High Voltage AC Dielectric Test Sets

Models Available & Selecting the Correct kVA

A Hipot for every application: High Voltage, Inc. designs and manµFactures many AC Dielectric Test Set lines to serve many applications for **high voltage AC testing of electrical apparatus and cable**. The many electrical components used for the generation, transmission, and distribution of electric power must be tested at AC voltages higher than their normal operating voltage levels. AC tests possible with HVI products are:

AC Withstand Testing Tan Delta/Power Factor Partial Discharge

HVI offers AC hipots designed to test loads from one vacuum bottle or hot stick, to insulators and bushings, Aerial Lift booms and buckets, iso-phase bus & switchgear, large motor and generator coils, and MV/HV cables. HVI has models to **test resistive loads to capacitive over 10 µF,** from **3 kVac to 300 kVac,** with **1 kVA to 250 kVA** of power. **Very Low Frequency (VLF) AC 0.1 Hz.** hipots are available for cable and generator testing, with **TD/PF and PD diagnostic** methods. **Parallel Resonant** technology is also available to test very high capacitance loads, typically **Motors & Generators, Large Bus Ducts, Switchgear, and MV Cables**. These lines range from small, portable 1 kVA hipots to field mobile 15 kVA models to 250 kVA factory stationary models weighing over a ton. Some models are **< 5pc in Partial Discharge output** and some are **CE marked**. Consult their respective brochures.

Sizing an AC Test Set - How Much kVA is Needed?

AC high voltage testing requires higher current and power ratings than when DC testing the same load. There are several parameters that must be considered when selecting an AC test set, the most important one being the **capacitance of the load,** which dictates the power required from the test set. Following are several considerations to make when specifying:

Voltage Output: Select a test set with **20 – 25% more voltage** than presently needed for possible future increases in testing standards or changes in application. However, **an AC test set is a constant current device** with the maximum output current based on **the full voltage at the kVA rating**. Increasing the output voltage rating but at the same kVA decreases the output current proportionately.

Power/Current Rating: When AC testing, **most loads appear capacitive.** To apply high voltage AC at 50/60 Hz to capacitive loads requires higher power and current ratings than most portable AC hipots can supply. A test set rated from 1 kVA to 100 kVA may be needed depending on the load tested. **The capacitance of the load must be known to calculate the required current at the required voltage.** Don't undersize the set: select a test set with at least 25% extra power than needed. Another way to determine the current needed is to apply a lower voltage to the load and measure the current. The current required at the higher test voltage should increase linearly. For example: **if your load draws 10 mA @ 5 kVac it will draw approximately 100 mA @ 50 kVac.**

To calculate the AC current needed, use: Amps = $2\pi fCV$

f = frequency (Hz.) C = load capacitance (Farads) V = test voltage (Volts)

Duty Cycle: Most AC hipot tests are for 60 seconds and most hipots are duty rated for 50%. For example: HVI specs 60 minutes on, then 60 minutes off. The continuous duty rating might be 80% of full rating. If production testing requires many consecutive tests, a longer duty cycle or higher kVA rating may be needed.

Summary: **When AC Withstand, Power Factor/Tan Delta, or Partial Discharge** testing, the **AC charging current can be high** depending on the capacitance of the load. The test voltage is determined by the Test Standard one is following. The current is the unknown. When selecting an AC high voltage tester, **the load current and/or capacitance must be known to size the set.**

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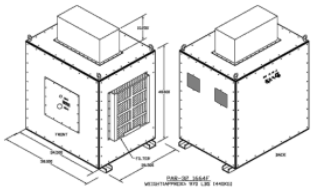
AC Models Series Offered

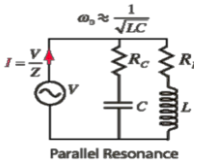
☐ The **PFT Series** are small, lightweight, portable, affordable field use Hipots, rated from 10 kVac - 100 kVac @ 1 kVA - 3 kVA. One piece shielded cable output design up to 50 kVac.

☐ The **FPA Series** is designed for field testing motors, generators, and other higher capacitance loads. Rated from 6 kVac - 32 kVac @ 6 kVA - 15 kVA. Other models are available for testing motor stators, iso-phase bus, and more.

☐ The **HPA Series** is designed to serve higher capacitance loads and offers various control options. Models range from 3 kVac - 300 kVac @ 3 kVA - 40 kVA. Most are custom made. Some CE marked and low PD.

☐ The **ALT Series**, although designed for AC voltage testing aerial lifts, is ideal for many substation and apparatus testing applications. The standard models available are rated 120/60 kVac, 210/35 kVac, and 300 kVac, all rated for 7 kVA.





$$F_R = \frac{1}{2\pi\sqrt{LC}}$$

☐ The **PAR Series** are parallel resonant designs able to test very high capacitance loads: large motors & generators, MV cables, large apparatus. Models range from 8 kVac - 250 kVac @ 50 kVA - 300 kVA load.

☐ The **ABT Series** hipots are bench top designs for use in laboratories, factories, and other industrial applications. They are like the PFT Series models only packaged differently and have several additional features. Ratings are from 10 kVac - 100 kVac, from 1 kVA - 3 kVA. Custom models are available.

☐ The **VLF & VLF E Series 0.1 Hz.** hipots are for testing loads of very high capacitance, like MV/HV power cables and large rotating machinery that would require hundreds of kVA of test power at 50/60 Hz. **Very Low Frequency (VLF) AC Technology** is available in model sizes from 30 kVac - 200 kVac, able to perform testing of loads from 0.1 µF – 50 µF. IEEE400.2-2013 & IEEE433-2012 apply. VLF TD and PD testing available.

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