



Power Quality Measurements and Troubleshooting

The use of power converters gives rise to power quality concerns in wind and solar plants. Power quality may be affected by increased voltage considerations, harmonics, voltage fluctuations and switching transients.

Power quality measurements are used to determine system baseline conditions and for troubleshooting. Power quality measurements can be essentially of two types: short-term monitoring in a system when a severe issue is identified, or long-term monitoring to assess system operation and to provide forensic information should something unforeseen occur.

EnerNex has a comprehensive experience in power quality measurements that includes:

- ▶ Assessing compliance with the harmonics standards.
- ▶ Performing tests on the facilities during the measurements to identify the interaction between the transmission system, wind plant, and reactive power facilities.
- ▶ Setting of the power quality meters to capture selected transient events such as inrush currents or capacitor switching
- ▶ Selecting the instrumentation to fully characterize the system under observation

EnerNex can assist in the installation and monitoring of site, and can perform data analysis. Additionally, EnerNex has experience in building sophisticated computer models by using the measurement data to identify the sources of power quality issues or the system resonance conditions.

EnerNex Experience

A list of the sites monitored by EnerNex includes the following:

- Milford Wind Plant, UT
- Kahuku Wind Plant, HI
- Maricopa Sun Catchers, AZ
- Sweetwater Wind Plant, TX
- Fowler Ridge, IN
- Adair, IA
- Ubly, MI
- Harvest Wind, MI

EnerNex



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EnerNex Expertise

HARMONIC TRENDING

The plot on the right shows an example of harmonic trending at a turbine terminal. The fifth and seventh harmonic currents are shown on a period of 14 hours. Harmonic trending can be used to identify the correlation between harmonic levels and generation levels in a wind plant.

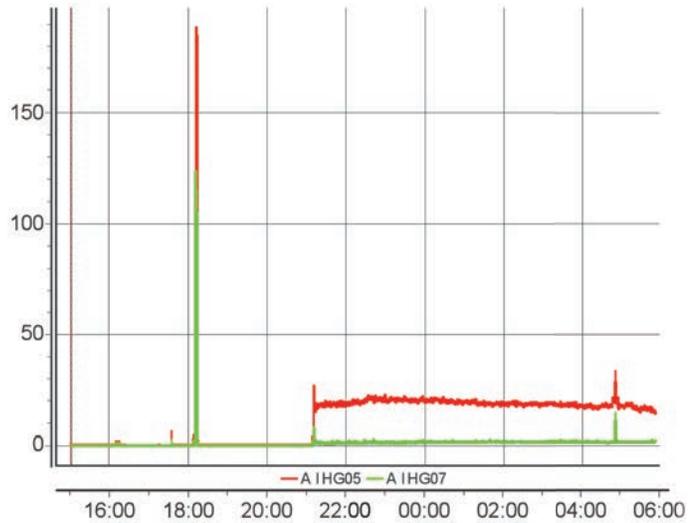


FIGURE 1 Example of Harmonic Trending Recording

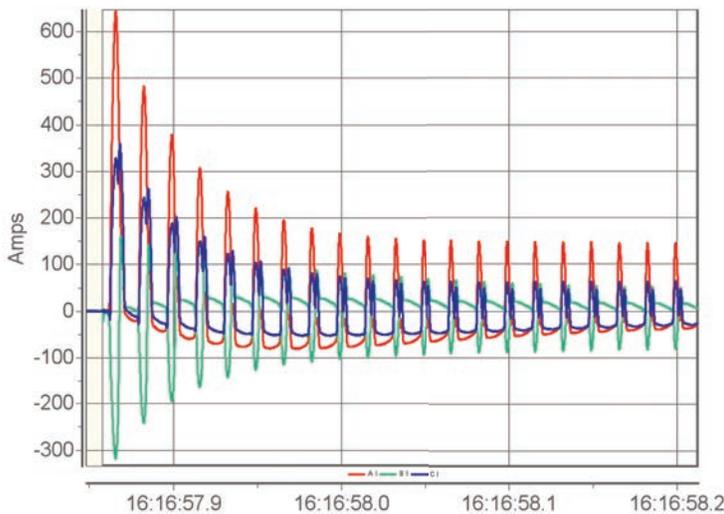


FIGURE 2 Example of Inrush Current Recording

TRANSIENTS

The graph on the left shows the inrush current recorded at the energization of a distribution transformer. Proper programming of power quality meters allow capturing selected transient events.

