JUPITER PRIME

Consulting • Training • Advisory

جوبيتر برايم للاستشارات والتدريب

COURSE BROCHURE

# Industrial Power Factor Correction and Sizing Training Course

17 – 21 January 2027
Abu Dhabi

**jupiterprime.uk**

info@jupiterprime.uk

Registered in the United Kingdom and Saudi Arabia

# Industrial Power Factor Correction and Sizing Training Course

**Ref:** 3224_122675 **Date:** 17 – 21 January 2027 **Location:** Abu Dhabi **Fees:** 6500 GBP

Industrial Power Factor Correction and Sizing is a 1-week training course for plant electrical engineers and energy managers who measure reactive demand, size correction equipment and present a power factor correction study with harmonic checks. Tariff penalties and growing drive loads make reactive power a direct cost and reliability issue. Jupiter Prime Training runs Industrial Power Factor Correction and Sizing as a calculation-led course.

## Why Industrial Power Factor Correction and Sizing Matters Now

Three forces shape industrial power factor correction and sizing today. Utilities increasingly bill reactive energy and maximum demand separately, so a lagging plant pays for current that does no useful work. Drives, rectifiers and modern lighting have changed load profiles, so older capacitor banks may now resonate or overcorrect at light load. Good sizing frees transformer headroom and avoids penalties; poor sizing risks failed capacitors, nuisance fuse operation and voltage rise at light load, with production stoppages in sectors such as food processing and cement.

## Who Gains Most from Industrial Power Factor Correction and Sizing

- Engineers responsible for low and medium voltage distribution in production plants
- Energy managers accountable for electricity bills, demand charges and loss reduction
- Maintenance leads who inspect, test and replace capacitor banks and contactors
- Project engineers who specify switchboards, drives and new motor loads
- Consulting engineers who audit sites and recommend reactive compensation

Plant engineering groups gain most when distribution, maintenance and energy staff attend together and agree one site correction strategy.

## Industrial Power Factor Correction and Sizing Capabilities

Participants move from a utility bill and load log to a sized, controlled and harmonic-checked correction scheme.

- Calculate reactive needs from metered load profiles — the size of the correction bank
- Specify fixed, stepped or motor capacitors per load group — the switchboard designer
- Design automatic controller steps and switching delays — the operations team
- Assess resonance risk between capacitors and the supply transformer — the reliability engineer
- Weigh detuning reactors against plain capacitors for drive-heavy feeders — the capital budget owner
- Build a payback case from penalties, losses and capacity — the plant manager

## Key Industrial Power Factor Correction and Sizing Terms

- Power factor — the ratio of real power to apparent power
- Reactive power — power that magnetises motors and transformers without doing useful work
- Displacement power factor — power factor caused by the phase angle at the fundamental frequency
- Detuning reactor — a series inductor that shifts a capacitor's resonance below the dominant harmonic
- Parallel resonance — capacitor and supply inductance amplifying a harmonic voltage at one frequency
- Automatic power factor controller — a relay that switches capacitor steps to hold a target value

## Industrial Power Factor Correction and Sizing Day by Day

## Day 1: Reactive Demand and the Cost of Low Power Factor

- Power Triangle and Phase Angle — Why Current Rises With Lagging Loads
- Utility Tariff Structures — Reactive Energy Charges and Demand Penalties
- Motor and Transformer Magnetising Current — Sources of Plant Reactive Load
- Cable and Transformer Losses — Capacity Released by Correction
- Single Line Diagram Review — Where Reactive Demand Enters the Network

## Day 2: Measuring the Plant Load Profile

- Portable Power Analyser Set-Up — Choosing Measurement Points and Logging Periods
- Kilowatt and Kilovar Load Logs — Peak, Average and Light Load Conditions
- Bill and Meter Reconciliation — Confirming the Baseline Power Factor
- Waveform and Spectrum Capture — Identifying Drive and Rectifier Distortion
- Displacement Versus True Power Factor — Which Value the Utility Bills

## Day 3: Sizing and Locating Correction Equipment

- Kilovar Calculation From Target Value — Bank Rating for Each Feeder
- Central, Group and Individual Compensation — Location Choice and Cost
- Motor Terminal Capacitors — Avoiding Self-Excitation on Switch-Off
- Capacitor Voltage and Temperature Ratings — Life Expectancy in Hot Switchrooms
- Fuses, Contactors and Discharge Resistors — Safe Switching of Each Step

## Day 4: Control, Harmonics and Resonance Checks

- Automatic Controller Step Sequencing — Holding Target Without Overcorrection
- Current Transformer Placement — Correct Signals for the Controller
- Resonant Frequency Estimate — Transformer Rating and Bank Size Interaction
- Detuned Banks and Reactor Tuning Ratio — Protection Against Harmonic Overload
- Capacitor Inrush and Back-to-Back Switching — Contactor and Step Selection

## Day 5: Practising the Power Factor Correction Study

- Load Log Interpretation for a Sample Plant — Baseline From Day 2 Data
- Bank Sizing and Location Choice — Applying Day 3 Calculations
- Resonance and Detuning Check — Applying Day 4 Harmonic Screening
- Savings and Payback Estimate — Penalties, Losses and Released Capacity
- Power Factor Correction Study — Findings, Equipment Schedule and Recommendations

## Applying Industrial Power Factor Correction and Sizing After the Course

- Run a one-week kilowatt and kilovar log on the main incomer and reconcile it with the utility bill.
- Inspect existing capacitor banks for failed steps and screen each for resonance with the supply transformer.

## Industrial Power Factor Correction and Sizing Questions FAQ

### What is industrial power factor correction and sizing and why does it matter now?

It is the practice of measuring a plant's reactive demand and choosing correction equipment to offset it. It matters now because tariffs penalise low power factor and modern drive loads make poorly sized capacitor banks fail or resonate.

### Which roles gain most from industrial power factor correction and sizing?

Plant electrical engineers, energy managers and maintenance leads gain most. It serves those who specify switchboards, manage the electricity bill or maintain capacitor banks in manufacturing or water treatment.

### How does industrial power factor correction and sizing differ from a power quality or harmonic filter design course?

It focuses on correcting power factor and sizing capacitor banks. Harmonics are checked only where they affect correction equipment; a filter design course models distortion limits and filters in depth.

### What will you bring back from industrial power factor correction and sizing?

You bring back a power factor correction study for a sample plant. It sets out the baseline, bank ratings, controller steps, resonance checks and payback, ready to adapt to your site.

## Industrial Power Factor Correction and Sizing: The Way Forward

The power factor correction study first informs whether a plant needs a new central bank, group correction or repair of existing steps. Energy managers use it to justify spending, and maintenance staff use its schedule to plan inspections. After its first use, revisit the resonance check whenever new drives, solar inverters or large motors are added to the network.