

## Additional Information: CDT-240

Getting meaningful information for the Capacitive Discharge Test can be difficult. With the switches or contactors normally used to cut power for this test, the test can need to be run numerous times before a disconnection at the peak voltage can be obtained. In addition, there may be different states that need to be tested; or the particular state needing to be tested may take some time to set. All these factors make for an inefficient test.

The Compliance West CDT-240 has been designed to make conducting this test fast, accurate and repeatable. The CDT-240 disconnects the mains voltage at the peak, every time; then it analyzes the discharge characteristics of the unit under test and presents results on its front panel display. The CDT-240 has presets, memory settings, or recommendations for conducting the Capacitive Discharge Test for the following Standards: (Notes 1, 3, 4 and 5 apply to all entries)

- **IEC 61010:** Para. 6.10.3: Plugs and connectors: Pins shall not be Hazardous Live (<60V) after 5 sec. CDT-240 Test Setting: Use Standard 1, IEC 61010.
- **IEC 61010:** Para. 6.6.2: Terminals for external circuits: Accessible conductive parts not Hazardous Live (<60V) after 10 sec. CDT-240 Test Setting: Use Memory 1, change Test Time to 10 sec. (see Note 2 and 3)
- **IEC 60065:** Para. 9.1.6: Withdrawal of Mains Plug: Pins shall not be Hazardous Live (<60V) after 2 sec. CDT-240 Test Setting: Use Standard 2, IEC 60065. Waived if < 0.1uF.
- **IEC 60335:** Para. 22.5: Pins shall not be >34V one second after disconnection. CDT-240 Test Setting: Use Standard 3, IEC 60335. All switches OFF. Waived if < 0.1uF.
- **IEC 60601-1:** Para. 8.4.3 ME Equipment intended to be connected to a power source by a plug: After disconnection, any pin to pin and any pin to enclosure <60V after one second: CDT-240 Test Setting: Use Memory 3 for Positive Waveform Test and Memory 4 for Negative Waveform Test (Note 1 and 2).
- **IEC 60950:** Para. 2.1.1.7: Discharge of capacitors in equipment: Pluggable Equipment Type A: Pins <37% of Supply Voltage after 1 sec. CDT-240 Test Setting: Use Memory 3 for Positive Waveform Test and Memory 4 for Negative Waveform Test (Note 1 and 2). Waived if < 0.1uF.
- **IEC 60950:** Para. 2.1.1.7: Discharge of capacitors in equipment: Pluggable Equipment Type B: Pins <37% of Supply Voltage after 10 sec. CDT-240 Test Setting: Memory 1, change Test Time to 10 sec. (see Note 2 and 3). Waived if < 0.1uF.
- **IEC 60950:** Para. 2.1.1.7: Both Pluggable Equipment Type A and B: Calculate 37% of peak supply voltage, set this amount and evaluate if the time taken to reach that value is acceptable: Memory 2, change voltage to 37% of peak supply voltage.
- **IEC 62368-1:** Para. 5.5.2.2: ES1 Limits of Table 5 under normal operating conditions for an ordinary person: Pins < 60V after 2 sec if capacitor is >300nF. CDT-240 Test Setting: Standard 2, IEC 60065.
- **IEC 62368-1:** Para. 5.5.2.2: ES2 Limits of Table 5 under normal operating conditions for an instructed person: Pins < 120V after 2 sec if capacitor is >300nF. CDT-240 Test Setting: Standard 2, IEC 60065.
- **IEC 62368-1:** Para. 5.5.2.2: ES2 Limits of Table 5 under single fault conditions. Pins < 120V after 2 sec if capacitor is >300nF. CDT-240 Test Setting: Standard 2, IEC 60065.

- Notes:

1. Memory must be at Factory Settings.
2. Reference Factory Settings, see Manual, Page 7.
3. To view or change Memory Settings, see Manual, Edit Memory Section, Page 11
4. All entries must be tested at L-N, L-G and N-G. See Please Note: section below. To change test points, see Manual, Edit Memory Section, Page 11.
5. List not complete. Standards requirements not comprehensive. Check Standard before conducting test. Please email additions and corrections to Jeff@compwest.com

**Please note:** The CDT-240 disconnects all three pins; line, neutral and ground in a proper simulation of a plug disconnect. Some switch- or contactor- type disconnection equipment may not break all three lines while conducting this test, which may return incorrect results. Since the CDT-240 disconnects all three pins simultaneously, the "ground plane" does not exist during this test, and capacitor discharge voltages may appear on any of the three conductors. Further, we have found that results of disconnections on the negative peak do not always match results of disconnections on the positive peak, most likely due to nonlinear behavior of the switching power supply of the device under test (DUT) as it discharges. We recommend that all three conductors be tested at both polarities to determine worst case results. In addition, results for this test can vary depending on the behavior of the DUT when the line is disconnected. Although the CDT-240 disconnects the line at the voltage peak every time, behavior of the equipment under test may return significantly differing results when the test is repeated. due to the DUT's switching power supply behavior. Although the variable of trying to disconnect at the peak has been solved by the CDT-240, conducting multiple tests to ensure worst-case results is recommended. Worst case results will be obtained when the plug is connected to the Y cap, and the DUT is in the lowest power state. Determining this state requires testing. As noted in IEC 60601-1, the test is to be conducted "with any relevant switch in the "On" or "Off" positions." (Except EN 60335 which is specified as all switches OFF). It is not known in which state the DUT will exhibit the highest voltages upon plug disconnection. If the power switch of the DUT is a double pole and disconnects both the line and neutral pins from the capacitor, it may be that having the DUT energized in a standby state is the worst case.

Voltage vs. Decay Test Reporting in the CDT-240: The CDT-240 can report on two types of tests; that which specifies a voltage after a set time (Voltage Testing), and that which specifies a time to reach a specified voltage (Decay Testing). All of the tests currently noted in the list above are Voltage Tests. If a Standard is found that requires reporting the time it takes to reach a certain voltage, the CDT-240 can conduct that test.

The CDT-240 can conduct forward or reverse polarity tests; that is, tests triggering on the positive or negative pulse. It can also test and report L-N, L-G, and N-G events.

The CDT-240 is rated for 90-270 volts input for the DUT, and is rated for 8A continuous. This can be raised to 16A continuous with option 00-CDT-16A.

The CDT-240 uses an internal probe, with an impedance of  $>100M\Omega$ ,  $< 25pF$ ; in accordance with the requirements of EN 60950. See Manual, Appendix A for further information.

The CDT-240 is in accordance with the accuracy requirements of CTL DSH 251B for both voltage and time measurements. These are the only portions of CTL DSH 251B that are applicable to the CDT-240. See our discussion of this topic [here](#).

The CDT-240 is supplied with a NIST traceable calibration. A2LA Calibration is available. The CDT-240 has a 1 year warranty.