HIGH VOLTAGE INC.
VLF HIPOT INSTRUMENTS

VLF Thumper – VT33

Very Low Frequency AC Hipot & Capacitor Discharge System

Industry First: VLF AC cable testing and fault finding in one package

- ***VLF cables up to 25 kV rating per IEEE 400.2, VDE DIN 0276 & CENELEC***
- ***13 kV @ 760 joules impulse rating***
- ***VLF burn cable faults***
- ***TDR / radar ready***

Model VT33

Complete URD Cable Care System*

- *VLF cable testing*
- *VLF fault burning*
- *Fault pre-location with radar*
- *Continuous discharging*

All the tools needed in one box

**Only available from High Voltage, Inc.*

Specifications

VLF Output:	0 - 33 kVac peak @ 0.1 Hz
Load Rating:	1.0 μF. Can test from 1.5 to 2 miles of typical 15 kV or 25 kV cable
Cap. Discharge:	0 - 13 kV @ 760 joules every 8 secs
Radar Ready:	Internal arc reflection filter
Input:	120V, 60 Hz, 10A or 220V, 50/60 Hz, 5A
Size & weight:	28″ w x 26″ d x 44″ h, 245 lbs 711 mm w x 660 mm d x 1118 mm h, 111 kg
Output Cables:	50′ (15 m) of shielded HV output & ground cable

Uses of the VLF Thumper

Cable testing. Utilities, testing contractors, and industrials worldwide are rapidly discontinuing testing solid dielectric cables with DC voltage. Very Low Frequency AC hipots are now used for AC testing solid dielectric cable. High Voltage, Inc. is the leader in this technology with VLF hipots from 25 kV to 200 kV. Use the VLF hipot output of the VT33 to test cables after installation or repair and to test substation cables, important feeders, critical customer cables, and any other situation where the integrity of a cable must be proven.

Post repair testing. You found your fault and made the repair. How do you know the repair is sound and the rest of the cable, or the cables adjacent to the fault, do not have additional problems? DC testing won't tell you. Before energizing, VLF It! Only a VLF test can quickly and easily prove the integrity of the cable.

Fault finding. The VT33 produces a 13 kV @ 760 joule discharge output. After using the VLF Burn mode to reduce a fault's impedance, the 760 joule rating of the VT33 is more than enough energy to easily locate faults.

Applications

5kV – 25kV CABLE TESTING AND FAULT LOCTING

- *VLF test cables per IEEE400.2*
- *Pre-locate faults with Arc Reflection TDR*
- *Pinpoint faults with continuous discharge*
- *Verify cable integrity after repair*
- *Use as a voltage source for VLF Tan Delta and Partial Discharge testing.*

If you're buying a thumper, why not one with VLF included.

If you are going to VLF cable test, you will need a fault locator.

HIGH VOLTAGE INC. VLF HIPOT INSTRUMENTS HIGH VOLTAGE, INC.
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Why a VLF Thumper?

DC testing of solid dielectric cable is largely ineffective, highly discouraged, and discontinued by most. The preferred method is to use AC voltage to test cables. To hipot long cables with AC voltage, Very Low Frequency AC hipots are required. A VLF test is a pass/fail stress test. When VLF proof testing, if a cable or splice defect cannot hold the test voltage, it will fail. The fault must be located and repaired, requiring the use of a capacitor discharge unit (thumper) and possibly radar. High Voltage, Inc. puts the VLF, thumper, and radar capability all into one package. HVI can also supply the radar and listening devices.

Another reason for a VLF/thumper combo: you found your fault, made the repair, and are ready to re-energize. How do you know the repair was good and/or there are no other problems? **VLF the cable before re-energizing** to make sure it can withstand 3 times normal voltage. Refer to IEEE400.2 for guidance in selecting the test voltage and duration.

What is VLF?

Using DC voltage to test solid dielectric cables is highly discouraged by worldwide engineering organizations, cable producers, and has been largely abandoned by most utilities. The new method is to use AC voltage supplied by VLF hipots. A VLF AC hipot is like any AC hipot only its output frequency is 0.1 Hz or lower rather than 50/60 Hz. The lower the frequency, the lower the power needed to test high capacitance cable loads. It takes 600 times less power to test a cable using 0.1 Hz compared to 60 Hz. With a VLF unit, long cables can be AC proof tested in the field with a portable instrument. VLF hipoting is the easiest and most effective method of determining the voltage withstand capabilities of cable insulation and accessories. Since it is a pass/fail test, no leakage currents are measured as with DC testing. If a cable can't hold 2 - 3 times operating voltage, cause failure at the defect location, find the fault, make the repair, and be left with a healthy cable. VLF hipots are rated by the capacitance of the load they can test. The VT33 is rated to test up to 1.0 uF of load, which translates to a 15 kV cable length of 1.5 – 2 miles, depending on size and insulation thickness.

When cables are VLF tested, there is a chance of failure if a defect cannot withstand the test voltage. If a failure occurs, the defect can be located using the capacitor discharge output of the VT33, with or without radar. Once a repair is made, the cable must be retested to insure that it holds voltage. The High Voltage, Inc. **VT33 permits its users to VLF cables, to burn down cable faults, and to locate defects with just one instrument**, from the leader in VLF technology and from the company that offers several of the top thumper products available. For more on VLF technology, consult our web site at **www.hvinc.com**.

VLF Hipoting

The VT33 can hipot cables up to 1.0 uF in capacitance and up to 33 kVac peak. The IEEE test standard for hipoting 15 kV cable is 23 kV peak. The typical test duration is 30 – 60 minutes. The purpose of VLF testing is to verify whether a cable can withstand at least twice the normal operating voltage, as it is routinely subjected to this level when in service. If a cable can't hold the test voltage, it will fail. It is better to cause failure at a defect location during the test rather than when the cable is in service. The HVI VLF hipot is easy to use with minimal training required.

VLF Cable Burning

A thumper burner is used to reduce the impedance of a fault, or make it a worse fault. Many conventional thumpers offer 20 – 50 mA of DC current from their DC hipot outputs for this purpose. (High Voltage, Inc. thumpers offer up to 400 mA on some models). To burn down a cable fault with only 25 or 30 mA can take many hours. The fastest method of burning down cable faults is with a VLF burner. The VLF hipot automatically raises its output voltage until the cable arcs. This repeated arcing of alternating positive and negative polarities (the VLF has a sinusoidal AC output), combined with the cable's stored energy discharged into the fault every half cycle, rapidly reduces the fault arc-over voltage to a lower level, **permitting the use of a lower voltage and joule rated thumper. The 760 joule output from the VT33 is more than ample energy to locate low impedance faults.**

Capacitor Discharge

The VT33 produces a capacitor discharge output of 13 kV @ 760 joules. The thump voltage is variable from 0 – 13 kV, but the 760 joules is achieved at 13 kV. There is a Pulse and Continuous mode. The Pulse mode is used when radar is connected and a single arc-over at the fault location is produced to reflect the radar signal to determine the distance to the fault. Once the fault is pre-located with the radar, the thumper is placed in the Continuous mode, where a discharge occurs every eight seconds while workers try to precisely pinpoint the fault.

Other Capacitor Discharge Models

CDS-2010U 0 – 5/10/20 kVDC
@ 1000 joules, 400 mA burn current, radar ready

CDS-3616U 0 – 9/18/36 kVDC
@ 1600 joules, 280 mA burn current, radar ready

CDS-3632U 0 – 9/18/36 kVDC
@ 3200 joules, 280 mA burn current,

TDR / Radar and Acoustical/Electromagnetic listening devices are also available.

VLF models available from 25 kV to 200 kV

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