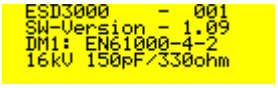
EMC - PARTNER

User Manual ESD3000



Title:	EMC Test System ESD3000
Date:	22.03.2002
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Revised:	**10.May 2016**

EMC TESTER

Electrostatic Discharge ESD3000

ATTENTION

This user manual provides information necessary for operation of the test equipment.

Throughout the users manual, standard references are used as an aid to understanding only.

The relevant standard(s) **must** be obtained and used in conjunction with this users manual

Declaration of Conformity

See sheets attached at the end of this user manual:

- **Declaration of conformity to product standards**
- **Declaration of conformity to low voltage directive**
- **Declaration of conformity to EMC directive**

Contents:

1 Description

1.1.1 Electrostatic discharge ESD

*E*lectro *S*tatic *D*ischarge

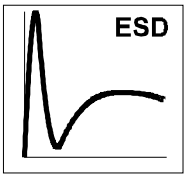
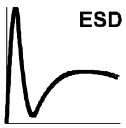
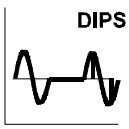


Figure: 1.0.2

What causes electrostatic discharges?
A person becomes electrostatically charged by walking over an insulating floor surface. The capacity of the body can be charged to several kilovolts (1000 V). This capacity is discharged when contact is made with an electronic unit or system. The discharge is visible as a spark in many cases and can be felt by person concerned, who gets a „shock". The discharges are harmless to humans, but not to sensitive, modern electronic equipment. The resulting current causes interference in the units or makes entire systems „crash".
For over 25 years it has been known to the electrical industry that electrostatic discharges as encountered every day can have a disastrous effect on electronic equipment.
The cost of damage caused by ESD is difficult to assess, but amounts to billions of dollars world-wide.

The areas most affected are:
- manufacturing of integrated circuits (chips).
- the chemical industry, e.g. by explosion, fires caused by the sparks from electrostatic discharges.
- malfunctioning of process control with the secondary damage costs. characteristics

1.1.2 How ESD, EFT, SURGE, DIPS differ

Characteristics	**Static discharges**	**Switched inductance**	**Lightning. switching actions**	**Mains Interruptions**
Phenomenon	**"ESD"**	**"EFT Burst"**	**"Surge"**	**"DIPS"**
Voltage U	up to 15 kV	up to 4 kV	up to 4 kV	supply source voltage
Energy at maximum voltage	approx. 10 mJ	300 mJ	300 J	-
Repetition rate	Single event	Multiple event 5 kHz	Maximum 6 Impulse / minutes	supply source frequency
Application to the different ports	Touchable metallic part (enclosure ports)	AC/DC ports, Signal and data lines	AC/DC ports, Signal and data lines	AC/DC ports
upper limit frequency	approx.. 1 GHz	approx. 200 MHz	approx. 350 kHz	approx. 100 kHz
impulse waveform	 IEC 61000-4-2	 IEC 61000-4-4	 IEC 61000-4-5	 IEC 61000-4-11

The overview of „How ESD,EFT, SURGE, DIPS differ" shows that all four test have to be carried out because the frequency content and energy of the four transient tests are different.

1.2 Technical data of the ESD3000 and DM Discharge Modules

1.2.1 ESD3000 equipment

Supply	batteries NIMH standard UM-3/AA size	
	charging time (empty to full)	ca. 5 hours
Polarity	positive, negative; alternate	
Number of discharges Detection of the number of discharges	-preselectable -count „all“, -count „discharge“. Only the impulses whereas the voltage of the discharge capacitor tropes lower then 10% of the charging voltage are counted.	1 to 29’999
Ramps	voltage amplitude changes from shot to shot,	
Reporting	test sequence with the number of discharges, voltage amplitude, polarity	Only possible with control form PC
Discharge modes:	see list below	
Repetition of the discharges	0.05 up to 30 s or single discharge „Man“	

Note: The repetition rates are applicable to IEC 61000-4-2 only. For all other modules or applications consult the relevant DM (Discharge Modules) or DN (Discharge Network) specific Instruction sheets.

1.2.2 Discharge Module ESD3000DM1 (IEC 61000-4-2 and EN61000-4-2)

Energy storage capacitance	150 pF	± 10%
Discharge resistance	330 Ω	± 10%
Charging resistance	54 MΩ	
Holding time (drop to 95%)	better than 5 s	
Current rise time, 2 Ω load	0,7 to 1 ns	
First current amplitude into 2 Ω „contact discharge“	7,5 to 30 A	± 10%
Current amplitude at 30 ns	4 to 16 A	± 30%
Current amplitude at 60 ns	2 to 8 A	± 30%
Voltage range „air discharge“	0.2 to 16 kV	± 10%
Voltage range „contact discharge“	0.2 to 10 kV	± 10%

1.2.3 Discharge Module ESD3000DM2 (ISO TR10605 - inside vehicle, module tests)

Energy storage capacitance	330 pF	± 10%
Discharge resistance	2000 Ω	± 10%
Holding time (drop to 95%)	better than 5 s	
Current rise time, 2 Ω load	0,7 to 1 ns	
First current amplitude into 2 Ω „contact discharge“	7,5 to 30 A	± 10%
RC time constant	600 ±130ns	
Voltage range „air discharge“	0.2 to 16 kV	± 10%
Voltage range „contact discharge“	0.2 to 10 kV	± 10%

1.2.4 Discharge Module ESD3000DM4 (MIL-STD-883E, MIL-STD-464, GR78-CORE)

Energy storage capacitance	100 pF	± 10%
Discharge resistance	1500 Ω	± 10%
Holding time (drop to 95%)	better than 5 s	
Current rise time, 2 Ω load	<10 ns at - 4 kV	
Peak current	3.33 A at 5 kV	
Voltage range „air discharge“	0.2 to 16 kV	± 10%
Voltage range „contact discharge“	0.2 to 10 kV	± 10%

1.2.5 Discharge Module ESD3000DM5 (RTCA/DO 160)

Energy storage capacitance	150 pF	± 10%
Discharge resistance	330 Ω	± 10%
Holding time (drop to 95%)	better than 5 s	
Current rise time, 2 Ω load	<5 ns at 15 kV	
RC time constant	50 ns	
Voltage setting accuracy	± 10% for voltages greater than 5 kV and ± 500 V for voltages lower than 5 kV	
Voltage range „contact discharge“	1 to 30 kV	± 10%

1.2.6 Discharge Module ESD3000DM6 (IEC 61340-3-1, JEDEC 22-A114, MIL-STD-750D9)

Energy storage capacitance	100 pF	± 10%
Discharge resistance	1500 Ω	± 10%
Discharge mode	only contact discharge	
Current rise time, 50 Ω load	2 to 10 ns	
RC time constant	150 ns	
Voltage range	200 V up to 10000 V	
Voltage rise time, 500 Ω load	5 to 25 ns	
Voltage verification V charging1000V	375 up to 550 V	
Voltage range	200 V up to 8000 V	

1.2.7 Discharge Module ESD3000DM7 (IEC 61340-3-2, JEDEC 22-A115)

Energy storage capacitance	200 pF	± 10%
Discharge resistance	500 Ω	± 10%
Discharge mode	only contact discharge	
Current waveform, short circuit <1 Ω	First peak to second peak	67% to 97%
	oscillation period	63 ns up to 91 ns
Voltage verification V charging 400V	first peak	<1.31 A
Voltage verification V charging 400V	amplitude at 100 ns	0.29 A -15%
Voltage range	80 V up to 2500 V	

1.2.8 Discharge Module ESD3000DM8 (IEC 60571, EN 50155)

Waveform B	Risetime 10/90%	< 0.05 µs
	Half value time 50 % to 50%	0.1 µs ± 20%
Voltage amplitude	> 8400 V	
Series Resistor (Rs)	100Ω	± 10%
Dimension / Weight	l = 120, diameter = 60 mm	0.5 kg
Pulse Repetition	Maximum 1 Hz	
Required equipment	ESD3000 + DM8	
Voltage amplitude CD	200V up to 10'000V CD = Contact Discharge	

Further Information to additional discharge modules DM or discharge networks DN can be found in the relevant instruction sheets. or in the ESD3000 brochure.

1.3 Technical data of the ESD3000RM and DN Discharge Networks

For all DN network the ESD3000RM relay module is necessary.

Discharge network ESD3000DN1 (IEC 61000-4-2 and EN61000-4-2)

Energy storage capacitance	150 pF	± 10%
Discharge resistance	330 Ω	± 10%
Charging resistance	54 MΩ	
Holding time (drop to 95%)	better than 5 s	
Current rise time, 2 Ω load	0,7 to 1 ns	
First current amplitude into 2 Ω „contact discharge“	7,5 to 30 A	± 10%
Current amplitude at 30 ns	4 to 16 A	± 30%
Current amplitude at 60 ns	2 to 8 A	± 30%
Voltage range „air discharge“	1 to 30 kV	± 10%
Voltage range „contact discharge“	1 to 30 kV	± 10%

1.3.1 Discharge Network ESD3000DN2 (ISO TR10605 - inside vehicle, module tests)

Energy storage capacitance	330 pF	± 10%
Discharge resistance	2000 Ω	± 10%
Holding time (drop to 95%)	better than 5 s	
Current rise time, 2 Ω load	0,7 to 1 ns	
First current amplitude into 2 Ω „contact discharge“	7,5 to 30 A	± 10%
RC time constant	600 ±130ns	
Voltage range „air discharge“	1 to 30 kV	± 10%
Voltage range „contact discharge“	1 to 30 kV	± 10%

1.3.2 Discharge network ESD3000DN3 (ISO TR10605 -outside vehicle, sensitive classification)

Energy storage capacitance	150 pF	± 10%
Discharge resistance	2000 Ω	± 10%
Holding time (drop to 95%)	better than 5 s	
Current rise time, 2 Ω load	5 ns at + 15 kV	
RC time constant	300 ±60ns	
Voltage range „air discharge“	1 to 30 kV	± 10%
Voltage range „contact discharge“	1 to 30 kV	± 10%

1.3.3 Discharge Module ESD3000DN4 (MIL-STD-883E, MIL-STD-464, GR78-CORE)

Technical data

Voltage	contact	up to 30 kV
Capacitance DN4	500 pF	
Serial resistor DN4	5000 Ohm	
Weight incl. accessories		0.8 kg
Standard	MIL-STD	1512
Standard	VG	95378
Usable with testers	ESD3000, ESD3000RM32	

1.3.4 Discharge Module ESD3000DN5 (MIL-DLT-23659D, STANAG 4239, MIL-STD 331)

Technical data

Voltage	contact	up to 30 kV
Capacitance	500 pF	
Serial resistor	500 Ohm	
Weight incl. accessories		0.8 kg
Standard	customised	
Usable with testers	ESD3000, ESD3000RM32	

1.3.5 Discharge Module ESD3000DN6 (MIL-DLT-23659D, STANAG 4239, MIL-STD 331)

Technical data

Energy storage capacitance	330 pF	± 10%
Discharge resistance	330 Ω	± 10%
Charging resistance	54 MΩ	
Holding time (drop to 95%)	better than 5 s	
Current rise time, 2 Ω load	0,7 to 1 ns	
Voltage range „contact discharge“	1 to 30 kV	± 10%
First current amplitude into 2 Ω „air discharge“	< 5ns	
RC time constant	300 ns	± 60ns
Voltage range „air discharge“	1 to 30 kV	± 10%

Further Information to additional discharge modules DM or discharge networks DN can be found in the relevant instruction sheets. or in the ESD3000 brochure.

1.4 Mechanical dimensions

Tester -Type	Dimensions [mm]	Weight [kg]	Versions
	width x depth x height		
ESD3000	350 x 70 x 200	0.7	19" 4 UH
Discharge Module DM	550 x 600 x 190	0.35	19" 4 UH

The weight slightly differ a little bit from module to module

1.5 Power Consumption

The power supply of the ESD3000 is 42 V d.c.

AD / DC adapter inputs	100 up to 240 V (50/60 Hz) 300 mA	± 10 %
Output of AC/DC Adapter	24 V 500 mA	

1.6 Accessories, dimensions

1.6.1 Included articles, dimensions

ESD3000 (Article No. 103605)

Mechanical Dimensions

Unit Height:	
Length:	46 cm
Width:	41 cm
Height:	17 cm
Net Weight:	0.7 kg

Included Articles

According to STL-Variante 20, STL-Version 1

Qty	*PN*	*Description*
1	103194	CD-UM-IN-ALL includes all User Manuals and Instruction sheets of all EMC PARTNER AG sales products.
1	104802	Standard calibration report
1	103191	Standard accessories pack
1	104836	Broschure ESD Test System
1	104817	Power Cord 2 pole

1.6.2 Standard accessories

Accessories to ESD3000 (Article No. 103605)
According to OP-Variante 1, OP-Version 1

Qty	PN	Description	Weight (kg)	Length (cm)	Width (cm)	Height (cm)
1	103104	Cable 9 pole f / LEMO plug 4pin	0	100	0	0
1	104065	MC Crocodile Clip yellow	0.02	0	0	0
10	104067	AA-Batteries 1.2V	0	0	0	0
1	104402	Battery Charger with LEMO plug 4pin to ESD3000	0	0	0	0
1	104404	Flat earth cable 20mm with 2 banana plugs 4mm to ESD3000, EXT-TRA3000 E	0.1	200	0	0

2 Safety

The ESD3000belongs to Safety class 1

2.1 Safety standard

The ESD3000 fulfils the requirements of the safety standards IEC 61010 for laboratory measurements equipment „Safety requirements for electrical measuring, control and laboratory equipment“. Based on EN 61010 (IEC61010) the declaration of conformity to low voltage directive (LVD 73/23/EEC O.J.N° L77, 1973-03-26) is given.

This manual is a integral part of the ESD3000 tester. The instructions contained in the manual regarding operation and the test set up are to be strictly observed

2.2 Climatic Conditions

The ESD3000 contains high voltage circuits in integrated form. EMC PARTNER only guarantees a correct functioning of the tester ESD3000 and the associated accessories, if the ESD3000 is operated in the climatic condition specified.

Temperature	15 °C to 35 °C	Charging voltage up to 25 kV
Relative humidity	10 % to 60 %	Charging voltage up to 25 kV
Atmospheric pressure	86 kPa to 106 kPa (860 to 1060 mbar)	Charging voltage up to 25 kV
Atmospheric condition **Voltages > 25 kV**	20°C, RH 30%, pressure 101.3 kPa	
Contact discharge not influenced by:	direct solar radiation, rain or condense water, dust or larger electro magnetic fields as specified in the EMC compatibility chapter.	

The ESD3000 should be operated in a dry, clean room. If for any reason water condenses in the ESD3000, then no operation should be started before the tester is dry.

It is strictly forbidden to operate the ESD3000 in rooms with of gas explosion risk. The high voltage of the ESD3000 generate sparks, which can ignite the gas.

People with heart pacemakers should not be in the vicinity of the test set up during operation.

2.3 Precautionary measure during use

The ESD3000 generates high voltages. The energy content of the 30 kV modules is high and can be dangerous with improper use. It is wise to observe the following rules

• Never touch the EUT when a test is in operation.
• Touch no connectors of connection cable or tips when a EMC test is in operation.
• The high voltage of the ESD3000 and the power on the EUT must turned off before a manipulation on the EUT is carried out.
• For all tests the 2 m ground cable must be connected to ground.

2.4 Electromagnetic Compatibility

The outputs of the ESD3000 and the discharge to the EUT will emit disturbances. Please consider the national emission rules.
The Test System ESD3000 should not be operated near sensitive measuring and control systems.

The ESD3000 fulfils the following immunity requirements

• Electrostatic discharge	Level 4 (8 kV)	(IEC 61000-4-2)

2.5 The manual is an integral part of the equipment. Refer to the manual.

This manual is an integral part of the ESD3000. The safety rules and precautions in the manual must be observed. EMC PARTNER and their representatives are not responsible for damage to persons and equipment by not observance the safety rules and precautions in the manual.

2.6 No operation of ESD3000 without ground wire

The ESD3000 must be operated with a ground wire attached to the battery case

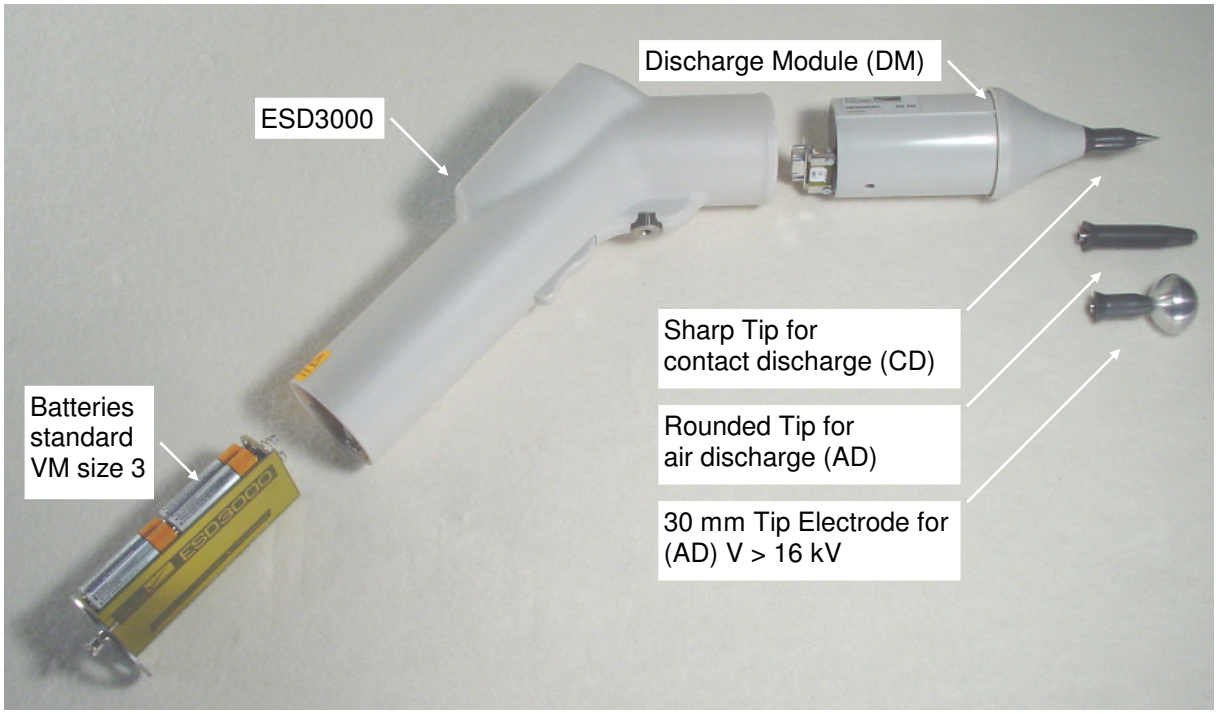
3 Mechanical structure

3.1 General

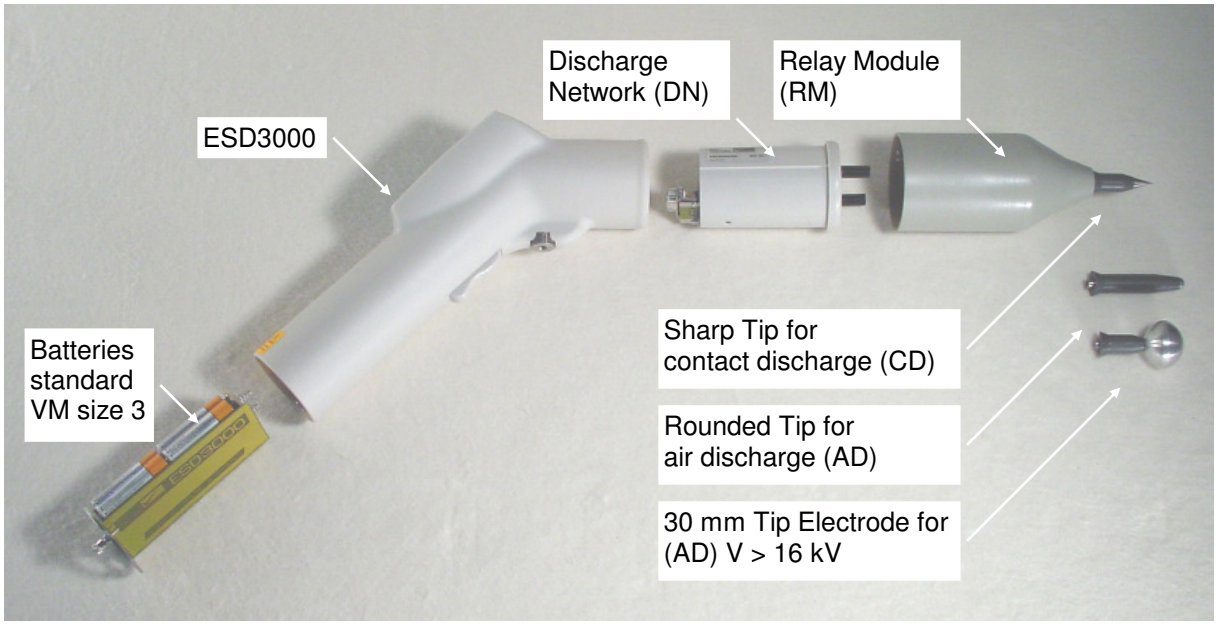
The battery operated ESD3000 is ideal for running tests in development/test laboratory environments and for outdoor service on larger systems.

3.2 Overview on ESD3000 system

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



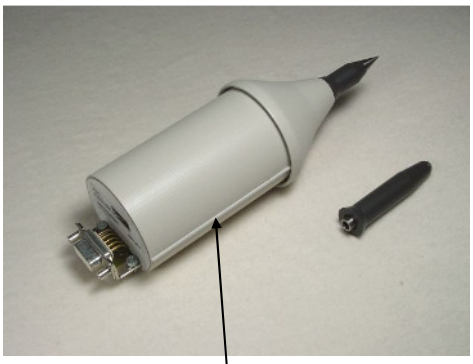
3.2.2 ESD3000 Contact Discharge (CD) up to max. 30kV with (RM and (DM)



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

The ESD test System consist of ESD3000, the discharge modules (DM) or relay module and networks. The batteries, the charger and control are part of ESD3000. The discharge modules or networks includes the high voltage generation and the wave-shaping network.

ESD3000 with one discharge module



Discharge Module

The screw on the bottom side of the ESD3000 must be unscrewed, before the DM can be pull out and changed with an other one. The modules can be inserted only in one position.

3.2.3 Avoiding Mechanical Damage to Discharge Modules

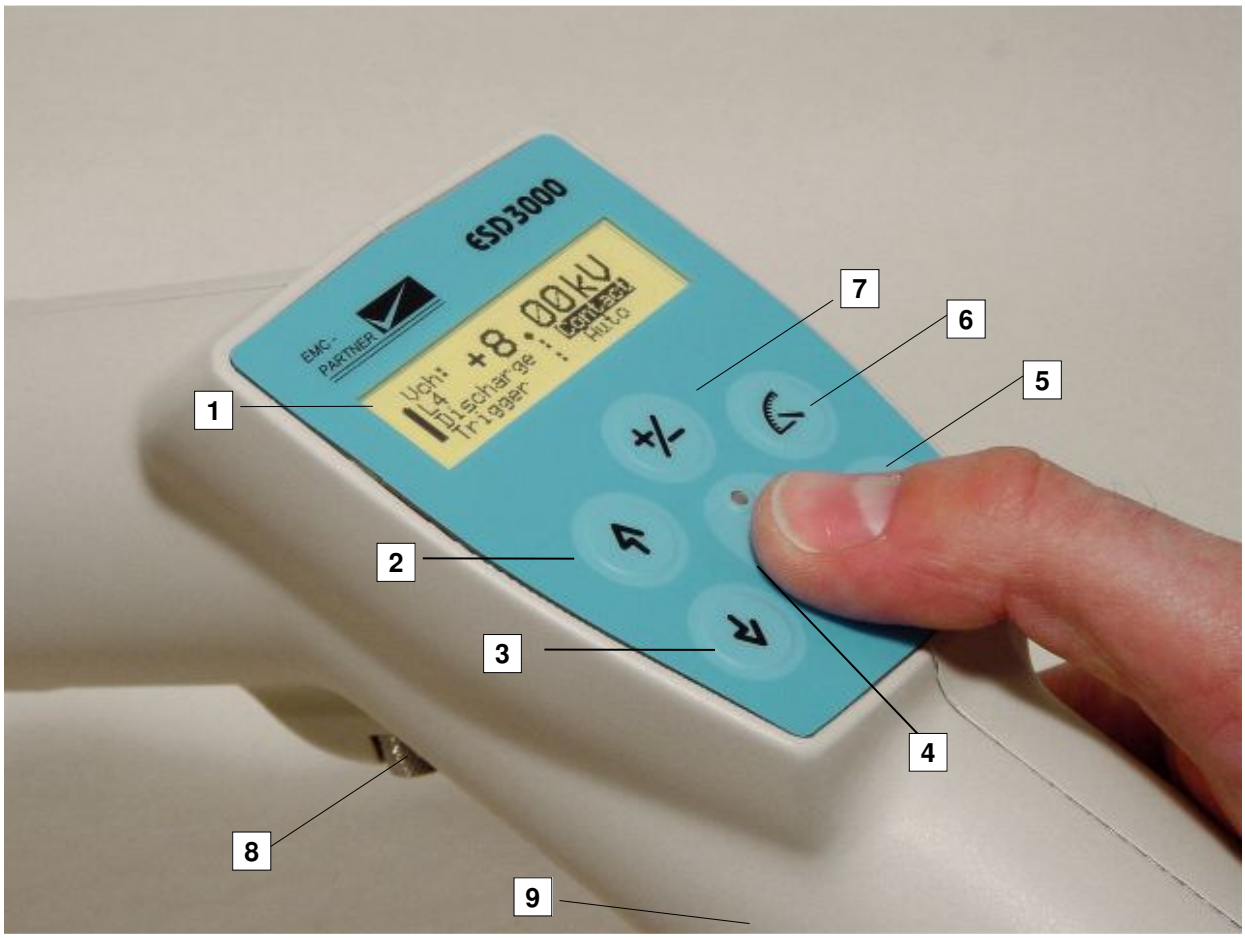
ESD3000 discharge modules contain components sensitive to mechanical shock. When modules suffer mechanical shock they can be damaged beyond repair.

When ESD3000 modules are not in use, place them in the transport case. Do not allow them to roll around on the test bench or fall onto the floor.

4 Control Panel

4.1 Front panel of the ESD3000

The operator should study the manual in detail. Only instructed personal is allowed to operate the ESD3000.



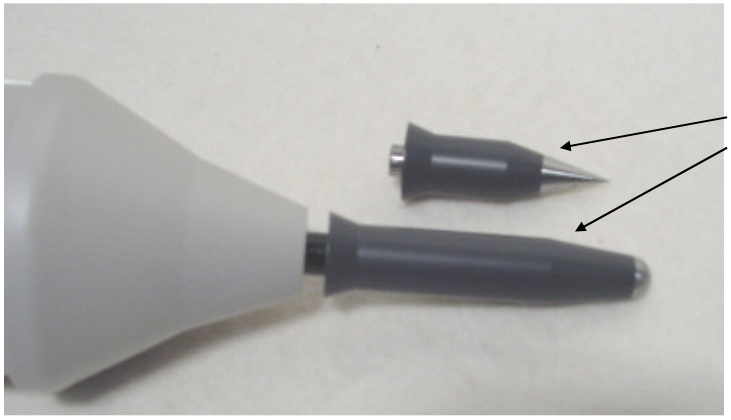
The most important elements of the front panel are:

1. **Display**
2. Voltage up or menu command line up
3. Voltage down or menu command line down
4. Run button: With the „Run“ button, a test can be started or interrupted. With the run button the unit is turned „ON“
5. **Enter**
6. Selection of the programmed test levels. The programmed test levels changes with discharge module interchange
7. **Polarity selection**
8. **Screw for looking the discharge modules.** The same screw can be used for fix the ESD3000 on a tripod stand.
9. **Trigger button:** When manual trigger is programmed and the tester is ready for manual trigger, this will be signalled by the LED. As soon as the signal occurs the pulse can be released.

4.2 Interchange of discharge modules

Loose the screw 8 and pull the discharge module out.

4.3 Interchange of the finger and tips



Pull out the finger and insert the tip

CD = sharp tip
AD = finger electrode

4.4 Inputs and Outputs

Ground connection 2 m

Screw holding the battery module

Input for charging the batteries, and RS232 input for remote control

The control of the ESD3000 is carried out by a microprocessor. The microprocessor controls the EMC tests, stores the inputs of the numeric input terminal, updates the display, checks whether the inputs of the operators are allowed values or not. The operator communicates with the ESD3000 via the input terminal and the display.

This plate is reserved for the CE mark. The CE -mark is needed for the free movement of the goods into and within European community.

Via this interface port, the ESD3000 can be also controlled by an external PC. To configure the interface, see Chapter 13 „Remote Control“.

5 Preparation for Operation

5.1 Attention, Refer to Manual

This manual is an integral part of the ESD3000. The safety rules and precautions in the manual must be observed. EMC PARTNER and their representatives accept no responsibility not responsible for damages to persons and equipment as a results of non-observation of the safety rules and precautions in this manual.

5.1.1 ESD test set up

Ports which must be tested:
Enclosure Ports include operational keys, displays, ground and earth points, metallic parts such as connector etc.

Coupling path:
Basically all types of coupling exists during static discharges. Practical experience shows that, for the most electronic equipment, the current is the dominant parameter.
In practice the current path of the discharge current plays a important role e.g. if secondary sparks or breakdown in the UET occur the test is no longer reproducible.
The frequencies contained in the ESD discharge current are higher than in the EFT spike impulse. As a consequences, reproducibility of the ESD test is more difficult than the reproducibility of the EFT test results. The ESD test is one of the most complex transient test.

Test set-up:
As shown by the example in the IEC document 61000-4-2 the same test set up can be used for all different discharge mode (contact-, air- and indirect-discharge). Under the table lays the reference ground plan and on the table is the horizontal coupling plane placed.

The test mode used depends on the test object.

The three different kinds of test object are:

Metallic equipment under test EUT	Combination such as metal case, insulated keyboard	Insulated EUT plastic, paint, varnish
with contact possibility	with discharge	voltage test with IEC finger and Vmax
	without contact possibility	without discharge (breakdown)
Discharge directly contacted with relay tip	Air discharge with IEC finger. Holding time 5 seconds.	Indirect test with coupling plane and relay
direct discharge	***air discharge***	***indirect discharge***

The ESD transient test is a single event test. The susceptibility of an EUT is strongly influenced by the clock frequency. With the clock frequency, the information will be transmitted in the EUT or to the auxiliary equipment within a system. The ESD pulse enters the EUT when no information is being transmitted, the EUT has a very good immunity to EMC test, whereas the equipment will fail in operation. The existing ESD testers on the market the discharge cannot be synchronised with the clock frequency. Therefore the number of shots must be increased up to 100 discharges.

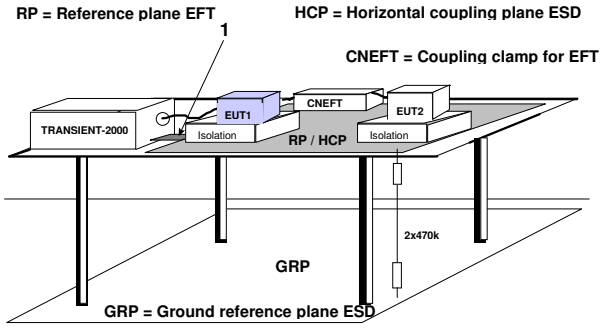
Safety:
ESD3000 is not a toy. It is a professional tool and belongs only in the hand of specialists and appropriately trained personnel.
The ESD3000 must no be switched „ON“ with the „RUN“ button unless a correctly connected earth or ground cable is in place.

5.1.2 Test set-up for table top equipment

Test set up

Test sequence

Single Phase EUT

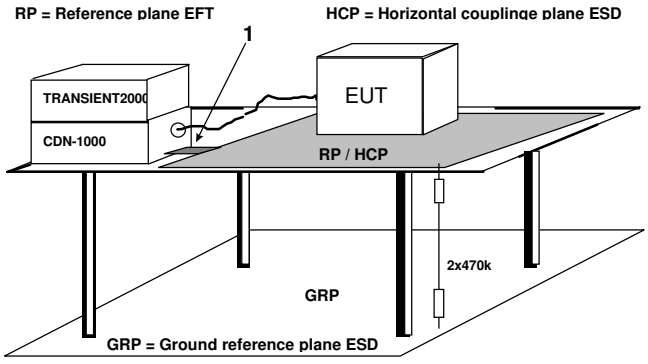


I. EFT
1. Connect the earth bar of the TRANSIENT-2000 with the flat multiwire cable (1) to the reference ground plate
2. Put 10 cm insulation between EUT and the reference ground plate
3. Carry out the tests!

II. ESD
1. Remove the flat multiwire cable (1) between the earth bar of the TRANSIENT-2000 and the reference ground plate
2. Put 0,5 mm insulation between EUT and the reference ground plate
3. Carry out the tests!

III. SURGE, DIPS, VARIATION
1. Reinstall the flat multiwire cable 1
2. Carry out the tests!

Three Phase EUT



I. EFT
1. As for single phase EUT
2. As for single phase EUT
3. Connect the Impulse out of the TRANSIENT with EFT coupling on the Threephase Coupling/De-coupling network CDN-2000-06-25
4. Carry out the tests!

II. ESD
1. As for single phase EUT
2. As for single phase EUT
3. Carry out the tests!

III. SURGE,
1. Make connection 1
2. Connect the surged phase for synchronisation with EUT Power 1
3. Carry out the tests!

IV. DIPS Interruption
1. Loop the phase for dips and interruption through the TRANSIENT-2000 (EUT Power 1)
2. Carry out the tests!

5.2 Practical testing sequence

In practice, the following test procedure has been shown to be reliable:

1. Burst-Testing:

- **Burst-testing** on mains inputs with a test voltage of 4kV
- **Burst-testing** of signal and data lines up to 4kV

The energy contained in the burst pulses is relatively small, thereby minimising damage to the test object. The higher the repetition frequency, the more likely it that weak points become evident in the test object.

2. ESD-Testing:

With this test, effects induced through the keys and the housing of electronic equipment can be simulated.

- Metallic parts, contacted method up to 8 kV
- Insulated parts, air discharge up to 15 kV

In practice, an item that has undergone burst testing shows a better immunity to ESD, than one which has not. Likewise, an item that has undergone burst testing shows a better immunity to current injection or cw field tests.

3 Surge-testing:

- **Surge testing** mains up to 2 kV

This should be used to test input protection elements and protection circuits installed in electronic equipment. The energy content is very high in the surge test, and can destroy elements in the EUT.

- **Surge testing** signal and data lines up to 1 kV

4 Mains simulation:
As a consequence of the increasing number of non-linear loads, the quality of the mains gets worse and worse. To be sure that electronic equipment can withstand the mains interference, test are such as:

Mains interruption, Mains under and over voltage variation, harmonics simulation etc. are required.

5 Further testing:

For most EUT, the described transient tests are sufficient. Further testing of the product to determine differences, e.g. with regards to the effects of magnetic field on monitors or on protection elements, may be needed.

Conclusion:

The product determines which kind of EMC test must be applied. It is also important, that EMC testing should only be carried out by trained personnel, with a knowledge of how the test object should function, and some knowledge of transients and EMC. The four tests, with their range of impulse types, simulate only single signals, and do not cover the complete range of EMP phenomena. However, if no more failures were registered, after a period of EMC testing with electronic equipment and systems in practical operation, it would not be justified to impose additional EMC tests.
Further EMC test information can be obtained from EMC Partner or from our representatives.

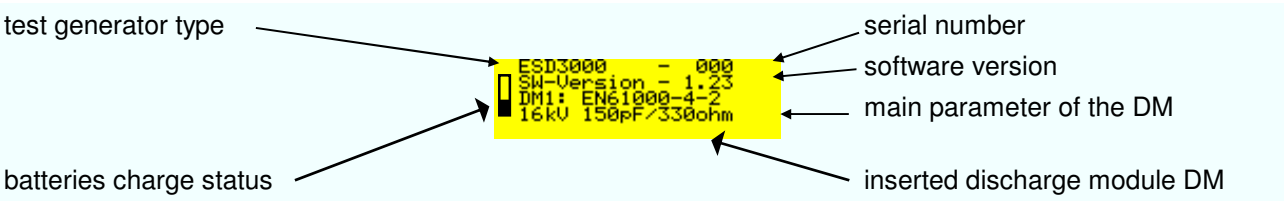
6 Testing with the ESD3000

6.1 Contact discharge

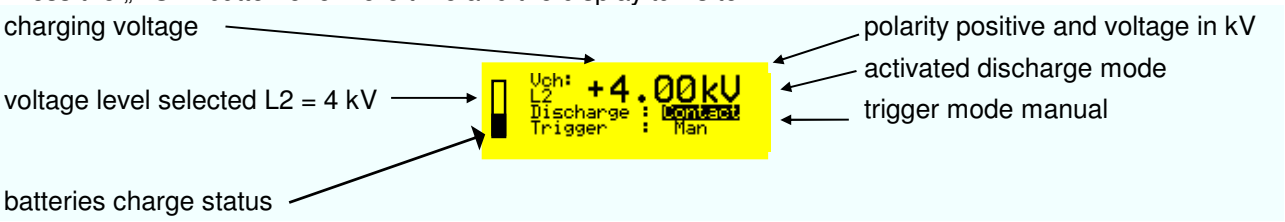
When you have studied Chapter 2 „Safety“ and Chapter 5 „Preparation for operation“ and all instructions have been followed you have green light for a quick start..
EMC PARTNER store the needed tests specified in the basic standard in the ESD3000 before shipping.

To carry out a contact discharge, the following steps must be carried out:

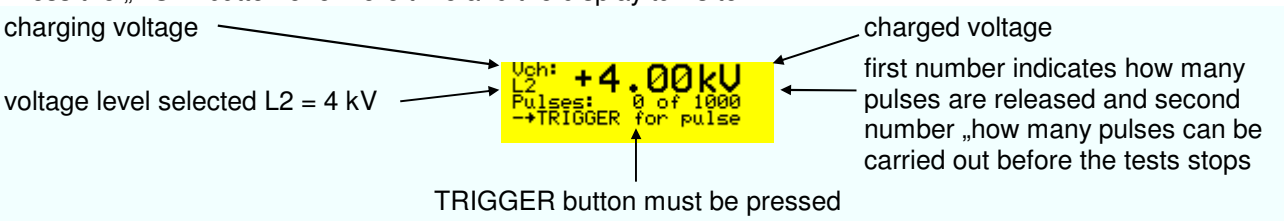
- Connect correctly the earth or ground cable to a laboratory supply earth point or to a earth point of the EUT.
- The discharge module must be equipped with the sharp tip
- Operate the „RUN“ button on the front panel the display turns to the EMC PARTNER logo and after a second to:



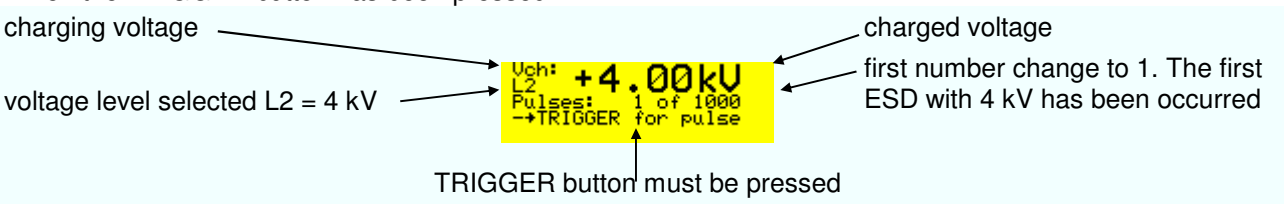
Press the „RUN“ button one more time and the display turns to:



Press the „RUN“ button one more time and the display turns to:



When the TRIGGER button has been pressed :

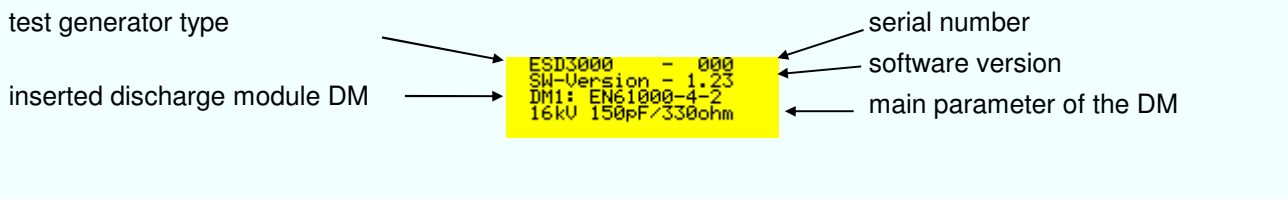


Press the „RUN“ button and the ESD3000 return to the main setting mode.

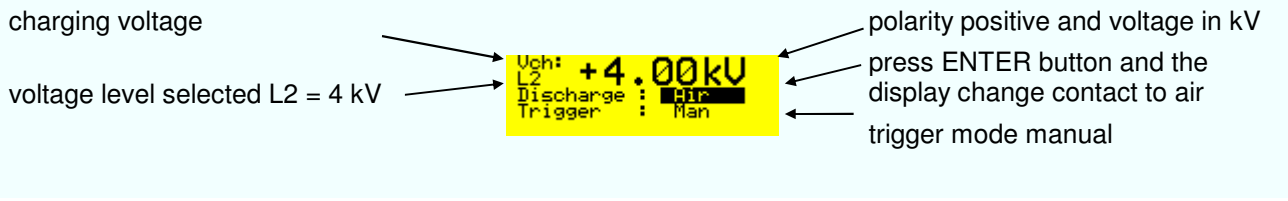
6.2 Air discharge

To carry out a air discharge, the following steps must be carried out:

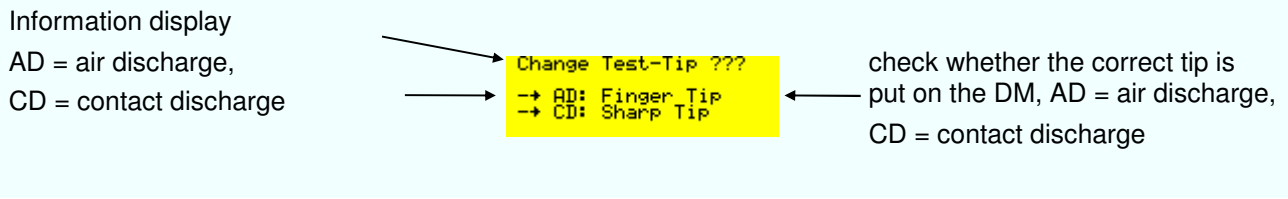
- Connect correctly the earth or ground cable to a laboratory supply earth point or to a earth point of the EUT.
- The discharge module must be equipped with the finger tip
- Press the „RUN“ button on the front panel and the display turns to the EMC PARTNER logo and after a second to:



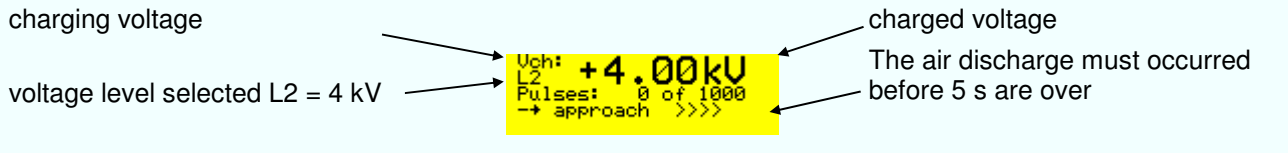
Press the „RUN“ button one more time and the display turns to:



Press the „RUN“ button one more time and the display turns to:

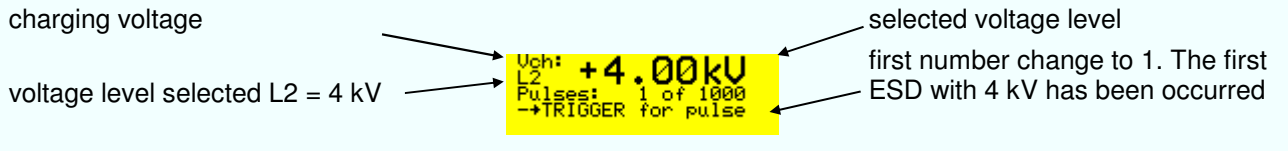


Press the „RUN“ button twice and the TRIGGER button once - the display turns to:



As soon as „approach >>>>“ is indicated on the display, the finger can be moved against the EUT. For the movement against the EUT a maximum of 5 Seconds are reserved, corresponding to the holding time in the IEC standard. For ISO 10605 test on insulated equipment press the Trigger button a second time when the 15 mm position is reached. This will avoid second air discharges.

Press the „RUN“ button - the display turns to:



Press the „RUN“ button and the ESD3000 will be in the main setting mode.

6.3 Main parameter setting with the buttons on the front plate

RUN

this button has different functions:

- Turn „ON“ and „OFF“ the supply of the ESD3000
- Turn “ON“ and „OFF“ the high voltage in the discharge modules DM
- The blinking light above the „RUN“ button indicates „High Voltage ON“

ENTER

this button has different functions:

- Change the mode of the black cursor location
- Activate parameter in one line to vary the parameter with up and down
- Quit the selected parameter

Examples with ENTER button

charging voltage

voltage level selected L2 = 4 kV

selected voltage level

When the black cursor is positioned as showed and the ENTER button is pressed, the discharge change to „contact“

charging voltage

voltage level selected L2 = 4 kV

selected voltage level

When the black cursor is positioned as showed and the ENTER button is pressed, the trigger change to „Auto“

LEVEL

- With the button „level“ very quickly the test levels of different standards can be selected.
- The test levels change in function of the DM discharge module inserted into the ESD3000.

Examples with LEVEL button

charging voltage

voltage level selected L3 = 6 kV

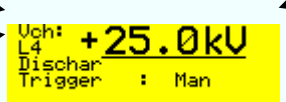
polarity and Voltage value

Wit discharge module DM1“

Examples with LEVEL button

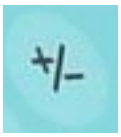
charging voltage

voltage level selected L4 = 25 kV



charged voltage

With discharge module DM3



POLARITY

- Change the polarity of the charging voltage from positive to negative or from negative to positive.

UP

this button has different functions:

- Change the charging voltage between the levels
- Moves the cursor in the menu up
- In the operation mode the charging voltage can be increased

DOWN

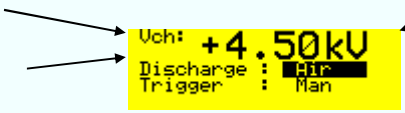
this button has different functions:

- Change the charging voltage between the levels
- Moves the cursor in the menu down
- In the operation mode the charging voltage can be decreased

Examples with charging voltage

charging voltage

No level is indicated



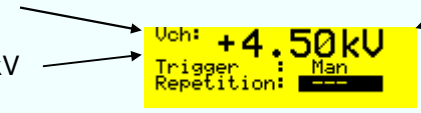
voltage increased to 4.5 kV

“

Examples with menu

charging voltage

voltage level selected L2 = 4 kV



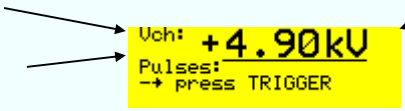
Increased voltage 4.5 kV

Twice the button „down“ pressed

Examples with voltage changes in operation mode

charging voltage

No voltage level selected kV



Increased voltage

RUN button pressed and with “up“ the voltage increased to 4.9 kV

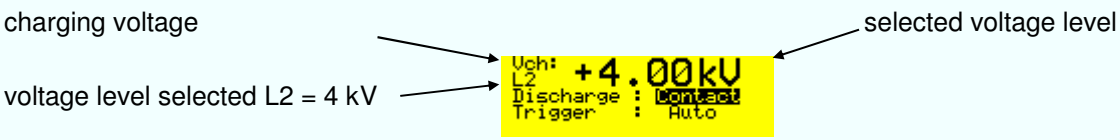
Well that's easy isn't it ?

Most of the ESD tests can be done only using the hardware button on the front plate. In the next two sections, the additional possibilities of the ESD3000 will be explained in detail.

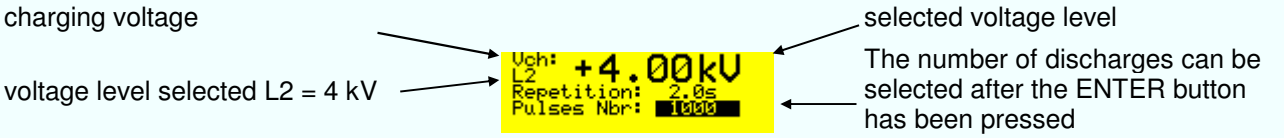
6.4 The different software menus of the ESD3000

6.4.1 Repetition, number of pulses, count mode

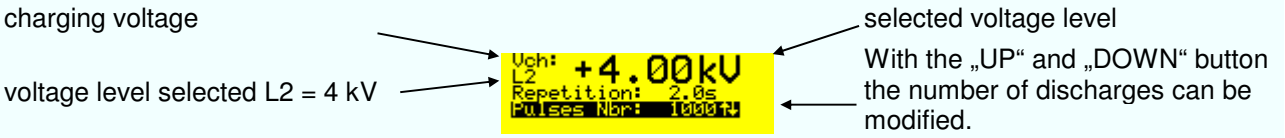
Number of pulses



When the „down button „ has been pressed twice - the display looks like:

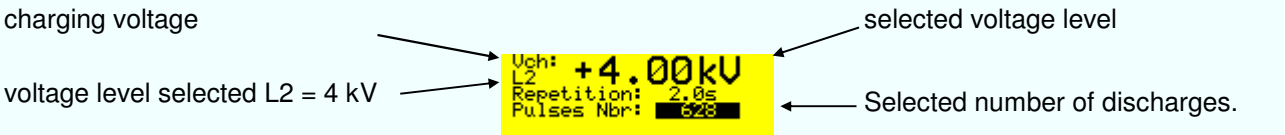


When the „ENTER „ button has been pressed the displays turns to:



Remark: up to 1000 discharges steps are 1, over 1000 steps change to 1000. Holding the „UP“ or „DOWN“ button pressed, the steps changes from 1 to 10 or from slow to fast.

The „ENTER „ button must be pressed to quit the selected pulse number:

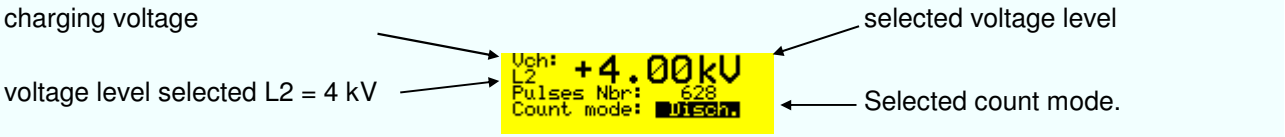


Repetition of the discharge pulses can be changed on same way as the pulse number. The repetition can only for AUTO mode be selected. The repetition time can be selected from 0.05 (20 Hz) up to 30 seconds

EMCP recommends to use the air discharge mode for week points exploration. The 20Hz repetition reduce the life span of the high voltage relay. See chapter 6.5.1.2.

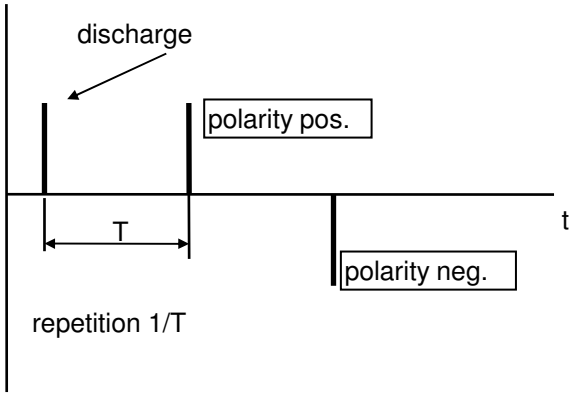
Count mode

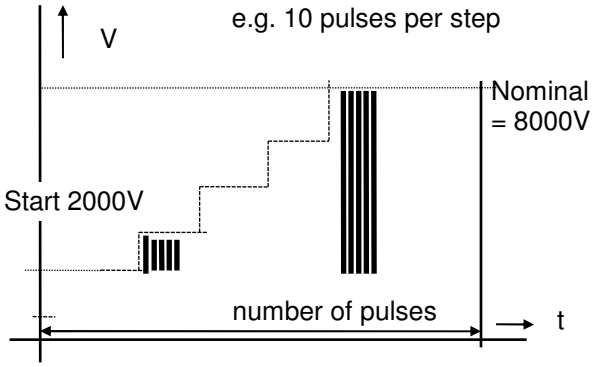
After pressing „down „ with the „ENTER“ button the count mode can be selected



Remark: two count mode can be differed: „Disch.“ or „ALL“. In „All“ mode all released impulses will be counted. In „Disch.“ mode only the real discharges are counted (current sensing).

6.4.2 Menu „Ramps“

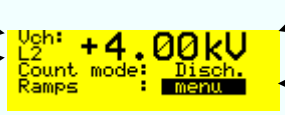




Polarity

charging voltage

voltage level selected L2 = 4 kV

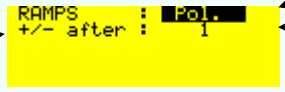


selected voltage level

Press the ENTER button to open the „Ramps“ menu.

When the „ENTER“ button has been pressed twice the displays indicate:

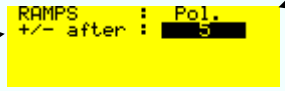
Polarity change after the selected number of pulses



Ramp polarity

Press the ENTER button to change the number of pulses with up or down

Polarity changes after 5 pulses

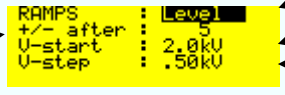


Ramp polarity

Voltage

When the „ENTER“ button has been pressed an additional once:

Level changes after the selected number of pulses



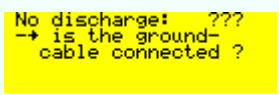
Ramp Level

The ramp starts at this level

After 5 pulses the voltage will be increased with 500 V

Remark: The maximum voltage is equal the nominal voltage or selected level 4 kV.

The following message will occur when after three releases no discharges was happen



6.4.3 Menu „Setup“

charging voltage

voltage level selected L2 = 4 kV

selected voltage level

Up to 9 customised parameter set-up can be stored

When „ENTER „ has been pressed

SETUP indicates that in storage place 1 set-1 is stored

Setup Nbr. 1 to 9

selected voltage level

All setted parameter of the ESD3000 will be stored into the set-1

With „Load“ and „ENTER“ button the set-1 can be activated.

Setup number

Setup Nbr.1 will loaded in to the ESD3000 control

Up to 9 customised parameter set-up can be stored

When the „ENTER“ button has been pressed twice.

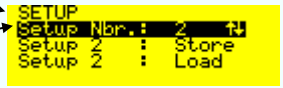
Instead of Uch, set-1 indicats that customer set-1 is loaded

L2 with the up and down arrow indicates that a voltage ramp is activated in the set-1

selected voltage level to start the ramp

The set-up number 2 is empty

With up and down it can be checked whether the storage places are empty



6.4.4 Menu „Settings“

charging voltage

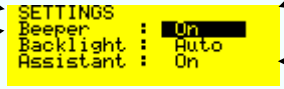
voltage level selected L2 = 4 kV

selected voltage level

When the black cursor is positioned as showed and the ENTER button is pressed, the trigger change to „Auto“

menu page

Beeper „ON“ or „OFF“ with “ENTER“ button



selected voltage level

Backlight „Auto“, „OFF“ or „ON“

Assistant: „ON“ or „OFF“. The message displays occur only when the assistance is in the „ON“ mode

6.4.5 Menu „Service“

Last menu which can be found with the down arrows is the service menu

charging voltage

voltage level selected L2 = 4 kV

selected voltage level

When the black cursor is positioned as showed and the ENTER button is pressed, the display below will be showed

menu page

calibration of the charging voltage at 4 kV or 16 kV

ESD3000 equipped with Discharge module DM1

For the time being only the English version exists

Remark: With the voltage calibration divider ESD-VERI-V all customers can calibrate the voltages at 4 or 16 kV with an oscilloscope. The calibration factor include two values: the value from ESD3000 and the values of the different discharge modules. As soon as the discharge module is interchanged the calibration factor will be adapted to the new discharge module.

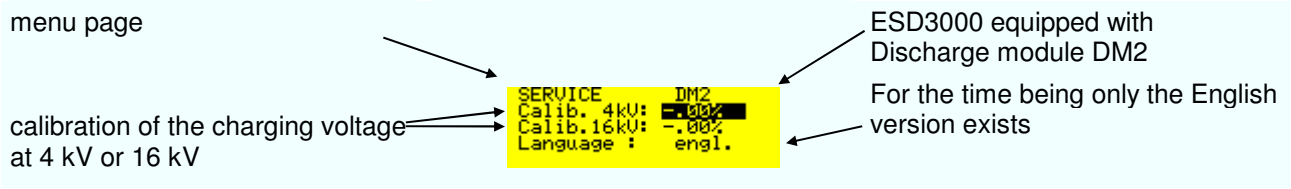
menu page

calibration of the charging voltage at 4 kV or 16 kV

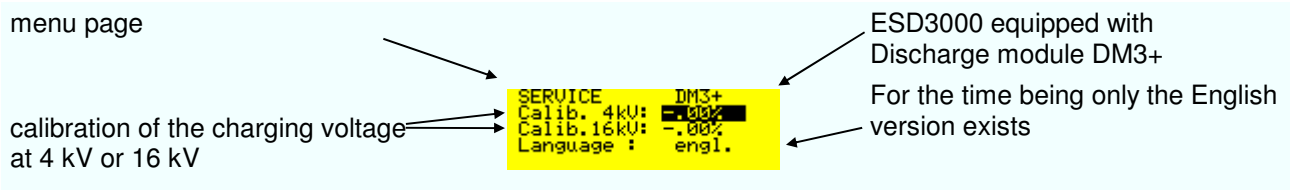
ESD3000 equipped with Discharge module DM2

For the time being only the English version exists

Remark: This solution offers different advantages :
advantage 1: The accredited calibration Lab can calibrate the ESD3000 directly
advantage 2: Additional DM can extend the application of the ESD3000 system after the first sale. The factor delivered with the DM must be set in the service menu.



Remark: When two discharge module exist for equal application e.g. two polarity for each discharge module the factors are specified.



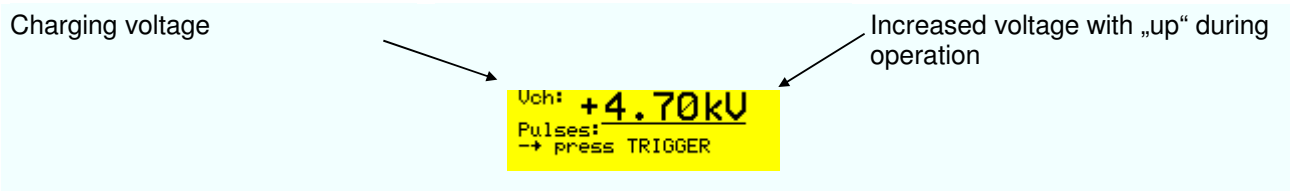
6.4.6 Reset of the ESD3000 to default values

When the ESD3000 is turned “OFF“ hold the +/- button and press the „RUN“ button. Relese the +/- button when the message „reset to default“ is dispayed. If no message occur repete the reset.

6.5 Parameter changing during operation „RUN Mode“

6.5.1.1 Changing values during operation

In RUN-mode, several parameters can be continuously varied using the „up“ and „down “ buttons. This is very helpful for exactly determining of the immunity level of the EUT. The manual change of the nominal voltage will be noted in the report with a warning.



For very fast investigation the polarity can also be changed during operation by pressing the +/- button.

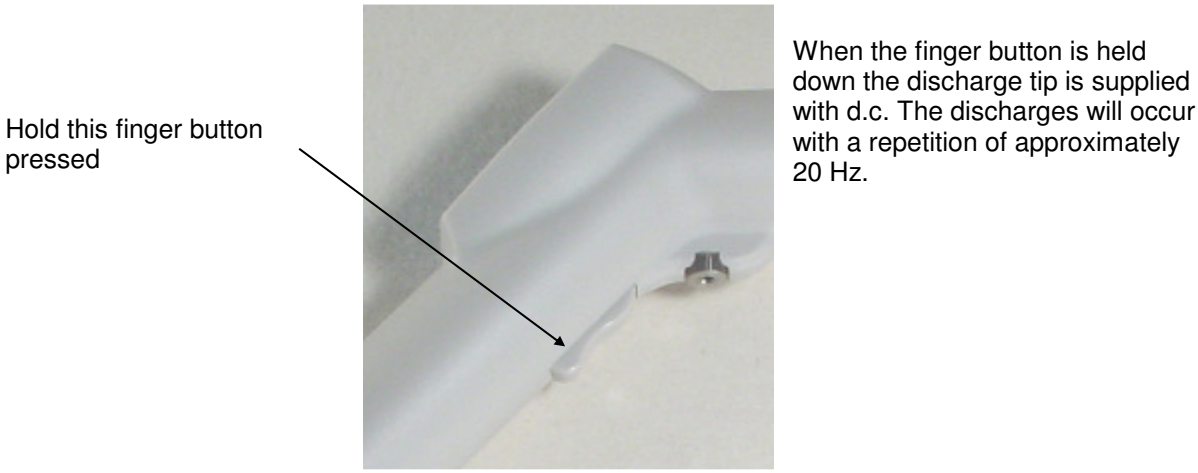
6.5.1.2 Point exploration with air discharge

The points on an EUT to which the discharges should be applied can be discovered by first doing an exploratory test by running at a repetition rate of approximately 20 discharges per second or more.

With the ESD3000 and the ESD3000DM1 it can be arranged as following:

Select the desired discharge voltage in air discharge mode.

Press the „RUN“ button and hold the trigger button pressed on the main body



6.5.1.3 Putting out of operation

As showed above the **„RUN“** button must be pressed until the message is shown **„power down“.**

7 Maintenance and Servicing

7.1 Maintenance

No maintenance is necessary on the ESD3000.

7.2 Verification of the ESD3000 by the user

A full verification in accordance with the IEC standards can only be carried out with very expensive measuring equipment. A simple verification is watching the spark at the finger or sharp tip to ground.

Ground cable must be connected. See warning advice on the ESD3000.
„ Make sure, the grounding cable is connected before you start using the ESD3000 high voltage“

7.3 Verification of the ESD3000 by EMC PARTNER AG

EMC PARTNER verify the ESD3000 in accordance with the verification chapter in the different standards.

ESD3000DM1	**IEC 61000-4-2**
ESD3000DM2 and DM3	**ISO 10605**
ESD3000DM4	**MIL-STD-883**
ESD3000DM5	**RTCA/DO-160**
ESD3000DM6 and DM7	**IEC 61340-3-1 and IEC 61340-3-2**

The ESD3000 and the discharge modules ESD3000DMx and ESD3000RM and networks have separate test reports.

EMC PARTNER recommend a full verification of the ESD3000 once a year. A test report with all oscillograms is included in the verification price. A full verification without a repair takes approximately 3 days.

Before a ESD3000 is delivered, all verifications are carried out in accordance with the basic documents.

All data are within the tolerable tolerances.

See verification report ESD3000 and DM or DN at the end of the Manual binder.

7.4 System Reset

A system reset can be made as follow:

1. Remove the batteries and wait about 5 to 10 seconds before inserting the batteries back.
2. With +/- hold, press button the power ON/OFF (RUN button).

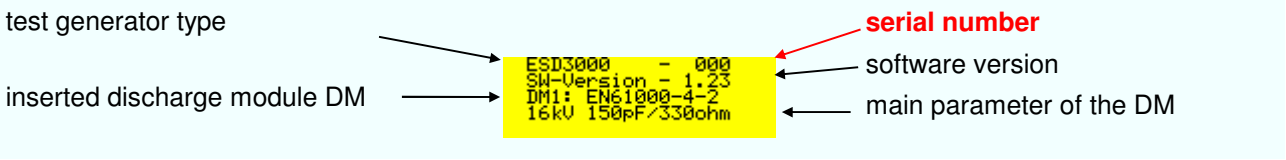
The software will be reset to the default values.

7.5 Caution with calibration labels

It is strictly forbidden to use metallic labels for calibration information. No metallic labels are allowed on neither on ESD3000 or modules and networks. Metallic labels could influence the current waveform or the voltage withstand capability.
Only plastic foils are allowed.

7.6 What must be done when the serial number is not indicated during the start up

If the serial number is not indicated in the display as showed below the stored information about the DN are lost. The calibration data “calib” and serial number must be manually inputed. Only with the correct % values the output current and voltages are correct.



8 What must be done following failed operation

- The ESD3000 has many of different messages to assist the operator to solve possible problems, give information regarding incorrect operation of the ESD3000, or to correct an incorrect system configuration.

8.1 Display messages

8.1.1 Examples of messages

The following message will occur when after three releases no discharges was happen

```
No discharge:   ???
-» is the ground-
  cable connected ?
```

Information display

AD = air discharge,

CD = contact discharge

```
Change Test-Tip ???

-» AD: Finger Tip
-» CD: Sharp Tip
```

check whether the correct tip is put on the DM, AD = air discharge, CD = contact discharge

Message display

```
No discharge:   ???
-» search for dis-
charges in DC-mode.
 ( hold TRIGGER )
```

advice for changing mode

8.2 Service; Repairs

The ESD3000 is a compact equipment and servicing or repairing the generator can only be carried out by EMC PARTNER authorised service companies.

Do not continue to use the instrument should any mechanical damage occur. The instrument housing has both an insulating and a screening function which can only be assured when the housing is intact. Return a damaged generator to EMC PARTNER service centre immediately for repair.

8.3 Spare parts list

No spare parts are necessary for the ESD3000.

8.4 Service department of EMC PARTNER AG

EMC PARTNER AG
Baselstrasse 160
CH - 4242 Laufen
Switzerland
Tel. ++41 61 775 20 50
Fax ++41 61 775 20 59
Email service@emc-partner.ch
Web www.emc-partner.com

9 Charging the batteries or replacing batteries

The ESD3000 is a laboratory test equipment. Whenever the tester is not used, store it in the ESD3000 box.

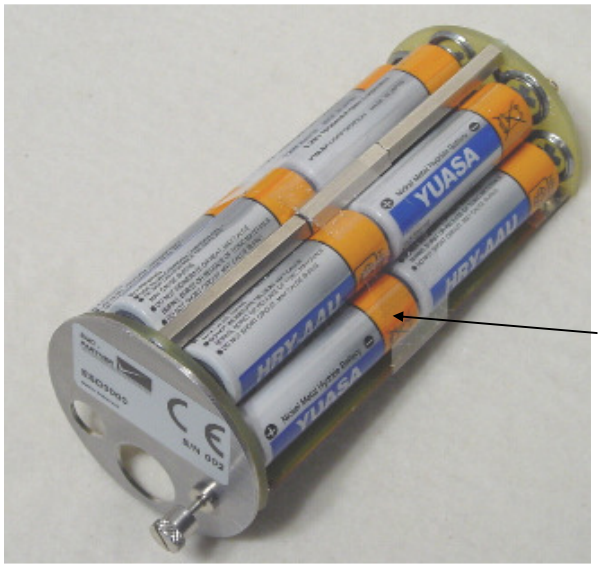
The time the ESD3000 is not in use the batteries can be charge as follow.

Connect the special Lemo connector to the ESD3000 on the bottom side. The power supply cord must be connected to a public outlet with voltage 110 V up to 240 V 50/60 Hz

The standard batteries can be changed as follow:

Unscrew the little screw on the bottom of the ESD3000 and pull the battery back out of the ESD3000

Charging time is approximately 5 hours (completely empty to completely full).



replace the batteries by pull it out piece by piece

10 Packaging and Transport

10.1 Packaging

If you transport the ESD3000, pack it in the original shipping box.

10.2 Transport

If you are transporting the ESD3000 to an EMC PARTNER field office for repair, attach a tag to the equipment showing the instrument owner and address, the name of the person to contact about the instrument, the instrument type and the serial number.

11 Recycling / Disposal

11.1 RoHS directive 2002/95/EG

The ESD3000 complies with the directive 2002/95/EG (RoHS - Restriction of certain Hazardous Substances). From July 2006 onwards.

From December 2005, all EMC Partner products either hand soldered or by machine are produced using lead-free solder.

11.2 WEEE directive 2002/96/EG

The EMC Partner ESD3000, is exempted from the directive 2002/96/EG (WEEE) under category 9.

The product should be recycled through a professional organisation with appropriate experience for the disposal and recycling of electronic products. EMC Partner are also available to help with questions relating to the recycling of this product.

11.3 Information for dismantling

 Remove always power cord fist.

There is no special danger involved in dismantling the ESD3000.

11.4 Parts which can be recycled

The ESD3000 contains parts made from steel, aluminium, PVC, two-component sealing compound. The impulse capacitors are filled with non-poisonous mineral oil. The various parts can be separated and recycled.

11.5 Parts which can not be recycled

All parts in the ESD3000 can be recycled.

12 Modules and accessories

12.1 ESD3000 with DM discharge modules

Pos.	Product No.	Type	Short Description
	103606	ESD3000DM1	Discharge module IEC 61000-4-2, 150pF, 330 Ohm, AD up to 16kV, CD up to 10kV. Incl. . 1 rounded tip for AD . 1 sharp tip for CD
	103607	ESD3000DM2	Discharge module ISO TR10605, 330pF, 2000 Ohm, AD up to 16kV, CD up to 10kV (inside vehicle). Incl. . 1 rounded tip for AD . 1 sharp tip for CD
	103608	ESD3000DM4	Discharge module MIL 883 and GR-78-CORE 100pF, 1500 Ohm, CD up to 10kV, AD up to 16kV. Incl. . 1 sharp tip for CD . 1 rounded tip for AD . 1x 0.75m cable green-yellow . 1 ESD-MC plug blue
	103609	ESD3000DM5	Discharge module RTCA/DO160-D, 150pF, 330 Ohm, AD up to 30kV consisting of ESD3000DM5+ and ESD3000DM5-. Incl. . 2 rounded tips for AD
	103610	ESD3000DM6	Discharge Module IEC 61340-3-1, 100pF, 1500 Ohm, CD up to 8kV. Incl. . 1 sharp tip for CD
	103611	ESD3000DM7	Discharge Module IEC 61340-3-1, 200pF, 0 Ohm, CD up to 3kV. Incl. . 1 sharp tip for CD
	103612	ESD3000DM8	Discharge Module in accordance with IEC 60571 and EN 50155 for Railway Testing

Pos.	Product No.	Type	Short Description
	103625	ESD3000RM32	Relay module with high voltage and polarity switch. Circuit for generating the first current peak. Can be used for CD up to 30kV and AD up to 30kV. Minimum one DN must be added. Incl. . 1 rounded tip for AD . 1 sharp tip for CD . 1 electrode 30mm . 1 permanent magnet.
	103615	ESD3000DN1	Discharge Network according to IEC 61000-4-2 with capacitor 150pF and resistor 330 Ohm. AD from 1kV up to 30kV and CD from 1kV up to 30kV.
	103616	ESD3000DN2	Discharge Network according to ISO TR10605 with capacitor 330pF and resistor 2000 Ohm. AD from 1kV up to 30kV and CD from 1kV up to 30kV.
	103617	ESD3000DN3	Discharge Network according to ISO TR10605 with capacitor 150pF and resistor 2000 Ohm. AD from 1kV up to 30kV and CD from 1kV up to 30kV.
	103618	ESD3000DN4	For explosive device testing MIL-STD-1512 or VG95378 with capacitor 500pF and resistor 5000 Ohm. AD from 1kV up to 30kV and CD from 1kV up to 30 kV. Consisting of 1 discharge network. ESD3000DM-EXT and safety switch must be ordered separately.
	103619	ESD3000DN5	Discharge network for military testing according to MIL-STD-331, MIL-DTL-23659D or STANAG 4239. 500pF, 500 Ohm. AD and CD 2kV up to 30kV. Requires ESD3000RM32. ESD3000DM-EXT & safety switch can be ordered separately
	104126	ESD3000DN6	Discharge network for automotive testing according to ISO TR 10605. VW TL 824-66 and Daimler Chrysler DC 10614. 330pF, 330 Ohm. AD and CD 2kV up to 30kV. Requires ESD3000RM32.

Pos.	Product No.	Type	Short Description
	103627	ESD-OPTOLINK	Optical link to control ESD3000 from PC. Must be ordered together with TEMA. Optolink length 10 m with special LEMO plug and RS232 9 pin connector. Incl. 1x ESD-TRA-CABLE
	103630	ESD-TARGET2	2 Ohm Target with SMA connector, upper limit >4GHz. For ESD calibration verification and comparison. Calibrated target attenuator cable chain. Incl. - 1x cable 50 Ohm
	103629	ESD-VERI-V	Charging voltage (up to 25kV) measurement divider 20Gohm, ratio determined by the 1Mohm input of the oscilloscope. Ratio approx. 1:20'000. Incl MC banana plugged cable green/yellow (1x 0.80m).
	103485	ESD-VCP50	Vertical coupling plate 0.5 x 0.5m with 2m cable and 2 x 470kOhm resistors.
	103637	ESD-STAND Ed2	Non metallic stand for ESD MOUSE, ESD2000, ESD3000 ESD3000DM-EXT, in accordance with IEC 61000-4-2 Ed.2
	103634	CNH12	Accessory to ESD3000 with RM32 and DN1 to simulate rapidly changing H-field as generated at real ESD discharge.
	103628	ESD3000DM-EXT	Accessory to ESD3000DM's to separate the control and the discharge module for special applications like airbag or explosive device testing. With the ESD3000DM-EXT the control can be separated maximum 1m.
	103626	ESD3000 SAFETY-SWITCH	Safety switch to short circuit the ESD3000 output, when testing explosive devices. Must be used together with ESD3000DN4 and ESD3000RM32.

12.2 Pictures of the accessories

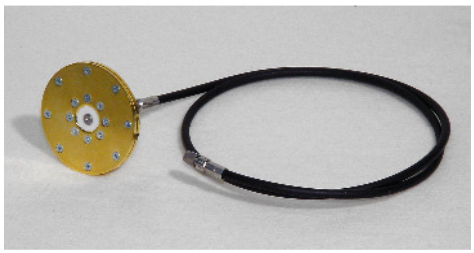
ESD-STAND Ed2:

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:

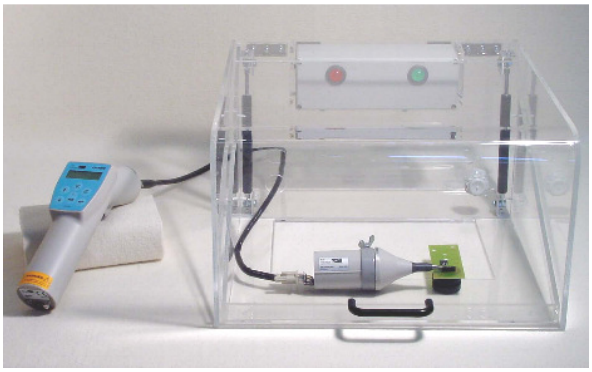


2 Ohm Target with SMA connector, upper limit >4GHz

VCP50

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

ESD3000DM-EXT

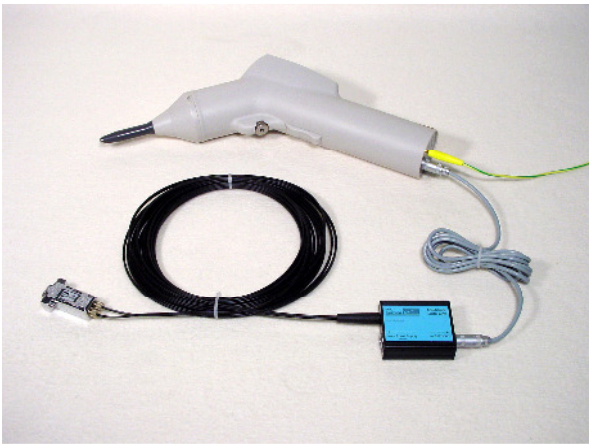


Testing of EUTs that could spontaneously explode or rapidly change state, such as airbags or munitions fuses

CNH12

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

ESD-OPTOLINK



Accessory to ESD3000 to remote control the ESD3000 without any galvanic connection

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13 E3Loader and Serial Communication

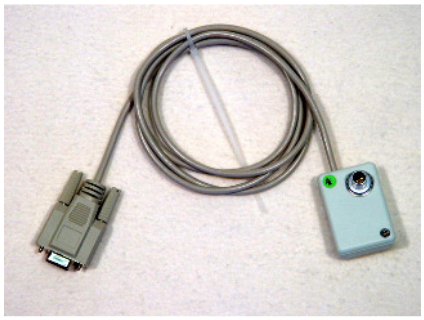
13.1 Remote control with „E3Loader“

The E3Loader program, delivered with ESD3000, is a basic software package primarily used for updating firmware and, with the optional ESD-VERI-V, adjusting the HV-DC level. E3Loader can also be used as a simple remote control tool.

The Download-Module (picture right) connects ESD3000 to a 9-pin serial port on the PC.

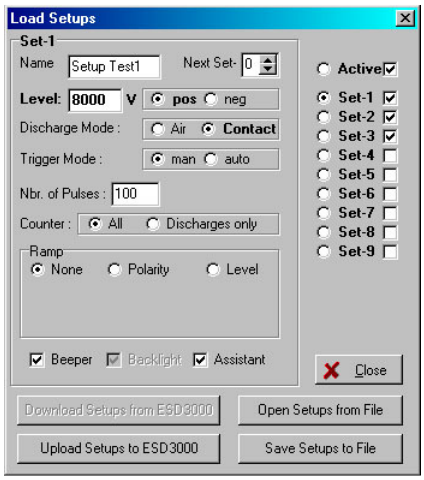
This is an easy way to upload new settings or firmware but as there is **no** galvanic insulation high-voltage testing is not possible.

For remote controlled testing, an optional optical RS232 interface is required.



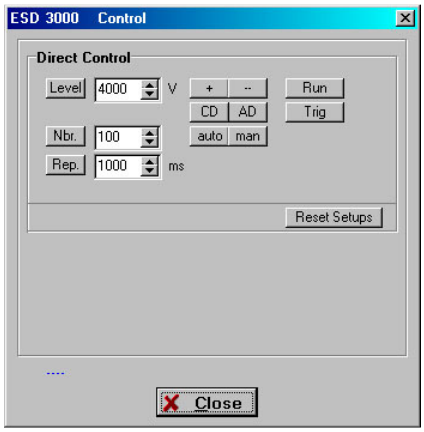
The serial port uses just the data lines TxD and RxD for information transfer (9600Baud, 8 N 1).

13.2 Controlling ESD3000

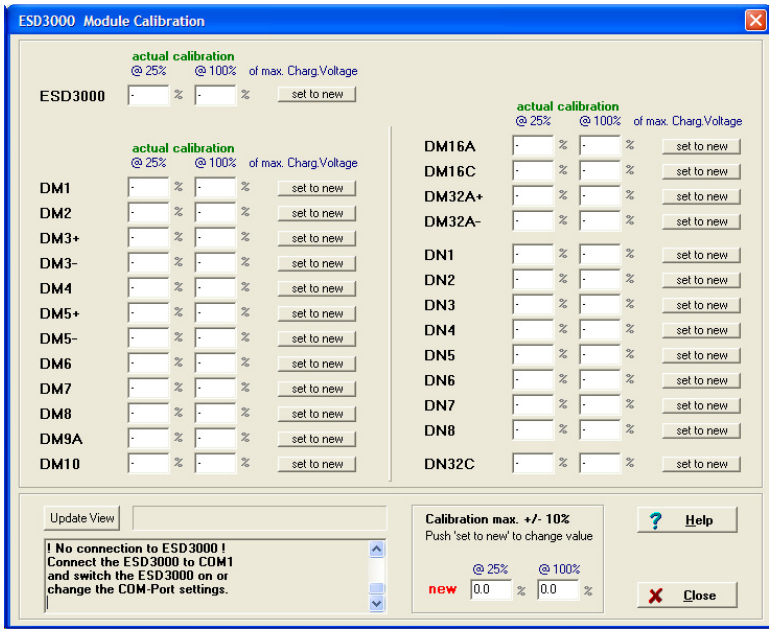


Click ‘Load Setup’ to enter the parameter input menu (picture left). Parameters can be changed and saved in one of 9 memory locations on the computer hard disk. These setup files can be transferred to the ESD3000 using the download module.

Click ‘Control’ to enter the real-time test menu (picture right). Parameter values can be changed, even when ESD3000 is operating (optical interface required).



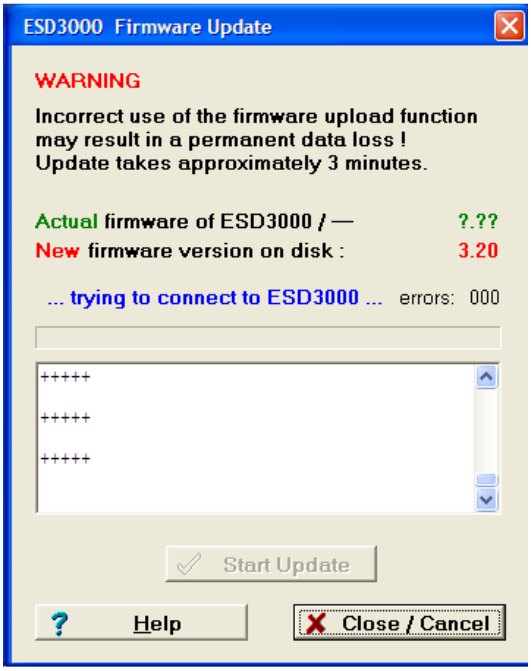
13.3 Module Calibration



Together with an optional high-impedance high-voltage divider (ESD-VERI-V), a recalibration and adjustment of the discharge-modules (DMx) can be performed and stored in the ESD3000 memory.

13.4 Firmware Upload

ATTENTION
Incorrect use of the firmware upload may result in permanent data loss ! See Warning windows before the upload starts.



How to update the ESD3000 Firmware:

1. Using The download module, connect ESD3000 to the serial port of a computer
2. Switch on ESD3000. Make sure system power is maintained during the upload process (Batteries fully charged before start of update). This takes approximately 10 minutes.
3. The window indicates the firmware version on the ESD3000
   and the version on the hard disk.
4. If communication with the upload monitor inside the ESD3000 is established (message...connected to ESD3000...), click on ‘Start Update’ and wait until the message ‘...Upload successful...’ appears.
5. Restart the ESD3000 and check if the new version is shown in the display.

14 ESD3000 Control with Test-Manager (Tema)

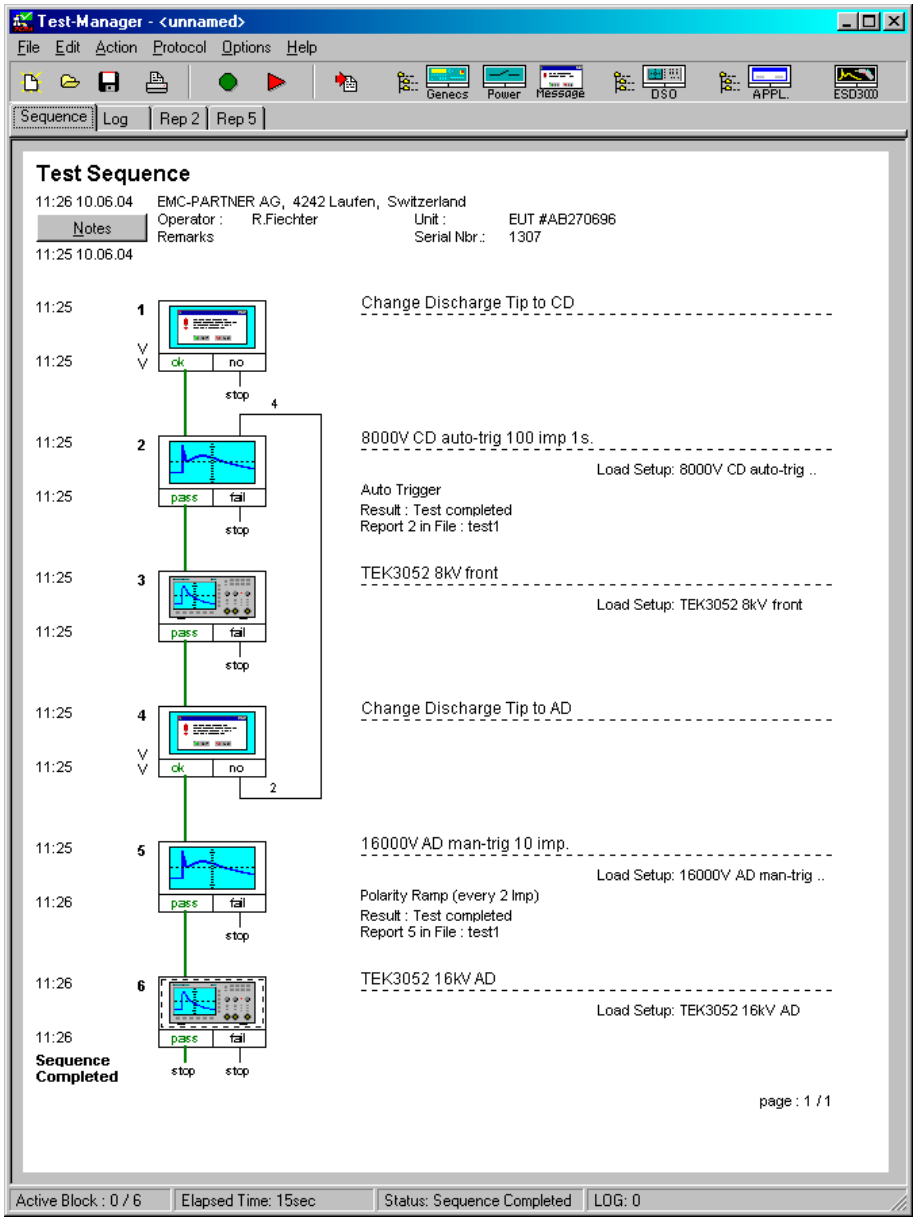
14.1 Remote Control from PC

Direct control of the ESD3000 with a PC requires the following items:

- ESD-OPTOLINK (RS232-interface with 10m optical wire)
- ESD-TRA-CABLE (cable with LEMO plugs to connect interface and ESD3000)
- TEMA ('Test-Manager' software)

Test-Manager software is available for all EMC Partner generators and enables complex test sequences to be programmed using standard windows methods. Test reports can be generated which include results from different generator sources and pictures from a DSO (Digital Storage Oscilloscopes).
ESD3000 can be connected directly to a PC and benefits from all these features.

When TEMA software is started, the following window appears:



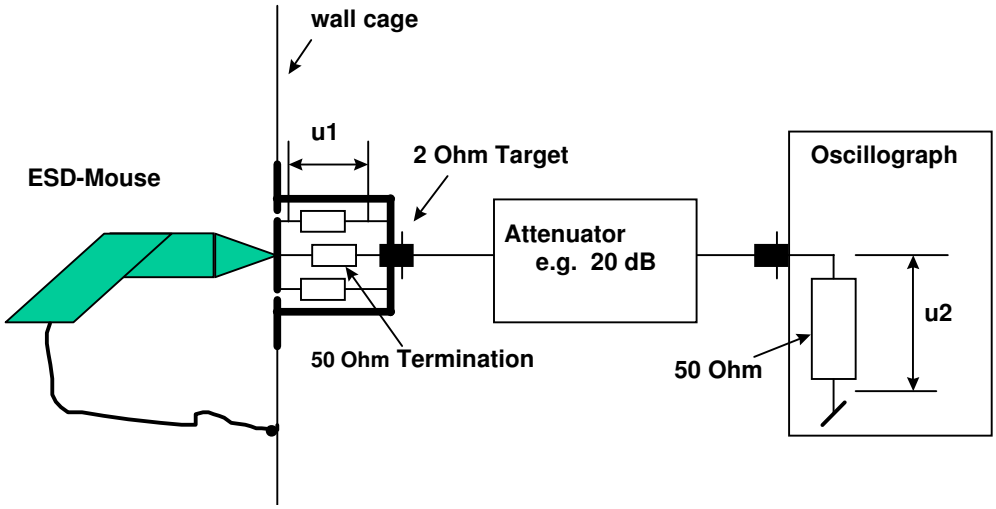
15 Appendix and Corrections

15.1 Appendix

15.1.1 Definition of the ESD Waveform

Level	Test voltage kV+-30%	Peak current A+-30%	Amplitude at 30ns A+-30%	Amplitude at 60 ns A+-30%	**Current peak**
1	2	7,5	4	2	
2	4	15	8	4	
3	6	22,5	12	6	
4	8	30	16	8	

It is only possible to check the impulse current by using very expensive pieces of measuring equipment. The price of such an instrument today lies at approx. 50 k$. In addition, persons who carry out such tests must have some experience with high voltage and high frequency test work, so that they can interpret the measured values. The calibration and verification of the generators must be carried out by the manufacturer or the official calibration authorities.



The ESD-current produces on 2 Ohm Shunt a voltage trop u1. The 2 Ohm target is terminated with 50 Ohm to avoid reflection. With the 20 dB attenuator the 60V trop on the 2 Ohm will be reduced to the allowed input voltage of the oscilloscope. The memory oscilloscope must have a minimum bandwidth of 1 GHz. For all four levels (2,4,6,8 kV) the current wave-form must be within the tolerances as specified in the IEC standard 61000-4-2.

The calibration of the ESD generator should be made at manufacturer side or at an accredited test house.

15.2 Correction

15.2.1 Declaration of conformity to the EMC directive 89/336/EEC

see appendix at the end of this documents.

15.2.2 Declaration of conformity to the LV directive 93/68/EEC

see appendix at the end of this documents.

15.2.3 Declaration of conformity to the Basic Standards

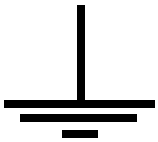
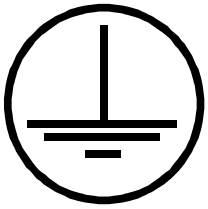
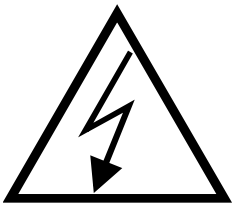
see appendix at the end of this documents.

16 Glossary

Wherever possible, definitions in accordance with IEC 50 (IEV 161) are used.

EUT EST	Equipment under Test French abbreviation of EUT
EMV = EMC = CEM	Electro Magnetic Compatibility German:Elektromagnetische Verträglichkeit French: compatibilité elctromagnetique
Hybrid pulse	Voltage at no load 1.2 / 50 µs and current at short circuit 8 / 20µs.
CWG	Definition in IEC 1000-4-5 used for Surge Tester Combination wave generator.
Coupling network	Electric circuit for transferring energy with low losses from one circuit into another circuit.
Decoupling network	Electric circuit to prevent transmitting energy from one circuit into another circuit.
CDN coupling decoupling network (single or three phase unit)	Consist of a coupling and a de-coupling network.
EFT	Electric Fast Transient (switched inductance)
ESD	Electric Static Discharge
SURGE	Transients with high energy content with relatively low frequency content as produced by lightning and switching of power lines.
DIP	Short voltage interruption or short voltage drop
IEC	International standardisation organisation for electronic technology
VARIAC	Voltage variable transformer
SPIKE	One pulse of the burst
CRO	oscilloscope
HV	High Voltage
rms.	root mean square; effective value

Used symbols:

	Direct current
	Alternating current
	Three phase alternating current
	Earth (ground) terminal
	Protective conductor terminal IEC 417, No. 5019
	Caution, risk of electric shock ISO 3864, No. B.3.6
	Caution (refer to accompanying documents) ISO 3864, No. B.3.1

17 Index

Declaration of Conformity to Standards

The EMC Tester

Type: ESD3000 with DMx or DNx

complies with the following standards:

ESD3000DM1	**IEC 61000-4-2**
ESD3000DM2 and DM3	**ISO 10605**
ESD3000DM4	**MIL-STD-883**
ESD3000DM5	**RTCA/DO-160**
ESD3000DM6 and DM7	**IEC 61340-3-1 and IEC 61340-3-2**

Laufen, 02. February 2004

EMC PARTNER AG

M. Lutz
Managing Director

EMC PARTNER AG

R. Henz
Manager Quality

Appendix to 14.2.3 Conformity declaration with basic standards

CE

EMC - PARTNER

Manufacturer Declaration Of Conformity EMC

Directive 89/336/EWG with table VII 2004/108/EG

The EMC Tester **Type: ESD3000; S/N > 10**

is designed and manufactured complying with the following harmonised standards:

has been tested in accordance with the following standards:

harmonised:
EN 61000-6-3: 2007
EN 61326: 2006

international
IEC 61000-6-3
IEC 61326-1

Fulfilling the directions of the EMC - Directive 89/336/EWG and with table VII 2004/108/EG

EMC PARTNER authorised representative established within the EC Community

H+H High Voltage
Technology GmbH
Im kurzen Busch 15
DE - 58640 Iserlohn

Laufen: 04. August 2009

EMC PARTNER AG

M. Lutz
Managing Director

EMC PARTNER AG

R. Henz
Manager Quality Department

Appendix to 14.2.2 K Conformity declaration with the EMC directive

CE

EMC - PARTNER

Manufacturer Declaration Of Conformity LV

Directive 73/23/EWG; with table VI 2006/95/EG

The EMC Tester **Type: ESD3000, S/N > 10**

has been tested in accordance with the following standards:

Harmonised:
EN 61010-1: 2001

international
IEC 61010-1

in accordance with the regulation of LV - directive of the members states 73/23/EWG and with table VI 2006/95/EG

EMC PARTNER authorised representative established within the EC Community

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Laufen, 05.August 2009

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Managing Director

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R. Henz
Manager Quality Department

Appendix to 14.2.2 Conformity declaration with Low Voltage Directive 93/68/EEC and with table VI 2006/95/EG