

Enhanced Protection When Measuring Charged Capacitors

Customer Inquiry

Some of QuadTech's customers are manufacturers of large value capacitors. A typical application in the production test process is to measure the Capacitance Value (C), Dissipation Factor (Df) and/or Equivalent Series Resistance (ESR) of these devices. There are many LCR meters and bridges capable of measuring these parameters but the real problem that often occurs is measuring these devices when they are still accidentally charged. **This problem has often plagued electrolytic capacitor manufacturers** because it is not uncommon to damage the measuring instrumentation from the high current generated from charged components.

QuadTech Solution

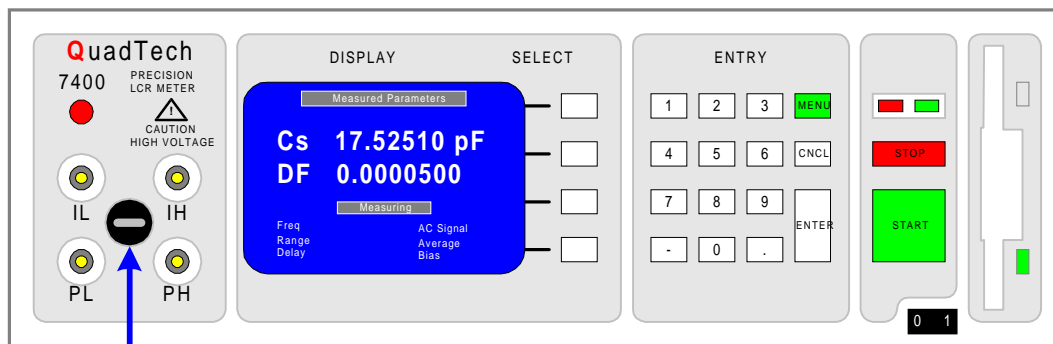
One solution to ensure that impedance-measuring instrumentation is not damaged by charged capacitors is to be 100% certain that no charged capacitor ever makes it to the impedance measuring station. Although this sounds easy, we all know that in the real world it may not be practical, so why not make sure that in the worst case scenario the measuring instrument is well protected. The standard 7400 Precision LCR Meter, or other bridges and meters for that matter, do not provide adequate protection for this particular application. To specifically meet this requirement QuadTech provides a **Charged Capacitor Testing version of the 7400**.

Measurement Procedure

A common practice in the Capacitor Production Industry is to precede impedance measuring tests with a voltage breakdown or leakage test. The voltage breakdown test is also known as a dielectric withstand or hipot test. This test subjects the DUT to a high voltage for a period of time to determine if breakdown will occur in the DUT's insulation. Since hipot testing can be a destructive test it is essential to perform this prior to the all-important test of impedance characteristics. The typical hipot test will leave a capacitor pre-charged to a substantial high voltage, easily in the order of 500, 1000 volts or more.

What's that look like?

Before a capacitor is moved to its impedance measuring station it is passed through one or more resistive discharge stations and/or a dead short station, which in most cases will remove any remaining charge. But, what if a device doesn't get fully discharged, or even worse, what if the device remains charged because of what we call dielectric absorption? Dielectric absorption is the persistence of electric polarization in some dielectric materials after removal of an electric field. This phenomenon is more likely to be the cause of a charged capacitor than anything else, and by the way, difficult to prevent. Therefore the Charged Capacitor version of the 7400 Model LCR Meter was introduced. The normal charged capacitor protection of the 7400 has been substantially upgraded so that it can handle very high surge currents up to 60Amps. This added protection is provided through a front panel fuse, making it readily accessible and easy to change if and when it should become necessary.



Charged Capacitor Protection Fuse (Front Panel mounted for easy access)

Figure 1: Location of External Charged Capacitor Protection Fuse

Summary

In working with some Capacitor Manufacturers QuadTech has been able to solve a troublesome problem. Troublesome from the point of view that if an expensive impedance measuring instrument becomes damaged from highly charged capacitors it becomes very costly to repair and or replace that piece of equipment. This often means that the manufacturing production line is shut down for an undesirable period of time.

For complete product specifications on the 7000 Series Precision LCR meters or any of QuadTech's products, visit us at <http://www.quadtech.com/products>. Do you have an application specific testing need? Call us at 1-800-253-1230 or email applications at jkramer@quadtech.com and we'll work with you on a custom solution. Put QuadTech to the test because we're committed to solving your testing requirements.

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