



Advancing The Power Curve



## ACuQor Hipot Voltage Balancing

Application Note 07/14/11 Rev. A

### Summary

*This application note describes the correct method for hipot testing the ACuQor series of AC-DC converters. The note provides an understanding of the difference in capacitance values from input-to-ground and from output-to-ground as well as a solution for balancing the voltage stresses.*

The ACuQor products are rated for these isolation levels:

Input-to-Ground: 1500VAC

Output-to-Ground: 1500VAC

Input-to-Output: 4000VAC

To avoid excessive voltage stress during hipot testing, external balancing capacitors are needed to equalize the voltage stress output-to-ground and input-to-ground. A common misconception is that one could simply apply 3000 or 4000 volts AC from input to output, with the ground floating in the middle. Applying a high voltage from input to output with the ground connection floating, creates an asymmetrical capacitive divider due to the fact the output has much lower capacitance to ground than the input-to-ground capacitance. Most of the voltage will appear across the lower capacitance, output-to-ground, which could cause a voltage breakdown failure by exceeding the breakdown level.

We recommend that external capacitors of 1nF input-to-ground and 2nF output-to-ground be applied to roughly balance the voltage stresses, as shown in the sketch below. Great precision is not needed, as up to 2250VAC is safe for either input-to-ground or output-to-ground. Generally ceramic capacitors are preferred, but other capacitor types with an appropriate voltage rating are acceptable. The VY1102M35Y5UQ63V0 (1nF) and VY-1222M47Y5UQ63V0 (2.2nF) from Vishay are suitable for balancing the voltage stress.

More information is available in IEC60601 as well as specified in the data sheet under "Hipot Testing" in the installation instructions section.

Note: "PE gnd" means Protective Earth ground. Capacitances shown inside the black box are internal to the ACuQor product. "Ground" is used in the text to refer to "PE gnd".

