Discharge and Grounding Sticks

Discharge and grounding sticks are a vital part of high voltage safety practices. The sticks have been specifically designed for high voltage testing in the field or laboratory. Depending on the application, only the ground stick may be used or a discharge and ground stick may have to be used.

DESIGN FEATURES

- Generous length is an additional safety factor
- Two piece design allows easy storage and transportation
- Safety hand guard on all sticks
- High discharge capability (DS100-2)

GS100-2 Ground Stick

DS100-2 Discharge Stick

GENERAL HIGH VOLTAGE SAFETY GUIDELINES

Note that the following information is for reference only and that there are operating guides for national and international safety standards that specify detailed safety requirements. It is the user's responsibility to verify that Phenix Technologies' products are applicable to these standards.

Any high voltage source that does not have a visible ground wire or ground device attached (high voltage output shorted to ground) are generally considered live and dangerous. It is established practice never to touch or come close to the high voltage source when the source is not grounded. Ground Sticks are one of the accepted methods to apply a temporary ground to these sources. For permanent grounds bolted grounding cables are typically used.

AC Sources

AC high voltage sources such as high voltage transformers and resonant test systems are typically grounded with ground sticks appropriate for their physical size and output voltage. Phenix Technologies' Model GS100-2 ground stick is ideally suited for this use. The generous length and the hand guard insure that the operator is distant when the high voltage output is grounded. The Model GS100-2 or GS160-2 is equipped with a hook that attaches to the high voltage electrode of the source. The ground cable is equipped with an alligator clamp for connection to earth ground.

DC Sources

When testing with DC, extra caution has to be taken in order to dissipate the stored energy in capacitive test objects such as cables, motors and transformers. These test objects have the capability to store large amounts of energy long after the high voltage is turned off. High Voltage DC sources require two different sticks. The first stick typically used is called a discharge stick. The discharge stick removes the stored energy through a resistor connected to ground. In this way the discharge happens over time and not instantaneously and potentially dangerously as with a direct short (ground stick). In addition, this limits transients and or traveling waves that could damage objects under test. First, the stored energy is minimized; typically by watching the output voltmeter return close to zero. Next, the ground stick is applied to remove any remaining charge and directly connect the high voltage source at test object to ground. Discharge sticks are not considered as grounding devices due to the resistance in the circuit. It should be noted that discharge sticks have three ratings that need to be considered for safe operation: the instantaneous energy (kilo joule) rating, continuous operating wattage of the discharge resistor, and the maximum discharge voltage rating. The Model DS100-2 is equipped with a hook that attaches to the high voltage electrode of the source. The ground cable is equipped with an alligator clamp for connection to earth ground.

CABLE | GIS SWITCHGEAR | CIRCUIT BREAKER | TRANSFORMER | MOTOR | GENERATOR | INSULATION MATERIALS | RECLOSER | PROTECTIVE EQUIPMENT | PORTABLE

GROUND STICKS SPECIFICATIONS

MODEL	AC RATING	DC RATING	CABLE LENGTH	LENGTH (assembled)	LENGTH (transportation)	WEIGHT
GS100-2	100 kVAC	100 kVDC	25' (7 m)	77" (1955 mm)	35" (889 mm)	4 lbs (1.8 kg)
GS160-2	100 kVAC	160 kVDC	25' (7 m)	91" (2311 mm)	46" (1168 mm)	5 lbs (2.2 kg)

DISCHARGE STICK SPECIFICATIONS

MODEL	DC RATING	MAXIMUM INSTANANEOUS ENERGY ABSORPTION	RESISTANCE	MAXIMUM DISCHARGE CAPACITANCE AT RATED VOLTAGE	MAXIMUM STEADY STATE POWER DISSIPATION
DS100-2	100 kVDC	40 kJ	100 kOHM	8.6 μF @ 100 kVDC	100 W

CABLE LENGTH	LENGTH (assembled)	LENGTH (transportation)	WEIGHT
25' (7 m)	77" (1955 mm)	35" (889 mm)	5 lbs (2.2 kg)

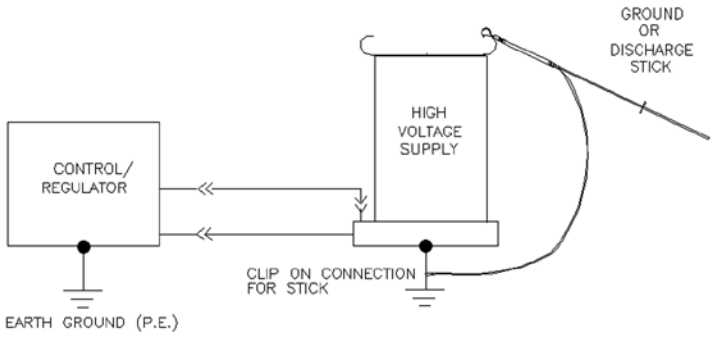
DISCHARGE STICK CALCULATIONS

J= Stored Energy
C= Total Test Circuit Capacitance
E= Test Voltage
R= Discharge Resistance

Stored Energy: $J = 0.5 * C * E^2$

If the capacitance is known the maximum safe discharge voltage is calculated as follows

Maximum Discharge Voltage: $E_{max} = \sqrt{\left(\frac{2J}{C}\right)}$



High Voltage • High Current • High Power Test Systems and Components

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