

ESD LS30-MIL LARGE-SCALE ELECTROSTATIC DISCHARGE SENSITIVITY TESTER

Product Datasheet



Large-scale electrostatic discharge sensitivity tester **ESD LS30-MIL**, is an improved version of ESD LS30 instrument. It allows measurement by two different testing modes. It is used for large-scale testing of sensitivity to electrostatic discharge as defined in **STANAG 4490**, and also for testing as according to **MIL-STD-331B, MIL-STD-1576, STANAG 4235 and STANAG 4239**, to determine resistance of explosive material, ammunition or electronic elements against electrostatic discharge generated by the human body.

Large scale testing procedure according to STANAG 4490 involves loading of an explosive sample weighing several hundred grams by a series of discharges with constant energy. Energy of discharge during testing is partially stored inside the tested sample and is dissipated to surrounding or transferred to the grounding electrode. The initiation of sample should occur when the level of transferred energy is sufficient to create electric spark with energy higher than the minimal initiation energy of the tested substance. Initiation mechanism is different in comparison with

small scale testing where the electric arc is formatted directly between two electrodes. The test simulates possible real-world scenario of accidental ignition of large charges of energetic materials (especially propellants) during their manufacture, processing, loading or demilitarization. It can be used also for evaluation of temperature influence of sample sensitivity. It is designed for testing of safety parameters of different types of energetic materials (non conductive high explosives, propellants or rocket motor; it is not applicable to primary explosives or pyrotechnics).

Testing mode according to standards **MIL-STD-331B, MIL-STD-1576, STANAG 4235 and STANAG 4235** involves loading of explosive sample or ammunition elements by one-shot or repeated, contact or air discharges. There are several combinations of capacitors, damping resistors, level and polarity of high voltage to adjust of discharges energy level and course. It is used to determine whether the testing objects will remain safe and suitable for service after being exposed to the electrostatic discharge conditions.

For safety reasons, large scale testing has to be carried out in detonation chambers, bunkers or in detonation pits (with necessary protection of the instrument) and the possible interactions (extent of reaction) of the electrostatic discharge with the sample detected remotely by CCD cameras.

APPLICATIONS

Sensitivity to initiation by electrostatic discharge is one of the main safety parameters important for the handling, processing or transportation of explosives. These testing methods are used in quality control of manufactured explosives, characterization and qualification of new explosives, surveillance of in-service explosives, R&D and many other testing programs.

ESD LS30-MIL is designed to comply with requirements of the following standard of testing:

- STANAG 4235, STANAG 4239, STANAG 44490, MIL-STD-331B and MIL-STD-1576

ESD LS30-B also fulfill requirements of EN 50191 standards and CE regulations.

ESD LS30-MIL LARGE-SCALE ELECTROSTATIC DISCHARGE SENSITIVITY TESTER

Product Datasheet

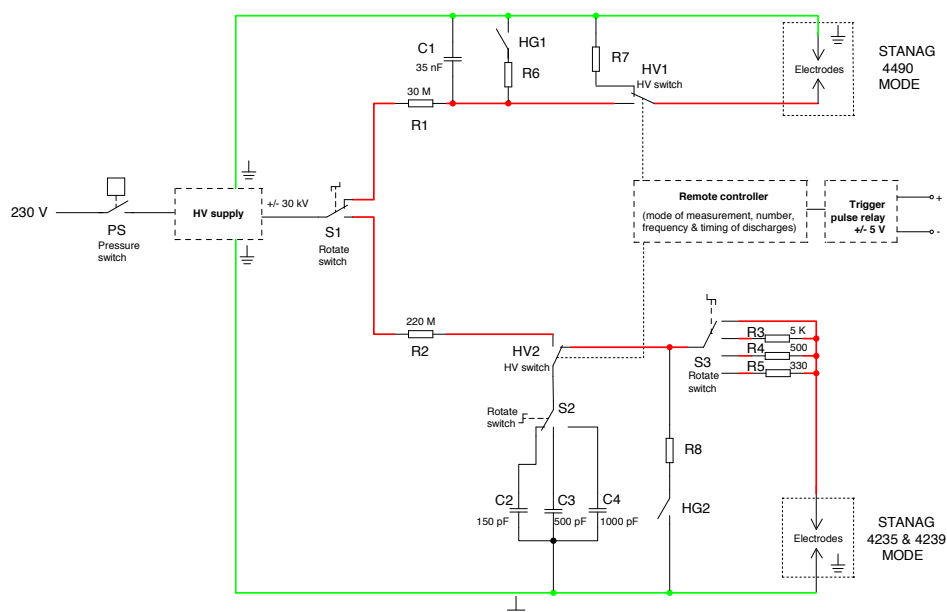


Fig. 2 Block diagram of the ESD LS30-MIL instrument

INSTRUMENT DESCRIPTION

The large-scale electrostatic discharge sensitivity tester **ESD LS30-MIL** is designed to measure sensitivity of crystalline high explosives or propellants, for testing of ammunition elements or electronic devices by single or repeated, oscillating or damped high voltage discharge in the range of 0 - 30 kV.

Large-scale electrostatic discharge sensitivity tester **ESD LS30-MIL** is mounted inside a robust transportation box with IP-54 protection for easy handling and outdoor applications. The instrument consists of precise high-voltage supply 0 - 30 kV with reversible polarity of output voltage, set of charging resistors, set of capacitors, set of damping resistors and two remotely controlled air-operated high voltage switches. The instrument is equipped with several couples of safety grounding switches and grounding resistors serving for the safe discharging of energy stored in the capacitors and to ground all live parts in release conditions.

There are two different testing modes due to different technical requirements of STANAG 4490 and other above mentioned standards, in order to discharging circuit must be divided into two independent parts (see figure 2).

Selection of testing mode, capacitors and damping resistors are carried out manually by means of changing position of high-voltage jumpers on the relevant plugs located on the front panel of the instrument. Desired output voltage and limit current are setup using potentiometers and are monitored on displays on the front panel of inbuilt high-voltage supply. Instrument is also equipped by a source of optically isolated triggering pulse ± 5 V to switching of external devices, e.g. high speed camera, oscilloscope, etc.

Start and stop measurement (operation of high voltage switches) are carried out by accessing the menu on the touch panel of the remote controller. The mode of measurement, number, frequency and timing of discharge is adjustable and is controlled by the PLC inbuilt in the remote controller. The battery powered remote controller is connected to the instrument by optical cable with maximal length of up to 2 km.

The tested sample is placed inside transparent testing containers and is different for compact or granular explosive materials, or is placed directly between two brass electrodes. The testing is carried out on a safe place (inside of detonation chamber or bunker).

Climatic chamber for temperature conditioning of the sample for evaluating the influence of temperature sensitivity of tested sample is supplied on inquiry.

ESD LS30-MIL LARGE-SCALE ELECTROSTATIC DISCHARGE SENSITIVITY TESTER

Product Datasheet

TECHNICAL PARAMETERS

HIGH VOLTAGE SUPPLY

Output voltage:	±0 - 30 kV (reversible polarity)
Output power:	1200 W
Stability:	0.01 % per hour after 1/2 hour warm up, 0.05 % per 8 hours
Output voltage ripple:	< 0.2 % of rated voltage
Output current:	40 mA
Input Voltage:	98 - 264V RMS, single-phase, 48 - 63 Hz, 1420 VA maximum

ENVIRONMENTAL

Operating temperature:	0 °C - 40 °C
Operating humidity:	0 - 90 % relative humidity (no condensation)
Storage temperature:	-60 to 70 °C
Storage Humidity:	< 95 % RH (no condensation)
Altitude:	For operation above 1900 m and up to 3000 m, de-rate the output current linearly from 100 % to 80 % of rated

BUILT-IN HIGH VOLTAGE CAPACITORS AND RESISTORS

Resistivity of charging resistors ± 5% (30 kV):	30 MΩ ¹ , 220 MΩ ⁵
Capacity of capacitors ± 5% (30 kV):	35 nF ¹ , 150 pF ² , 500 pF ^{2,3,4,5}
Insulation resistance better than 4000 MΩ*µF @25 °C	
Resistivity of damping resistors ± 5% (30 kV):	330 Ω ² , 500 Ω ^{2,3,4} , 5 kΩ ^{2,3,4,5}
1 - STANAG 4490; 2 - STANAG 4235; 3 - STANAG 4239; 4 - MIL-STD-331B; 5 - MIL-STD-1576	

HIGH VOLTAGE CABLES

Rated voltage:	30 kV
Isolation voltage:	60 kV
Capacity:	127 pF/m
Bending radius:	120 mm
Center wire material:	Cu
Working temperature:	0 - 60 °C

REMOTE CONTROLLER

Touch screen dimension:	3.5 "
Connection to main unit:	Optical plastic fiber cable, length up to 2 km, temperature resistivity 20 °C to +65 °C
Operates on batteries:	Over 10 hours of autonomy, rechargeable with AC/DC adapter/charger

STANDARD INSTRUMENT PARTS

ESD LS30-MIL	HV supply 30 kV, capacitors unit, HV switch, automatic firing system and remote controller in robust container for operating in outdoor conditions.
Set of accessories	Tools for replacement of electrodes, copper flat file, grounding cable and power cable.

OPTIONAL ACCESSORIES

ESDLS-HCH	Heating chamber incl. temperature controller for preheating of container with sample.
ESD-HVB40/60	High voltage probe (in metal box) Max DC/Pulsed: 40 V / 60 V (kV); Max frequency: 40 Mhz
	Various detonation chambers (0.15 - 2 kg) - technical parameters on inquiry
	CCD Camera

CONSUMABLES

ESDLS-SCont	Set of 5 pcs of testing container for compact materials (each set contains 5 anodes, 5 cathodes, 5 plastic vessels with cover, 5 rubber holders of cathodes, 10 spare connectors, and 5 wooden stands)
ESDLS-GCont	Set of 5 pcs of testing container for granular materials (each set contains 5 anodes, 5 cathodes, 5 plastic vessels with cover, 5 rubber holders of cathodes, 10 spare connectors, and 5 wooden stands)

INSTALLATION REQUIREMENTS

Main unit dimensions:	L x W x H: 86 x 49 x 66 cm; Weight: 75 kg
Electric power source:	230 V / 50 Hz or 120 V / 60 Hz (to be specified when ordering)
Power consumption:	100 W
	Detonation chamber or bunker

SHIPPING DATA

Package dimensions:	L x W x H: 94 x 80 x 78 cm
Brutto weight:	148 kg
Netto weight:	100 kg
Custom code:	9031 20 00

The export of above mentioned equipment is subject to an export license. The equipment can only be exported after having received the approval of the authority concerned. To apply for the export license, an end-user certificate or an International import certificate is required.