

COURSE OVERVIEW EE0707
Fault Calculations

Course Title

Fault Calculations

Course Date/Venue

Session 1: July 13-17, 2025/Boardroom 1, Elite
 Byblos Hotel Al Barsha, Sheikh
 Zayed Road, Dubai, UAE

Session 2: December 15-19, 2025/Fujairah
 Meeting Room, Grand Millennium Al
 Wahda Hotel, Abu Dhabi, UAE

Course Reference

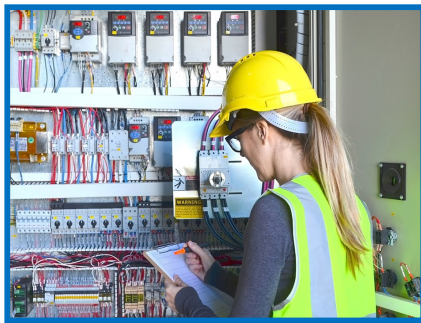
EE0707

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs



Course Description



This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.



This course is designed to provide participants with a detailed and up-to-date overview of fault calculation and relay sitting calculation. It covers the fault types, system configuration and relay operations, negative sequence directional unit operation, the polarizing current connection, forward pilot zone setting and slow clearing breaker; the current accuracy check, fault location, directional unit supervision, zero sequence current supervision, tripping and overcurrent protection; the PSM setting and phase relay coordination, PSM setting and relay coordination for phase fault; and provision of backup protection by time discrimination and evaluation of the performance of CTs and relays.



During this interactive course, participants will learn the effect of fault type on CT burden, PSM setting for primary and back-up protection, relay coordination for phase fault relay, 3 fault type and CT burden; the per unit (PU) and percentage quantity (%) and fault level calculation procedure; the short circuit contribution of equipment as well as discuss fault current considerations in relay, coordination studies, primary and bac-up protection; the zones of protection, need for co-ordination, properties of protection scheme, tools available to reduce fault clearance, typical relay setting and co-ordination.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain a good working knowledge on fault calculation and relay setting calculation
- Identify fault types, system configuration and relay operations, negative sequence directional unit operation, the polarizing current connection, forward pilot zone setting and slow clearing breaker
- Apply current accuracy check, fault location, directional unit supervision, zero sequence current supervision, tripping and overcurrent protection
- Carryout PSM setting and phase relay coordination, PSM setting and relay coordination for phase fault
- Provide backup protection by time discrimination and evaluate the performance of CTs and relays
- Recognize effect of fault type on CT burden, PSM setting for primary and back-up protection, relay coordination for phase fault relay, 3 fault type and CT burden
- Explain per unit (PU) and percentage quantity (%) and fault level calculation procedure
- Carryout short circuit contribution of equipment as well as discuss fault current considerations in relay, coordination studies, primary and bac-up protection
- Identify zones of protection, need for co-ordination, properties of protection scheme, tools available to reduce fault clearance, typical relay setting and co-ordination

Exclusive Smart Training Kit - H-STK®



*Participants of this course will receive the exclusive “Haward Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of fault calculation and relay setting calculation for managers, engineers and other technical staff involved in engineering field.

Course Fee

US\$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations:-

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.
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The International Accreditors for Continuing Education and Training (IACET USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology’s courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units (CEUs)** in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant’s involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant’s CEU and PDH Transcript of Records upon request.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Ehab Mohamed, BSc, CompEX, ETAP, is a **Senior Electrical & Instrumentation Engineer** with **30 years** of extensive industrial experience within **Power & Water Utilities** and Other **Energy Sectors**. He specializes in **Power System Equipment, Electrical Drawing, Electrical Forecasting, Transmission Networks, Distribution Networks, Certified Cyber Security Practitioner, Power System Blackouts, Power System During Emergency and Blackouts, Electric Power System Operation, Electrical Transient Analysis Program (ETAP), Electrical Installation & Maintenance, Electrical Inspection & Testing, HV/LV Equipment, High Voltage Electrical Safety, LV & HV Electrical System, HV Equipment Inspection & Maintenance, HV Switchgear Operation & Maintenance, LV Distribution Switchgear & Equipment, Substation Design & Commissioning, Substation Maintenance Techniques, Switchgear Operation & Maintenance, Circuit Breakers & Switchgears Inspection, Power System Control & Stability, Industrial UPS Systems & Battery Power Supplies, Power Generation & Transmission, Power System Protection & Relaying, Electric Power Calculation, Power Systems Protection, Distributed Control System (DCS) Applications & Troubleshooting, SCADA & Industrial Communication, Process Logic Controller (PLC), Load Flow Calculation, Cable Installation, Transformer Maintenance, Short Circuit & Protection Coordination, Harmonic Analysis Studies, Earthing & Grounding, Power Factor Correction, Power System Protection & Relaying, Electric Motors & Variable Speed Drives, Power Generation, Electrical Fault Detection & Remedies, Electrical Control Circuits & Equipment, Hazardous Area Classification, Electrical Hazards, Explosion Proof Ex Equipment, Hazardous Area Classification & Intrinsic Safety, Motor Testing & Maintenance, Modern Power System Protective Relaying, Generators and Transformer. Further, he is well-versed in **Process Control & Instrumentation, Practical Industrial Data Communications & Telecommunications, Renewable Energy, Preventive Maintenance Management System, Condition-based Maintenance, Engines Oil Quality System, Root Cause Analysis (RCA), Computerized Maintenance Management System (CMMS) and Rig Modification Request (RMR)** and is very skillful in various softwares like the Office 365, Outlook 365, Visio, ETAP, AutoCAD, RAMS, HRMS, Microsoft BI for Dashboard and Online Reports, Siemens TIA, ABB Drive, Wizard, Window, Composer Suite, SharePoint, NOV Rig Sense all versions, Cond Master Ruby for Condition Monitoring and OSIsoft Data Analytics. He is currently the **Engineering Manager (Electrical & Controls) in Weatherford Drilling International.****

During his career life, Mr. Ehab has gained his expertise and thorough practical experience and handling challenging positions such as being the **Engineering Manager, Product Manager, Acting Project Manager, Lead Operation Engineer, Plant Engineer, Electrical Project Engineer, Project Engineer, Field Support Engineer, Lead Electrical & Automation Engineer, Lead Electrical Engineer, Field Support Engineer, Application Engineer, Allen Bradley Rockwell Engineer, Lead Technical Assessor, Team Leader, Principal Teacher, Global Field Support Technician, Foreman, Technical Consultant, Technical Trainer and Staff Lecturer** for various companies such as the **Weatherford Drilling International Inc., Daleel Petroleum Company (DAPECO), NDSC Drilling Contractor, NOKHBA Energy, Abraj Drilling, American Standard Polymer and Acrylic Plant, Future Technologies Ltd, Industrial Technical College, Ministry of Higher Education and El-Masria Trading & Technical Services.**

Mr. Ehab has a **Bachelor** degree in **Electrical Engineering**. Further, he is a **Certified Instructor/Trainer, a Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership of Management (ILM)**, a **Certified CompEx Inspector & Installer**, a **Certified Allen Bradley Rockwell Engineer** and a member of the **Institution of Engineering & Technology (IET)**. Moreover, he holds a certification in **Electrical Power Calculation (ETAP)** and has delivered numerous trainings, courses, workshops, seminars and conferences internationally.



Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome and Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Fault Types
0930 – 0945	Break
0945 – 1230	System Configuration & Relay Operations, Negative Sequence Directional Unit Operation, The Polarizing Current Connection, Forward Pilot Zone Setting, Slow Clearing Breaker
1230 – 1245	Break
1245 – 1300	System Configuration & Relay Operations, Negative Sequence Directional Unit Operation, The Polarizing Current Connection, Forward Pilot Zone Setting, Slow Clearing Breaker (cont'd)
1300 - 1420	Current Accuracy Check
1420 - 1430	Recap
1430	Lunch & End of Day One

Day 2

0730 – 0930	Fault Location, Directional Unit Supervision, Zero Sequence Current Supervision, Tripping, Overcurrent Protection
0930 – 0945	Break
0945 – 1015	Fault Location, Directional Unit Supervision, Zero Sequence Current Supervision, Tripping, Overcurrent Protection (cont'd)
1015 – 1230	PSM Setting & Phase Relay Coordination, PSM Setting & Relay Coordination for Phase Fault, Providing Backup Protection by Time Discrimination, Evaluating the Performance of CTs & Relays
1230 – 1245	Break
1245– 1420	PSM Setting & Phase Relay Coordination, PSM Setting & Relay Coordination for Phase Fault, Providing Backup Protection by Time Discrimination, Evaluating the Performance of CTs & Relays (cont'd)
1420 - 1430	Recap
1430	Lunch & End of Day Two

Day 3

0730 – 0930	Effect of Fault Type on CT Burden, PSM Setting for Primary & Back-up Protection, Relay Coordination for Phase Fault Relay, 3 Fault Type & CT Burden
0930 – 0945	Break
0945 – 1045	Effect of Fault Type on CT Burden, PSM Setting for Primary & Back-up Protection, Relay Coordination for Phase Fault Relay, 3 Fault Type & CT Burden (cont'd)
1045 - 1230	Examples & Case Study
1230 – 1245	Break
1245– 1420	Examples & Case Study (cont'd)
1420 - 1430	Recap
1430	Lunch & End of Day Three





Day 4

0730 – 0930	<i>Per Unit (PU), Percentage Quantity (%) & Fault Level Calculation Procedure</i>
0930 – 0945	<i>Break</i>
0945 – 1045	<i>Per Unit (PU), Percentage Quantity (%) & Fault Level Calculation Procedure (cont'd)</i>
1045 – 1230	<i>Short Circuit Contribution of Equipment</i>
1230 – 1245	<i>Break</i>
1245 – 1420	<i>Short Circuit Contribution of Equipment (cont'd)</i>
1420 – 1430	<i>Recap</i>
1430	<i>Lunch & End of Day Three</i>

Day 5

0730 – 0930	<i>Fault Relay Current Considerations in Relay, Coordination, Studies, Primary & Back-up Protection</i>
0930 – 0945	<i>Break</i>
0945 – 1045	<i>Fault Relay Current Considerations in Relay, Coordination, Studies, Primary & Back-up Protection (cont'd)</i>
1045 – 1230	<i>Zones of Protection, Need for Co-Ordination, Properties of Protection Scheme, Tools Available to Reduce Fault Clearance, Typical Relay & Setting & Co-ordination</i>
1230 – 1245	<i>Break</i>
1245 – 1300	<i>Zones of Protection, Need for Co-Ordination, Properties of Protection Scheme, Tools Available to Reduce Fault Clearance, Typical Relay & Setting & Co-ordination (cont'd)</i>
1300 – 1400	<i>Course Conclusion</i>
1400 – 1415	POST TEST
1415 – 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch & End of Course</i>

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-



Course Coordinator

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