

Technical Specification

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1 Tester Type ESD3000-System

ESD3000 is a unique hand held ESD discharge tester from EMC Partner. The ESD3000 simulates different discharges such as contact and air discharges in accordance with IEC 61000-4-2 and several other standards. When discharge modules or relay module with discharge networks are added the ESD3000 can be expanded to comply with test standards up to 30 kV.

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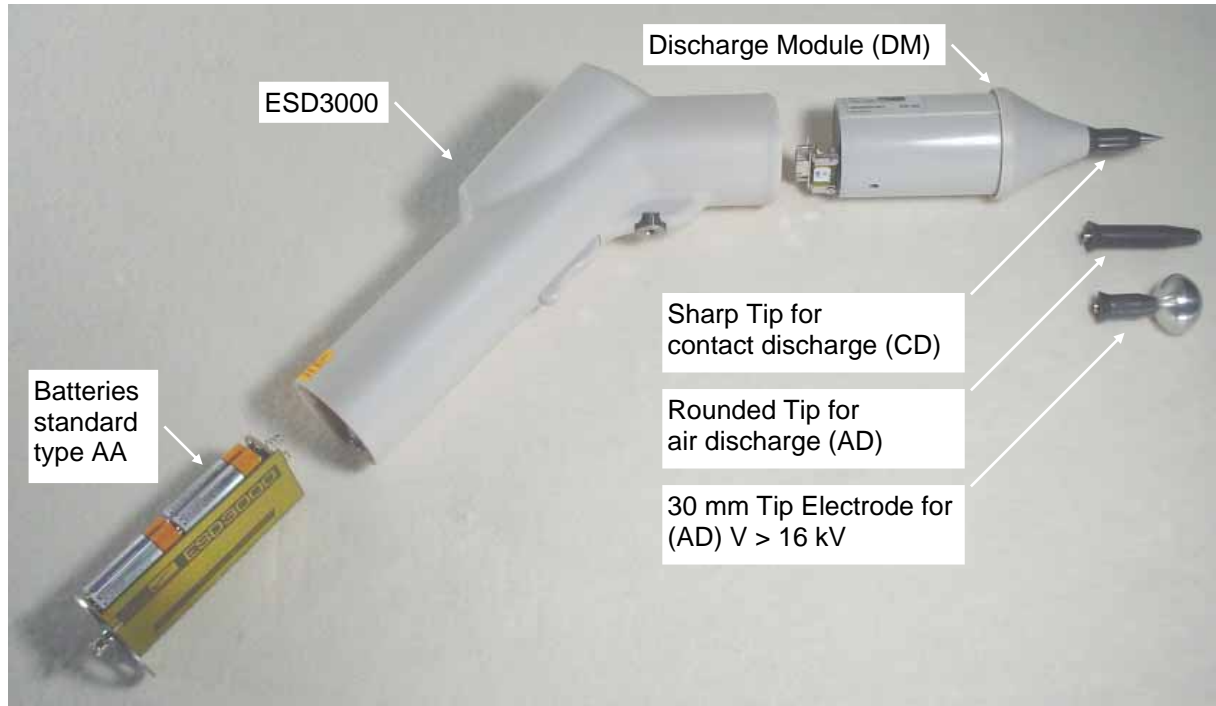
Introduction

The ESD3000 can be operated as stand alone or together with the TEMA software
The ESD3000 generator is compact and has an excellent value for money.

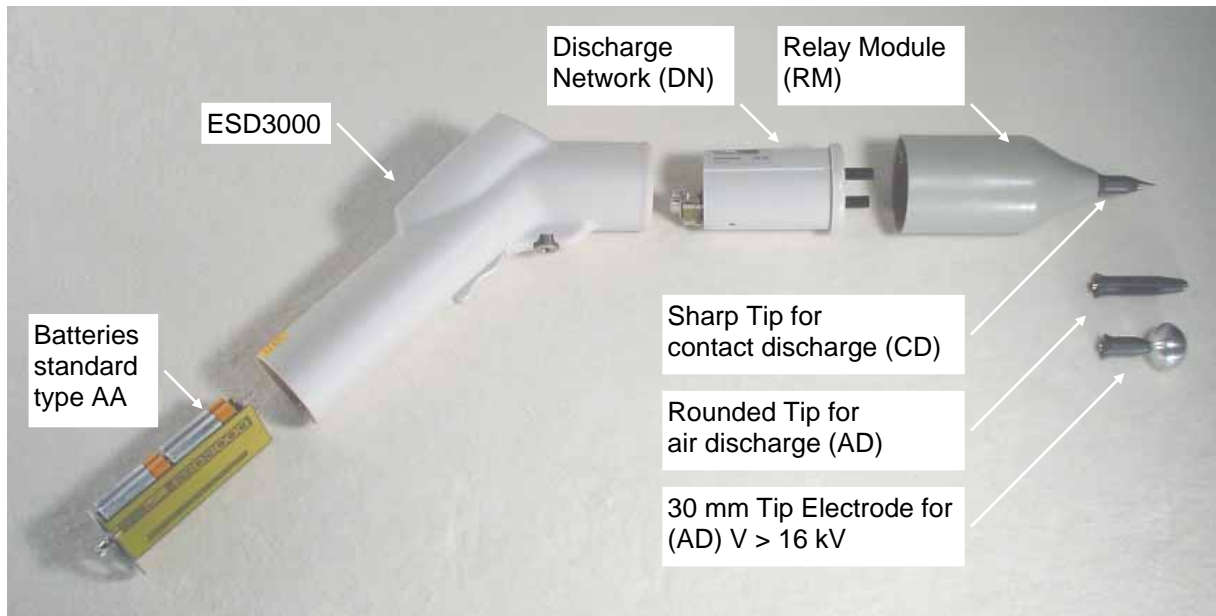
- All relevant parameters in one display
- Easy parameter changes during operation
- Voltage generation up to 30 kV positive and negative
- Commercially available standard rechargeable or non-rechargeable batteries can be used
- Low weight only 870 grams
- Ergonomic form of the ESD3000
- Modules can be easily interchanged

2 General ESD3000 System of EMC-PARTNER

2.1 Overview of ESD3000 system



2.1.1 ESD3000 Contact Discharge (CD) up to max. 10kV with Discharge Module (DM)



2.1.2 ESD3000 Contact Discharge (CD) up to 30 kV) with Relay Module (RM), Discharge Network (DN)

2.2 ESD3000 with Discharge Modules (DM). Voltages: Contact Discharge (CD) up to 10 kV and Air Discharge (AD) up to 30 kV

- ESD3000 includes a rechargeable battery pack and a charger. The battery capacity is designed to operate at highest level and 1 Hz repetition for one full work day (8 hours).
- For long term ESD test evaluation the ESD3000 can be mounted on a tripod (standard M5 thread).
- Discharge modules must be selected from the list below. For contact discharge a sharp tip and for air discharge a rounded tip is included.

2.2.1 Accessories Discharge Modules (DM)

The modules contain the high voltage source and the impulse network, therefore the discharge modules are optimized for specific applications. The modules can be easily interchanged. Discharge Modules (DMs) are delivered with a waveform calibration according to the relevant standard. DM modules can be ordered at any time to enhance ESD3000 test capability.

2.2.2 Overview Discharge Module (DM) - Standards - C, R, Voltage ranges

DM-Modules	Standards	Cap /Res.	Voltage range (CD) Contact Discharge	Voltage range (AD) Air Discharge
DM1	IEC 61000-4-2	150 pF / 330 Ohm	+/- 0.2 up to 10 kV	+/- 0.2 up to 16 kV
DM2	ISO TR10605	330 pF / 2000 Ohm	+/- 0.2 up to 10 kV	+/- 0.2 up to 16 kV
DM4	MIL-STD-464 MIL-STD-883 GR78-CORE	100 pF / 1500 Ohm	+/- 0.2 up to 10 kV	+/- 0.2 up to 16 kV
DM5	RTCA/DO-160	150 pF / 330 Ohm	no CD	+ and -1 up to 30 kV
DM6	IEC 61340-3-1 JEDEC 22-A114 MIL-STD-750D	100 pF / 1500 Ohm	+/- 0.2 up to 8 kV	no AD
DM7	IEC 61340-3-2 JEDEC 22-A115	200 pF / 0 Ohm	+/- 0.08 up to 2.5 kV	no AD
DM8	IEC 60571 EN50155	rise time < 0.05us duration 0.1us	+/- 0.2 up to 10 kV	+/- 0.2 up to 16 kV

2.2.3 Discharge Modules DM – for special applications

DM-Modules	Standards	Cap / Res.	Voltage range CD	Voltage range AD
DM16-C63-HAND	ANSI C63.16	330pF / 150 Ohm	no CD	+/- 0.2 up to 16 kV
DM16-C63-HAND	ANSI C63.16	330pF / 150 Ohm	+/- 0.2 up to 8 kV	No AD

2.3 ESD3000 with Relay Module (RM), Contact Discharge (CD) up to 30 kV and Air Discharge (AD) up to 30 kV

- For 30 kV applications the discharge circuit is divided into two parts the relay module and the discharge networks. The relay module (RM32) includes the discharge and polarity switches. The relay module generates the first current peak. Discharge networks (DN) generate the second part of the wave mainly determined by the values of R and C and the charging voltage.
- Discharge networks include the impulse capacitor, discharge resistor and the high voltage generation circuit.
- Discharge networks must be selected from the list below.
- The relay module includes a sharp tip for contact discharge, a rounded tip for air discharge and a special large electrode tip for high level discharges.

2.3.1 Accessories Discharge Networks DN

The Discharge Network contains a high voltage source and impulse network, specifically to meet applicable standards. The networks are easily interchanged. RM32 and DN networks include waveform calibrations according to the listed standard. Discharge Networks (DNs) are delivered with a waveform calibration according to the relevant standard. DN networks can be ordered at any time to enhance ESD3000 test capability.

2.3.2 RM32 - DN - Standards - C, R, Voltage ranges

RM32-Module	Rise time first current peak	Cap /Res.	Voltage range CD	Voltage range AD
RM32	0.7 up to 1 ns	Included in DN	+/- 1 up to 30 kV	+/- 1 up to 30 kV

Available networks that can be used together with the RM32 relay module are listed below. When a rise time faster than the standard 0.7 to 1 ns is required, fitting the external magnet to the RM32 will enable impulse generation with a rise time of approximately 500ps.

DN-Module	Standard	Cap /Res.	Voltage range CD	Voltage range AD
DN1	IEC 61000-4-2 RTCA/DO-160 GMW 3100	150pF / 330 Ohm	+/- 1 up to 30 kV	+/- 1 up to 30 kV
DN2	ISO TR10605 SAEJSSI-IS FORD AB/AC GMW3100	330pF / 2000 Ohm	+/- 1 up to 30 kV	+/- 1 up to 30 kV
DN3	ISO TR10605 SAEJSSI-IS FORD AB/AC	150pF / 2000 Ohm	+/- 1 up to 30 kV	+/- 1 up to 30 kV
DN4	MIL-STD-331B STANAG 4239 ISO14304	500pF / 5000 Ohm	+/- 1 up to 30 kV	+/- 1 up to 30 kV
DN5	MIL-STD-331 MIL-DTL-23659D STANAG 4239	500pF / 500 Ohm	+/- 2 up to 30 kV	+/- 2 up to 30 kV
DN6	ISO TR10605	330pF / 330 Ohm	+/- 2 up to 30 kV	+/- 2 up to 30 kV

2.3.3 Discharge Network DN - for Special Applications

DN-Module	Standards	Cap / Res. Range	Voltage range CD	Voltage range AD
CAR1	JASO D 001-94	150pF / 500 Ohm	+/- 2 up to 30 kV	+/- 2 up to 30 kV
CAR5 ^{NOTE 1}	Renault 32-10-001/D	330pF / 0 Ohm	+/- 2 up to 30 kV	+/- 2 up to 30 kV
IND1	ABD0100.1.2	150pF / 150 Ohm	+/- 2 up to 30 kV	+/- 2 up to 30 kV
MIL2	?	400pF / 150 Ohm	+/- 2 up to 30 kV	+/- 2 up to 30 kV
MIL3	MIL-STD-1576	500pF / 0 Ohm	+/- 2 up to 30 kV	+/- 2 up to 30 kV



Note 1: **ESD3000DN32-CAR5** is an integrated network that includes discharge network and relay module in one unit. The relay module is specific for this application and cannot be used with other DNs

3 Generator, Technical Data

3.1 Mechanical dimensions, climatic conditions

Type	Dimension L x D x H [mm]	Weight [g]	Remarks
ESD3000 with DM	340 x 70 x 190 mm	870	with batteries 1050 g
DM alone	340 x 70 x 190 mm	355	
RM alone	138 x diameter 68	350	
DN alone	131 x diameter 57 mm	270	
Case	450 x 350 x 120 mm	3000	

Power adapter	95 up to 250 V (50 /60 Hz)
Power consumption	operation mode < 20 VA Standby < 0 VA

Environment conditions		
Temperature range	°C	0 to 40 °C
Humidity	rh %	30 to 60%
Pressure	kPa	86 to 106



Accessories included with ESD3000:

- Power adapter with national power lead
- Earth connection cable (length 2 m)
- One set of rechargeable batteries (NIMH)
- User manual (1 pce)
- EMCP E3Loader software
- RS232 cable for software uploads
- Verification Report

3.2 Technical data

3.2.1 ESD high voltage circuit - Example ESD3000DM1

Energy storage capacitance	150 pF	± 10%
Discharge resistance	330 Ω	± 10%
Charging resistance	> 50 MΩ	
holding time (drop to 95%)	better than 5 s	
Current rise time, 2 Ω load	0,7 to 1 ns	
Definition of current waveform:		
Current amplitude at 30 ns	2 A / kV	± 30%
Current amplitude at 60 ns	1 A / kV	± 30%
Voltage range „air discharge“	0.5 to 16 kV	± 10%
Voltage range „contact discharge“	0.5 to 10 kV	± 10%
First current amplitude into 2 Ω „contact discharge“	3.75 A / kV	± 10%

ESD3000 with DM



ESD3000 with RM+DN



3.2.2 ESD control circuit

Polarity	positive / negative; automatic switchover
Number of discharges Detection of the number of discharges	-preselectable 1 up to 30000 -count every pulse or count discharge only. Only the impulses whereas the voltage of the discharge capacitor drops lower than 10% of the charging voltage are counted.
Ramps	voltage amplitude or polarity change after a predefined number of discharges
Reporting	test sequence with the number of discharges -Voltage amplitude -Polarity
Discharge modes:	-Air discharge (AD) -Contact discharge (CD)
Repetition of the discharges	0.055 up to 99 s or single discharge



Note: The repetition rates are applicable to IEC61000-4-2 only. For all other modules or applications consult the relevant DM (Discharge Module) or DN (Discharge Network) specific Instruction sheets.



For all other module specifications or applications consult the relevant DM (Discharge Module) or DN (Discharge Network) specific Instruction sheets. These will be provided upon request.

4 ESD3000 Accessories

ESD-STAND Ed2:



Height adjustable from 0.4 m up to 1.75 m
Application:
long term tests in contact and air discharge mode

ESD-VERI-V:



20 G divider for high voltage measurement on the ESD3000 up to 25 kV.
Ratio is determined by 1 M Ohm input of the oscilloscope.
Ration approximate 20'000

ESD-TARGET2:



2 Ohm target with SMA connector, upper limit approximately 4 GHz.
Option DN extends the target use up to 30kV.

ESD-VCP50:



Vertical coupling plate.
Mechanical dimension: 0.5 x 0.5 m
Application indirect ESD discharge with contact tip.

ESD3000DM-EXT



Testing of EUTs that could spontaneously explode or rapidly change state, such as airbags or munitions fuses

ESD3000 CNH12



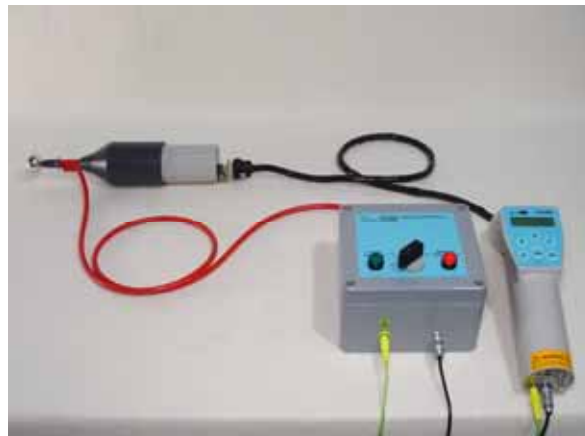
Accessory to ESD3000 with RM32 and DN1 to simulate rapidly changing H-field as generated at real ESD discharge.

TC-MIG24ED



Test cabinet to protect operators when testing explosive devices such as air bag initiators or munition fuses.

ESD3000 SAFETY-S



Accessory to ESD3000 with RM32 to make sure the generator is discharged fully before connecting explosive devices.

ESD3000-OPTOLINK



For remote control of ESD3000, the ESD-OPTOLINK and one of the following software packages is needed:

-E3LOADER: Firmware can be updated using the serial interface.

-TEMA Software: Comfortable control of ESD3000 from a PC.

4.1.1 ESD3000 Remote control Software

The ESD3000 is controlled via the „E3Loader“ software for basic control functions or can be fully integrated into a test suite using „TEMA“ software.



E3Loader software provided with each ESD3000

TEMA software for full EMC test integration

