



MAINTENANCE AND ENGINEERING

Power Factor Correction and Harmonics

Course code: ME-009

SPARK TRAINING

Professional training courses for leaders, specialists, and organizations seeking practical capability development.

info@sparktraining.eu

+31 85 115 0004 | sparktraining.eu

— Workshop Overview

Poor power factor and excessive harmonic distortion reduce electrical system efficiency, increase operating costs, shorten equipment life, and negatively impact power quality. This course equips participants with the knowledge and practical skills to analyze power quality issues, implement effective power factor correction solutions, mitigate harmonics, and optimize electrical system performance in industrial and commercial facilities.

Why Attend

The course combines instructor-led presentations, engineering calculations, practical workshops, case studies, equipment demonstrations, power quality analysis exercises, and real-world industrial applications.

Who Should Attend

Electrical engineers
Electrical maintenance engineers and technicians
Power system engineers
Energy managers
Plant and facility engineers
Operations and maintenance supervisors
Industrial automation professionals

— Learning Objectives

- Understand the principles of power factor and harmonic distortion
- Evaluate the impact of poor power quality on electrical systems
- Apply effective power factor correction techniques
- Measure, analyze, and interpret harmonic data
- Design and implement harmonic mitigation solutions
- Improve electrical system efficiency, reliability, and energy performance
- Prepare electrical systems for modern smart grid and renewable energy integration

— Course Outline

DAY 1

Fundamentals of Power Quality, Power Factor, and Harmonics

- Understanding the principles of power factor and its impact on electrical system performance
- Evaluating the causes and consequences of low power factor in industrial facilities
- Understanding harmonic distortion and its effects on electrical equipment and networks
- Identifying common harmonic-producing loads and nonlinear devices
- Reviewing international standards, regulations, and power quality requirements
- Assessing the relationship between power quality, equipment reliability, and energy efficiency

DAY 2

Power Factor Correction Techniques and Applications

- Understanding reactive power and compensation principles
- Evaluating various power factor correction methods for industrial applications
- Selecting and applying capacitor banks for reactive power compensation
- Understanding synchronous condensers and other dynamic compensation technologies
- Optimizing power factor correction systems for different operating conditions
- Performing technical and economic evaluations of power factor improvement projects
- Practical workshop: Designing a power factor correction solution

DAY 3

Harmonic Measurement and System Analysis

- Identifying major sources of harmonic distortion in electrical installations
- Applying power quality analyzers and monitoring equipment for harmonic measurements
- Measuring voltage distortion, current distortion, and Total Harmonic Distortion (THD)
- Interpreting harmonic measurement results and identifying system vulnerabilities
- Evaluating the impact of harmonics on transformers, motors, cables, and sensitive equipment
- Practical exercise: Conducting harmonic assessments and interpreting field measurements

DAY 4

Harmonic Mitigation and System Improvement

- Understanding passive, active, and hybrid harmonic filtering technologies
- Selecting appropriate harmonic mitigation solutions for different applications
- Designing harmonic filtering systems to improve power quality
- Integrating harmonic mitigation strategies into complex industrial power systems
- Evaluating system performance following harmonic reduction measures

- Practical case studies: Solving harmonic-related operational problems

DAY
5

Future Power Quality Technologies and Strategic Planning

- Understanding the impact of renewable energy systems and distributed generation on power quality
- Evaluating smart grid technologies and intelligent power quality management systems
- Reviewing emerging technologies in harmonic suppression and reactive power compensation
- Developing long-term strategies for maintaining power quality and system reliability
- Practical workshop: Developing a comprehensive power quality improvement plan
- Course review, lessons learned, implementation roadmap, and final Q&A

— Upcoming Classroom Dates

DATE	LOCATION	FEE
11 - 15 January 2027	Munich - Germany	€2,125
8 - 12 February 2027	Geneva - Switzerland	€2,625
8 - 12 March 2027	Barcelona - Spain	€1,925
12 - 16 April 2027	Amsterdam - Netherlands	€2,125
10 - 14 May 2027	London - United Kingdom	€2,100
14 - 18 June 2027	Munich - Germany	€2,125
12 - 16 July 2027	Kuala Lumpur - Malaysia	€1,400
9 - 13 August 2027	Amsterdam - Netherlands	€2,425

— Certificate and Registration

Participants who attend and complete the full programme receive a SPARK Training Certificate of Completion. For registration, in-house delivery, or availability questions, contact info@sparktraining.eu or +31 85 115 0004.