2 - Day Training

Electrical Safety, Protection and Relays

Hands on learning in protection, relays, and Safe Systems of Work for engineers committed to safety and performance.

13th - 14th
July 2026

Johannesburg -
South Africa

Course Facilitator:

David Davenport

Chief Consultant Engineer - ESIPAC
Techical Director - Transmag UK

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Electrical Safety, Protection and Relays

13th - 14th July 2026 - Johannesburg - South Africa

Course Overview

This two day training program is designed for technicians and engineers to build a solid understanding of electrical safety, the perils of arc flash and the hierarchy of control. We then move on to protection systems and protective relays, the requirements for power systems including integration of redundancy and emergency power. The course follows international NFPA/70E; IEC and IEEE standards, combining theoretical fundamentals with practical applications and hands on examples. Participants will start with the fundamentals of safety whilst switching/working on/or nearby live circuits. The core concepts of appropriate protection and integration schemes and progressively move to complex, with time allocated for interactive Q&A and discussions.

Key Learning Outcomes

- Understanding of **Protection Systems**: Gain an in depth grasp of both **HV and LV electrical protection systems**, importance of **discrimination and settings** including **fault analysis** and **short circuit** studies following **IEC and IEEE standards.**
- Insight into Instrument Transformers: Learn the **critical role of CTs** and **VTs** in **relaying accurate signals**, including proper selection, **installation, and potential pitfalls**.
- Protection Scheme Design: Familiarize with protection methods such as **overcurrent, differential, distance, motor, generator, and transformer, generator, arc flash and safe access** protection to design **resilient safety systems**.
- Practical Skills in Testing and Coordination: Acquire hands on experience.
- **Practical and Enhanced Troubleshooting and Decision Making**: Develop the ability to diagnose issues and apply best practices to **mitigate risks**, **ensuring rapid and precise responses in critical industrial settings**, effective troubleshooting and system optimization.
- Interactive Learning Environment: **Engage in Q&A sessions**, **real world case studies**, and discussions that bridge the **gap between theory and practical application**.

Why You Should Attend?

- **Strengthen Electrical Safety Competence:** Reduce the risk of equipment damage, life threatening failures, and power system downtime through expert relay coordination and fault detection techniques
- **Apply International Standards with Confidence:** Learn how to implement IEC and IEEE standards in practical protection schemes that meet global safety and reliability benchmarks
- **Bridge the Gap Between Theory and Practice:** Move beyond textbooks into hands on applications, real life case studies, and interactive discussions that prepare you for actual site challenges
- **Stay Ahead in a Fast Evolving Field:** As technologies evolve and systems become more integrated, understanding protection relay design, settings, and testing methods is critical for operational excellence
- **Work Smarter and Safer:** Leverage techniques to improve system reliability, reduce downtime, and prevent catastrophic failures critical for safe and efficient operations

Course Facilitator

David Davenport

Chief Consultant Engineer - ESIPAC
Techical Director - Transmag UK

This course will be delivered by an **experienced Electrical** Engineer with over **40 years of expertise** commencing as an electrical apprentice in the **Mining industry.**

Professional Memberships

- Board Member **ESIPAC.online**
- Associate Fellow of the **Higher Education Academy (FIoI)**
- Member of the **Institution of Engineering and Technology (MIET)**
- Member of the **Institution of Leadership and Management (MInstLM)**

Key Professional Highlights:
Professional Certificates and Qualifications

- **CEng I Electrical Engineering**
- CEng in **Electrical Safety Management**
- **HNC Electrical** Engineering
- **ONC Electrical** Engineering
- **NEBSS Man Management Diploma**
- **IOSH Safety Certificate**
- **Authorised Person LV**
- Senior Authorised Person – **Safe Switching Operation of High Voltage Power Systems**
- Authorised Engineer **(HV & LV)**
- Senior Authorised Person
- Wiring Regulations **17th Edition BS 7671**
- Temporary installations at concerts and sporting venues **BS 7909**
- Test and Inspection **BS2391**

Going on to continued and further studies throughout his career. A career of project management on **electrical infrastructure**, **electrical apparatus and safety procedures**. Leading significant projects across a diverse range of industries including **aerospace, mining, oil & gas**, **data-centres, heavy industry, marine and micro grids**. With advanced academic **qualifications 2 degrees in electrical safety**, a member of **MIET and a Fellow of Leadership** and **Management Institution**. Presently serving as **Chief Electrical Engineer Board Member** for the **global safety standards committee ESIPAC**, **ESIPAC.online the trainer** has a long history of **electrical safety training**, **conferences and seminars**, including **Australia, New Zealand,** throughout **EU, UK and Ireland**. A highly credited career, **recently awarded** in The **House of Lords** for service to industry.

Project Experience
The trainer has successfully completed several **high profile projects**, including but not limited to:

- **Airbus 380 fuselage** interconnect design
- **Concorde re flight**
- **Audi/Toyota joint venture R&D GPS**
- **NEC internal antenna design project management**
- **Aston Martin production re-site**
- **Forth Ports Leith Docks,** UK
- **Tarmac Mountsorrel Site,** UK
- **Octopus Hydrogen Plant,** UK
- Makufa Site Transfer
- **Hull Biomass Power Plant, Arc Flash design and commission,** UK

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Day 1

Electrical Safety, Arc Flash, Fault Studies and Protection

Session 1: Course Objectives, Electrical Safety and HV/LV Protection Standards

- Open debate to assess improvements in understanding electrical safety, process and planning, followed by an introduction to protection and control systems and the purpose of electrical protection in networks to enhance safety and reliability in industrial power systems.
- Overview of high voltage and low-voltage protection setups, including differences in relay types, breaker systems, and typical protection schemes used at different voltage levels.
- Introduction to IEC and IEEE standards governing protective relaying practices, establishing best practices and terminology used throughout the course.

Session 2: Electrical Safety and Arc Flash Practices

- Electrical safety as paramount to worker competence and confidence, including improving risk assessments, applying the hierarchy of controls, and general good practices considering high incident energy levels.
- Prevention of arc flash through careful planning, evaluation of all available options, understanding inadvertent causes of catastrophic incidents in today's electrical infrastructure, and time proven working methods that support worker safety.

Session 3: Faults, Short Circuit Studies and CT/VT Fundamentals

- Fundamentals of electrical faults and short circuit analysis, common fault types, calculation of fault currents using IEC/IEEE methods, and understanding fault magnitudes for equipment rating, relay setting, and protection device selection.
- Current and voltage transformers providing critical inputs to protective relays, including their importance, characteristics such as ratio, accuracy class, burden and saturation, and proper selection and installation in accordance with IEC/IEEE standards.

Session 4: Overcurrent and Earth Fault Protection

- Overcurrent and earth fault protection in HV and LV systems, including instantaneous and time-delayed tripping using inverse time characteristics (IEC, ANSI or IEEE relay curves) and their application in protective devices.
- Detection and clearance of residual and ground fault currents to prevent shock and equipment damage, with practical examples from HV feeder relays and LV circuits, setting the foundation for protection coordination.

Day 2

Protection Relays, Testing and Emergency Power Integration

Session 1: Differential Protection

- Principle of differential protection for detecting internal faults by comparing currents entering and leaving a protected zone such as transformers, generators, or busbars, and isolating equipment when faults occur.
- Application considerations including CT ratio matching, pickup threshold settings, and stabilisation against external faults or inrush currents, discussed in line with IEC/IEEE guidelines.

Session 2: Motor and Generator Protection and Black-Start Testing

- Protection and control schemes for motors and generators, covering thermal overload, locked rotor, phase imbalance, ground fault protection, high inrush currents, and frequent start-stop duties.
- Generator protections including differential, overcurrent, ground fault, voltage and frequency protection, reverse power, loss-of-excitation, black-start schedules, benefits, risks, and operational awareness for on site staff.

Session 3: Transformer Protection

- Transformer fault scenarios and dedicated protection methods, including differential protection settings, servicing considerations, harmonic restraint, bias settings, and stability during inrush or external faults.
- Electrical and mechanical protection including overcurrent, earth-fault, arc flash, restricted earth fault (REF), Buchholz relays, pressure relief devices, temperature monitoring, and asset lifetime enhancement in line with IEC/IEEE best practices.

Session 4: Protection Relays for Personnel and Asset Safety

- Value of protection relays in preventing life loss, injury and catastrophic failures through correct settings that ensure fast fault intervention without nuisance tripping.
- Identification of partial discharge, humidity and thermal warnings, and integration of early detection and prevention procedures to avoid long-term or catastrophic failures.

Session 5: Relay Testing and Commissioning

- Relay testing and commissioning using primary and secondary injection (e.g. OMICRON), including test planning, pickup and time-delay verification, and differential relay testing with injected unbalanced currents.
- Interpretation of results, comparison with relay settings, safety and best practices, routine maintenance and calibration to ensure reliable deployment and long term performance.

Final Q&A, Course Wrap Up and Feedback

- Open Q&A to reinforce learning across both days, revisit key concepts and protection schemes, and ensure confidence in practical application.
- Summary of key takeaways, best practices, overall electrical safety and system protection framework, and participant feedback and real world challenges.

Programme Schedule

08:30 am – 09:00 am	Registration & Coffee Break
09:00 am – 11:00 am	Course
11:00 am – 11:30 am	Networking & Coffee Break
11:30 am – 01:00 pm	Course
01:00 pm – 02:00 pm	Networking & Luncheon
02:00 pm – 03:00 pm	Course
03:00 pm – 03:30pm	Networking Break
03:30 pm – 05:00 pm	Course

Who Should Attend?

- Chief Safety Officer (CSO)
- Chief Maintenance Officer
- Professionals Operations & Maintenance
- Asset Integrity / Reliability
- Safety, Health & Environment (SHE/HSE)
- Chief Asset Management Officer
- Protection & Control Systems
- Chief Electrical Engineer
- Chief Technical Officer (CTO)
- Chief Operations Officer (COO)
- Chief Engineer – Power Systems

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Registration Form

Please fill & sign below form & send us on
training@Indulead.com

Delegate 1
Name : _____
Job title: _____
Email: _____
Mobile:_____

Delegate 2
Name : _____
Job title: _____
Email: _____
Mobile:_____

Delegate 3
Name : _____
Job title: _____
Email: _____
Mobile:_____

Delegate 4
Name : _____
Job title: _____
Email: _____
Mobile:_____

Delegate 5
Name : _____
Job title: _____
Email: _____
Mobile:_____

Note: In case of 6 or more nominations make a duplicate of this form & fill in the details.

ORGANIZATION DETAILS:

Company :_____
Address: (to be used on invoice):
_____
_____
Telephone:_____
Country: _____

AUTHORIZED BY:

Signature:_____
Name: _____
JobTitle:_____
Email:_____
Date:_____

PAYMENT DETAILS:

Credit Card Holder's Details - To send Payment Link
First Name: _____
Last Name: _____
Email: _____
Country: _____

Event Code: IL-EPSR-015

Course Fee

Registration Fees:

• Book 1 delegate	Pay USD 2,795/delegate
• Book 2 or 4 delegates	Pay USD 2,595/delegate
• Book 5 or more	Pay USD 2,395/delegate

(All pricing excludes all taxes)

Payment Mode:

- Payments will be made by **Credit Card** or by **Bank transfer**, an Invoice will be sent soon after we receive the signed & filled registration form.
- Payment is required within **5 working days** after the receipt of the invoice.
- Payment must be received in full prior to the Course Origination.

Terms & Conditions:

1) Fee Includes (For Face 2 Face Training): the course fee covers all course material, lunch & refreshments. Please note that hotel accommodation is not included in the course fee.
2) Fee Includes (For Virtual Training): the course fee covers the live course session & the course material soft copies along with Certificates of Attendance.
3) Payment terms: Payments are required within 5 working days from the date of receipt of an invoice; all payments should be transferred by Credit Card/bank transfer to the Indulead International account. A receipt will be issued as payment is received.
4) Cancellation /Substitution Policy: Cancellation is only acceptable if submitted to us by email & will be subject to charges, cancellation received 60 days prior to the event 25% of the training fee will be charged, 30 Days prior to the event 50% of the training fee will be charged. 15 days prior to the event 75% of the training fee will be charged, 7 days prior to the event 100 % of the training fee will be charged. Substitution is the best option to avoid cancellation, as the cancellation is required in writing via email likewise Substitution is also required by email with complete details of the substituted delegates (Name, Position, Email & Mobile).
5) In the case of No Show, clients cannot claim any refund, & are not entitled to claim the Credit Voucher.
6) Cancellation by a paid client; does not subject to any cancellation charges, Indulead International will either accept the substitution or will provide a Credit Voucher of the Invoice amount which can be utilized in any of our future training, with validity up to 6 months.
7) Every possible effort is made to incorporate the event as it campaigns, however, due to any unforeseen circumstances Indulead International reserves the right to change the venue, location, and trainer. Also due to unforeseen circumstances, the event may be canceled or postponed, in this case, the paid delegate(s) Indulead International will process & refund the full amount, less the bank/service charges up to 5 % or less.
8) While all topics shown in this brochure will be covered in the course, the facilitator/instructor reserves the right to restructure and delivers them in a different order or sequence.
6) The client is considered aware of all the above terms and conditions, as they sign on this registration form & Indulead International will not be responsible for any expectation or monetary loss as indicated above.

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