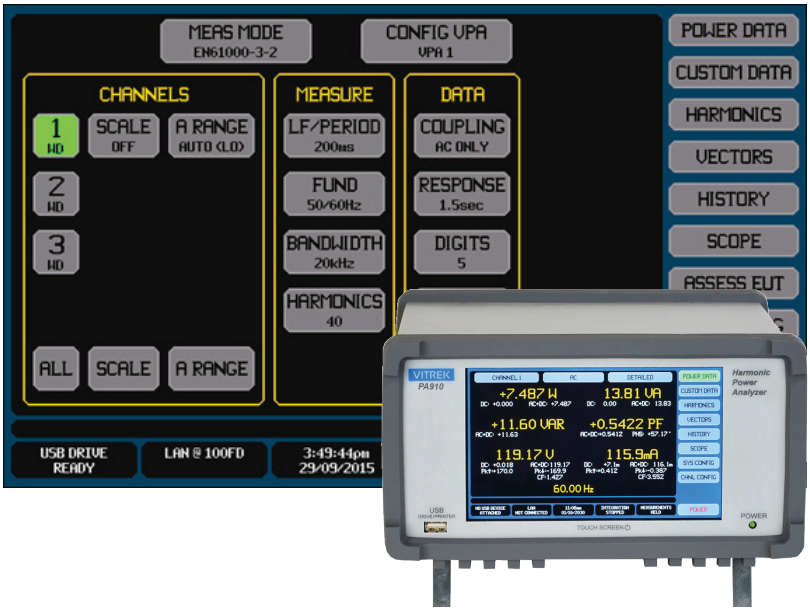
Compliance Testing of Harmonic Current Emissions According to IEC61000-3-2 and IEC61000-3-12.

Using the Vitrek PA900 Precision Harmonic Power Analyzer



INTRODUCTION

Compliance with electromagnetic compatibility (EMC) standards is mandatory for electrical and electronic equipment sold in many global markets. Among these, the IEC61000-3-2 and IEC61000-3-12 standards specify limits for harmonic current emissions of equipment connected to low-voltage public supply systems.

These limits ensure that individual devices do not contribute excessively to harmonic distortion on the power grid, which can lead to overheating in transformers, nuisance tripping of breakers, and interference with other equipment.

The Vitrek PA900 Precision Power Analyzer offers advanced capabilities to accurately measure harmonic emissions and determine compliance with both standards using its built-in harmonic analysis and limit-checking features, providing a cost-effective and reliable compliance testing solution.

STANDARDS OVERVIEW

Standard	Applies To	Harmonic Order	Connection Conditions
IEC61000-3-2	Equipment ≤16 A per Phase	Up to 40th	Single-Phase or three-phase, low-voltage public mains
IEC61000-3-12	Equipment >16 A and ≤75A per phase	Up to 40th	Equipment connected to public LV systems, primarily three-phase

Each standard classifies equipment into types (Class A, B, C, D), with different harmonic limits and test methods. Class D (for IEC61000-3-2) applies to devices with low power consumption such as TVs, PCs, and monitors. IEC61000-3-12 applies to larger industrial or commercial equipment.

MEASUREMENT SETUP

To conduct harmonic emission testing with the Vitrek PA900, the following components are typically required:

- Vitrek PA900 Power Analyzer with harmonics analysis option
- Current transducers (e.g., Vitrek TL8 or CT series) for higher current measurements
- Stable AC source or programmable power source compliant with IEC test conditions
- Device Under Test (DUT) connected per standard test setup
- Load simulation, if necessary, to reflect worst-case operating conditions

The PA900 can directly measure voltage and current waveforms and extract harmonics up to the 100th order, exceeding the requirements of both standards.

PA900—STREAMLINED HARMONIC TESTING

The PA900's integrated harmonic analysis engine performs real-time Fourier decomposition of voltage and current waveforms and displays:

- Harmonic order vs. amplitude (in absolute and percentage terms)
- Total Harmonic Distortion (THD)
- Phase angle of each harmonic
- Real-time pass/fail limit checking against IEC61000-3-2 and 3-12 limits

The analyzer supports user-selectable IEC classes and automatically applies the correct limit table and harmonic orders, eliminating manual configuration errors. The harmonic bar chart and tabular views provide engineers with intuitive visualization of compliance margins and problem areas.

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Extraordinary Aspects of the PA900

- Measurement Accuracy: Voltage and current measurement accuracy down to 0.03%, enabling precise harmonic amplitude capture.
- Advanced Display: Large touchscreen UI allows easy navigation through harmonics, waveform captures, and limit settings.
- Custom Limit Import: Allows loading of custom harmonic limits for non-IEC specifications or manufacturer-specific thresholds.
- Data Logging and Export: Continuous logging of harmonic data in .CSV format or full PDF compliance reports for documentation.

Unlike traditional harmonic analyzers, the PA900 enables simultaneous acquisition of up to 7 power channels, allowing multi-phase DUTs to be tested without additional equipment.

Equipment & Sensors Used

Component	Model	Description
Power Analyzer	Vitrek PA900	0.03% accurate, 7-channel, with built-in harmonics analyzer
Current Sensor	Vitrek TL8 or CT Series	High bandwidth current transducers with ranges up to 1000 A
Voltage Input	Direct to PA900	100 V CAT II inputs standard
AC Source	e.g. California Instruments or Chroma	Programmable for stable input voltage/frequency under IEC conditions

Conclusion

The Vitrek PA900 offers an integrated, high-accuracy solution for evaluating harmonic emissions to IEC61000-3-2 and IEC61000-3-12 standards. It's user-friendly interface, real-time limit checking, and multi-channel capabilities make it ideal for both design validation and formal compliance testing across consumer, commercial, and industrial product categories.

Use the QR Code below to learn more about PA900 power analyzers, or visit us online at www.Vitrek.com.

About Vitrek

More than the sum of our parts - Vitrek is a unified company driving innovation through a family of industry-leading brands: Vitrek, GaGe, and MTI Instruments. Together, we enable breakthroughs across a wide range of industries by delivering high-precision, user-friendly test and measurement solutions that improve product quality and enable real-time, in-process data collection where accuracy matters most.

Vitrek's product portfolio includes precision power analyzers, hipot safety testers, insulation resistance meters, high-voltage scanning systems, and advanced high-voltage measurement devices. In addition to standalone instruments, Vitrek offers turnkey automated electrical safety test stations, complete with barcode integration and test automation software - designed to streamline compliance testing and boost manufacturing efficiency.