

Middle East Training Center

Excellence through Education



Training for the Region

In 2013, the OMICRON Academy opened its training center in Manama, Bahrain. Manama is in an ideal position to serve the Middle East due its central location, road connection to Saudi Arabia and excellent air links to the major cities in the region.

The facility, situated in the prestigious and easily accessible Al Moayyed Tower, is very well equipped with a wide selection of equipment from OMICRON's product range. It provides a combination of actual test objects and simulation tools to enable practical training.

Our experienced trainers are fluent in Arabic and English, enabling them to provide effective training for customers throughout the Middle East and for Arabic and English speakers in North Africa. In addition to the courses provided in our training center, OMICRON can also deliver training in other countries in the region, which can take place either in a suitable central location or at the customer's site.

Training with the OMICRON Academy will enable customers to get the most from their OMICRON equipment, allowing it to be used in the most efficient and effective way.

Types of Training

With flexible location possibilities, training is offered at our Training Center in Manama, at our customers' premises and online for remote attendance.

> Scheduled Training

These courses take place regularly at the OMICRON Academy on fixed dates. You will benefit from exchanging experiences with other students and from working with the Academy's dedicated training equipment.

> Customized Training

These courses are planned specifically for you and are tailored to your requirements. They can take place at a variety of locations, including the Manama Training Center, customer premises or a location of your choice.

> Webinars

Our webinars are short interactive online courses. To participate, only a computer, a microphone, a fast Internet connection and speakers or headset are necessary.

Who Should Attend

Our professional training courses cover multiple levels ranging from fundamental through to advanced topics. Areas covered include: how to use the equipment, different applications of the equipment, and theoretical understanding.

Built around real testing situations, these courses are ideal for technicians and engineers from electrical utilities, industrial plants, equipment manufacturers and service companies.

Work Areas

Attendees include technicians and engineers in the fields of:

- > Design and commissioning
- > Substation maintenance
- > Asset management
- > Protection
- > Metering

Convenient Location

The training center is easily accessible via the Bahrain International Airport, which is located just 13.6 km away on the island of Muharraq. As Bahrain is linked to Saudi Arabia by the King Fahad Causeway, it can also be reached comfortably by car.

There are several hotels within 10 minutes walking distance:

- > Ibis Seef
+973 17386020, www.accorhotels.com/gb
- > Ramee Grand Hotel & Spa
+973 17111999, www.rameegrandbahrain.com
- > Swiss-Bel Hotel
+973 66310000, www.swiss-belhotel.com/en-gb

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Protection Testing

Protection Testing helps to ensure proper protection functions for the safe operation of substation assets and a secure power supply.

Power System Protection Testing

Duration: 4 days

Solutions: Test Universe, CMC-Family

Code: C.0047.AAH

Learn how to efficiently test overcurrent, distance and transformer differential relays from scratch with the OMICRON Test Universe. Get familiar with the test procedure in hands-on and theoretical sessions.

Objectives

- > Performing commissioning, trouble-shooting and periodic tests of protection relays
- > Testing overcurrent, distance and transformer differential relays with the OMICRON Test Universe
- > Creating and modifying automated test plans and customized test reports
- > Using the OMICRON Test Universe from scratch

Content

- > Quick current and voltage output for easy wiring tests
- > Configuration of the test object parameters and the test hardware
- > Creating test plans which adapt automatically to newly entered relay settings
- > Creating a flexible test plan for overcurrent relays including testing pick-up values and trip times
- > Hands-on testing of the overcurrent protection function
- > Creating a flexible test plan for distance relays including testing the trip times and zone reaches as well as switch on to fault (manual close) and auto-reclosing
- > Hands-on testing of distance relays
- > Creating a flexible test plan for transformer differential relays including testing the stability during external faults, the tripping characteristic, the trip times and the harmonic restraints
- > Hands-on testing of transformer differential relays

Solutions

- > Control Center, QuickCMC, Ramping, Pulse Ramping, Overcurrent, Advanced Distance, State Sequencer, Autoreclosure, Advanced Differential (Diff Configuration, Diff Operating Characteristic, Diff Trip Time Characteristic, Diff Harmonic Restraint)
- > CMC-Family

Audience

Technical staff from electric utilities, service companies and manufacturers involved in protection testing

Prerequisites

Basic knowledge of power system protection





IEC 61850 Basics, Application and Testing

Duration: 2 days Solutions: CMC-Family Code: C.0055.AAA

Get a thorough introduction to the IEC 61850 standard in a combination of theoretical and hands-on sessions. Get familiar with the IEC 61850 implementation in IEDs from different manufacturers. Learn how to efficiently test IEC 61850 substations with the CMC test system, IEDScout and SVScout.

Objectives

- > Designing and analyzing IEC 61850 based communication systems
- > Using the client/server, GOOSE and sampled values services for power utility automation
- > Configuring the communication according to the IEC 61850-6 standard
- > Performing commissioning and functional testing of IEC 61850 based IEDs and systems

Content

- > Basics of IEC 61850
- > Data models and services
- > Specific communication mappings
- > Configuration and engineering
- > Basic aspects for designing communication networks
- > Client/server communication for SCADA applications
- > GOOSE analyses and applications
- > Sampled Values basics
- > Testing of IEC 61850 IEDs and systems

Solutions

- > IEDScout, SVScout, GOOSE Configuration module, Sampled Values Configuration module
- > CMC test sets with Ethernet adapter

Audience

Technical staff from electric utilities or companies involved in project planning, commissioning or maintenance of IEC 61850 systems

Prerequisites

Basic knowledge of electrical engineering



Power Utility Communication

Power Utility Communication enables applying the engineering process according to IEC 61850 standard and testing the performance of the substation communication network.





Instrument Transformer Testing

Instrument Transformer Testing helps to verify the proper functionality of the instrument transformer as well as to determine the insulation condition and fault types.

Current Transformer Testing

Duration: 1 day

Solutions: CT Analyzer

Code: C.0061.BBX

Improve your comprehension of the CT working principle by focusing on physical basics and relevant content from common CT standards. Learn how to use the CT Analyzer for revolutionary and convenient CT measurement and how to create reports with the flexible software tool.

Objectives

- > Using the advantages of the CT Analyzer approach for CT testing
- > Classifying CTs according to relevant standards
- > Assessing specified parameters of a CT
- > Generating test reports with the PC tool set

Content

- > Basics of current transformers (Electro-physical principles, different types and de-signs)
- > Relevant standards for CTs to understand the CT Analyzer's settings
- > Measuring principle and operation of the CT Analyzer for effective CT testing
- > CT Analyzer PC tool set for easy preparation and reporting of CT testing

Solutions

- > CT Analyzer
- > Classes and relevant content of the standard IEC 600 44-1 and IEC 600 44-6
- > Classes and relevant content of the standard ANSI C57.13

Audience

Technical staff involved in CT testing in utilities, transmission, distribution and generation networks, railway grids, service companies and manufacturers

Prerequisites

Knowledge of electrical engineering





Power Transformer Testing & Monitoring

Power Transformer Testing and Monitoring enables detecting fault types as well assessing the transformer's insulation condition.

Diagnostics of Distribution and Power Transformers

Duration: 4 days Solutions: CPC, DIRANA, FRANEO Code: C.0061.BBX

Participants acquire the knowledge and skills to perform and operate diagnostic tests (conventional or advanced as FRSL measures, FRA, FDS) on power and distribution transformers. Subsequently this knowledge is embodied in practical work.

Objectives

- > Performing diagnostic measurements on transformers
- > Interpreting and evaluating the measurement results
- > Correlating results from different measurement methods

Content

- > Introduction to the diagnosis of transformers
- > Electrical basic tests on a transformer
 - > Transformer Ratio
 - > Winding Resistance
 - > On-load Tap Changer Test
 - > Short-circuit impedance measurement
- > Introduction to the measurement of $\tan \delta$ (dielectric loss factor) and the frequency response of the dielectric (FDS)
 - > Measurement of dissipation factor on insulation of windings
 - > Implementation and interpretation of results
- > Introduction to the sweep frequency response analysis of the scanning coils (SFRA)
 - > Measurement principles of the SFRA
 - > Implementation and interpretation of results

Solutions

- > CPC-Family
- > DIRANA
- > FRANEO 800
- > PTM (Primary Test Manager)

Audience

Technicians and engineers from utilities or companies responsible for maintenance and diagnostics of power transformers.

Prerequisites

General knowledge of power and distribution transformers





Circuit Breaker / Switchgear Testing

Circuit Breaker and Switchgear Testing helps to assess a Circuit Breaker's condition, verifying proper electrical connections, adequate tension and intact contacts.

Circuit Breaker Testing

Duration: 2 days Solutions: CIBANO Code: C.0105.AAX

Get to know the CIBANO 500 and the measurement principles for circuit breakers. Learn how to perform efficient circuit breaker tests in hands-on and theoretical sessions. Simplify your tests with the PTM (Primary Test Manager).

Objectives

- > Performing commissioning and periodic tests of circuit breakers with the CIBANO 500
- > Preparing, performing and documenting tests easily with the control software PTM (Primary Test Manager)
- > Interpreting, assessing and comparing measurement results

Content

- > Constructional and operational characteristics of circuit breakers relevant for testing
- > Overview of measurement principles to illustrate the different procedures
- > Interpreting and assessing measurement results
- > Introduction to the hardware and software features
- > Typical procedures for testing contact resistances, minimum pick-up voltages, timing including undervoltage condition as well as coil/motor current analysis
- > Hands-on testing on a circuit breaker model

Solutions

- > CIBANO 500
- > CB MC2
- > PTM (Primary Test Manager)

Audience

Technical staff from utilities or service companies responsible for circuit breaker testing

Prerequisites

Knowledge of electrical engineering



PD Training Program

With our modular training program you will become familiar with both the principles of PD and their measurement techniques on different assets. Attend the course on fundamentals of PD testing and choose from four application-focused courses in order of importance based on your company priorities.



Gain a **bronze** certificate by attending the „Fundamentals of PD Testing“ course.



Gain a **silver** certificate by attending the „Fundamentals of PD Testing“ course and up to three PD application courses.



Gain a **gold** certificate by attending the „Fundamentals of PD Testing“ course and all four PD application courses



Partial Discharge Testing

Detection of aging and deterioration processes as well as identification and localization of faults for assessing the insulation condition of electrical assets.

Fundamentals of Partial Discharge Testing

Duration: 2.5 days Solutions: MPD-System Code: C.0171.BBX

Become familiar with the basic principles of partial discharge testing using the MPD system. Learn to set-up and measure according to IEC 60270 in hands-on sessions on special training equipment. Be introduced to the interpretation of the test results.

Objectives

- > Measuring partial discharges on high voltage devices with the MPD according to IEC 60270
- > Monitoring the quality of the production process by performing measurements on assembled parts
- > Performing measurements to determine the insulation condition and identify fault types and fault location

Content

- > Getting to know the MPD system
- > Understanding how partial discharges are measured
- > Connecting the MPD to high voltage devices, such as power transformers, generators, motors, cables
- > Getting to know the software of the MPD for efficient measurements
- > Performing partial discharge tests according to IEC 60270 and the IEC standard of the test object
- > Hands-on testing on a circuit breaker model
- > Performing real partial discharge measurements in hands-on sessions
- > Getting to know PRPD, Q(V), trend analysis
- > Interpreting partial discharge test results
- > Handling interferences

Solutions

- > MPD 600 and accessories

Audience

Technical staff from electric utilities, railway and service companies as well as manufacturers to be involved in partial discharge testing

Prerequisites

Knowledge of electrical engineering





Partial Discharge Testing on Power Transformers

Duration: 2.5 days Solutions: MPD-System Code: C.0172.BBX



Enhance your knowledge on partial discharge testing on power transformers. Become familiar with advance software features of the MPD system. Learn how to identify fault types and fault locations to assess the condition of your assets. Get to know advanced testing techniques in hands-on sessions on special training equipment.



Objectives

- > Enhancing your knowledge on partial discharge on power transformers
- > Performing measurements to determine the insulation condition and identify fault types and fault location
- > Evaluating deterioration processes in power transformers by partial discharge measurements
- > Monitoring the quality of the production process by performing measurements on assembled parts
- > Applying partial discharge technology to design or redesign devices exposed to high voltage



Content

- > Understanding the physics behind partial discharges
- > Getting to know the advanced diagnostic features of the MPD system
- > Performing partial discharge tests according to IEC 60270 and IEC 60073
- > Non-conventional measurement techniques (e.g. UHF, inductive Sensors)
- > Connecting the MPD to power transformers
- > Performing real partial discharge measurements in hands-on sessions
- > Getting to know 3PAR and 3CFRD/3FREQ diagrams to discriminate discharge sources
- > Handling interferences (frequency selection, gating and source discrimination)
- > Interpreting partial discharge test results
- > Classifying partial discharge types and determine the risk for the test objects



Solutions

- > MPD 600 / OMS 605 and accessories
- > PDL 650 (acoustic partial discharge locator)

Audience

Technical staff from electric utilities, railway and service companies as well as manufacturers involved in partial discharge testing on power transformers

Prerequisites

Fundamentals of Partial Discharge Testing with the MPD system or comparable knowledge

Partial Discharge Testing on HV Cables

Duration: 2.5 days Solutions: MPD-System Code: C.0173.BBX



Enhance your knowledge on partial discharge testing on HV cables. Become familiar with advance software features of the MPD system. Learn how to identify fault types and fault locations to assess the condition of your assets. Get to know advanced testing techniques in hands-on sessions on special training equipment.



Objectives

- > Enhancing your knowledge on partial discharge on HV cables
- > Performing measurements to determine the insulation condition and identify fault types and fault location
- > Evaluating deterioration processes in HV cables and accessories by partial discharge measurements
- > Monitoring the quality of the production process by performing measurements on assembled parts
- > Applying partial discharge technology to design or redesign devices exposed to high voltage

Content

- > Understanding the physics behind partial discharges
- > Getting to know the advanced diagnostic features of the MPD system
- > Performing partial discharge tests according to IEC 60270, IEC 62067 and IEC 60840
- > Non-conventional measurement techniques (e.g. inductive Sensors)
- > Connecting the MPD to HV cables
- > Performing real partial discharge hands-on sessions
- > Synchronous and multichannel partial discharge testing for optimized test results
- > Locating partial discharge in cables using TDR and STDR
- > Getting to know 3PAR and 3CFRD/3FREQ diagrams to discriminate discharge sources
- > Handling interferences (frequency selection, gating and source discrimination)
- > Interpreting partial discharge test results
- > Classifying partial discharge types and determine the risk for the test objects



Solutions

- > MPD 600 / OMS 605 and accessories

Audience

Technical staff from electric utilities, railway and service companies as well as manufacturers involved in partial discharge testing on HV cables

Prerequisites

Fundamentals of Partial Discharge Testing with the MPD system or comparable knowledge



Partial Discharge Testing on Generators and Motors

Duration: 2.5 days Solutions: MPD-System Code: C.0174.BBX



Get an introduction to the basics of partial discharge and to the setup for conventional and unconventional measurements. Learn how to make full use of its software tools for detecting, measuring and documenting partial discharge in primary assets



Objectives

- > Gaining a better insight into the theory and origin of partial discharge
- > Understanding both conventional and unconventional measurement principles
- > Performing time-efficient measurements for comprehensive insulation diagnostics on different assets
- > Interpreting the measurement results to draw conclusions on the insulation for condition-based maintenance planning



Content

- > Basics, origin and different types of partial discharge
- > Theory about HV breakdown in different insulation systems
- > Measurements in time domain and frequency domain (FFT)
- > Conventional measurement methods as per IEC 60270:2013
- > Measurements with high-frequency current transformers (HFCT) and UHF range
- > Applicable standards for PD measurements on different assets
- > Offline and online measurement on different assets
- > Performing measurement using 3PARD and 3FREQ methods
- > Noise suppression techniques for handling of high interference levels (software & hardware approaches)
- > Assessment and interpretation of PD patterns for different assets
- > Practical measurement examples about calibration, 3PARD, 3FREQ on different assets
- > Analyzing case studies of most common defects in different assets



Solutions

- > MPD 500/600 and accessories
- > OMS 605
- > MPD software with Basic and Advanced package

Audience

Technical staff involved in the planning or assessment of the condition monitoring of Generators and Motors

Prerequisites

Fundamentals of Partial Discharge Testing with the MPD system or comparable knowledge

Partial Discharge Testing on MV assets

Duration: 2.5 days Solutions: MPD-System Code: C.0175.BBX



Enhance your knowledge on partial discharge testing on MV assets. Become familiar with advance software features of the MPD system. Learn how to identify fault types and fault locations to assess the condition of your assets. Get to know advanced testing techniques in hands-on sessions on special training equipment.

Objectives

- > Enhancing your knowledge on partial discharge on MV assets
- > Performing measurements to determine the insulation condition and identify fault types and fault location
- > Evaluating deterioration processes in MV assets by partial discharge measurements
- > Monitoring the quality of the production process by performing measurements on assembled parts
- > Applying partial discharge technology to design or redesign devices exposed to medium voltage

Content

- > Understanding the physics behind partial discharges
- > Getting to know the advanced diagnostic features of the MPD system
- > Performing partial discharge tests according to IEC 60270 and IEC standard of the test object
- > Non-conventional measurement techniques (e.g. inductive Sensors)
- > Connecting the MPD to MV assets like MV transformers, switchgear, cables, asset transformers
- > Performing real partial discharge hands-on sessions
- > Synchronous and multichannel partial discharge testing for optimized test results
- > Locating partial discharge in cables using TDR and STDR
- > Getting to know 3PARD and 3CFRD/3FREQ diagrams to discriminate discharge sources
- > Handling interferences (frequency selection, gating and source discrimination)
- > Interpreting partial discharge test results
- > Classifying partial discharge types and determine the risk for the test objects



Solutions

- > MPD 600 / OMS 605 and accessories

Audience

Technical staff from electric utilities, railway and service companies as well as manufacturers involved in partial discharge testing on MV assets

Prerequisites

Fundamentals of Partial Discharge Testing with the MPD system or comparable knowledge

OMICRON is an international company serving the electrical power industry with innovative testing and diagnostic solutions. The application of OMICRON products allows users to assess the condition of the primary and secondary equipment on their systems with complete confidence. Services offered in the area of consulting, commissioning, testing, diagnosis and training make the product range complete.

Customers in more than 160 countries rely on the company's ability to supply leading-edge technology of excellent quality. Service centers on all continents provide a broad base of knowledge and extraordinary customer support. All of this together with our strong network of sales partners is what has made our company a market leader in the electrical power industry.

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