California Instruments

CTS
Power Systems
3-45 kVA Programmable AC and DC Power Source / Analyzer

CE

EN/IEC 61000-3-2
Harmonics, including Amendment 14

EN/IEC 61000-3-12 *
Harmonics

EN/IEC 61000-3-3
Flicker

EN/IEC 61000-3-11
Flicker Measurement

EN 61000-4-11
Voltage Dips and Interruptions

EN 61000-4-13
Harmonics and Inter-harmonics

EN 61000-4-(14, 17, 27, 28, 29)
EN/IEC 61000-4-14: AC Voltage Fluctuations; EN/IEC 61000-4-17: DC Ripple; EN/IEC 61000-4-27: Three phase AC Voltage unbalance; EN/IEC 61000-4-28: Frequency Variations; EN/IEC 61000-4-29: DC Voltage Dips & Interruptions

NPL Certified

Powerful Software Package

Detailed Test Reports

1 & 3 Phase Configurations Available

Introduction

The CTS Series is a complete, turn-key compliance test system for EN 61000-3-2 / IEC 1000-3-2 (Harmonics), EN 61000-3-3 / IEC 1000-3-3 (Flicker) and various EN 61000-4 / IEC 1000-4 AC immunity tests. Consisting of an AC power source, power analyzer conditioning system (PACS) and a PC based data acquisition system; the CTS provides a complete turn-key solution for IEC testing. The Windows™ based CTS software performs all required IEC tests and generates detailed test reports. Comprehensive data files are stored on disk to allow post test analysis.

The CTS system implements all IEC standards including the new **Amendment 14** and provides a software only upgrade path for future standard changes.

A European style AC outlet is provided on the front panel for easy connection of single phase loads. Three phase loads are connected using rear terminal blocks.

Configurations

The CTS system is available in both single phase and three phase configurations. Single phase configurations range in power from 3000 VA to 5000 VA.

Three phase configurations offer 15-45 kVA or 62.5A per phase at 230 V (15003*i*X & MX45-3Pi). Single phase 5001iX-CTS systems can be upgraded to three phase systems if needed.

Measurement only CTS system versions (100-CTS and 300-CTS) can be added to an existing California Instruments power source.

CENELEC - Amendment 14

The CTS, with its flexible architecture, allows the user to select measurements to be made per the recently harmonized amendment.

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Does Your Current System Meet The Latest Standards?

The following represents some simple questions to assist users in verifying that their system is ready to measure per CENELEC A-14 and can also accommodate IEC61000-4-7 (referenced in the A-14 document). IEC61000-4-7 was revised in August 2002 and CE product compliance is required by January 2005.

Has your system been verified to have NO-GAP acquisition for prolonged tests?

NO-GAP acquisition can easily be verified. If the system uses the old 320 ms - 16 cycle acquisition window, it MUST have more than 3 sets of data points per second, i.e. 188 lines of data in the test data file for each minute of the test. For example, a 2.5-minute test requires 469 data lines. If the system uses the recommended 200 ms (10 cycle @ 50 Hz) acquisition window, which is required in the new IEC61000-4-7, it must have 5 sets of data points for every second, i.e. 300 lines of data in the test file for every minute of the test. For a 2.5-minute test, 750 data lines are required.

If the system doesn't store these data sets, there is no easy way to check the limit calculation for the proportional test classes, (Class-D and Class-C) nor can one prove that the system actually does measure per the requirements of A-14. Some manufacturers cannot produce the data, and instead claim that their products perform the calculations, but do not write the data to a file. This is a somewhat questionable approach, and the user should as a minimum, ask for the test sequence and all the test data that such manufacturers have. Also, insist on an independent third party verification of the system.

Has your system been verified to utilize a 1.5 second time constant filter, and hold peak values?

The 1.5-second filter is critical, as it is utilized to filter the data prior to limit comparisons. To verify this er, step functions in power and harmonics (independent from each other) are applied, and the system response is measured. The system has to track (and store) the peak level of the filtered power data, as this is used to compute limits for Class-D equipment. Also, the peak levels of each of the filtered harmonics are used to compare against 1.5 times the limit (this is called the 150 % limit). Ask for data from the manufacturer to prove that the system implements the 1.5 sec. filter properly.

Has your system been verified to produce a linear average of all harmonics during a test?

The linear average of each harmonic is computed over the whole duration of the test and then compared against the limit value (this is the 100 % limit). This is true for all test classes.

Does your system have all the test data, i.e. 300 data points @ 200 ms windows?

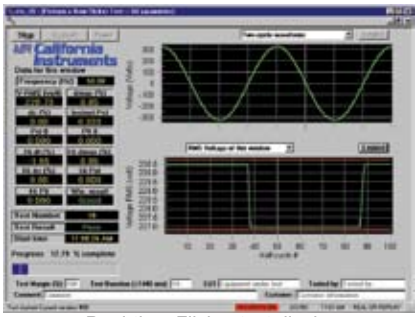
If yes, it is easy to apply a known fluctuating harmonic level, verify the data points, and verify the averaging. If the data points are not available, the user should as a minimum, ask for the test sequence and all the test data that the system manufacturer has. Also, insist on third party verification of the system.

Does your system produce the Partial Harmonic Current comparison for H 21-H 39?

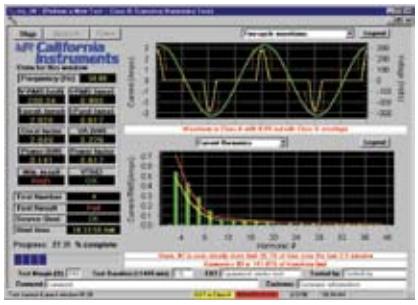
The A-14 amendment permits individual odd harmonics in the range H 21 - H 39 to exceed the 100 % limit, provided that the RMS value of the H 21-39 subgroup does not exceed the RMS value of the limit subgroup. If this RMS value is below the limit, the EUT still passes, provided all lower harmonics pass as well.

Is your system ready to comply with the requirements of IEC61000-4-7 (2002)?

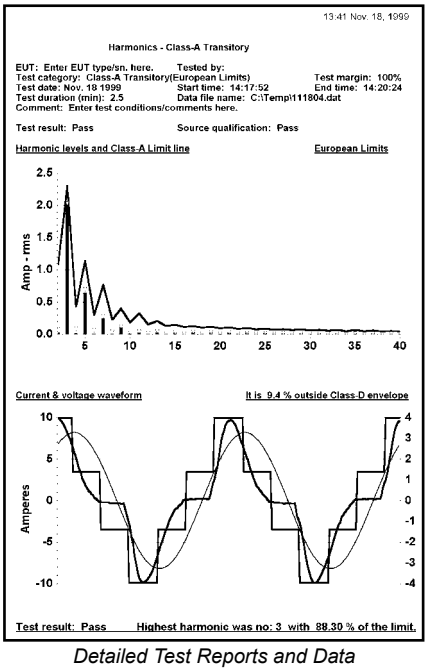
The IEC61000-4-7 (2002) includes a number of important provisions. Probably the most demanding is the requirement to evaluate inter-harmonics. These inter-harmonics are included with the integer harmonic levels through a geometric averaging process, similar to a RMS calculation. This places much bigger demands on the analysis (FFT) section, as it needs to compute all the inter-harmonic spectrum lines, and on top of that do this in 200 milliseconds instead of the existing 320 ms. Simple proof of being ready for this revised IEC61000-4-7 is the system's ability to write the analysis data for every 200 ms period to a data file, so that the user can verify operation with a known harmonics data pattern. Short of this capability, it is next to impossible to verify proper operation for all the possible harmonics signal combinations. In these cases, only an independent, third party verification (such as by the NPL) can guarantee compliance.



Real-time Flicker test display



Current Harmonics test display



Detailed Test Reports and Data

CTS Series Model Numbers

Model	Output Power	Source Model	Number of Phases
3001iX-CTS	3000 VA	3001iX	1
5001iX-CTS	5000 VA	5001iX	1
10001iX-CTS	10000 VA	10001iX	1
15003iX-CTS	15000 VA	15003iX	1 or 3
MX45-3Pi-MXCTS	45000 VA	MX45-3Pi	1 or 3

Note: Specifications are subject to change without notice. Specifications are warranted over an ambient temperature range of 25°± 5° C. Unless otherwise noted, specifications are per phase for a sinewave with a resistive load and apply after a 30 minute warm-up period. For three phase configurations, all specifications are for L-N. Phase angle specifications are valid under balanced load conditions only.

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