



**231-162**  
**Van De Graaff Generator With Accessory Kit**

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**Description:**

The Van de Graaff Generator consists of a conducting sphere (the “dome”), supported by an acrylic tube, and a rubber belt driven by a low-voltage DC electric motor concealed in a metal base. This belt is enclosed to provide protection from contamination. Static electrical charge on the belt is produced by friction with the two rollers, one of polythene, the other of acrylic. This charge is removed from the top of the belt by metal gauze and stored in the dome. The electric motor is driven from the AC mains supply, via a transformer and rectifier system, using the three-wire cable supplied. The cable, fitted with a mains plug incorporating a 5A cartridge fuse, ensures that all metal components in the base of the generator are fully earthed. A small pulley on the shaft of the motor is connected to a similar pulley on the lower rotating roller by a short rubber-band drive. The speed of the DC motor can be adjusted by a knob on the front of the metal base.

The metal base is fitted with an earthed 4 mm socket, used to support a separate conducting sphere fitted on a cranked rod. This rod can be turned to alter the separation of the sphere and the dome.

**Operation:**

The dome is placed in position by aligning it with the metal pillar on the upper pulley holder and then fixing it firmly. This can most easily be achieved by inserting a finger into the dome first and using this to guide it onto its mounting. The cranked rod of the conducting sphere should be inserted in the metal base and rotated to give an air gap of about 1 cm between the sphere and the dome. A spark is normally produced in this air gap immediately after the motor is switched on. If there is a delay, it is probably because the apparatus or the surrounding air is cold or damp. This delay can be rectified by a very gentle and careful heating of the apparatus (e.g. by an infrared lamp or hairdryer). Once running, the air gap can be widened, and the spark length increased, by rotating the cranked rod supporting the conducting sphere. The motor speed can then be adjusted to give maximum spark length.

A separate adjustment can be made of the separation of the off-take gauze, which is easily bent by hand, from the upper part of the rubber belt. However this adjustment should NOT be attempted whilst the motor is running and the dome charged.

**Safety Precautions:**

The Generator produces, by frictional means, a very low current at a very high D.C. voltage. The charged dome produces a strong electric field in its vicinity.

Although careless handling might result in weak electric shocks, the Generator is generally harmless. However the following precautions should be observed:

In general, manipulations should not be carried out by hand but by the use of some form of insulated tool. The spark gap can be safely adjusted by means of rotating the lower, insulated, portion of the cranked rod, provided that the rod is earthed.

- Direct static discharge can damage electronic equipment.
- Discharges (“sparks”) from the Generator produce electromagnetic waves that can potentially affect electronic equipment such as computers and mobile phones.
- Discharges can ignite inflammable vapours or gases.
- The apparatus should not be used by persons fitted with certain medical implants, e.g. heart pacemakers.
- A person who is charged should not adjust the generator controls. The metal case is earthed!



**Technical Data:**

Diameter of the Generator dome:	220 mm
Operating voltage:	220 to 240 V a.c.
Dome capacitance:	15 pF (approx.)
Maximum (intermittent) current:	6 $\mu$ A (approx.)
Maximum spark length:	80 mm (approx.)
Diameter of conducting sphere:	100 mm

**Maintenance:**

The dome, the vertical acrylic pillar, the rubber band and the two rollers should be kept totally free of dust and dirt. The Generator should not be exposed to strong sunlight for extended periods, as this will cause deterioration of the rubber belt.

Access to the motor system can be obtained by unscrewing the three domed nuts at the base of the glass cylinder using the spanner provided in the accessories kit. This facility enables the short rubber band connecting the motor and the lower insulating roller to be changed from time to time.

The charging belt can be changed as follows:

Remove the power cable. Lift off the dome. Turn the generator on its back. Pull the top roller against belt tension, release it from its pivots and remove it from the belt. Some care is needed at this stage to avoid the belt catapulting the roller down the tube, possibly causing damage. Return the generator to the upright position. Undo the three domed nuts and withdraw the tube assembly from the base, taking care not to damage the motor supply wires. Remove the drive belt. Pull the charging belt to one side to expose the lower roller and rotate this to expose the grub screw halfway along its length. Loosen the grub screw with a 2mm hex (Allen) key and withdraw the shaft from the roller. The roller can then be withdrawn, allowing the belt to be replaced. Reassembly is fairly straightforward to whoever dismantled the unit, but the observations below will be helpful. The position of the bottom roller on its shaft is critical to the smooth operation of the generator. The grub screw should be tightened so that it bears on the flat on the shaft in such a position that the roller does not touch the bushes or black frame at either end when the shaft is pushed right in until the pulley bears on the bush in the frame. The shaft and pulley attain this position during operation due to the slight angle of the motor mount. It can be advantageous to thread a piece of string through the belt and pass this through the tube so that the ends protrude at the upper end to be used in tensioning the belt and refitting the upper roller. The plastic ring which fits between the case and tube assembly will pass over the nuts when correctly oriented. The tube assembly should be refitted so that the motor wires are on the right, seen from the front of the unit. Care should be taken to avoid distorting the upper and lower metal gauzes, which should be positioned so that their teeth are close to, but not touching, the rubber belt at the line where the belt leaves the roller.

Spare drive and charging belts are available:

VDG/BELT	Van De Graaff Generator –Belt
EDU2030	Van de Graaff Generator Drive Belt (Pk 5)



