Test&Measurement



Application Note

IEC harmonic and voltage fluctuation/flicker test

Industry: Appliance & Lighting

Precision Power Analyzer WT5000 Integrated Software Platform IS8000



Overview

Low frequency emission standards required for electrical appliances include IEC 61000-3-2 for harmonics and IEC 61000-3-3 for voltage fluctuation/flicker. The standard adjusted to the power supply voltage in Japan is JIS C 61000-3-2.

Harmonics refer to the distortion components of the current consumption waveform of equipment. When devices such as inverter-driven motors or switching mode power supplies are connected to a commercial power supply, frequency components that are integral multiples of the power supply frequency are generated from the devices, causing distortion in the commercial power supply. Harmonics not only increase the reactive power of a power system, but also cause adverse effects such as equipment malfunction, noise, and burnout.

Voltage fluctuation/flicker refer to variations in power supply voltage and flickering of lighting fixtures (flicker). Power supply voltage fluctuates due to load fluctuations caused by turning on and off electrical appliances. This can cause equipment malfunction and flicker.

CE Marking certification or product development and evaluation require testing to ensure compliance with the latest standards.

Challenges / Demands

Harmonic and voltage fluctuation/flicker tests require measuring instruments meeting the requirements of each standard. The standards are frequently revised and updated, so you must always check for the latest version.

Because of the complexity of classifying the conditions for target equipment in standard testing, it is hoped engineers will be able to complete jobs from condition setting to testing, and reporting without any specialized knowledge.

Harmonic test

Evaluate whether the harmonic currents of the power supply voltage are within the limits. IEC 61000-3-12 is a standard for large currents greater than 16 A.

IEC 61000-3-2 EN 61000-3-2	Equipment with a rated current of 16 A or less per phase
JIS C 61000-3-2 (Japan)	Equipment with a rated current of 20 A or less per phase
IEC 61000-3-12 EN 61000-3-12	Equipment with a rated current exceeding 16 A, up to 75 A per phase

Voltage fluctuation / flicker test

Evaluate whether power supply voltage fluctuations and flicker are within the limits. IEC 61000-3-11 is a standard for large currents greater than 16 A.

IEC 61000-3-3 EN 61000-3-3	Equipment with a rated current of 16 A or less per phase and not subject to conditional connection
IEC 61000-3-11 EN 61000-3-11	Equipment with a rated current of 75 A or less per phase and subject to conditional connection

Solution / Proposal

The Precision Power Analyzer WT5000 (/G7 option) and the Integrated Software Platform IS8000's Harmonic Current and Voltage Fluctuation/Flicker Measurement Software IS8011 / IS8012 can be combined to perform harmonic and voltage fluctuation/flicker tests in accordance with IEC standards.



Supported standards:

Harmonics

EN61000-3-2, IEC61000-3-2, EN61000-3-12, IEC61000-3-12, and JIS C 61000-3-2

- Voltage fluctuation/flicker
- EN61000-3-3, IEC61000-3-3, EN61000-3-11, IEC61000-3-11
- 30 A/ 5 A High Accuracy Element (760901/760902) are available.
- GP-IB, Ethernet, and USB communications are available.

IS8011 / IS8012 Features

- Easy setting with the use of test menus
- Standard equipped with power supply control function
- Pass/Fail judgment based on the criteria for classes A, B, C and D
- Re-judgment after class change
- Measured value judgment graph that shows the limits and pass/fail judgments for each harmonic order in different colors
- Trend display of harmonic current/flicker in time-series
- Reporting capabilities
- CSV conversion function



Example of IEC 61000-3-2 test report

Supported standards (as of April 2021)

Harmonic standards

IEC 61000-3-2: Ed3.0 (2005), Ed3.0 A2 (2009) IEC 61000-3-2: Ed4.0 (2014), Ed5.0 (2018) EN 61000-3-2: 2006, 2009, 2014, 2019 IEC 61000-3-12: Ed1.0 (2004), Ed2.0 (2011) EN 61000-3-12: 2005, 2011 IEC 61000-4-7: Ed1.0 (1991), Ed2.0 (2002), Ed2.0 A1 (2008) EN 61000-4-7: 1993, 2002, 2009 JIS C 61000-3-2: 2011, 2019 JIS C 61000-4-7: 2007

Voltage fluctuation / flicker standards

IEC 61000-3-3: Ed2.0 (2008), Ed3.0 (2013) IEC 61000-3-3: Ed3.0 A1 (2017) EN 61000-3-3: 2008, 2013, 2019 IEC 61000-3-11: Ed 1.0 (2000), Ed2.0 (2017) EN 61000-3-11: 2000, 2019 IEC 61000-4-15: Ed1.1 (2003), Ed2.0 (2010) EN 61000-4-15: 2003, 2011



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