

Power Quality Issues with Variable Frequency Drives: Why Monitor?

Power Quality Monitoring & Data Analysis Can Provide the Answer

The installation of variable frequency drives (VFDs) is rapidly increasing in industrial plants. Higher power VFDs are finding new applications as power levels increase. Industries include pulp-and-paper, water treatment, chemical processing and steel mills, among many others.

Plant systems are not likely suitable for VFDs, but installations still occur. The point where the VFD is powered and grounded is vital to successful VFD operation, and

maintaining plant PQ.

Aside from the common problem of harmonics, VFDs can react with plant electrical systems to cause ringing transient voltages to develop. VFDs can generate high-frequency transient over-voltages and voltage notches that cause damage and malfunction of sensitive electronic equipment. VFDs can also cause electromagnetic interference (EMI) problems to develop. EMI problems can affect equipment in the plant. VFDs are also sensi-

tive to common everyday voltage sags, and swells.

PQ monitoring of VFD installations allows changes in VFD operation and plant electrical systems to be detected before a catastrophic event occurs. Advanced PQ monitors from Dranetz Technologies, Inc.—sister company to Electrotek, should be installed at each VFD to capture conditions critical to VFD life and plant PQ.

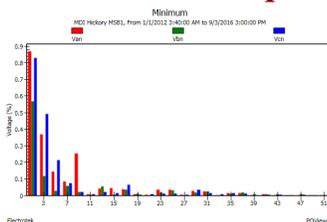
Monitors can also be used to measure performance critical to motor life such as temper-

ature, vibration, speed, etc. Electrotek's PQView® analysis software can be used to manage, and analyze, VFD PQ, and motor performance data simultaneously. Because VFDs and motors must operate as a system, this allows quick and detailed comparison of VFD, and motor conditions as plant conditions change.

PQView® email notifications can be setup to notify Electrotek and customer facility engineers when conditions change to prevent permanent damage to VFDs and motors. PQView® can also be used to generate PQ reports customized to any number of VFDs, monitors or VFD applications.



Electrotek Expert PQView® Software Analyzes PQ Data



Harmonic voltage data from PQView® illustrate potentially problem-causing harmonics affecting electronic equipment.

Integration of new VFDs into existing water treatment plants can cause high levels of voltage distortion (Vthd). PQView® is used here to identify harmonic components critical to determining why plant programmable logic controllers (PLCs) are malfunctioning.

PQView® can provide detailed analysis of harmonic voltage and current data. Comparison to other important PQ trends can be made to determine what condition impact Vthd.

VFD, motor and pump temperature can also be integrated into the PQ monitoring

process, and reported to PQView® for detailed analysis. Trends critical to VFD, motor and pump life, correlated with harmonics, allow our engineers to determine acceptable levels of Vthd for a water treatment plant. Conditions of high Vthd are integrated into PQView's email notification system.

Electrotek's Power Quality Engineering Services Center is a world-renowned center for power systems and power quality engineering. Our Center includes an Advanced Power Quality Testing & Research Laboratory.

Learn about our Center by visiting: www.pqengineering.com

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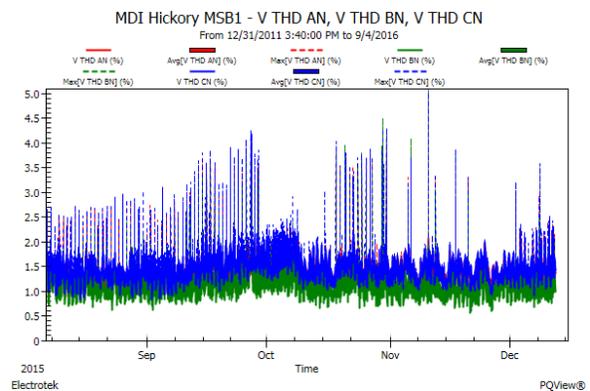
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PQView® Identifies Types of Disturbance Patterns in Harmonic Trends

PQ data from monitoring at a grocery warehouse was downloaded from a monitor to PQView® as a part of an investigation to determine why LED drivers were failing.

The steady-state harmonic voltage trend shown here reveals interesting patterns in Vthd peaks corresponding to disturbances. PQView® allows our engineers to determine which disturbances and loads are significant contributors to high Vthd levels. This information helps to determine which non-linear loads may need harmonic filtering.

Detailed analysis of this trend



A steady-state voltage trend from PQView® allowing identification of disturbances and loads with significant contribution to harmonics. .

also allows our engineers to determine which phase is contributing more to the Vthd. Harmonic data can also be used to determine

how frequently specific loads turn on and off, and other contributors to high Vthd, like temperature, and imbalanced currents.

About Electrotek

Founded in 1984, Electrotek Concepts, Inc. is world renowned for its research, developmental, applications and problem-solving work in understanding, identifying, analyzing and preventing power quality (PQ) problems. Our expertise extends from the utility generators, to inside the electrical/electronic load inside a customers' facility. The experience of Electrotek's team of PQ engineers extends from experts in utility power systems, participants on IEEE and IEC standards boards regarding PQ standards, to designers of end-use electronic equipment. Our engineers are armed to address any PQ problem at any level. The future of reliable, available power, and customer equipment in today's modern technological society depends on compatibility between utility power, the customer's facility electrical system and the end-use equipment customers depend on to carry out their day-to-day business activities.

