Content Community Connection

United States
The Electricity Forum Inc.
742 Pre Emption Road
Geneva, NY 14456
Tel 289-387-1025

Canada
The Electricity Forum
1885 Clements Rd, Unit 218
Pickering, ON L1W3V4
Tel 905-686-1040
Fax 905-686-1078
Toll Free 855-824-6131

Power Quality Training - Harmonic Analysis, Diagnostics, Mitigation

View Course Details

COURSE DATES AND TIMES

May 4-5 , 2026

10:00 am - 4:30 pm ET

September 14-15 , 2026

10:00 am - 4:30 pm ET

Why Power Quality Training Matters

This 12-hour instructor-led course is important because power quality and harmonics analysis, measurement, and mitigation of electrical disturbances are no longer optional in our modern electronic society; they are a necessity. The course is designed to help organizations recognize power quality problems by their symptoms and waveforms, and to understand their root causes and typical remedies.

Microprocessor-based industrial controls - PLCs, industrial computers, HMI, drives, motion controllers and sensors - are the foundation of high productivity, quality and competitiveness. If there is one universal factor that can and will disrupt microprocessor-based controls and cause downtime, it is power quality. Since industrial electrical systems frequently experience voltage fluctuations, harmonic distortions, noise and short- or long-term power outages, it is essential to ensure maximum uptime. The ability to quickly identify and remedy power quality problems will help ensure metering accuracy, lengthen the life of electrical equipment and improve power system availability.

Power quality failures are costly and can significantly impact an organization's bottom line. Electrical engineering and maintenance personnel have long been aware that identifying, monitoring and correcting power quality problems is vital to keeping facilities and processes running smoothly. This forum offers electrical professionals the opportunity to stay up to date on the latest technologies and techniques in this field. It also offers delegates an

excellent opportunity to ask specific questions and exchange ideas related to their own applications. This is designed to be an interactive, problem-solving, learning environment for delegates of all disciplines.

Upon completion of this Power Quality Analysis Training course, students should have a meaningful understanding of various types of power quality disturbances associated with typical motor control applications. They should understand the causes of these problems, their symptoms, the problems associated with each, and the typical means of solving or preventing them.

Power Quality Training Course Overview

Our Instructor-Led Course offers:

- Explanation of various power quality disturbances.
- Explanation of the causes, symptoms, problems and solutions for each disturbance.
- Suggested Best Practices to prevent future problems.
- Recognizing Power quality problems through waveforms.

Harmonics Problems Cause:

- Increased losses, e.g. machines will operate at increased temperature and can be overheated
- Resonance problems between the inductive and capacitive parts of the power network
- Malfunctioning of control systems since electronic meters, relays, etc., are matched to the fundamental frequency
- Overloading of capacitors, leading to malfunctioning and premature aging
- Interference with telecommunications and computers
- Disturbances in ripple control systems
- High currents in neutral conductors.

THIS COURSE WILL ALSO TEACH YOU ABOUT:

- Voltage sags
- Power factor
- Voltage transients
- Harmonics
- Harmonic resonance
- PWM voltage and its effects on motors
- Long motor lead applications
- EMI in VFD environments
- Identifying power quality problems through waveforms

LEARNING OBJECTIVES

- Recognize symptoms of power quality problems, including sags, swells, under or overvoltage, harmonics, transients, electrical noise (EMI/RFI/EMF), interruptions, wiring and grounding issues.
- Classify power quality events according to IEEE, ITIC (CEBNA) and public utility standards.
- Collect the required data to perform a detailed coordination study
- Explain proper application and interpret the results of power quality monitoring equipment
- Recommend viable solutions, including UPS, line voltage regulators, transient (surge) suppressors, harmonic filters, line filters, power conditioners, k-rated, isolation and zig-zag transformers, proper wiring and grounding, etc.

Related Courses

Power Factor Correction Training

WHO SHOULD ATTEND

- Industrial, Commercial, Institutional Electrical Engineering and Electrical Maintenance Personnel
- Electrical Personnel Who Are Responsible for keeping electrical equipment running
- Electrical Engineers
- Plant Electricians
- Qualified Electrical Workers
- Instrumentation Mechanics
- Electrical Technicians
- Managers & Safety Professional

STUDENTS RECEIVE

- Power Quality Training Course Certificate
- 1.2 Continuing Education Unit (CEU) Credits (12 Professional Development Hours)
- $100 Coupon Toward any Future Electricity Forum Event (Restrictions Apply)
- FREE Electricity Forum 120-page Digital Power Quality Handbook (Value $20.00)
- FREE Magazine Subscription (Value $20.00)
- Course Materials in PDF Format

COURSE OUTLINE

Power Quality Training Course Outline

Instructor

John Houdek, *Power Quality Consultant, The Electricity Forum*

DAY ONE

POWER QUALITY DISTURBANCES

- Typical Disturbances
- Disturbances associated with motor control applications
- Voltage quality

VOLTAGE SAGS

- Across the line motor starting
- What are the effects of voltage sags
- Motor inrush current
- Flat–topped voltage
- Preventing Voltage Sags
- Soft starting with VFDs, RVSS

POWER FACTOR

- Fundamental Frequency Power Factor
- Causes of low power factor
- What are the effects of low power factor
- Motor currents
- Power factor vs energy savings
- Improving Power Factor
- Selection methods for power factor capacitors
- Cost of low power factor
- Locating PF capacitors
- Capacitor applications issues
- Best practices

VOLTAGE TRANSIENTS

- Sources of transients
- What are the effects of transients
- Capacitor switching transients
- Effects of Transients on drives
- Voltage notching
- Best practices

DAY TWO

HARMONICS

- What is harmonic distortion, and what does it look like?
- What are the effects of harmonics
- Causes of harmonic distortion
- Power system reactance – effect on harmonics
- AC-DC Rectifier types
- Problems caused by harmonics
- Harmonics vs energy loss
- Harmonic Voltage distortion & effect on circuit elements
- Capacitors vs harmonics
- Harmonic resonance
- IEEE-519-2014 harmonic distortion limits
- Analyzing harmonic distortion
- Remedies for harmonic distortion
- Line reactors
- Tuned harmonic filters
- Wide band harmonic filters
- Multi-pulse drives
- Active filters
- Filter for grid-connected inverters
- Symptoms of harmonics
- Best practices

PWM Voltage effects on motors

- PWM effects on motor temperature
- What are the effects of PWM Voltage
- PWM voltage when motors have long cables
- Motor bearing currents
- Remedies for PWM motor issues

EMI / RFI

- Definition of EMI and RFI
- What are the effects of EMI/RFI
- Equipment vulnerable to EMI
- Causes of EMI
- EMI propagation methods
- Measuring common mode current
- Remedies for EMI
- Best practices

Cautions for Retrofits

- Starter to VFD upgrades
- LED lighting upgrades
- Best practices

Waveforms & Measurements

Questions and Answers

COURSE SCHEDULE:

Both days:

Start: 10 a.m. Eastern Time
Finish: 4:30 p.m. Eastern Time