EMC PARTNER

User Manual

ESD3000 System

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Typographical Conventions

Warnings
Safety notices that must be heeded are indicated with this warning triangle.

Additional Advice
Throughout the user manual very important or helpful advice is indicated with this symbol.

The Small Print

All products from EMC PARTNER, where appropriate, fulfil the requirements for CE and UKCA certification. A copy of the individual certificates can be viewed and downloaded from www.emc-partner.com/downloads.

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» Contents

1 Safety / Sicherheit / Sécurité

Safety Instructions

This warning sign is visible on the tester. Meaning: This equipment should only be operated by trained personnel after carefully reading the user manual.

The system belongs to safety class 1.

The system fulfils the requirements of the safety standards IEC 61010 for laboratory measurement equipment "Safety requirements for electrical measuring, control and laboratory equipment".

Consider always the following safety points

- Dangerous mains voltage or high voltages are present inside the test equipment and ALL devices attached to it.
- The Protective Earth must be connected to Earth on the test equipment.
- Before removing any covers from the test equipment, remove all external connection cables.
- Before changing the mains fuse, remove all external connection cables.
- Fuses should only be replaced with the same type and value.
- People with heart pacemakers must not be in the vicinity of the test equipment when it is in operation.
- Do not switch on or operate the test equipment if an explosion hazard exists.
- The test equipment should be operated in a dry room. If condensation is visible, the affected unit(s) should be dried before operating.
- Never touch the Equipment Under Test (EUT), when the test system is operating.
- Establish a safety barrier around the EUT and if required connect it to the safety circuit in the auxiliary connector on the rear panel. The cables under high voltage must not be touched during testing.
- The EUT should be covered and/or well marked during the tests.
- If protective parts are tested, which are likely to explode during tests, they must be covered with a protective cabinet.
- If the test equipment or any of the system components are damaged or it is possible that damage has occurred, for example during transportation, do not apply any voltage.
- This user manual is an integral part of the test system. EMC PARTNER and its sales partners refuse to accept any responsibility for consequential or direct damage to persons and/or goods due to non-observance of instructions contained herein or due to incorrect use of the test equipment.

Sicherheitshinweise

Gefahr! Dieses Warnsysmbol ist am Tester sichtbar angebracht. Es bedeutet: Diese Ausrüstung darf nur durch ausgebildetes Personal bedient werden, nachdem diese die Bedienungsanleitung sorgfältig gelesen hat.

Das Gerät gehört der Schutzklasse I an.

Das Gerät erfüllt die Anforderungen der Sicherheitsnormen IEC 61010 für Messungen in Laboratorien “Sicherheitsanforderungen an elektrische Mess- und Regelgeräte sowie Laborausrüstung”.

Beachten Sie stets die folgenden Sicherheitshinweise:

- Gefährliche Netzspannung oder Hochspannung liegt im Inneren der Testausrüstung und an ALLEN daran angeschlossenen Geräten an.
- Der Schutzerdeanschluss der Testausrüstung muss mit der Schutzerde des Netzes verbunden sein.
- Bevor Sie irgendwelche Abdeckungen von der Testausrüstung entfernen, entfernen Sie alle äusseren Anschlusskabel.
- Bevor Sie die Netzsicherung austauschen, entfernen Sie alle äusseren Anschlusskabel.
- Netzsicherung nur mit demselben Typ und Ansprechwert ersetzen.
- Personen mit Herzschrittmacher dürfen sich nicht in der Nähe des Geräts aufhalten, wenn dieses in Betrieb ist.
- SchaltenSiedieTestausrüstungnichteinoderbetreibenSiedasGerätnicht, wenn Explosionsgefahr besteht.
- Die Testausrüstung darf nur in einem trockenen Raum betrieben werden. Wenn Kondensation (Beschlag) sichtbar ist, sind die betroffenen Teile der Ausrüstung zu trocknen.
- Berühren Sie niemals die getestete Ausrüstung (EUT), wenn das Testsystem arbeitet.
- Stellen Sie eine Sicherheitsabtrennung rundum das EUT auf und verbinden Sie diese, wenn verlangt, mit dem Sicherheitskreis im Hilfsanschluss (Auxiliary) an der Rückwand. Die unter Hochspannung stehenden Kabel dürfen während des Tests nicht berührt werden.
- Während des Tests sollte das EUT abgedeckt und/oder gut markiert werden.
- Wenn Schutzelemente leicht explodieren können während Tests, müssen diese mit einem schützenden Deckel abgedeckt werden.
- Legen sie keine Spannung an, wenn die Testeinrichtung oder irgendwelche Systembestandteile beschädigt sind oder möglicherweise ein Schaden eingetreten ist, zum Beispiel beim Transport.
- Diese Bedienungsanleitung ist ein vollständiger Bestandteil des Testsystems. EMC PARTNER und seine Verkaufspartner lehnen jede Verantwortung für direkte wie für Folgeschäden an Personen oder Gütern ab, die aufgrund von Nichtbeachten von hierin enthaltenen Anweisungen oder aufgrund von unrichtigem Gebrauch dieser Testausrüstung entstehen

Consignes de sécurité

Ce sigle d'avertissement est visible sur le testeur. Signification: Cet équipement ne doit être utilisé que par du personnel formé et après avoir soigneusement lu le mode d'emploi.

Le système appartient à la classe de sécurité 1

Le système répond aux exigences des normes de sécurité CEI 61010 pour les équipements de laboratoire "Exigences de sécurité pour les appareils électriques de mesure, de contrôle et d'équipement de laboratoire".

Considérez toujours les points de sécurité suivants:

- Des tensions secteurs dangereuses ou des tensions élevées sont présentes à l'intérieur de l'équipement de test et de TOUS les périphériques.
- La mise à la terre de l'équipement de test doit être effectuée.
- Avant de retirer les couvercles de l'équipement, débranchez tous les câbles de connexion externes.
- Avant de changer le fusible secteur, débranchez tous les câbles de connexion externes.
- Les fusibles ne doivent être remplacés que par le même type et valeur.
- Les personnes portant un stimulateur cardiaque ne doivent pas se tenir à proximité de l'équipement de test lorsqu'il est sous tension d'opération.
- Ne pas allumer ou faire fonctionner l'équipement de test si un risque d'explosion existe.
- L'équipement de test doit être utilisé dans un local sec. Si de la condensation est visible, les appareils affectés doivent être séchés avant utilisation.
- Ne jamais toucher l'équipement sous test (EST), lorsque le système est sous fonction.
- Mettre en place une barrière de sécurité autour de l'EST et, si nécessaire raccorder la au circuit de sécurité du connecteur auxiliaire sur le panneau arrière. Les câbles sous haute tension ne doivent pas être touchés pendant le test.
- L'EST doit être couvert et / ou bien marqué pendant les essais.
- Si des éléments de protection sont susceptibles d'exploser lors de tests, ils doivent être couverts avec un boîtier de protection.
- Si l'équipement de test ou l'un des composants du système ont été endommagés ou il est possible que des dommages ont eu lieu, par exemple pendant le transport, ne pas appliquer de tension.
- Ce manuel fait partie intégrante du système de test. EMC PARTNER et ses partenaires commerciaux refusent d'accepter toute responsabilité pour des dommages indirects ou directs à des personnes et / ou des marchandises dues au non-respect des instructions contenues dans ce document ou en raison d'une mauvaise utilisation de l'équipement de test.

2 Phenomena Description

Electrostatic discharge (ESD) is the result of triboelectric voltage generated by contact between non-conductive, specifically artificial materials (walking on a carpet, getting out of a chair, etc.) or objects moving fast through air (cars, helicopter blades, etc.). The phenomena is most common in conditions of low humidity.

ESD is not particularly dangerous for humans even though voltages can reach or exceed 25kV, because the energy content is extremely low. However, electronic circuits and semiconductors are particularly susceptible to damage caused by electrostatic voltages. Semiconductors may suffer latent damage which only becomes apparent as a slow degradation in equipment performance.

There are two types of electrostatic discharge

Personnel generated, caused by charge accumulated on a human body with discharge occurring when an object is touched. Typical discharge voltages can reach 16 to 25 kV.

Object generated, caused by charge building up on a moving structure. This can be any vehicle. Worst case scenario is a helicopter where the rotating blades can generate ESD up to 300kV.

3 Relevant Standards

IEC 61000-4-2	Basic immunity standard
MIL-STD-461	Requirement CS118 Electronic Subsystems
RTCA/DO-160	Section 25 Personnel Borne ESD
EUROCAE/ED14	Section 25 Personnel Borne ESD
MIL-STD-331	Fuse and Fuse Components Personnel Borne ESD
ISO 10605	Road Vehicles

4 General Description of Product

ESD3000 comprises a main unit with AA battery pack and controller plus discharge modules (DM) or discharge networks (DN) depending on the voltage test level. A relay module (RM) is needed for the higher operating voltages between 16 kV and 30 kV. Discharge tips for air modes are included as standard.

ESD3000 is supplied as standard with the following accessories.

Qty	PN	Description
1	103104	Special cable for updating ESD3000 software.
1	104065	Crocodile clip (yellow) for ground connection
10	104067	AA batteries 1.2 V
1	104402	Battery charger
1	104404	Flat ground cable 2 m long for ground connection
1	104817	Country specific AC power cord
1		Calibration report according to customer wishes (on USB stick)
1		User manual (on USB stick)

ESD3000 case with standard accessories

5 Technical Specifications

5.1 ESD3000 Mainframe

Parameter	Specification
Polarity	Positive, Negative, Alternating
Trigger Mode	Automatic, Manual
Repetition	0.05 s – 30 s
Discharge counter	1 - 30000
Count Mode	Every pulse or discharge only
Power supply	10 AA rechargeable batteries
Charger Mains Supply	100 V – 240 V @ 50 / 60 Hz
Serial Interface	9600 Bits/s, 8 bit, no parity, 1 data bit
Weight	0.73 kg Mainframe only, 1.05 kg with DM module

5.1.1 Environmental Conditions

Parameter	Specification
Temperature	10 °C – 35 °C
Pressure	86 kPa – 106 kPa
Humidity	30 % - 60 % non-condensing

5.2 Discharge Modules up to 16kV

5.2.1 ESD3000DM1

Parameter	Specification
Storage Capacitor	150 pF
Discharge Resistor	330 Ω
Circuit Inductance	< 5 µH
Voltage Range Air Discharge	0.2 – 16 kV selectable, 2 – 15 kV ± 5% guaranteed
Voltage range Contact Discharge	0.2 – 10 kV selectable, 2 – 10 kV ± 5% guaranteed
Current Rise time into 2 Ω	0.8 ns ± 25%
Current Peak	7.5 A @ 2 kV - 37.5 A @ 10 kV ± 15%
Current at 30 ns	4 A @ 2 kV – 20 A @ 10 kV ±30%
Current at 60 ns	4 A @ 2 kV – 10 A @ 10 kV ±30%

5.2.2 ESD3000DM4

Parameter	Specification
Storage Capacitor	100 pF
Discharge Resistor	1500 Ω
RC Time Constant	150 ns ± 20 ns
Voltage Range Air Discharge	0.2 – 16 kV selectable, 0.5 – 15 kV ± 5% guaranteed
Voltage range Contact Discharge	0.2 – 10 kV selectable, 0.5 – 8 kV ± 10% guaranteed
Current Rise time	< 10 ns

5.2.3 ESD3000DM6

Parameter	Specification
Storage Capacitor	100 pF
Discharge Resistor	1500 Ω
RC Time Constant	150 ns ± 20 ns
Voltage range Contact Discharge	0.2 – 8.5 kV selectable, 0.25 – 8 kV ± 5% guaranteed
Current Rise time into 2 Ω	2 - 10 ns @ 0.25 – 8 kV
Current Discharge into 500 Ω	0.375 – 0.55 A @ 1 kV

5.3 Discharge Networks up to 30kV

All Discharge Networks (DN) require the ESD3000RM32 relay module

5.3.1 ESD3000DN1

Parameter	Specification
Storage Capacitor	150 pF
Discharge Resistor	330 Ω
Circuit Inductance	< 5 µH
Voltage Range Air Discharge	1 – 30 kV selectable, 2 – 30 kV ± 5% guaranteed
Voltage range Contact Discharge	1 – 30 kV selectable, 2 – 30 kV ± 5% guaranteed
Current Rise time into 2 Ω	0.8 ns ± 25%
Current Peak	7.5 A @ 2 kV - 112.5 A @ 30 kV ± 15%
Current at 30 ns	4 A @ 2 kV – 60 A @ 30 kV ±30%
Current at 60 ns	2 A @ 2 kV – 30 A @ 30 kV ±30%

5.3.2 ESD3000DN2

Parameter	Specification
Storage Capacitor	330 pF
Discharge Resistor	2000 Ω
Circuit Inductance	< 5 µH
Voltage Range Air Discharge	1 – 30 kV selectable, 2 – 30 kV ± 5% guaranteed
Voltage range Contact Discharge	1 – 30 kV selectable, 2 – 30 kV ± 5% guaranteed
Current Rise time	0.7 - 1 ns standard, 0.5 ns ± 0.2 ns fast
Current Peak	7.5 A @ 2 kV - 112.5 A @ 30 kV + 30% / -0%
Current at 400 ns	0.55 A @ 2 kV – 8.25 A @ 30 kV ±30%
Current at 800 ns	0.3 A @ 2 kV – 4.5 A @ 30 kV ±50%

5.3.3 ESD3000DN3

Parameter	Specification
Storage Capacitor	150 pF
Discharge Resistor	2000 Ω
Circuit Inductance	< 5 µH
Voltage Range Air Discharge	1 – 30 kV selectable, 2 – 30 kV ± 5% guaranteed
Voltage range Contact Discharge	1 – 30 kV selectable, 2 – 30 kV ± 5% guaranteed
Current Rise time	0.7 - 1 ns standard, 0.5 ns ± 0.2 ns fast
Current Peak	7.5 A @ 2 kV - 112.5 A @ 30 kV + 30% / -0%
Current at 400 ns	0.55 A @ 2 kV – 8.25 A @ 30 kV ±30%
Current at 800 ns	0.3 A @ 2 kV – 4.5 A @ 30 kV ±50%

5.3.4 ESD3000DN4

Parameter	Specification
Storage Capacitor	500 pF
Discharge Resistor	5000 Ω
Circuit Inductance	< 5 µH
Voltage Range Air Discharge	1 – 30 kV selectable, 2 – 30 kV ± 5% guaranteed
Voltage range Contact Discharge	1 – 30 kV selectable, 2 – 30 kV ± 5% guaranteed
Current Rise time	0.7 - 1 ns
RC Time Constant	2.5 µs ± 10%

Current Peak	7.5 A @ 2 kV - 112.5 A @ 30 kV + 30% / -0%

5.3.5 ESD3000DN5

Parameter	Specification
Storage Capacitor	500 pF
Discharge Resistor	500 Ω
Circuit Inductance	< 5 µH
Voltage Range Air Discharge	1 – 30 kV selectable, 2 – 30 kV ± 5% guaranteed
Voltage range Contact Discharge	1 – 30 kV selectable, 2 – 30 kV ± 5% guaranteed
Current Rise time	0.7 - 1 ns
RC Time Constant	250 ns ± 10%
Current Peak	7.5 A @ 2 kV - 112.5 A @ 30 kV + 30% / -0%

5.3.6 ESD3000DN6

Parameter	Specification
Storage Capacitor	330 pF
Discharge Resistor	330 Ω
Circuit Inductance	< 5 µH
Voltage Range Air Discharge	1 – 30 kV selectable, 2 – 30 kV ± 5% guaranteed
Voltage range Contact Discharge	1 – 30 kV selectable, 2 – 30 kV ± 5% guaranteed
Current Rise time	0.7 - 1 ns standard, 0.5 ns ± 0.2 ns fast
Current Peak	7.5 A @ 2 kV - 112.5 A @ 30 kV ± 10%
Current at 65 ns	4 A @ 2 kV – 60 A @ 30 kV ±30%
Current at 130 ns	2 A @ 2 kV – 30 A @ 30 kV ±30%

5.3.7 ESD3000DN32-MIL3

Parameter	Specification
Storage Capacitor	500 pF
Discharge Resistor	0 Ω
Circuit Inductance	< 5 µH
Voltage Range Air Discharge	1 – 30 kV selectable, 2 – 30 kV ± 5% guaranteed
Voltage range Contact Discharge	1 – 30 kV selectable, 2 – 30 kV ± 5% guaranteed

6 Initial Operation

To ensure a safe and long operation of ESD3000, the following rules and advice should be followed.

6.1 Read Before using ESD3000

ESD3000 generates high voltages. The impulse energy content can be dangerous if incorrectly used. The following rules should be observed.

- Never touch the EUT when a test is being performed
- Never touch connections or test tips when the ESD3000 is operating
- Always turn off ESD3000 and EUT power before manipulating the EUT
- Always ensure the 2 m ground cable is connected

ESD3000 generates electromagnetic disturbances. Always observe the national emission regulations.
ESD3000 should not be operated close to sensitive electronic equipment.

ESD3000 has been certified as fulfilling CE requirements. A copy of the CE certificate can be downloaded from the EMC PARTNER website.

In particular, ESD3000 has itself been tested to the immunity requirements of:

- IEC 61000-6-3
- IEC 61326-1

6.2 Hardware Description

ESD3000 is a modular system designed for easy expansion from 16 kV up to 30kV and with many discharge circuit options. The battery operated hand-held ESD3000 is ideal for making tests in the laboratory but also rugged enough for testing outdoors on larger test objects.

ESD3000 is supplied in a robust carrying case with special foam insert to ensure safe storage and transport.

6.2.1 Mechanical Structure

ESD3000 comprises a hand-held base unit with battery pack and controller. The base unit can be fitted with discharge modules (DM) up to 16 kV or discharge networks (DN) up to 30 kV as required.

Discharge modules and discharge networks have a mechanical guide to ensure correct orientation in the ESD3000 base unit. They are held in place by a knurled nut which also has a threaded hole for attaching a tripod.

Discharge networks require an additional relay module (ESD3000RM32) shown as the dark grey element in the picture below.

ESD3000 modules contain components sensitive to mechanical shock. When 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.

The battery pack comprises ten AA rechargeable cells. Should the need arise, these can be easily replaced with commercially available cells.

ESD3000 system components

6.3 ESD3000 control panel

ESD3000 control elements

1	LCD display
2	Electronic polarity switch
3	Voltage increase or menu command line up
4	Voltage decrease or menu command line down
5	Enter button
6	Test Run / Stop button. Press and hold to turn ESD3000 on or off
7	Test level selector. Jump between pre-programmed IEC test levels

6.4 ESD3000 Operator Controls and Connections

ESD3000 control and connection elements

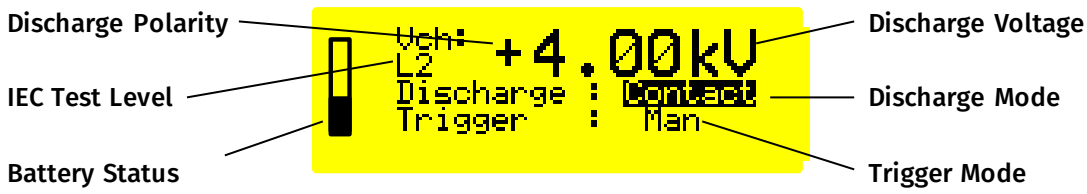
1	Ground connection
2	Discharge circuit retaining nut with threaded hole for tripod mounting
3	Discharge release trigger
4	Battery charging and remote control port
5	Type plate with ESD3000 serial number and CE mark

7 ESD3000 Operation

7.1 Entry Screen

To activate ESD3000 press the RUN button on ESD3000 control panel. The EMC PARTNER logo appears for a short time, followed by the first information screen.

After a few seconds the parameter input screen is displayed.



7.2 ESD3000 Control Panel

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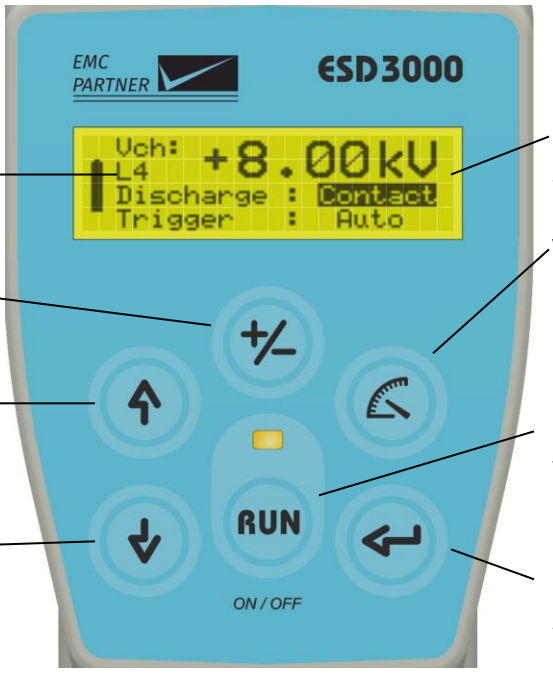


IEC Test Level
1 to 4

Polarity Switch
Positive or Negative

Menu Up
Move up through the menu structure

Menu Down
Move down through the menu structure

LCD Display
Shows all parameters

Voltage Level Select
Change between predefined standard test levels.

RUN & ON/OFF Button
Turn on ESD3000 and start discharge

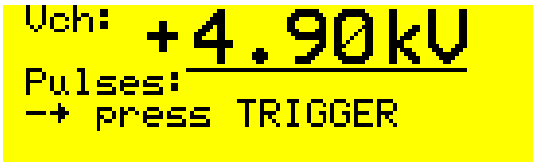
Enter Button
Accept changed parameter

7.3 Parameter Input

Navigate through the ESD3000 menu structure using the MENU UP or DOWN arrows followed by ENTER to select a parameter

7.3.1 Test Level

Discharge test level can be entered using two methods. Press the Voltage Level select button on ESD3000 control panel. The voltage level will be highlighted by a line underneath.



Discharge level is active and can be changed.

- Press the Voltage Level selector to move between pre-defined IEC test levels (1 to 4)
- Use the UP / DOWN arrows to adjust voltage.
- Confirm the selection by pressing ENTER.

7.3.2 Number of Discharges

Select the number of discharges as follows.

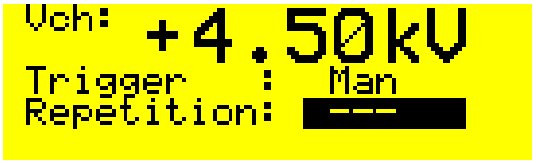
use the DOWN arrow to place the cursor on the menu point Pulses Nbr.

Enable the selection by pressing ENTER

Use the UP and DOWN arrow to select the required number of impulses. Step size from 1 to 1000 is 1, above 1000 is 10.
Confirm the selection by pressing ENTER.

7.3.3 Impulse repetition

Only single discharges are specified in the IEC standard for compliance testing. The time interval between discharges should be sufficient to allow charge to dissipate before another discharge occurs. However, for exploratory purposes, a repetition up to 20 Hz can be used. ESD3000 can be programmed with repetition rates from 1 Hz to 20 Hz in both AIR and CONTACT modes. Repetition programing is time based. For example 20 Hz = 0.05 s.



When MANUAL trigger mode is selected, no repetition is possible.

7.3.4 Count mode

The number of discharges to be applied at a particular test point on the EUT can be defined in the range 1 to 30,000. For compliance testing 10 initial discharges should be made at any test point.

Count mode will count down from the number of discharges programmed.

ESD3000 can be programmed to count:

- All trigger events
- Discharges only

Discharges only mode monitors the energy transferred from the impulse capacitor to the EUT to ensure a real discharge has taken place.

Trigger event mode counts may include discharges with no or low energy transfer to the EUT that are an under test.

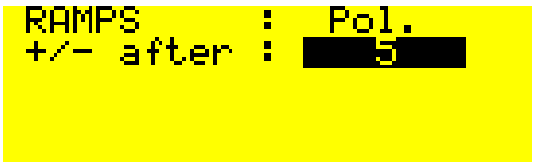
Use ENTER button to select the COUNT MODE. Disch. or All

7.3.5 Ramp functions

ESD3000 can be programmed to automatically change parameters during a test process. Parameters that can be changed are Polarity and Voltage.

Use the UP / DOWN arrows to select Ramps.
Press ENTER to open the Ramp menu.
Press ENTER again to scroll through the ramp options.

When Pol (Polarity) is highlighted, use the ENTER button and UP / DOWN arrows to edit the number of discharges to be released at each polarity.



In this example, ESD3000 will release 5 discharges at each polarity.

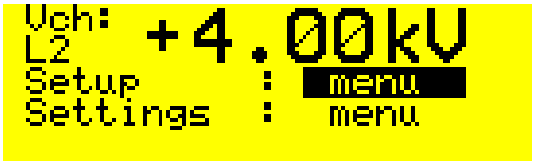
When Level is highlighted, use the ENTER button and UP / DOWN arrows to select:
- the number of discharges at each level
- the start level
- the steps size to each new discharge level

The maximum discharge level is the programmed Charging voltage (Vch) in main menu.

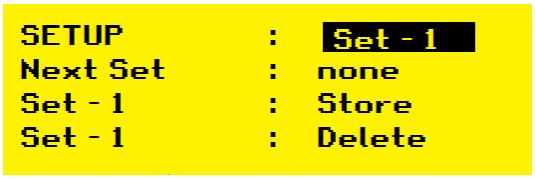
7.3.6 Test setup menu

ESD3000 can store up to 9 pre-defined test routines.

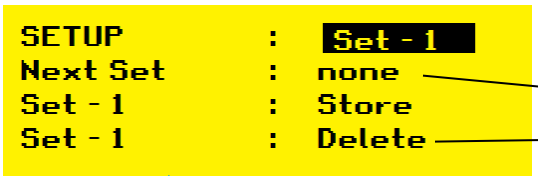
Program ESD3000 with the required test parameters, then using the UP / DOWN arrows scroll to the menu point Setup.



With menu highlighted, press ENTER to activate the storage function.



Select a storage location (1 – 9) using the UP / DOWN arrows Confirm with ENTER.
Move the cursor to Store and press ENTER.
All parameters will be stored in memory location 1



Tests can be linked to run sequentially.
Select the next test to be started by moving the cursor to Next Set and pressing ENTER.
Delete a set by moving the cursor to Delete and pressing ENTER

7.3.7 Run Mode

Always fit a ground cable between the ESD3000 and Ground Reference Plane.

Press the RUN button to start a test.

If discharge mode has been changed, the following message is displayed. The operator is informed that the discharge tip may need to be changed.

AD = AIR Discharge
CD = CONTACT Discharge

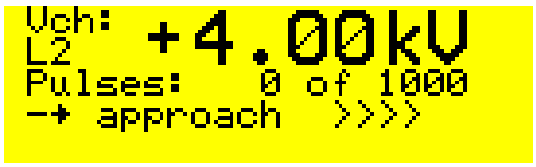
Press any button to continue and then the RUN button again to initiate discharges.

During RUN mode the LED above the RUN button flashes and the following screen is shown.

Press the discharge trigger on underside of ESD3000 to start the test.

7.3.8 AIR discharge

To test using AIR discharge mode, first make sure the correct (round) discharge tip is fitted. The ESD3000 needs to be brought into contact with the EUT by the operator. This action simulates a person moving towards and touching the EUT.



ESD3000 prompts the operator to perform this action.

ESD3000 should be moved towards the EUT until a discharge occurs. The discharge will be registered and the operator is prompted to press the discharge trigger again. This process is repeated until all pre-programmed discharges have been released.

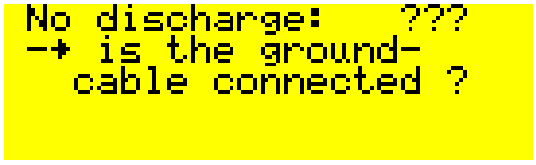
If ESD3000 is not brought into contact with the EUT within 5 seconds, the unit will produce a timeout message and start the charging process again. This corresponds to the 5 second holding time as specified in IEC 61000-4-5.

7.3.9 CONTACT discharge

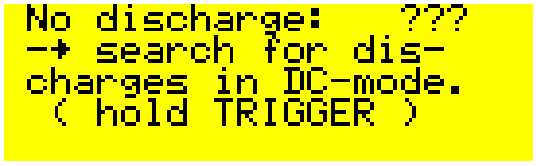
To test using CONTACT discharge mode, first make sure the correct (sharp) discharge tip is fitted. ESD3000 tip should be placed on the discharge point of the EUT. Press the discharge trigger once only and the discharges will be released with the pre-programmed repetition until all programmed discharges have been counted.

7.3.10 Operator Messages

If ESD3000 detects an irregularity in the discharge process, messages will be displayed for the operator.



Contact mode
After 3 attempted discharges if no discharge occurs, this message is shown.

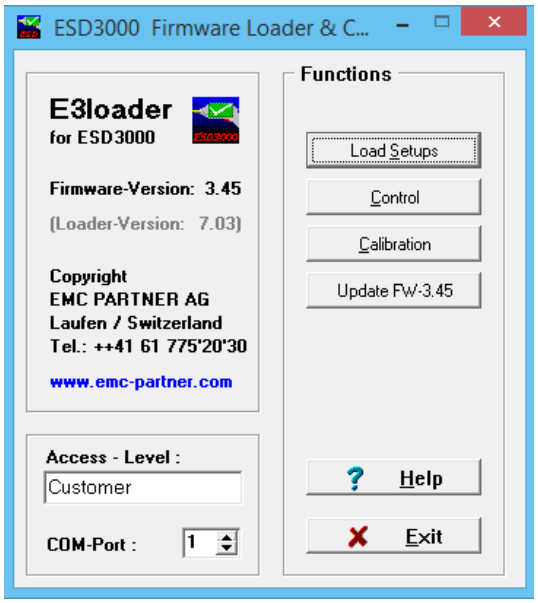


Air mode
After 3 cycles if no discharge can be counted, this message is shown.

7.4 External PC Software

Remote control from a computer can be performed using the E3Loader software package delivered free of charge with every ESD3000 or the more sophisticated TEMA software available for purchase.

7.4.1 E3Loader Software



E3Loader has multiple functions:

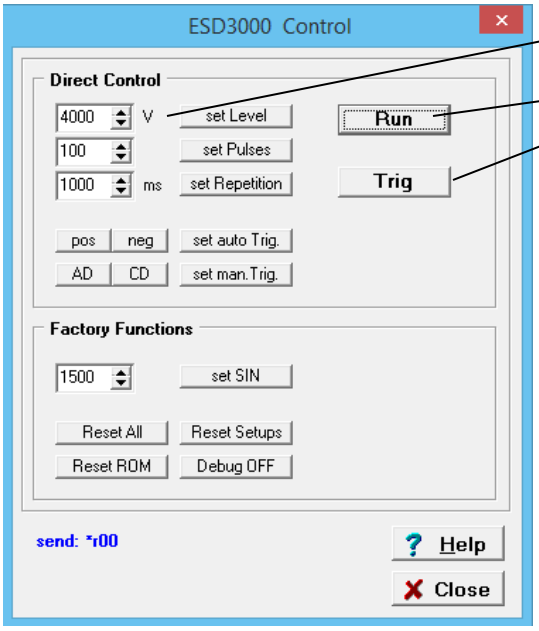
- Update ESD3000 software
- Adjust calibration levels
- Load pre-defined test routines
- Control ESD3000

Select the COM-Port in E3Loader to match an available port in the computer.

Further information on remote operation is provided in section 13.7 of this manual.

Control of ESD3000 can be performed directly from E3Loader software or by uploading pre-defined tests into ESD3000 for autonomous operation.

Enter test Parameters and control ESD3000 directly.

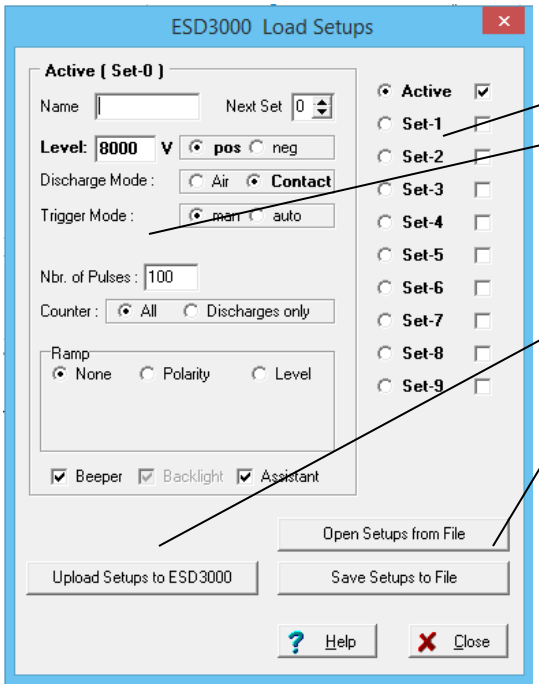


All parameters for a single test can be entered on one screen.

A test is started by pressing the Run button.

Trig is the discharge release for ESD3000

Load Pre-defined Tests into ESD3000 using Setup function.



All parameters for a test can be entered on one screen.

Select a memory location (Set 1 – 9).

Enter parameters for ESD3000

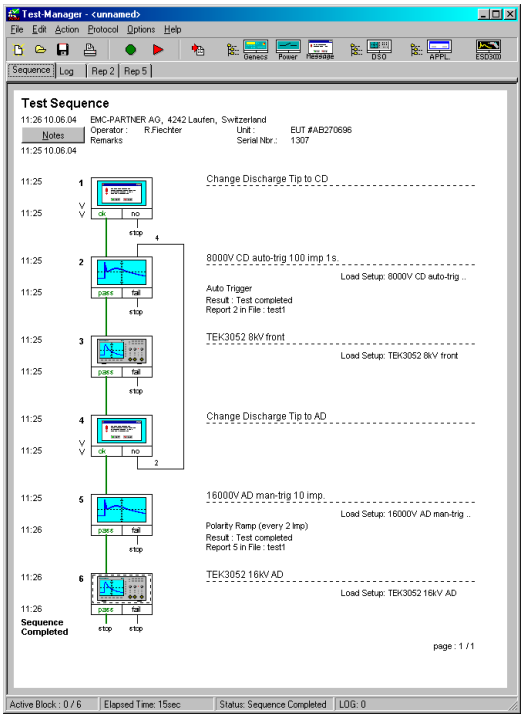
Select a new memory location and repeat the process until all tests have been entered.

When connected to ESD3000 using the upload module, press Upload Setups to ESD3000 to transfer the programmed test data from the computer to ESD3000.

Test Setups can be saved and recalled from the computer memory.

Calibration and software update functions are described in more details under section 13 Maintenance and Updates.

7.4.2 TEMA Software



The optional TEMA software can be purchased from your EMC PARTNER representative.

TEMA software enables test sequences to be programmed,

ESD3000 can also be integrated into a complex routine including other EMC PARTNER impulse generators.

A complete test report is available in html format. This can be exported into Word© or Excel©.

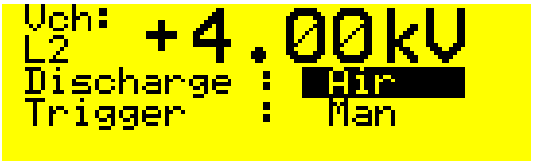
The basic TEMA software can be extended with the TEMA-EXT-MEAS package which enables remote operation with oscilloscopes to capture measurement data.

8 Special Applications

8.1 Faster Repetition Testing

A EUT can be subjected to fast repetition impulses up to 20 impulses per second to search for weak points in the design. This can only be done using ESD3000 together with ESD3000DM1 module.

ESD3000 is programmed for 20 Hz repetition by selecting charging voltage 4 kV, discharge mode to AIR, trigger mode to manual as shown below.



To continuously release impulses with 20 Hz repetition, press the RUN button to activate the high voltage circuits, then press and hold the impulse trigger to release the impulses.

8.2 Faster Risetime Testing

IEC 61000-4-2 requires a discharge risetime of between 0.6 and 1 ns.

To stress the EUT beyond these requirements, a discharge with faster risetime can be used. The ESD3000RM32 relay module is supplied with a magnet that can be used to activate a reed relay in the ESD3000RM32, bypassing part of the waveshaping circuit and allowing the risetime to be approximately 400 ps.

Magnet is fixed on the ESD3000RM32 by two insulated screws.

9 System Accessories

9.1 ESD-VCP50 Coupling Plane

Parameter	Specification	Picture
Dimensions	50 cm x 50 cm	
Weight	8 kg	
ESD Application Points	One on each side	
Included Items	2 m earth cable 2 x 470 k	

9.2 ESD-TARGET2 DN

Parameter	Specification	Picture
Input Impedance	2 Ω	
Input Voltage	30 kV max. Contact Discharge	
Frequency Response	± 0.5 dB to 1 GHz ± 1.2 dB to 4 GHz	
Included Items	40 dB Attenuator Cable 1 m 50 Ω	

9.3 ESD-VERI-V

Parameter	Specification	Picture
Input Impedance	20 GΩ // 3pF	
Input Voltage	30 kV max.	
Output Voltage Range	0 – 1.6 V in 10 MΩ or 1 MΩ	
Output Connector	BNC	
Dimensions	17 cm H x 5.5 cm Diameter	
Weight	433 g	
Included Items	BNC adapter and termination	

9.4 ESD-STAND Ed2

Parameter	Specification	Picture
Height	50 – 180 cm adjustable	
Dimensions	64 x 17 x 12 cm (packed)	
Weight	4 kg	
Included Items	Cable holder	

9.5 ESD-HCP-AUTO

Parameter	Specification	Picture
Length	150 cm	
Insulation	0.5 cm	
Test Level	0 – 20 kV	
Dimensions	180 x 120 x 5 cm	
Weight	2.2 kg	
Included Items	Earth cable	

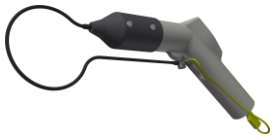
9.6 ESD3000DM-EXT

Parameter	Specification	Picture
Compatibility	DM and DN modules	
Cable Length	1 m	
Weight	0.5 kg	
Application	Remote module operation	

9.7 ESD3000 SAFETY-S

Parameter	Specification	Picture
Voltage Application	30 kV maximum	
Dimensions	20 x 16 x 12 cm	
Weight	2 kg	
Included Items	Mains adapter	
Application	Explosive device testing	

9.8 ESD3000 CNH12

Parameter	Specification	Picture
Loop diameter	12 cm	
Loop current 15 kV	50 A	
Loop curret 30 kV	100A	
Discharge mode	Contact discharge only	
Dimensions	33 x 13 x 1 cm	
Weight	0.2 kg	
Application	Magnetic field generation	

9.9 ESD3000-OPTOLINK

Parameter	Specification	Picture
Cable length	10 m	
Connector type	D-Sub DE-9 female	
Weight	0.2 kg	
Baud rate	9600 bps	
Included items	USB adapter	

9.10 TC-ST ED for Explosive device testing

Parameter	Specification	Picture
Voltage Insulation	36 kV maximum	
EUT dimensions	20 x 30 x 20 cm	
Safety circuit	Door interlock	
EUT weight	5 kg maximum	
Weight	8.5 kg	
External dimensions	47 x 43.5 x 25.4 cm	
Included items	25 pol cable for safety	

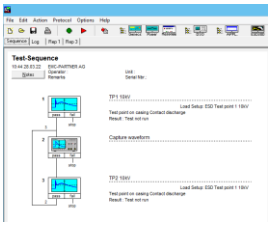
9.11 Warning Lamp

Parameter	Specification	Picture
Cable length	5 m	
Dimensions	25 cm H x 7 cm diameter	
Weight	0.5 kg	

9.12 Emergency Stop

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

9.13 TEMA Software

Parameter	Specification	Picture
Compatibility	Windows© XP upwards	
Operations with ESD3000	Remote, reporting, sequences	
Licence	1 per generator	
Requires	ESD3000-OPTOLINK	

10 Recycling

10.1 RoHS directive 2002/95/EG

The ESD3000 generator and all accessories comply with the directive 2002/95/EG (RoHS - Restriction of certain Hazardous Substances).

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

10.2 WEEE directive 2002/96/EG

The EMC Partner ESD3000 generator and all accessories, 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.

10.3 Information for dismantling

Always remove power cords first.

There is no special danger involved in dismantling the ESD3000 tester.

10.4 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.

10.5 Parts which cannot be recycled

All parts in the ESD3000 testers can be recycled.

11 Maintenance and Updates

11.1 ESD3000 Verification

Correct output from ESD3000 can be checked using a 2 Ω current shunt for discharge waveform verification or a voltage divider for ESD voltage verification.

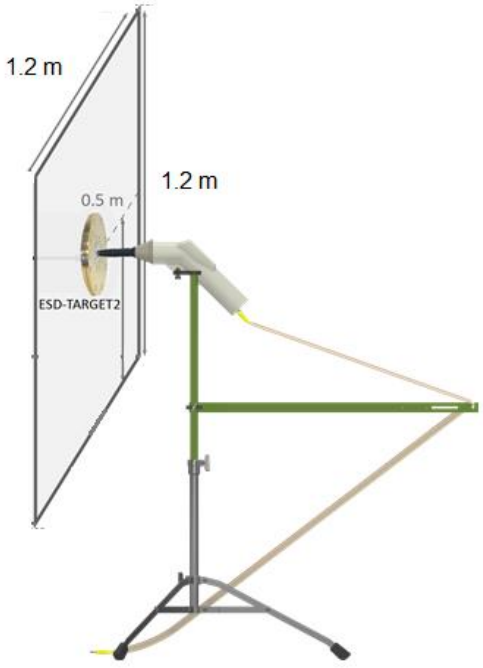
11.1.1 ESD3000 current discharge waveform

The verification procedure is defined in the standard IEC 61000-4-2.

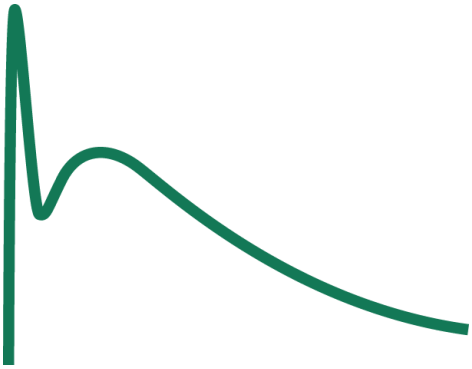
Equipment needed is as follows:

- 2 Ω ESD target
- Vertical calibration plane 1.2 m x 1.2 m
- Oscilloscope bandwidth > 2 GHz
- Non-metallic tripod
- Attenuators

The ESD3000 is setup as below:

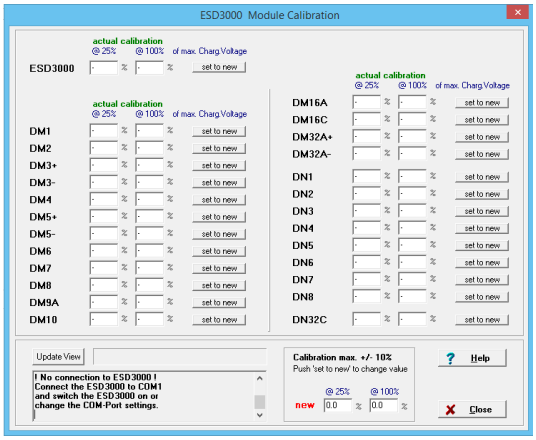


ESD3000 is mounted on the non-metallic tripod.
The ground cable is drawn back in a "V" shape as shown.
ESD3000 contact discharge tip is placed on the 2 Ω calibration target.
The target is connected to the oscilloscope to record the ESD current waveshape.



11.1.2 ESD3000 DC voltage level

ESD3000 dc level can be adjusted using the E3Loader software and ESD-VERI-V.



The procedure for using ESD-VERI-V is describe in the ESD-VERI-V user manual and E3Loader help file.

11.2 ESD3000 System Reset

Attention!
Performing a system reset will delete all user programs from ESD3000 internal memory. Before proceeding, make sure programs are backed up using E3Loader software.

To reset ESD3000 to default values proceed as follows:

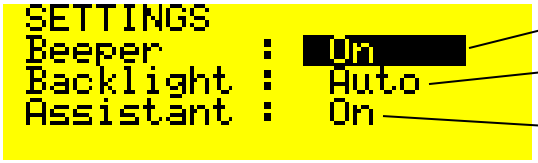
- Ensure ESD3000 is turned OFF
- Press and hold the polarity (+/-) button
- Press the RUN button
- When message “Reset to default” is displayed
- Release polarity (+/-) button

11.3 Labels on ESD3000 and Modules

Use only plastic labels!
It is forbidden to place metallic labels on the ESD3000 or ESD3000 modules and networks. Metallic labels could influence the discharge and compromise insulation capability.

11.4 Settings Menu

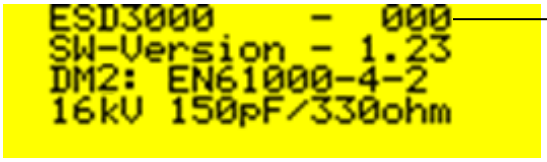
ESD3000 settings can be customised by the user.



The internal beeper can be turned ON or OFF.
The backlight can be turned ON, OFF or set to Auto mode. Default Auto.
Test assistant can be deactivated. Default ON.

11.5 Module Calibration Data

When ESD3000 starts, the welcome screen should show the network serial number. If no serial number is displayed, this indicates that the calibration data has been lost and must be re-entered manually.



No serial number, module data lost.

Calibration values for each Discharge Module (DM) or Discharge Network (DN) are included in the calibration report.

Remarks	Service Menu / Calibration Factor: Calib. at 4kV = -1.00% Calib. at 16kV = 0.00%	The information is located on page 2 of each calibration report.

Calibration values can be entered directly into ESD3000 in the service menu.

Alternatively, the calibration values can be entered or adjusted using the E3Loader software supplied free of charge with each ESD300. Refer to the E3Loader Help file for more information on this process.

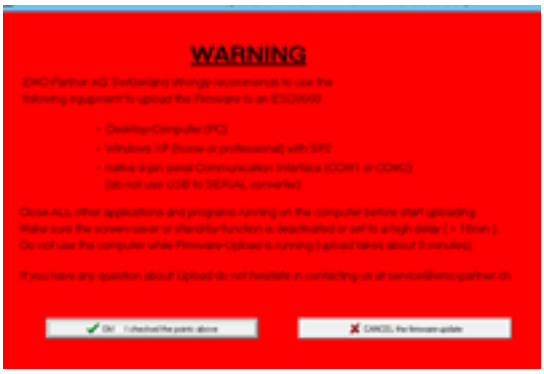
11.6 ESD3000 Software Update

ESD3000 software can be updated using the E3Loader program. A special update cable is provided as standard with every ESD3000 unit. This cable can only be used for software update.

Software update cable cannot be used for remote control. A box on the cable end covers the ground connection as shown. For remote control during testing, use only the fibre optic link.

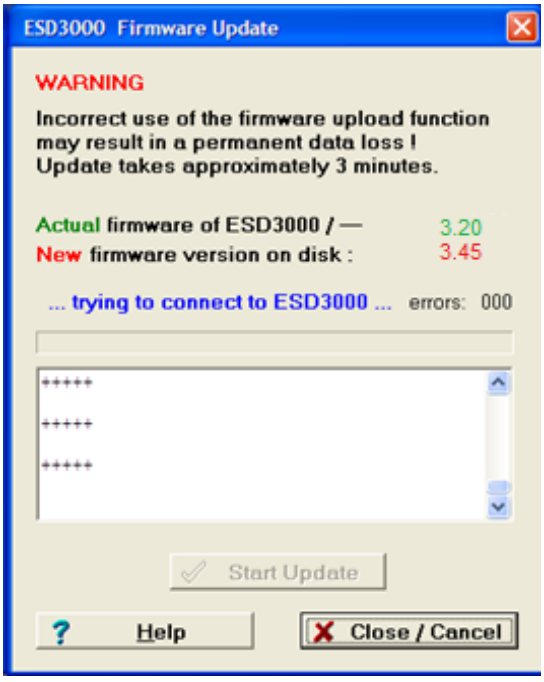
- Connect ESD3000 to the serial port of a computer

- Switch on ESD3000.
  - Make sure system power is maintained during the upload process (Batteries fully charged before start of update). Update takes approximately 10 minutes.
- Start E3Loader software
- Communication with the upload monitor inside ESD3000 is established when the message...connected to ESD3000 appears



When pressing the button

A red screen appears with information to follow BEFORE continuing with the update



The window indicates the firmware version on the ESD3000 and the new version on the hard disk.

- Click on 'Start Update' and wait for the message '...Upload successful...'
- Restart the ESD3000 and check if the new version is shown on the display.

11.7 Power Supply and Charging the Batteries

ESD3000 is a battery operated equipment powered by ten AA rechargeable batteries. The batteries are located in a removable pack. In normal operation, it is not necessary to remove the batteries as they can be recharged using the supplied charger unit. If they do need to be replaced, this is achieved by unscrewing the knurled head screw on the base of ESD3000 handle and pulling them out.

To recharge the batteries, connect the charger unit special Lemo connector to the socket on the base of ESD3000 handle. The battery charger operates with AC voltages between 110 V and 240 V.

Removing battery pack

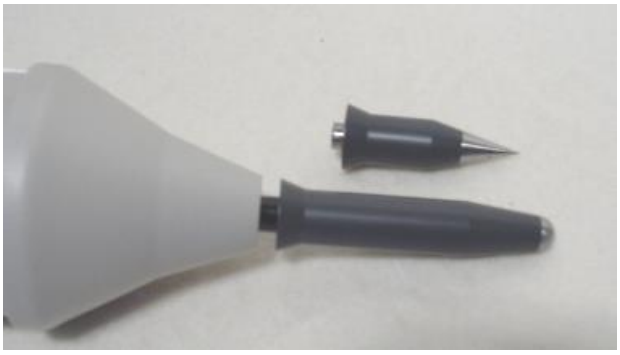
Charging connector on base of ESD3000 handle

11.8 Exchange Discharge Tips

The air discharge and contact discharge tips are easily exchanged simply by pulling one off and replacing with the other tip.

When AIR discharge is selected in ESD3000 menu, ensure that the rounded test finger is fitted.

When CONTACT discharge is selected in ESD3000 menu, ensure that the sharp tip is fitted.



Exchanging discharge tips

11.9 Repairs

ESD3000 circuits can only be repaired by EMC PARTNER AG service department or our certified service partners.

If ESD3000 or any discharge circuits suffer mechanical damage, immediately stop use and return to EMC PARTNER AG. The casing performs an insulating and also a screening function. Damage to the mechanical casing may expose the user to dangerous high voltages.

11.9.1 Returning ESD3000 for Repair

In the unlikely event of an ESD3000 system component needing to be returned to EMC PARTNER, ensure the devices are packaged carefully. ESD3000 modules contain components sensitive to mechanical shock. The best is to return the items in the ESD3000 case.

Always contact EMC PARTNER service department BEFORE returning any parts to obtain a Return Material Authorisation (RMA) number. This ensures the fastest handling and return.

12 Service Information

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