test level multiple stroke	10 V – 1900 V +20%, -0% (first stroke)
	10 V – 1000 V +50%,-0% (subseq. stroke)
Test level multiple burst	10 V – 700 V +20%, -0%
Pulse repet. single stroke	up to 2 / 1 s @ 100 V – 750 V
Polarity	positive, negative, alternating
Programmable ramp	voltage
Requires	CN-BT8

AVI-LV3 circuit: WF3, 10 MHz, cable induction

Standards	DO-160G S22, MIL-STD-461G CS117, other
Coupling mode	Cable Induction (CI)
Voltage, current WF3	frequency: 10 MHz ± 20 %
	damping: 25 – 75 % (1st to 5th peak)
Test level	specified at coupler output
Test level single stroke	50 V – 1100 V +20%, -0%
Test level multiple stroke	50 V – 1100 V +20%, -0% (first stroke)
	50 V – 800 V +50%, -0% (subsequent stroke)
Test level multiple burst	50 V – 800 V +20%, -0%
Pulse repet. single stroke	up to 2 / 1 s @ 100 V – 1100 V
Polarity	positive, negative, alternating
Programmable ramp	voltage
Requires	CN-BT8

AVI-LV3 circuit: WF4, pin injection

Standards	DO-160G S22, other
Coupling mode	pin injection / direct application
Output impedance	5 Ω
Voltage, current WF4	6.4 µs ± 20 % / 69 µs ± 20 %
Test level	specified at application point
Test level single stroke	50 V – 500 V +10%, -0%
	10 A – 100 A +10%, -0% in short circuit
Pulse repet. single stroke	up to 2 / 1 s @ 50 V, 1 / 3 s @ 500 V
Polarity	positive, negative, alternating
Synchronization	automatic on power peak
Programmable ramp	voltage
EUT max. AC-voltage	230 V
EUT max. supply frequency	800 Hz
EUT max. DC-voltage	± 50 V

AVI-LV3 circuit: WF4 ground injection

Standards	DO-160G S22
Coupling mode	Ground Injection (GI)
Voltage waveform WF4	6.4 µs ± 20 % / 69 µs ± 20 %
Test level	specified at application point
Test level single stroke	10 V – 1600 V +20%, -0%
Test level multiple stroke	10 V – 800 V +20%, -0% (first stroke)
	10 V – 400 V +50%, -0% (subsequent stroke)
Pulse repet. single stroke	up to 2 / 1 s @ 50 V, 1 / 9 s @ 1600 V
Polarity	positive, negative, alternating
Programmable ramp	voltage
EUT max. power	230 V / 16 A AC 50 – 800 Hz and DC

AVI-LV3 circuit: WF4 cable induction

Standards	MIL-STD-461G CS117, other
Coupling mode	Cable Induction (CI)
Voltage waveform WF4	6.4 µs ± 20 % / 69 µs ± 20 %
Test level	specified at coupler output
Test level single stroke	max. 10 V – 600 V +20%, -0%
Test level multiple stroke	max. 10 V – 300 V +20%, -0% (first stroke)
	max. 10 V – 150 V +50%, -0% (subsequent stroke)
Pulse repet. single stroke	up to 1 / 8 s @ 600 V
Polarity	positive, negative, alternating
Programmable ramp	voltage
Requires	CN-GI-CI-V

AVI-LV3 circuit: WF5A, pin injection

Standards	DO-160G S22, other
Coupling mode	pin injection / direct application
Output impedance	1 Ω
Voltage, current WF5A	40 µs ± 20 % / 120 µs ± 20 %
Test level	specified at application point
Test level single stroke	25 V – 50 V +20%, -0%
	25 A – 50 A +20%, -0% in short circuit
	50 V – 500 V +10%, -0%
	50 A – 500 A +10%, -0% in short circuit
Pulse repet. single stroke	up to 2 / 1 s @ 50 V, 1 / 5 s @ 500 V
Polarity	positive, negative, alternating
Synchronization	automatic on power peak
Programmable ramp	voltage
EUT max. AC-voltage	230 V
EUT max. supply frequency	800 Hz
EUT max. DC-voltage	± 50 V

AVI-LV3 circuit: WF5A cable induction

Standards	DO-160G S22, MIL-STD-461G CS117, other
Coupling mode	Cable Induction (CI)
Current waveform WF5A	40 µs ± 20 % / 120 µs ± 20 %
Test level	specified at coupler output
Test level single stroke	20 A – 1800 A +20%, -0%
Test level multiple stroke	20 A – 1800 A +20%, -0% (first stroke)
	20 A – 390 A +50%, -0% (subsequent stroke)
Pulse repet. single stroke	up to 2 / 1 s @ 50 A, 1 / 14 s @ 1800 A
Polarity	positive, negative, alternating
Programmable ramp	current
Requires	CN-BT8

AVI-LV3 circuit: WF6 cable induction

Standards	DO-160G S22, MIL-STD-461G CS117, other
Coupling mode	Cable Induction (CI)
Current waveform WF6	0.25 µs ± 20 % / 4 µs ± 20 %
Test level	specified at coupler output
Test level single stroke	2.5 A – 75 A +20%, -0%
Test level multiple burst	2.5 A – 75 A +20%, -0%
Pulse repet. single stroke	up to 2 / 1 s @ 5 A – 75 A
Polarity	positive, negative, alternating
Programmable ramp	current
Requires	CN-BT8

AVI-LV3 control features

Operating system	EPOS propietary firmware
Languages	8 menu languages, selectable
User interface	7“ capacitive touch display
Connectivity	gigabit ethernet, USB, RS485
Programmable patterns	DO-160, multiple stroke, multiple burst, custom
	Airbus ABD patterns, Boeing D6 patterns for
	multiple stroke, multiple burst
Synchronization on signals	40 – 800 Hz
Synchronization source	EUT Power
Synchronization angle	automatic peak synchronization as per standard
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),
	Remote EMERGENCY STOP button

AVI-LV3 supply, weight, dimensions, climatic conditions

Operating voltage	100 V - 240 V ± 10% (50/60 Hz)
Power consumption	ON < 400 VA, standby < 15 VA
Weight	50 kg
W x d x h	45 x 60 x 37 cm
Version	19“ unit, 8 UH
Temperature range	10 – 35 °C
Humidity	< 80 % non-condensing
Air pressure	86 – 106 kPa
Included articles	
Power cord	with country plug
User manual	with conformity declaration
Calibration certificate	factory calibration

AVI-LV3 accessories

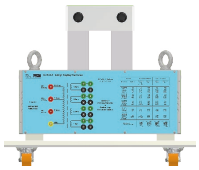
LISN	DN-LISN160-32
Calibration load	SHUNT0E1, for WF2 and WF3 short circuit
Voltage probe	V-PROBE-SI, common and differential mode
Current probe	I-PROBE-MB-P1
Coupling devices (CI)	CN-BT8, for WF 1, 2, 3, 5A, 6
	CN-GI-CI-V, for WF4 in MIL-STD-461G, CS117
Software	TEMA3000 and modules

COUPLING DEVICES

CN-BT8

Application AVI-LV5-CB	WF 1, 2, 3, 6 all test levels
Application AVI-LV3	WF1, 2, 3, 5A, 6 up to level 3
SC current	≥ 3200 A
OC voltage	≥ 1600 V
OC voltage	≥ 3200 V, 1 and 10 MHz
SC current	≥ 160 A multiple burst
EUT supply CB	≤ 426 A @ 60 Hz, ≤ 32 A @ 800 Hz
Aperture	5.5 x 8 cm
Dimensions	approx. 39 x 18 x 21 cm
Weight	approx. 19 kg
For generators	AVI-LV3, AVI-LV5-CB

CN-GI-CI-V



Standards	MIL-STD-461G CS117, DO-160G S22, other
Application	injection probe for WF4, WF5A (voltage) in cable induction mode
Test level WF4 (CI)	max. 600 V with AVI-LV3
EUT supply	max. 130 A @ 50-60 Hz with AVI-LV3
	max. 20 A @ 400 Hz with AVI-LV3
	max. 10 A @ 400 Hz with AVI-LV3
Aperture	6 x 12 cm
Dimensions	53 x 65 x 50 cm
Weight	190 kg
For generators	AVI-LV3, MIG0600MS, MIG0618SS
Included	connection cables

ACCESSORIES

SHUNT0E1

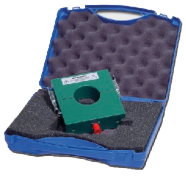
Application	calibration of WF2, WF3 short circuit current
Impedance	0.1 Ω ± 2 %
Output	100 mV/A
Maximum setting AVI-LV3	WF2: 1600 V, WF3: 1900 V
Weight	0.15 kg
Dimensions	12 x 2.5 x 2.5 cm
Requires	AVI-LV3, CN-BT8

V-PROBE-SI

Standards	DO-160G S22, MIL-STD-461G CS117, other
Type of probe	differential (can measure CM as well)
Input voltage	max. 7 kV DC + peak, max. 2.5 kV r.m.s.
Waveforms	all AVI-LV3 waveforms and voltage test levels
Bandwidth	DC – 70 MHz (-3 dB)
Accuracy	± 2 %
Input impedance	10 MΩ || 10 pF
Attenuation ratio	1:100 or 1:1000
Power supply	4 x AA batteries and/or mains adapter
Weight	1.5 kg (packed)
Dimensions	29 x 34 x 8 cm (packed)
For generator	AVI-LV3
Included	carrying case, mains adapter, AA batteries

I-PROBE-MB-P1

Standards	DO-160G S22, MIL-STD-461G CS117, other
Application	measurement of SC current / clamp on probe
Output impedance	50 Ω (BNC connector)
Input current	max. 100 A r.m.s., max. 5 kA impulse
Waveforms	all AVI-LV3 current waveforms
Bandwidth (-3 dB)	5 Hz – 15 MHz
Sensitivity	0.1 V/A into 1 MΩ
Accuracy	+ 1 / - 0 %
Current time product	0.5 As
I/f	3.5 A/Hz
Usable rise time	25 ns
DSO input selection	1 MΩ AC
Weight	1.68 kg
Dimensions	12 x 13 x 4 cm (inner diameter 5 cm)
For generators	AVI-LV3, MIG-OS-MB, other
Included	carrying case



LISN-5U-32

Standard(s)	DO-160G S22, MIL-STD-461G CS117, ED-14G S22
Application	Line Impedance Stabilization Network (5 µH)
Inductance	5 µH per line (for both AC and DC lines)
Capacitance	10 µF/line included, 2 x (≥28 mF) included
	LISN is calibrated with capacitors connected
Number of lines	4 AC lines (L1 L2, L3, N), 2 DC lines (+ / -)
AC voltage max.	L-L: 420 V @50/60 Hz, L-PE: 240 V @50/60 Hz
	L-L: 420 V @ 800 Hz, L-PE: 240 V @ 800 Hz
AC current max.	32 A
DC voltage max.	50 V
DC current max.	32 A
Weight	tbd
Dimensions	57 x 45 x 19 cm
For generator(s)	AVI-LV3, AVI-LV5-CB, other

LISN-50U-32

Standard(s)	MIL-STD-461G CS117
Application	Line Impedance Stabilization Network (50 µH)
Inductance	50 µH per line (for both AC and DC lines)
Capacitance	10 µF/line included, 2 x (≥28 mF) included
	LISN is calibrated with capacitors connected
Number of lines	4 AC lines (L1 L2, L3, N), 2 DC lines (+ / -)
AC voltage max.	L-L: 420 V @50/60 Hz, L-PE: 240 V @50/60 Hz
	L-L: 210 V @ 400 Hz, L-PE: 120 V @ 400 Hz
AC current max.	32 A
DC voltage max.	50 V
DC current max.	32 A
Weight	tbd
Dimensions	57 x 45 x 19 cm
For generator(s)	AVI-LV3, AVI-LV5-CB, other

EXT-LISN-DC-270

Standard(s)	DO-160G S22, MIL-STD-461G CS117, ED-14G S22
Application	extends LISN-50U-32 capability up to 270 V DC
Capacitance	2 lines, ≥ 28 mF each
Weight	tbd
Dimensions	52 x 13.3 x 18 cm
Special characteristics	built-in safety features

WARNING-LAMP

Cable length	5 m
Dimensions	diameter 7x cm x 25 cm
Weight	0.5 kg

EMERGENCY-STOP

Cable length	5 m
Dimensions	8 cm x 8 cm x 10cm
Weight	0.3 kg

SOFTWARE

TEMA3000-AVI

Suitable for generator	AVI-LV3
Type of license	modular:
	TEMA3000 basic license (remote control)
	TEMA3000 REPORT (automatic test report)
	TEMA3000 DSO (DSO control, supports most
	current oscilloscopes on Ethernet)
	TEMA3000 LIBRARY (pre-programmed
	test levels according to standards)
Operating system required	Windows, latest
Communication port	ethernet
Updates	lifetime updates at no additional cost
Latest version	available on EMC PARTNER website

ETHERNET-OPT-LINK

Application	galvanic isolation between computer
	AVI-LV3 and AVI-LV5 generators
Type	optical fibre kit with Ethernet converters
Length	10 meters
For generators	AVI-LV3, AVI-LV5-PIN, AVI-LV5-CB
	(one piece per generator)

Tradition meets Technology

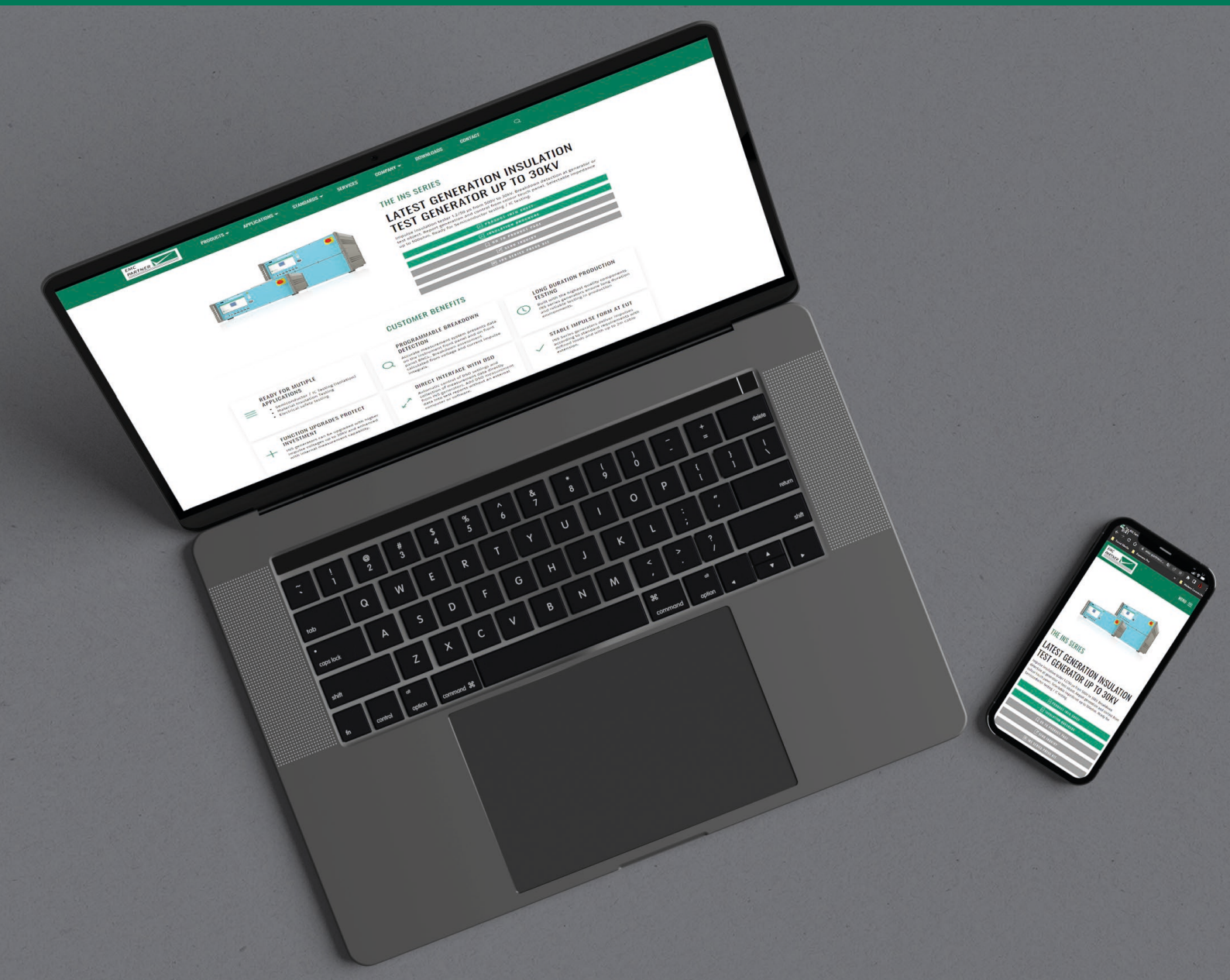
Over 25 years devoted to combining latest technologies into the best products.

100% Swiss made products

Specific EMC test requirements ?

Search & find your required test equipment by application, standard or test type

www.emc-partner.com



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

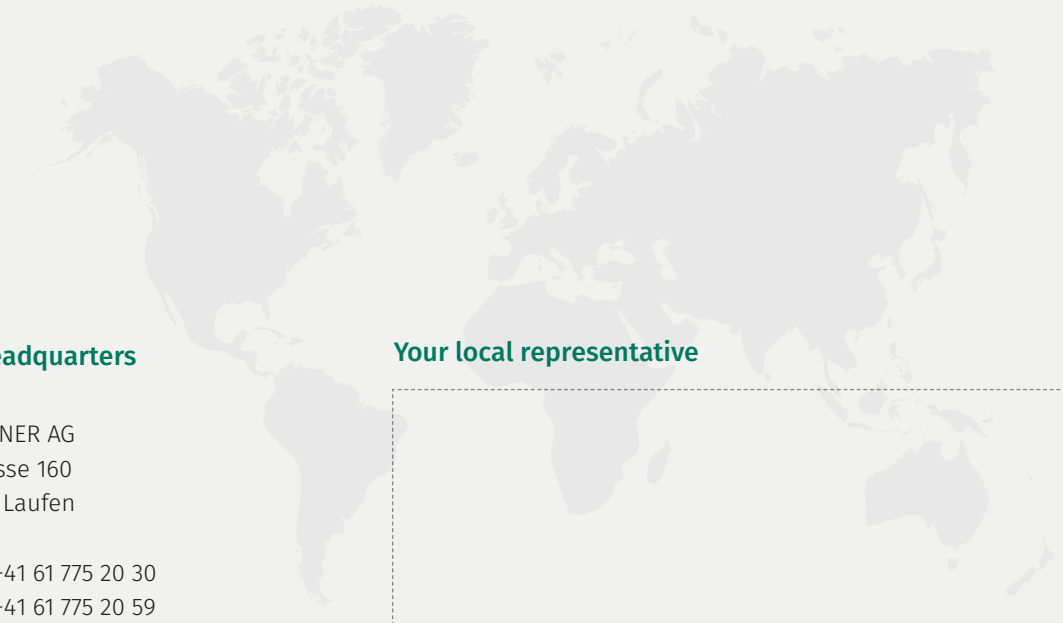
High current CDNs combined with transient test equipment fulfil requirements to test renewable and classical energy distribution network and monitoring equipment.

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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