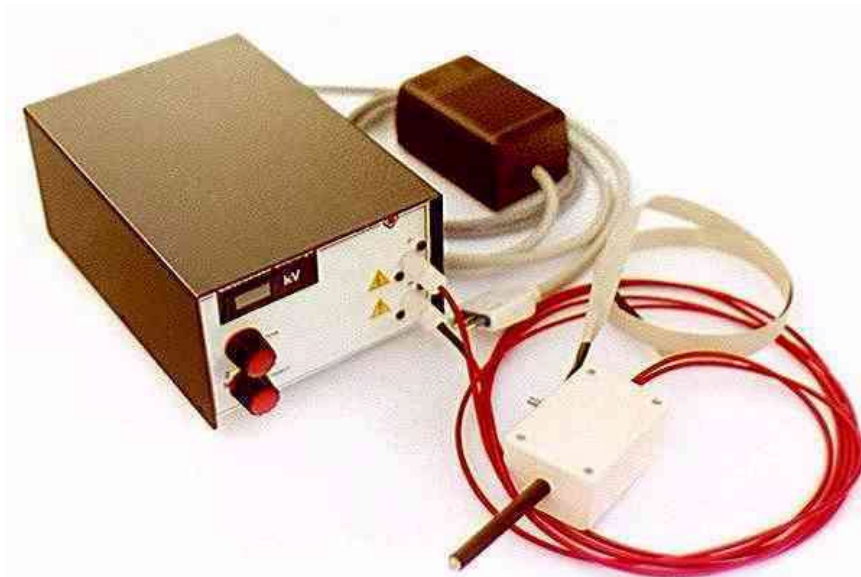




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# GENERATOR FOR ELECTROSTATIC DISCHARGES SIMULATION DNBESD01



## MANUAL

rev. 11/2004

**DENE B ELETTRONICA s.n.c.**

*Progettazione, Produzione e Commercio  
Apparecchiature Elettroniche*

C.da Vallebona 2 - 62100 MACERATA (ITALY)

Tel. +39 (0733) 236427

Tel. e Fax +39 (0733) 236399

B.B.S. Tel. +39 (0733) 261396

Cod. Fisc. e Part. IVA n. IT 01015290438

R.I. Macerata 7785 - R.E.A. 110447

<http://www.deneb.electronics.it>

e-mail: [deneb@deneb.electronics.it](mailto:deneb@deneb.electronics.it)



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# **1. INTRODUCTION**

The DNBESD01, Deneb high voltage generator for the electrostatic discharges simulation is a compact tool, that allows the execution of "PRE-COMPLIANCE" immunity tests on electronic and/or electromechanical apparatuses, to verify the requisite of the electromagnetic compatibility (EMC).

The DNBESD01 can perform the immunity test to electrostatic discharges according with the norm EN 61000-4-2, and it is composed by a unit including the high voltage generator, the voltage control circuit, and the lcd display to visualize the output voltage level.

Included in the packages are:

- AIR ESD: passive probe for the electrostatic discharge in air to the device under test (EUT), complete of high voltage cables for the connections with the generator
- External transformer for main unit

Optional accessories:

- Contact ESD: active probe with discharge switch, for the application of "contact" discharge to the EUT

Note: this contact probe is not yet available from Deneb

## **2. PRECAUTIONS AND SAFETY MEASURES**

### **2.1 GENERALITIES**

The tool has been designed in conformity with the norms EN61010 and EN60950, related to the tests and measure of electronic instruments, for an use in an environment with pollution level 2 and can be used for "in air" immunity ESD tests (electro static discharges) on apparatuses and installations with category of overvoltage III, 600V.

Before using the device, it is essential to read carefully the instructions for its use and maintenance. Make sure that all the persons assigned to its use and maintenance must be adequately specialized and has read and understood the safety indications present in this manual.

### **2.2 PRELIMINARY INSTRUCTIONS**

The tool generates in output high voltages, that can create a serious danger to the human life, therefore must be used from personal specialized in accord with VDE 0104.

Before and during the execution of tests follow meticulously these indications:

- Don't make the tests in damp environments, in presence of gas or explosive materials, combustible or in dusty environments
- Avoid contacts with the circuit in examination
- Avoid contacts with exposed metallic parts, with unused measure terminal, etc.
- Don't make any test if anomalies are found in the tool as deformations, break-ups, escape of substances, absence of indications on the display etc.

People that use peace maker or they have other handicaps, don't have to be near the zone where tests are effectuated, because the tool is able to radiate a strong energy in the proximities in which work.

Possible interventions inside the instruments, must exclusively be performed by specialized and authorized personal.

Before opening the equipments verify that all cables, power supply and others, are completely disconnected.

To open the tool after its use, wait at least 10 minutes to allow the inside capacitors to discharge themselves completely.

The not respect of this norms could cause danger at operator life.

In case of not observance than exposed, or, interventions inside the tool performed without written authorization of DENE B Elettronica, it will extinct automatically every form of guarantee on the instrument.

The partial non observance of these norms, can generate malfunctions, equipment damages and personal lesions.

On the other hand, only meticulously following the prescriptions and the recommendations provided by the manufacturer, You can have the absolute certainty to always get the maximum results and receive in case of necessity, efficient technical service.

This instructions manual must be preserved in secure site and available for the use.

For further questions call DENE B Elettronica.

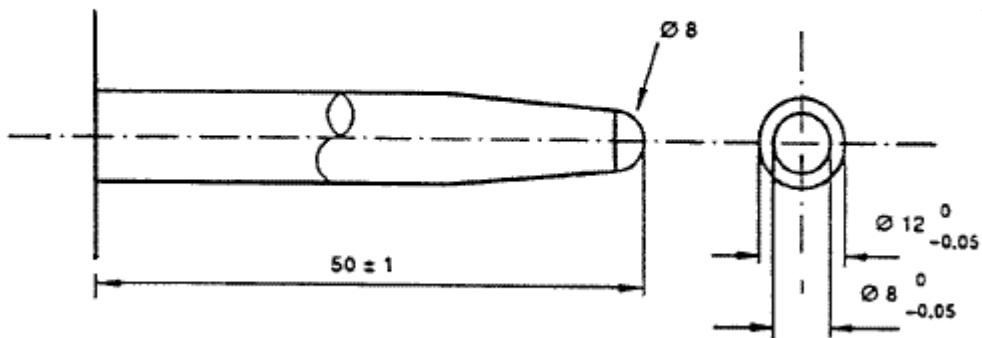
### **3. TECHNICAL SPECIFICATIONS**

#### **3.1 High voltage generator**

- Norm of reference: IEC 1000-4-2 (EN 61000-4-2)
- External dimensions 150x100x220(mm)
- Output voltage without load: 0,5-18kv  $\pm$  10%
- Voltages selectable on the panel:  
from 0,5 to- 8kv (continuously through the potentiometer)  
9kv-10kv-14kv-16kv-18kv (fixed values through the selector)
- Polarity: Positive/Negative (inverting probe connectors: THE INVERSION MUST BE PERFORMED ALWAYS at INSTRUMENT SWITCHED OFF)
- Charge resistor (Rc) 50-100 M
- Discharge resistor 330 Ohm  $\pm$  10%
- Energy load capacity 150pF  $\pm$  10%

#### **3.2 Air ESD Probe**

- Norm of reference: IEC 1000-4-2 (EN 61000-4-2)
- Discharge electrode: in brass, isolated body, circular tip
- Connection cables to generator: 20kV isolated, with high voltage connectors
- Ground connection of the probe: 2m flexible, thin connector
- Electrode dimensions: see figure



Discharge electrode: dimensions in mm

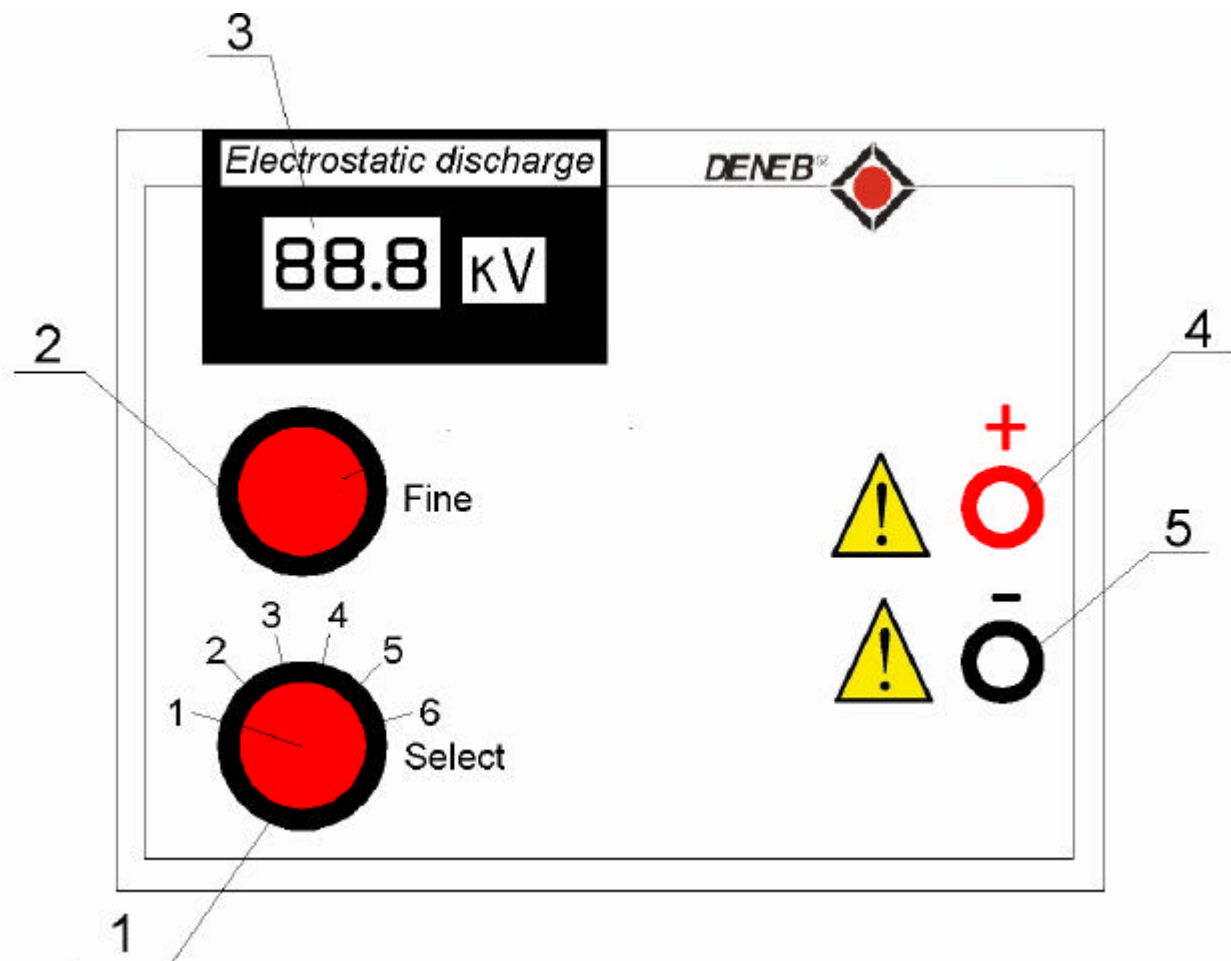
## 4. DESCRIPTION OF THE OPERATIONS

### 4.1 Generator DNBESD01

The DNBESD01 generator is contained in a compact metallic box. On the back side are present the female socket for external power supply adapter included with the tool, and the on/off switch.

On the frontal panel of the DNBGBS01 are present:

- 1 - Six positions selector to choice the output high voltage level
- 2 - Fine regulation of the high voltage output, (active only if the selector is positioned on level 1)
- 3 - Display to measure the output voltage
- 4 - High voltage output, Positive connector
- 5 - High voltage output, Negative connector



Through the selector 1 (SELECT) it is possible to choose the output voltage level and display it on the LCD 3.

With the selector 1 (SELECT) set on 1 the output voltage is linearly variable from 0,5kV to 8kV through the selector 2 (FINE).

With the selector 1 set on positions 2-3-4-5-6 the selector 2 is not active and the output level is fixed to the voltages set as below:

- SEL.1 pos. 1: 0,5-8KV through SEL.2 (FINE)
- SEL.1 pos. 2: 9KV
- SEL.1 pos. 3: 10KV
- SEL.1 pos. 4: 14KV
- SEL.1 pos. 5: 16KV
- SEL.1 pos. 6: 18KV

All voltages generated from the instrument are POSITIVE if the 2 cables are connected into the females 4-5 by respecting the colours: red with red and black with black, NEGATIVE in contrary case.

Remember to change the polarity always at INSTRUMENT SWITCHED OFF.



## **5. PREPARATION BEFORE USE**

### **5.1. Initial check**

The tool, has been checked electrically and mechanically from Deneb before the shipping, and all possible precautions for his delivery without damages has been taken.

Nevertheless it is recommend to the user to check the tool to verify possible damages suffered during the transport and contact the courier when anomalies are fount.

Check that the package contains all the suitable parts as specified in paragraph 1. In case of discrepancies contact DENEb Elettronica.

If it was necessary to return the tool, please follow the instructions as in paragraph 7.

### **5.2. Switching on the generator**

The tool must be powered through 230 VAC 50/60 Hz. The electric plant must have ground cable and must be protected from the indirect contacts, accordingly to the norms CEI 64-8 or to the equivalent national norms in use in the country of installation.

### **5.3. Adjustments**

The device is compliant with the technical characteristics written in this manual. The performances of the device are guaranteed for one year if the conditions of use written in the manual are respected.

### **5.4 Instrument's clean**

To clean the tool use a soft and dry cloth. Never use damp cloths, solvents, water, etc.

### **5.5 Store**

To guarantee precise test, after a long period of store under extreme environment conditions, wait that the device returns to the normal conditions (see the environmental specifications listed in the paragraph 5.6).

### **5.6 Environment conditions for normal use**

Temperature of reference:	18°C
Temperature of use:	0 ÷ 40 °C
Admitted relative humidity:	< 80%
Storage Temperature:	-5 ÷ 50 °C
Storage humidity:	< 70%



## 6.2 Test levels and criteria of immunity evaluation

Here the test levels described by the norm:.

<b>Test levels as indicated in the basic norm EN 61000-4-2</b>		
<b>Level</b>	<b>Air discharge</b>	<b>Contact discharge</b>
	<b>Test voltage kV</b>	<b>Test Voltage kV</b>
<b>1</b>	<b>2</b>	<b>2</b>
<b>2</b>	<b>4</b>	<b>4</b>
<b>3</b>	<b>8</b>	<b>6</b>
<b>4</b>	<b>15</b>	<b>8</b>
<b>x</b>	<b>Special</b>	<b>special</b>

The choice of the test level depends on the degree of immunity that has to possess the EUT, determined from the environment in which is destined to operate, or specified from the generic norms of product related to the specific instrument, or determined by particular applications.

Established the test level to apply, the criterions of evaluation (degrees of immunity) described from the norm EN 61000-4-2 are summaries in the following table:

<b>Evaluation criteria of immunity as described by norm EN 61000-4-2</b>	
<b>Immunity degree</b>	<b>Performances</b>
<b>1</b>	Normal performances within the specified limits
<b>2</b>	Temporary degradation or loss of operation with auto restore
<b>3</b>	Temporary degradation or loss of operation with necessary intervention of the operator or reset of the system
<b>4</b>	Degradation or loss of function not recoverable because of damage to the equipment (components) or to the software, or of loss of data

Admissible immunity degree is established from the generic norms of product which the EUT is subject in examination.

As general rule, the test result positive if the equipment shows its immunity during the whole tests period, and at the end of the tests the EUT satisfies the established functional prescriptions of technical specifications.

### 6.3 How to apply discharges

The discharge ESD must be applied only in all points of the EUT that the user can contact directly during his normal operation. The test must be carried out with single discharges. On the selected points must be applied at least 10 single discharges with positive polarity and ten single discharges with negative polarity. The discharges to contact are applied for apparatuses with metallic covering or conductors. Contact discharges must be applied only to apparatuses with metallic or conductive covering.

### 6.4 Tests preparation

For the execution of the immunity test ESD for "table EUT" it's necessary:

- Plan of reference earth
- Table in wood
- ESD generator
- EUT

The earth plan of reference is a metallic sheet (copper or aluminium) with a minimum thickness of 0,25 mm. Other metallic materials can be used, but they must have a thickness of almost 0,65 mm. This metallic plane must be placed on the floor, under the table.

Adequately with EUT's dimensions and the weight, a wood table or other insulating material can be used to support the ESD Generator and the EUT, with a minimum height of 0,8m.

The EUT must be placed to the centre of the table and powered like in the normal conditions of operation.

## 6.5 Execution of "in air" tests using AIR ESD probe

Before starting the test it's necessary to connect together the metallic reference plan, the electric plant's heart where it is working and the flat cable of the AIR ESD probe provided in the package.

The AIR ESD probe must be connected to the output female terminals (4-5) of the generator through the 2 coloured connectors. By matching the colours, the electrode will generate a positive discharge and by inverting the plugs it will give negative discharge.

Discharges must be applied to the EUT by approaching the tip of the electrode to the EUT as fast as possible without provoke any mechanical damage. After the discharge, the probe must be removed from the EUT. This procedure must be repeated so times as indicated by the norms to all possible EUT application points, with positive and negative polarity.

## 6.6 Execution of "contact" tests

Using the AIR ESD probe included with DNBESD01, is not possible to execute this type of test. Contact ESD probe is not yet available from Deneb.

7. Example of air ESD TEST REPORT

**Description of immunity test to the electrostatic discharges**

EUT: \_\_\_\_\_

**Gate: Insulating covering**

**Norm:** EN 61000-4-2

**Levels test of the norm:**

air discharge	
level	Voltage
1	2 kv
2	4 kv
3	8 kv
4	15 kv

Evaluation criteria of immunity by norm EN 61000-4-2	
Immunity degree	Performances
1	Normal performances within the specified limits
2	Temporary degradation or loss of operation with auto restore
3	Temporary degradation or loss of operation with necessary intervention of the operator or reset of the system
4	Degradation or loss of function not recoverable because of damage to the equipment (components) or to the software, or of loss of data

**Environment test:**

Norm of reference: EN 61000-4-2.  
 Temperature: 18 °C  
 Relative humidity: 45%  
 Atmospheric pressure: 1000 mbar

**Operating conditions of the EUT:**

Normal Operation

**Instrumentation used for the test:**

Instrument	Manufact.	Model	Serial number
High Voltage ESD generator	DENEB	DNBESD01	#####
Air ESD probe	DENEB	AIR ESD	

**Uncertainty of the measure: In agreement with the norm.**

## Continuation detail of the immunity test to electrostatic discharges

Test points	Types disch.	N° of disch.	Voltage	Criterion of evaluation	Result
○ Frontal part	air	10	+ 8 kv	B	Conform
○ Frontal part	air	10	- 8 kv	B	Conform
○ Right lateral part	air	10	+ 8 kv	B	Conform
○ Right lateral part	air	10	- 8 kv	B	Conform
○ Left lateral part	air	10	+ 8 kv	B	Conform
○ Left lateral part	air	10	- 8 kv	B	Conform
○ Posterior part	air	10	+ 8 kv	B	Conform
○ Posterior part	air	10	- 8 kv	B	Conform
○ Superior part	air	10	+ 8 kv	B	Conform
○ Superior part	air	10	- 8 kv	B	Conform

**Note:**

The EUT during the tests isn't dangerous or unsure. It shows its immunity because it is able to auto restore its functionality at the end of tests in a small time.

## 8. SERVICE AND GUARANTEE CONDITIONS

This tool is guaranteed against every defect of manufacture and used parts, in agreement with the sale general conditions. During the guarantee period, the defective parts can be replaced, but the manufacturer reserves him the right to repair or to replace the product.

If the tool doesn't work correctly, before contacting the Service of Assistance, check the state of cables and connections, so replace them if necessary.

If the tool continues to manifest malfunctions check if the procedure of use is conform as described in the present manual.

If the tool must be returned, for any reason, to the DENEb Elettronica, the shipment is at charge of the owner and the delivery will be, in every case, discussed preventively with Deneb.

Attached to the tool must be always inserted an explanatory note regarding the motivations of the return of the tool.

For the shipment use an adequate protected box; every damage caused by the use of inadequate package will be charged to the Customer.

The manufacturer declines every responsibility for damages caused to people or objects.

The guarantee is not applied in the following cases:

- Reparation e/o substitution accessories (not covered by guarantee).
- Reparations that are made because of a wrong use of the tool with non compatible equipments.
- Reparations that are made because of a non suitable packing .
- Reparations that are made because of interventions performed from personal not authorized.
- Changes to the tool without explicit authorization of the manufacturer.
- Use not contemplated in the specifications of the tool or in the user manual.

In case of not observance of previous written, or, interventions inside the tool performed without written authorization of DENEb Elettronica, will be extinct automatically every form of guarantee on the instrument.

The content of the this manual cannot be reproduced in any form without the authorization of the manufacturer.



DENEB Elettronica reserve the right to make changes to the specifications and the characteristics of the tool described in the present manual, due to technological improvements.

## **9. FAC-SIMILE OF DECLARATION OF CONFOMITY**

In the following page is reported a fac-simile of declaration of conformity.



## FAC-SIMILE OF DECLARATION OF CONFORMITY

The undersigned Pierantoni Giovanni, director of the “Deneb Elettronica s.n.c.” headquartered in C.da Vallebona, 2 - 62100 Macerata (Italy)

### DECLARES

that the tool: instrument “**DENEb DNBESD01**” ESD generator

to which this declaration refers, it is conform to the followings product directives:

Referred norm	Argument
73/23/CEE	Electric security – low voltage
89/336/CEE	Electromagnetic compatibility
93/68/CEE	CE logo

and what the norms harmonized of reference applied are:

- EN 61010-1: Safety prescriptions for electric instruments of measure, control and for use in the laboratory
- EN 61326: Instruments of measure, control and laboratory - Prescriptions of electromagnetic compatibility
- EN 55011: Radio frequency industrial instruments, scientific and cure - Characteristics of radio disturbance

The undersigned,

Macerata, May 14, 2002

The manufacturer

