ESD TESTING WITH PRECISION AND CONVENIENCE

NSG 435, NSG 437, NSG 438 AND NSG 439 ESD SIMULATORS

- Ergonomic design
- High functionality
- Easy to see and use touch panel display
- Battery powered
- Interchangeable discharge networks

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WHY ELECTROSTATIC DISCHARGE TESTING?

ESD – high frequency pulse components help diagnose immunity failures. The simulation of electrostatic discharges is an important part of electromagnetic compatibility testing for any type of electronic equipment and is a particularly critical component of EMC test strategies.
ESD tests are used to verify complete systems and duplicate disturbances in installations. These tests contribute to identify immunity failures caused by bad cabling or system composition, as well as grounding problems.
Teseq's ESD simulators fulfill the requirements of all major ESD standards. Special care has been taken to satisfy the discharge holding time of at least five seconds demanded by the standard. Thanks to stabilized HV output all Teseq simulators exceed this need by far and guarantee optimized reproducibility of tests. The basic models are type-approved and calibrated to IEC/EN 61000-4-2. A comprehensive range of additional network modules is available for testing to other standards including ISO 10605 and various product standards.
Teseq provides a traceable calibration certificate with each simulator. Accredited calibration services are also available from Teseq calibration labs upon request.

An innovative ESD operating concept that provides conformity to both today's and tomorrow's standards. Combining easy operation and ergonomic design with highly sophisticated functionality, Teseq's ESD simulators combine all the features of a comprehensive ESD test system in a compact hand-held instrument.

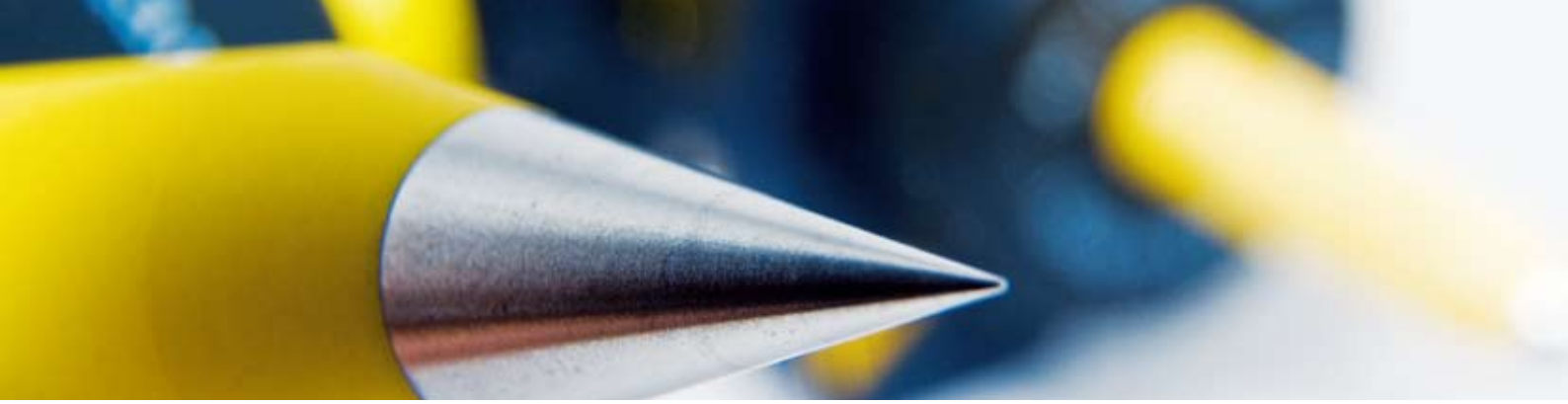
Ergonomic design and advanced functionality. The pistol-shaped NSG 435, NSG 437 and NSG 438 simulators are designed to sit comfortably in the operator's hand, with current operating conditions constantly displayed and clearly visible. All ESD simulators have been ergonomically designed to be held easily for long duration test procedures.
The NSG 435's LCD panel is clearly visible at all times in the operating position and all controls are placed conveniently at the user's fingertips.
Even more convenient is the touch panel display of the NSG 437 and NSG 438 with keypad functions for setting test parameters.

NSG 435 – COMPACT AND COST-EFFECTIVE

NSG 435's microprocessor-based controller and multifunction keypad provide the operator with instant access to its comprehensive range of built-in functions. The LCD panel continuously displays the operating status and all user-selected test parameters. The simulator also includes a discharge pulse counter as well as a counter for long duration tests and remote use.

NSG 435 has its own internal, battery operated high voltage generator producing pulses up to 16.5 kV. In addition to the pre-programmed, standard IEC pulses, the user can create custom tests using single or repetitive discharges with selectable rates and manual or automatic polarity switching. An optional mains supply is available for extended test operation or for use when the battery is being charged.

NSG 435 measures and displays true air breakdown voltages. It also detects real or valid air-discharges, thereby avoiding misleading discharge counts. This is especially important during long term tests and remote test setups.
The simulator is powered by a rechargeable battery supply, so there is no separate high voltage generator or connecting cable to hinder access to the EUT. The battery, which lasts for several days under normal test usage, can be interchanged in seconds, and recharged in just a few hours.



A range of interchangeable discharge networks is available, including EN, ANSI-IEEE, and ISO. The unit comes with a standard 150 pF/330 Ω discharge network for tests to IEC/EN 61000-4-2. The discharge voltage of up to 16.5 kV for air-discharges and up to 9 kV for contact-discharges ensures a comfortable margin over the generally required test levels.

NSG 435 is supplied with standard accessories, including interchangeable test tips, a grounding cable and battery charger – all in a durable carrying case. There is an optional fiber optic remote control trigger for operation inside a screened room or enclosure.

The LCD panel gives the operator a clear, continuous indication of all the test parameters, the operational status of the instrument and the current function of each of the five soft keys. The display shows the programmed voltage and actual discharge voltage after triggering with polarity indicator, number of discharges and battery status.

- **Programmable discharge voltage 200 V to 16.5 kV**
- **Stabilized charging voltage**
- **Pre-programmed IEC/EN 61000-4-2 test settings**
- **True air-discharge breakdown voltage**
- **Battery powered**
- **Compact and light-weight design**
- **Comfortable use and convenient operation**

NSG 437 – HIGH PERFORMANCE WITH BASIC FEATURES

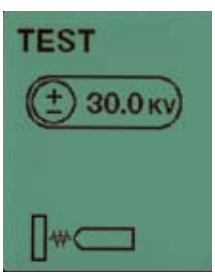
NSG 437 ESD simulator comprehensively fulfills virtually all international standard requirements. Based on over 20 optional discharge networks, the NSG 437 can also meet any of today's automotive manufacturers' standards. Furthermore, with pulse voltages of up to 30 kV, the NSG 437 supports demanding manufacturers' R&D test procedures to determine immunity limits.

NSG 437 already meets the proposed new requirements. Revisions of the ESD standards refer to a more precise definition of calibration methods and tighter specifications for pulse parameters, as discussed by ANSI and by IEC.

NSG 437 generates pulses from 200 V to 30 kV, both in air- and contact-discharge operation. The simulator is simple, convenient and safe to use. The whole range of parameter setting possibilities, including polarity selection, counter functions and breakdown detection, remains fully available up to the maximum discharge voltage.

The touch panel display with its keypad for parameter settings shows the precise functional and test data at any moment, perfectly arranged in a logical manner. All essential functions and actual status are displayed, with user-selectable language for convenient and safe operation worldwide.

The simulator contains a threshold detector to eliminate faulty discharge counts over its wide operating voltage range and applications. Only valid HV discharges are indicated. When discharges are detected, the counter or preset counter is incremented or decremented respectively – a particularly useful feature for long test runs. The detection feature can be switched off when testing EUT's with non-conductive surfaces, such as plastic housings.



A wide range of discharge networks and tips fulfills the high demand for different test applications and can be exchanged. Completed by a wide selection of rigid and flexible discharge tips, any application is possible.

Molded HV discharge networks in solid cases eliminate ionization and leakage current effects. Selected combinations of RC components guarantee wave shape parameters to be within tolerances. Discharge network modules with resistance values from zero ohms combined with capacitances up to the nF-range can be simply pushed into place.

Pre-programmed settings for IEC/EN 61000-4-2 and ISO 10605 ensure that the simulator is automatically set up correctly. The menu with last settings automatically comes up again after shut-down of a test sequence.

Automatic self-calibration of the NSG 437 simulator is performed at every start-up. This procedure runs up to max. voltage in either polarity, thus giving confidence, that test levels are maintained within tolerances.

- **Air- and contact-discharge up to 30 kV**
- **Light version featuring uncompromised test performance**
- **Compliant with a wide range of standards (IEC, ANSI, SAE, ISO)**
- **Touch panel display controls**
- **Easily and quickly interchangeable network modules**
- **Wide range of accessories (HV networks, tips, adapters)**

NSG 438 – OPTIMIZED FOR AUTOMOTIVE TESTING

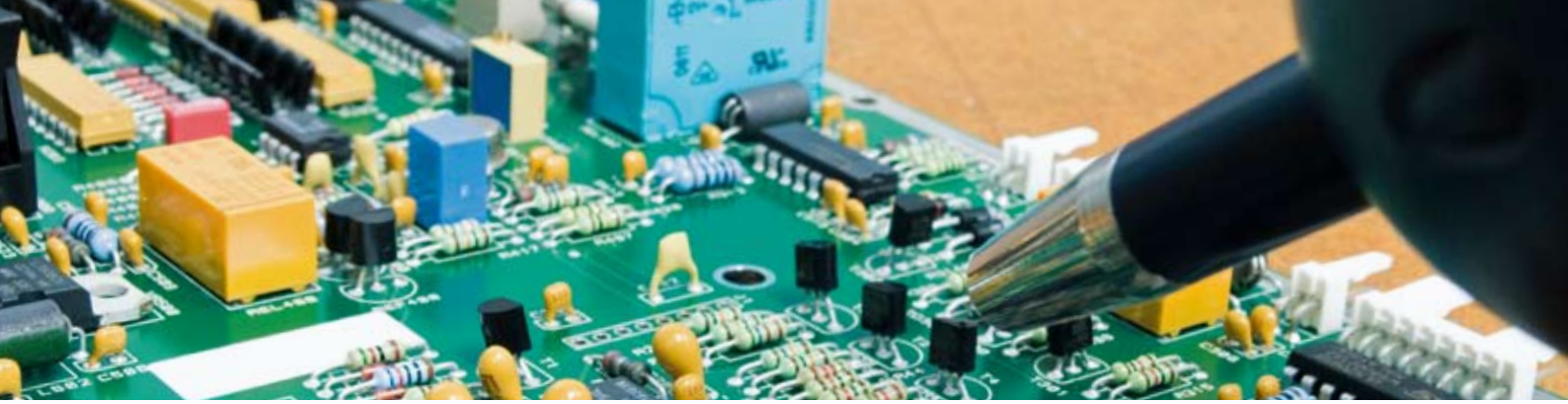
NSG 438 ESD simulator comprehensively fulfills virtually all international standard requirements. Based on over 20 optional discharge networks, the NSG 438 can also meet any of today's automotive manufacturers' standards. Furthermore, with pulse voltages of up to 30 kV, the NSG 438 supports demanding manufacturers' R&D test procedures to determine immunity limits.

NSG 438 already meets the proposed new requirements. Revisions of the ESD standards refer to a more precise definition of calibration methods and tighter specifications for pulse parameters, as discussed by ANSI and by IEC.

NSG 438 generates pulses from 200 V to 30 kV, both in air- and contact-discharge operation. The simulator is simple, convenient and safe to use. The whole range of parameter setting possibilities, including polarity selection, freely adjustable pulse repetition, counter functions and breakdown detection, remains fully available up to the maximum discharge voltage.

The touch panel display with its virtual thumb wheel or keypad for parameter settings shows the precise functional and test data at any moment, perfectly arranged in a logical manner. All essential functions and actual status are displayed, with user-selectable language for convenient and safe operation worldwide.

The simulator contains variable threshold selection to enable accurate discharge detection and to eliminate faulty discharge counts over its wide operating voltage range and applications. Only valid HV discharges are indicated. When a discharge is detected, the counter or preset counter is incremented or decremented respectively – a particularly useful feature for long test runs. The detection feature can be switched off when testing EUT's with non-conductive surfaces, such as plastic housings.



A wide range of discharge networks and tips fulfills the high demand for different test applications and can be exchanged. Completed by a wide selection of rigid and flexible discharge tips, any application is possible.

Molded HV discharge networks in solid cases eliminate ionization and leakage current effects. Selected combinations of RC components guarantee wave shape parameters to be within tolerances. Discharge network modules with resistance values from zero ohms combined with capacitances up to the nF-range can be simply pushed into place.

Pre-programmed settings for IEC/EN 61000-4-2 and ISO 10605 ensure that the simulator is automatically set up correctly and the appropriate discharge network is installed. The actual R/C value is displayed at all times.

Users can create and store test conditions in the instrument's memory for subsequent reuse. The menu with last settings does automatically come up again after shut-down of a test sequence. A list of saved test conditions can be called up at any time. A built in optical interface enables external control of the simulator.

Safety interlock. The high-voltage simulator can only be activated as a result of a deliberate actions by the user. In all other cases, the instrument switches itself off automatically. An integral interlock system allows setting up accessibility and safety configurations even in combination with other test instruments. For extra safety an emergency stop switch is built in.

- **Air- and contact-discharge up to 30 kV**
- **Compliant with a wide range of standards (IEC, ANSI, SAE, ISO)**
- **Built-in ISO self-calibration procedure**
- **Powered by high-energy battery pack**
- **Touch panel display controls**
- **Easily and quickly interchangeable network modules**
- **Adjustable discharge detector**

With the built-in ISO calibration self-test feature considerable time can be saved by eliminating extra calibration and functional measurements before starting a test procedure as required by the ISO standard. The calibration routine is configured for all required voltage levels in either polarity and summarized in a convenient, easy to read table form including relevant tolerances.

The freely adjustable pulse repetition rate ranges from 0.04 s to 300 s. This allows greatest flexibility for R&D purpose and some specific product standards, where the prestored pulse repetition rates may not match all requirements.

A special random generator function is provided for non-standard interference immunity tests. The controlled statistical repetition rate of pulse triggering can be programmed in either pulse or time mode. Thereby major benefits are experienced primarily for multi-clock systems by cutting down overall test time considerably.

In conjunction with an optional charge remover, it is possible to program the time to complete discharge of the charged EUT via bleed-off resistor, and the delay time until the next pulse takes place. This option enables the EUT to be reset to a defined status (ground potential) before the next discharge occurs.

NSG 438 is packed in a convenient and stable carrying case with space for accessories.

NSG 439 – FULLY AUTOMATED ROBOTIC ESD TESTING

- Complete system solution with 30 kV ESD simulator for robotic applications
- Compact and specially designed housing
- Unique robotic air-discharge adapter
- Fully compliant with IEC/EN 61000-4-2 and ISO 10605
- Robot attachment points on multiple enclosure faces
- Easily and quickly interchangeable networks

Today's growing trend towards miniaturizing and more comprehensive product standards means that ESD testing is now required not only for operating controls, but also for any associated peripheral devices such as sensors, actuators and controllers. Many of these devices have multi-pin connectors with high pin counts. In order to meet space restrictions, these pins are often arranged close together.

With an innovative robotic air-discharge adapter accessory, Teseq provides a tool which will prevent unintentional discharge paths. However, conventional air-discharge testing of these closely spaced pins is problematic because the air-discharge arc may jump to an adjacent pin instead of the pin intended for test. Furthermore, the approach speed, which is crucial for reliable air-discharge testing, can be programmed as a constant.

ESD testing of connectors often requires that each individual pin is tested for an extensive range of conditions including multiple discharges, polarities, voltage settings, and even R/C networks. Connector testing can take many hours or even days of monotonous, precise effort to complete. As a result, when this testing is done manually it is prone to errors. The advantage of robotic testing is that these procedures can be automated and precisely executed, ensuring a level of repeatability that cannot be achieved with manual testing.

NSG 439 has been designed to withstand the large acceleration forces found in harsh robotic environments. The ESD simulator includes all NSG 438 functions, and supports the complete set of discharge networks and optional discharge probes. In order to guarantee the greatest possible functionality, Teseq offers the NSG 439 only as a complete test station including the robotic mechanism, ESD simulator, control software, test bench and interlocked enclosure.

TECHNICAL SPECIFICATIONS

Information	NSG 435	NSG 437	NSG 438
Description	Compact ESD simulator with microprocessor-based, large LCD panel, built-in HV relay for contact–discharge, battery and mains operation	Compact ESD simulator with microprocessor-based, large touch-sensitive LCD panel, built-in HV relay for contact-discharge, mains operation	Compact ESD simulator with microprocessor-based, large touch-sensitive LCD panel, built-in HV relay for contact-discharge, battery and mains operation
Basic set	Carrying case with: ■ Electrostatic discharge simulator ■ Battery pack ■ Battery charger 100 to 240 VAC ■ Discharge network 150 pF/330 Ω ■ Air- and contact-discharge tips ■ Grounding cable ■ Tripod adapter ■ User Manual	Package with: ■ Discharge pistol ■ High voltage base unit ■ Mains power supply adapter (100 to 250 VAC) ■ Discharge network 150 pF/330 Ω ■ Air- and contact-discharge tips ■ Grounding cable ■ User Manual	Carrying case with: ■ Discharge pistol ■ Cradle for discharge pistol ■ High voltage base unit with built-in battery pack ■ Mains adapter and battery charging unit (100 to 250 VAC) ■ Discharge network 150 pF/330 Ω ■ Air- and contact-discharge tips ■ Grounding cable ■ User Manual ■ 25 mm discharge sphere
Pulse data	Standard: Conforms to IEC/EN 61000-4-2 (2001) Special: Interchangeable networks for other standards	Standard: Conforms to IEC/EN 61000-4-2 (2001) Special: Interchangeable networks for other standards	Standard: Conforms to IEC/EN 61000-4-2 (2001) Special: Interchangeable networks for other standards
Pulse networks	Network 150 pF/330 Ω as per IEC/EN 61000-4-2 (included) Range of R/C-networks for other standards: R = 0 Ω to 10 kΩ C = 60 pF to 500 pF	Network 150 pF/330 Ω as per IEC/EN 61000-4-2 (included) Optional ISO 10605 networks 150 pF/2 kΩ and 330 pF/2 kΩ. Range of R/C-networks for other standards: R = 0 Ω to 20 kΩ C = 50 pF to 2000 pF	Network 150 pF/330 Ω as per IEC/EN 61000-4-2 (included) Optional ISO 10605 networks 150 pF/2 kΩ and 330 pF/2 kΩ Range of R/C-networks for other standards: R = 0 Ω to 20 kΩ C = 50 pF to 2000 pF
Discharge voltage	Air-discharge 200 V to 16.5 kV (in 100 V steps) Contact-discharge 200 V to 9 kV (in 100 V steps)	Air-discharge 200 V to 30 kV (in 100 V steps) Contact-discharge 200 V to 30 kV (in 100 V steps)	Air-discharge 200 V to 30 kV (in 100 V steps) Contact-discharge 200 V to 30 kV (in 100 V steps)
Discharge tips	Ball and point as per IEC, fast risetime; exchangeable by threaded cap	Ball and point as per IEC and specials; exchangeable by threaded cap	Ball and point as per IEC and specials; exchangeable by threaded cap

Information	NSG 435	NSG 437	NSG 438
Charging voltage measurement	kV, accuracy better than ±5% (stabilized); measurement and display of true air flashover voltage	kV, accuracy better than ±5% (stabilized)	kV, accuracy better than ±5% (stabilized)
Discharge detection (air-discharge only)	Indicated by an oval around the kV symbol, also acoustically in the ‚Single' operating mode	Indicated by the kV symbol being displayed in inverse, also acoustically in the ‚Single' operating mode. Threshold level on/off	Indicated by the kV symbol being displayed in inverse, also acoustically in the ‚Single' operating mode. Adjustable threshold level
Holding time	> 5 s (charging voltage ±5%)	> 5 s (charging voltage ±5%)	> 5 s (charging voltage ±5%)
Charge resistor	50 MΩ	50 MΩ	50 MΩ
Triggering	Trigger button in hand-grip or via remote control input	Trigger button in hand-grip	Trigger button in hand-grip or via remote control input
Operation	Via push-buttons and microprocessor	Via touch screen and microprocessor	Via touch screen and microprocessor
Discharge modes	Air-discharge / Contact-discharge	Air-discharge / Contact-discharge	Air-discharge / Contact-discharge
Polarity	Positive / negative / automatic change	Positive / negative / automatic change	Positive / negative / automatic change
Operating modes	Single / repetitive Pulse counter 0 to 9999 Pre-select counter 0 to 9999 Repetition: ■ 0.5/1/5/10/20 or 25 Hz (air) ■ 0.5/1/5 or 10 Hz (contact) ■ continuous operation	Single / repetitive Pulse counter 0 to 9999 Pre-select counter 0 to 9999 Repetition: ■ 0.5/1/5/10/20 or 25 Hz (air) ■ 0.5/1/5/10 or 20 Hz (contact) ■ continuous operation	Single / repetitive / random (time/pulse) Pulse counter 0 to 9999 Pre-select counter 0 to 9999 Repetition: ■ 0.5/1/5/10/20 or 25 Hz (air) ■ 0.5/1/5/10 or 20 Hz (contact) ■ freely selectable from 0.04 s to 300 s ■ continuous operation
Auto-shut-off	After 30 minutes idle time (without loss of the test parameters)	No auto-shut-off	After 15 minutes idle time (without loss of the test parameters)
Display	LCD panel showing: ■ Charging voltage ■ Discharge voltage ■ Polarity ■ Air-/contact-discharge ■ Counter/preselect counter content ■ Soft-key functions ■ Battery monitor	LCD panel showing: ■ Charging voltage ■ Breakdown event ■ Polarity ■ Air-/contact-discharge ■ Counter/preselect counter content	LCD panel showing: ■ Charging voltage ■ Breakdown event ■ Polarity ■ Air-/contact-discharge ■ Counter/preselect counter content ■ Network parameters ■ Battery monitor
Weight	NSG 435 with battery: 1.2 kg (2.6 lbs) approx.	Discharge pistol (w/o cable): 1.2 kg (2.6 lbs) approx. Base unit: 5.7 kg (12.6 lbs) approx.	Discharge pistol (w/o cable): 1.2 kg (2.6 lbs) approx. Base unit: 6.5 kg (14.3 lbs) approx.
Ambient conditions	Operation: +5 to +40°C 20 to 80% r.h. (non-condensing) 68 to 106 kPa	Operation: +5 to +40°C 20 to 80% r.h. (non-condensing) 68 to 106 kPa	Operation: +5 to +40°C 20 to 80% r.h. (non-condensing) 68 to 106 kPa

ORDERING INFORMATION

NSG 435
Basic set (see technical specifications)

Accessories NSG 435	Part Number
Fast risetime test tip <400 ps	INA 420
Network and test tip for IEC 801-2 (1984), 150 pF/150 Ω	INA 421
ESD measurement target conforming to IEC 61000-4-2 (2001)	MD 101
ESD measurement target (ANSI and IEC draft)	MD 103
Mains power supply (80 to 240 V, 50/60 Hz) including grip adapter	INA 402-x
Spare battery pack	INA 405
Remote triggering unit including 5 m opto-cable	INA 415
Special discharge networks (specify values of R and C)	INA xxx
Opto-link set to a PC with 10 m opto-cable	INA 417B

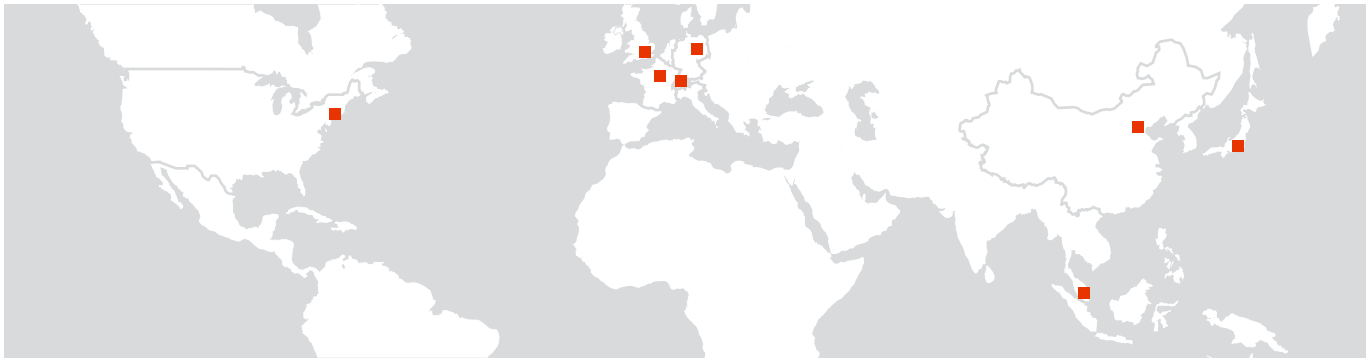
NSG 437 / 438
Basic set (see technical specifications)

Accessories NSG 437/438/439	Part Number
Discharge network ISO 10605, 150 pF/2 kΩ	INA 4381
Discharge network ISO 10605, 330 pF/2 kΩ	INA 4382
Discharge network, ANSI C63.16, 150 pF/330 Ω	INA 4383
Discharge network, ANSI C63.16, 150 pF/75 Ω	INA 4384
Discharge network, ANSI C63.16, 150 pF/15 Ω	INA 4385
Special discharge networks, specify standard and/or values of R and C	INA xxxx
Fast risetime test tip < 400 ps	INA 4411
Tripod support	INA 4421
Carrying bag for the base unit	INA 4422
ESD measurement target conforming to IEC 61000-4-2 (2001)	MD 101
ESD measurement target (ANSI and IEC draft)	MD 103
Ground cable with resistors (2 x 470 kΩ), Test bench: upon request	INA 414
Discharge tip with 0.5 m flexible cable	INA 4413
Flexible tip set	INA 4415
Soft touch contact tip	INA 4416
Banana socket contact tip	INA 4417
Banana socket fast rise time tip	INA 4418
E-field adapter	INA 4419
H-field adapter	INA 4420
Charge remover device, NSG 438 only	INA 4430
Opto-link set to a PC with 10 m opto-cable, NSG 438/439 only	INA 417B

EMC INSTRUMENTATION AND SYSTEMS TO SUIT ANY BUDGET.

Teseq offers the world's most comprehensive range of EMC systems for immunity and emission testing. We boast a world class research and development program, backed by state-of-the-art global manufacturing. Our membership in the relevant international committees demonstrates our commitment to the industry. Our network of agents and distributors offers market leading EMC expertise tailored to local needs in more than 30 different countries.

Our unique modular approach to EMC is focused on our customers' business needs. By breaking down the barriers between traditionally separate test functions Teseq helps to optimize test processes and to bring products to market quicker.



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Teseq is an ISO-registered company. Its products are designed and manufactured under the strict quality and environmental requirements of the ISO 9001.