Excitation Relay Protection



Overview

Relay XE2 is designed to be fastened onto a DIN-rail acc. to DIN EN 50022, the same as all units of the PROFESSIONAL LINE.

Key Takeaways

Relay protection for excitation safeguards generators against loss of field, preventing instability, overheating, and loss of synchronism.

Overview of Loss of Excitation

Loss of excitation occurs when a generator's excitation system fails, causing the generator to operate above synchronous speed and behave like an induction generator. This can lead to overheating of the rotor, overloading of the stator, and sudden reactive power absorption from the system, potentially destabilizing the power network. Causes include tripping of the field breaker, short circuits in field circuits, poor brush contact, or operational errors.

Protection Principles

Relay protection for excitation primarily detects under-excitation conditions and responds to prevent damage or system instability. Key principles include: Undercurrent Relays: These relays monitor the excitation current in the field winding. If the current drops below a set threshold (typically around 8% of rated full load current), the relay operates to isolate the generator.

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

Offset Mho Impedance Relays: Used in larger generators operating in parallel, these relays detect loss of excitation by measuring the generator's terminal voltage and current, providing fast and selective tripping. Timing Relays: These are used to stabilize the protection scheme against slip frequency effects and prevent false operations during transient conditions. Coordination with Generator ControlThe excitation system, often controlled by an Automatic Voltage Regulator (AVR), maintains generator synchronism and regulates reactive power output.

Relay protection must be coordinated with the AVR to avoid unnecessary tripping during normal voltage fluctuations or short-circuit recovery. Proper coordination ensures that the generator remains stable while responding to genuine loss-of-excitation events.

Operational Considerations

Immediate Isolation: Upon detection of excitation loss, the generator should be disconnected from the system until the excitation system is restored. Reactive Power Management: Loss of excitation can cause the generator to absorb reactive power, potentially leading to voltage collapse. Protection relays act quickly to prevent widespread instability.

Large Generator Schemes: For high-capacity generators, advanced protection schemes may include master tripping relays, load shedding, and under-voltage relays to maintain system stability.

Summary

Relay protection for excitation is essential to prevent generator damage and maintain system stability. It typically involves undercurrent relays, offset mho relays, and timing relays, coordinated with the generator's AVR and control systems. Proper design and coordination ensure rapid detection of excitation loss, safe isolation of the generator, and mitigation of reactive power disturbances in the network.

Article Content

XE2 DC current relay for loss of excitation protection

Relay XE2 is designed to be fastened onto a DIN-rail acc. to DIN EN 50022, the same as all units of the PROFESSIONAL LINE. The front plate of the relay is protected with a sealable transparent cover

Loss-of-Exciation Protection for Synchronous Generators

In all cases, it was assumed the loss of excitation was caused by a short-circuited field, the most Fig. 2. Loss-of-excitation characteristics for a tandem-compound generator.

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

40 loss of excitation relay

Type 40 is an offset mho impedance relay. The Type 40 is an offset mho impedance relay used for loss of excitation protection of a generator operating in parallel with other system generators.

CEH Loss of Excitation Relay | GE Vernova

The type CEH relays are used for the detection of the loss of excitation of synchronous generators, and to automatically remove the generator from service. Loss of excitation can be damaging to the

Loss of Excitation Protection in Generator

Loss of excitation protection in generator can endanger the generator or the connected system or both. It is caused by accidental tripping of field breaker,

Testing Loss-of-Field / Loss-of-Excitation Elements (40)

“How do I test a Loss of Excitation element?” is the number one question I get asked, and most of the relay testers with problems apply P-N test values and

Loss of Excitation Protection Working Principle – 40

Loss of excitation protection is used to protect the synchronous machine (alternator or generator) acts as induction motor when the excitation fails. Loss excitation protection operates under many

Generator Over Fluxing or Over Excitation Protection 24 G

Over Fluxing or Over Excitation Protection 24 G. Over Fluxing relay is used to protect the generator against overheating and the winding insulation failure. Over fluxing protection is a popular protection

Basic protection relay knowledge

Relion protection and control relays for several application reduce complexity. Long term cost reduction (TCO) for trainings and maintenance by reduce variety of relays

ADLINK TB-24P/24-01

Error generating description for ADLINK TB-24P/24-01. Please contact support for details. This model is typically used in power industry, petrochemical, and general ...

Review of Loss of Excitation Protection Setting and Coordination

There have been several unwanted trip on some generators when operating in this conditions by the loss of excitation relay (40). After the analysis of several unwanted trips, we found several reasons,

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

Loss of Field or Excitation Protection of Alternator or Generator

Undercurrent Relay Protection: An undercurrent relay can protect against loss of field by operating when the excitation current falls below a certain value. Timing Relays for Stability: Using

Loss of Excitation Protection

Loss of Excitation Protection can be detected by measuring the reactive component of stator current; an excessive value of VAR import indicates either actual or prospective loss of synchronism. To allow

Improvement of loss of excitation protection of an alternator in the ...

Abstract Among the different Loss of Excitation (LOE) relaying schemes in practice today, the most famous is the mho relay. During the loss of excitation, the impedance as seen by the relay

Loss of Field Protection for Synchronous Generators: Current Practice ...

The loss of field (LOF) is a common phenomenon that occurs in the excitation system of a synchronous generator (SG), and the LOF relay (ANSI code 40) offers crucial LOF protections for SGs in electrical

Performance Assessment of Some Practical Loss of Excitation ...

Loss of excitation (LOE) relay is one of the most essential protection elements for synchronous generators in power plants. During the last few decades, several LOE detection

Loss of Excitation Protection in Generator

Several loss of excitation protection in generator characteristics and the relay operating characteristic on an R-X diagram are illustrated in Fig. 11.19 (b). As soon on the excitation is lost, the equivalent

Over-excitation Relaying for Digital Generator Protection using the 765 ...

For over-excitation protection, various factors for the synchronous generators in several power plants including the coordination with a generator control system, and over-excitation limiters

Related Video Reference

This video was associated with the source search result. Verify technical details against current product documentation and project requirements.

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

Contact Us

Continue your research online:

Website: https://fdsoluciones.es
Technical inquiry: https://fdsoluciones.es/project-enquiry.html

This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved