

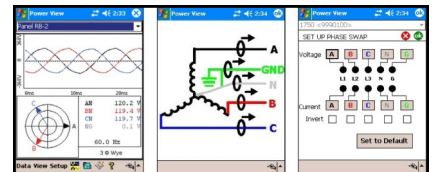
Introduction to Power Quality & Energy Analysis— Hands-On Training Class



Prepare your team to be productive with Power Quality and Energy Analysis instruments with training and services available from Fox River Systems. Introduction to Power Quality & Energy Analysis Hands-On Training provides a fast path for learning electrical power quality concepts, common power quality applications, and the test and measurement tools used to characterize and troubleshoot power quality problems. The course covers fundamentals of Power Quality and operation of power quality instruments using a combination of lecture, video case studies, hands-on labs, and Q&A.



The lecture and case studies introduce each of the power quality topics that are covered in the course. Specifically, each topic introduces how power quality instruments can be used to find or validate problems and assist in analyzing and troubleshooting them. Each case study is supplemented by a hands-on experience which makes use of a power quality fault simulator to help demonstrate the techniques employed in measuring and analyzing power. Fox River Systems provides students with hands-on opportunities with a variety of Fluke Power Quality test instruments and you can bring your own tools as well.



Offered as a Public or Private On-Site Training Class Tailored to Your Needs

Our goal is to help you develop the operational readiness of personnel to make the best possible use of the investment you've made in your Power Quality instruments. By the end of the course, students should have a basic idea of the tasks associated with making and analyzing power quality measurements and strategies for remediation.

People learn in different ways, at different speeds, and from different starting points. For organizations that prefer to tailor the training content to specific applications and problems, our private on-site classes can be tailored to emphasize what's important to you.



Part Number/Description	
<p>INTRO-PQ - Introduction to Power Quality - Public Training Class (8 hours) Fox River Systems provides use of Fluke Power Quality instruments for class, however if you have your own tools, you should bring them so we can assist with software installation and firmware upgrades that may be available. The course is open to everyone regardless of the make/model of power quality test tools you may use.</p>	

For current course schedule, ordering assistance, or cancellation/refund policy, please contact:

Pub: INTRO-PQ 201702

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Introduction to Power Quality — Course Syllabus

Module 1: Power Quality Concepts Overview

- Introduction to Power Quality
- Power Disturbances: Symptoms & Causes
- The Cost of Poor Power Quality
- Internal vs. External/Utility Sources of PQ
- PQ Standards
- Power Quality Tools and Where They're Applied: Troubleshooters, Loggers, and Recorders

Module 2: Instrumentation—User Interface & Cabling

- Powering the instrument
- Connections: Voltage and current probes as well as power supply, Ethernet cable, WiFi, and SD-memory card.
- User Interface—Menu Navigation
- Identifying and Specifying the Electrical Distribution System Topology: Single vs. multi-phase, Wye vs. Delta Topology
- Connecting to the Power System to Make Measurements
- Review of Instrumentation Screens such as: Meter, Scope, Vector/Phasor, Trend Graph, Events List, Bar Graph/Harmonics

Module 3: Checking Probe Connections Hands-on Lab

- Overview of techniques to ensure voltage and current probes are correctly configured
- Hands-on lab exercise

Module 4: Case Study—Voltage Dips & Flicker

- Video Case Study—Ski Café Flickering Lights
- Low voltage cause and effects
- System impedance (Z)
- Trending voltage and current to capture dips and swells
- Isolating the source of disturbance—upstream vs. downstream voltage and current measurements
- Severity of voltage events
- Why worry about sags?
- Flicker and Flicker Measurements
- Hands-on laboratory: voltage dips
- Lessons and key questions

Module 5: Case Study—Energy Consumption & Power Factor

- Video Case Study: Wastewater Plant Upgrades
- Load studies to evaluate peak demand and system capacity
- Power Factor & Power Factor Correction
- Lessons and questions
- Utility Bill and Key Utility Measurements
- Energy Consumption (kWh)
- Peak Demand
- Voltage and Current with Capacitive & Inductive Loads
- Power Types: True Power (W), Reactive Power (VAR), and Apparent Power (VA)

- Displacement Power Factor (DPF) & Total Power Factor (TPF)
- Power Factor Penalties & Correcting Power Factor Problems
- Hands-on: Displacement Power Factor & Total Power Factor

Module 6: Case Study - Voltage Unbalance, Voltage Distortion & Harmonics, and Power System Resonance

- Video Case Study—Chemical Plant Motor Heating
- Diagnostic approach
- Lessons and questions
- Why Unbalance is Important
- Vector display used as a tool to understand unbalance
- Overcurrent, Current Unbalance, and Single Phasing
- Harmonics and distortion
- Distorted waveforms
- Voltage distortion on motors
- Power system resonance
- The resonance dilemma: correcting DPF vs. creating a harmonics problem
- Hands-on: Unbalance

Module 7: Case Study—Harmonic Sources and Sequences

- Video Case Study—Plastic Plant With High Neutral Current
- Diagnostic Measurements and Solution
- Lessons and Questions
- Effects of Harmonics
- Linear & Non-Linear Loads
- Causes of Distortion
- Single-Phase Loads and 3-Phase Rectifiers
- Harmonic Sequences and Effects
- Insidious 3rd Harmonic in 3-Phase, 4-Wire topologies
- When distortion is a problem
- Solutions to Harmonics Problems
- Hands-on: Harmonics

Module 8: Case Study—Transients

- Video Case Study: Wind farm transient events
- Diagnostic measurements and solution
- Lessons and Questions
- Causes and Effects of Transients
- Transient waveform capture
- Protecting against transients
- Hands-on: transient capture

Module 9: Analysis & Reporting Software

- Menu Navigation
- Building a report



Power Quality training is provided by Fox River Systems.

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