Instruments
SCHAFFNER

NSG 432
Electrostatic Discharge Simulator

Electrostatic charges

Electrostatic charges are an everyday phenomenon. Materials that have differing dielectric constants become mutually charged through friction and can sometimes achieve quite significant voltages. The most well-known example is the charge generated by people walking on an insulated floor covering with the subsequent discharge through a spark when approaching a conductive article. Although unpleasant for the person involved, it is in fact harmless. Not so for electronic circuitry where the occurrence can have deadly effects. The high discharge current that results,and the consequent high electromagnetic field that is induced,can lead to faulty operation in office automation systems,computer installations, industrial electronic plant, automotive electronics, etc. (program errors, data loss, wild control signals) or to destruction of hardware components. Only systematic testing with simulation generators can ensure that items of equipment can withstand such disruptive effects in practice and that no damage with associated economic penalties results.

NSG 432
Static Discharge Simulator

The Simulator type NSG 432 generates static discharges of up to 25 kV in a defined and reproducible form. The handy shape, user-friendly controls and a range of accessories make the NSG432 into a highly practical and universal ESD test instrument.The instrument is modularly built. Various discharge networks can be attached to the generator section thereby making the unit suitable for carrying out tests according to various standards. A range of power supply units, including a mains-independent battery-pack, cover numerous user needs. A relay adapter enables testing to be carried out in conformity with the latest IEC recommendations. A wealth of accessories such as E-field/H-field adapters, measuring targets, etc. complete the range of possibilities offered by this flexible simulator.

Technical specifications

(in conformity with IEC 801-2)

Discharge voltage V_c (air-discharge)		2 - 25 kV (0.2 - 2.5 kV optional)
Discharge voltage V_c (with contact discharge adapter)		2 - 9 kV
Polarity		positive/negative
Discharge capacitor C_s		150 pF ± 10 %
Discharge resistor R_s		330 Ω ± 10 % or other value, depending on the discharge network
Operating modes		single/repetitive discharge
Test finger		conforms to IEC 801-2
Max. discharge energy		350 mJ (47 mJ at 150 pF)
Rise time (air-discharge)		< 1 ns for voltages ≤ 8 kV
Rise time (with contact discharge adapter)		0.7 - 1 ns
First current peak (with contact discharge adapter) at a voltage set to:	2 kV	7.5 A ± 10 %
	4 kV	15 A ± 10 %
	6 kV	22.5 A ± 10 %
	8 kV	30 A ± 10 %
Current pulse shape		conforms to IEC 801-2
Voltage indication tolerance (LCD)		± 5 %
Holding time		> 5 s
Charging resistor R_{Ch}		100 MΩ

Generator NSG 432

The generator housing, in a handy pistol shape, is formed from robust ABS onto which one or other of the many HV discharge networks can be mounted to suit the application. A multi-turn potentiometer enables the necessary high voltage to be easily set; the actual voltage being shown on an LC-display. A toggle switch sets the operating mode to either a single pulse or repetitive pulsing at 20 Hz. Pulse triggering is by means of a press-button integrated into the hand-grip. A flexible, coiled cable connects the generator to its power supply. A tripod mount is provided for testing that requires a large number of discharges.

Important ESD Standards

- IEC 801-2
  Electrostatic discharge Requirements
- EN 55101-2
  ESD Requirements
- ISO/CD 10605/E
  Road Vehicles - Electrical Disturbance from Electrostatic Discharges
- SAE J1113, Part 5
  Susceptibility to Electrostatic Discharges
- ANSI - IEEE
  Guide for electrostatic discharge test methodologies and criteria for electronic equipment
- VDE 0847, Part 2
  Measurement techniques for the assessment of electromagnetic compatibility (Messverfahren zur Beurteilung der elektromagnetischen Verträglichkeit)

- ECMA
- European computer manufacturers association
- ESD immunity testing of ITE, TR/40
- MIL-STD-883C
  Electrostatic Discharge Sensitivity Classification
- etc.

NSG 432
Base set

The base set includes:
- Generator NSG 432 without discharge network
- Carrying case in which accommodation is provided for the additional items
- Standard-conforming ground cable
- Spacers to set fixed distances between the test finger and EUT
- IEC discharge sphere
- Operating instructions

Power supplies

Three different power supplies are available to suit differing requirements.

Mains unit

A simple power supply with fuse and IEC cable; mains input voltage and connector as per order page.

Mains unit with preset counter

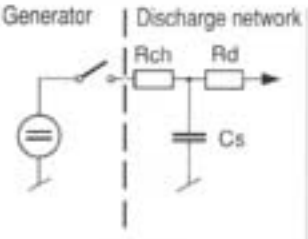
In this case, a counter is incorporated for presetting a defined number of discharges by means of an internal 1 Hz generator or with external triggering. The presettable counter is particularly useful in combination with the contact discharge adapter.

Battery-pack

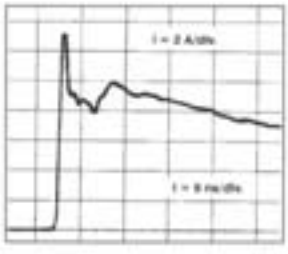
A rechargeable battery supply that makes the generator mains-independent with consequently greater freedom of use.Storage capacity is sufficient for up to 10 hours of testing. Charging unit for 110 Vac or 220 Vac as per order page.

Discharge networks

The required high voltage is produced in these modules through cascading. They also contain the various standard-conforming discharge networks.



Simple equivalent circuit



Typical discharge pulse for a discharge through air

Standard 25 kV discharge networks
Modules, that are standard products, with RC values corresponding to the most common Standards:.

+ 150 pF/150 Ω	- 150 pF/150 Ω (IEC 801-2,1984)
+ 150 pF/330 Ω	- 150 pF/330 Ω (IEC 801-2,1990)
+ 150 pF/2 kΩ	- 150 pF/2 kΩ (SAE J1113; ISO)
+ 330 pF/2 kΩ	- 330 pF/2 kΩ (SAE J1113; ISO)

Special 25 kV discharge networks
Modules produced to order with RC values and polarity specified by the customer (Cmax = 1200pF).

Special 2.5 kV discharge networks
Special versions for applications at the IC and PCB level.
Voltage range: 200 V ... 2.5 kV
The RC values and polarity have to be specified.

E- and H- field adapter set

(supplied as a set)

H-field adapter
Current-loop to check the interference immunity of circuit boards and equipment against electromagnetically induced disturbances.

E-field adapter and coupling piece
The disc-electrode produces a homogeneous E-field. Field breakdown upon arcing results in a very fast pulse rise time.

Adjustable discharge gap
A spark-gap that can be calibrated for the H-field adapter and a simple substitute for direct contact tests.

Measuring targets

Target (402-283)
for IEC 801-2 (1984)

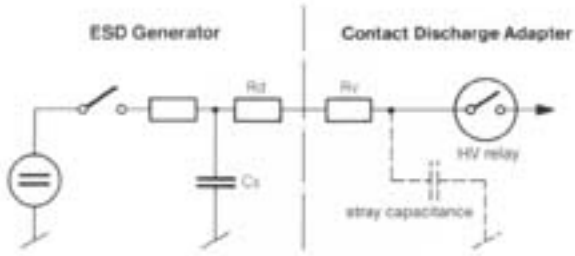
Target MD 101
for IEC 801-2 (1990)
Coaxial measurement attenuator as specified by IEC 801-2 (1990) for mounting in the Faraday-cage of a screened oscilloscope.

Contact discharge adapter
(Add-on HV relay)

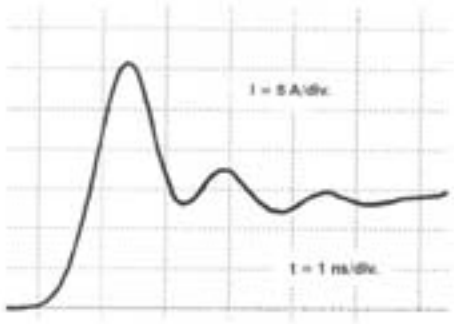
The reproducibility of conventional discharge tests is affected to some extent by environmental influences (air pressure,humidity and temperature). Pre-discharges, which depend on the speed of approach and the shape of the electrode, also affect the pulse form as well as the arcing voltage during tests.

In order to improve the reproducibility, the new Standards (e.g.IEC 801-2, 1990, ANSI-IEEE, ECMA) specify ESD simulation using the direct contact method. The CONTACT DISCHARGE ADAPTER meets these recommendations and enables precisely reproducible electrostatic discharge tests to be carried out irrespective of external influences. The device produces specification-true fast discharge pulses with rise times of < 1 ns. The adapter is simply mounted on the test finger of the generator.

The CONTACT DISCHARGE ADAPTER is available in two versions with Rv = 0 Ω or Rv = 180 Ω . The version has to be chosen such that a total resistance of 330 Ω results when added to the Rd of the discharge network.



Principle of operation



Typical pulse shape: first current peak

Technical specifications

Charging voltage	2 ... 9 kV, approx. 10 kV max.
Rise time tr	0.7 ... 1 ns
Polarity	positive or negative (depending on the cascade)
Triggering: NSG 432	- Manually with preset counter version of the mains unit: - 1 Hz automatically - external trigger

Current peak values

IEC-Level	Open circuit output voltage	Current value
1	2 kV	7.5 A
2	4 kV	15 A
3	6 kV	22.5 A
4	8 kV	30 A

Mechanical specifications

Dimensions approx.	80 x 80 x 60 mm (3.15" x 3.15" x 3.35")
Weight approx.	0.350 kg (0.77 lbs)

NSG 432 Order List

A copy of this page can serve as an order form directly when completed with the quantity (Qty) required.

BASIC EQUIPMENT

Minimum requirement: 1 Base set, 1 Power supply, 1 Discharge network

BASE SET

Set consisting of:

Ord.No.	Qty.
400-125	.....

- Carrying case
- Basic unit
- Bracket
- Earthing cable
- Spacing adapter
- Discharge sphere
- Manual English
- Manual French
- Manual German

POWER SUPPLY UNITS

Mains unit without preset counter
inkl. mains cable and fuse

Connector type	Ord.No.	Qty.
Schuko,(01)	402-921	.....
Swiss Type 13,(02)	402-922	.....
USA, UL 498/13,(04)	402-923	.....
GB, BS 1363,(05)	402-924	.....

Mains unit with preset counter
inkl. mains cable and fuse

Connector type	Ord.No.	Qty.
Schuko,(11)	402-918	.....
Swiss Type 13,(12)	402-917	.....
USA, UL 498/13,(14)	402-919	.....
GB, BS 1363,(15)	402-920	.....

Rechargeable battery-pack
incl. charging unit

Version	Ord.No.	Qty.
Battery-pack incl. 220Vac charger	402-915	.....
Battery-pack incl. 110Vac charger	402-916	.....

DISCHARGE NETWORKS

Standard 25 kV discharge networks

Version	Ord.No.	Qty.
+ 150 pF 150Ω	402-568	.....
+ 150 pF 330Ω	402-628	.....
+ 150 pF 2kΩ	402-682	.....
+ 330 pF 2kΩ	402-635	.....
- 150 pF 150Ω	402-580	.....
- 150 pF 330Ω	402-645	.....
- 150 pF 2kΩ	402-683	.....
- 330 pF 2kΩ	402-636	.....

Special 25 kV discharge networks

Special version			Qty.
+	pF	Ω	.....
-	pF	Ω	.....

Special 2.5 kV discharge networks

Special version			Qty.
+	pF	Ω	.....
-	pF	Ω	.....

OPTIONS

CONTACT-DISCHARGE ADAPTER

Contact-Discharge Adapter

	Ord.No.	Qty.
R_v = 0 Ω	402-664	.....

incl. connecting cable

Contact-Discharge Adapter

	Ord.No.	Qty.
R_v = 180 Ω	402-619	.....

incl. connecting cable

E- and H- FIELD ADAPTER SET

Adapter Set

	Ord.No.	Qty.
Set consisting of:	402-618	.....

- H-field adapter
- E-field adapter
- Discharge sphere
- Coupling piece
- adjustable spark-gap

MEASURING TARGETS

Measuring target

	Ord.No.	Qty.
IEC 801-2 (1984)	402-283	.....

Measuring target

	Ord.No.	Qty.
IEC 801-2 (1990)	MD 101	.....

Date: _____ Sender: _____ Signature: _____