

Relay protection during startup



Article Overview

Relay protection during motor startup ensures motors are safeguarded against overcurrent, thermal overload, and mechanical faults while accommodating high inrush currents.

Understanding Motor Startup Challenges

When a motor starts, it can draw 6–8 times its full-load current (locked-rotor current), which is significantly higher than normal operating current. This inrush can cause nuisance trips if protective relays are not properly configured, and it can also stress the electrical system, causing voltage drops and potential damage to upstream equipment .

Types of Relays for Startup Protection

- **Overload Relays:** These relays protect against prolonged overcurrent conditions. Modern digital or microprocessor-based relays can estimate motor temperature using a thermal model, allowing them to distinguish between normal startup currents and actual overloads .
- **Start Relays:** For single-phase motors, start relays temporarily connect the start winding to provide initial torque. They disengage automatically as the motor reaches ~75% of its operating speed, preventing mechanical stress .
- **High-Speed Fuses or MCCBs:** Semiconductor fuses provide fast protection and can achieve Type 2 coordination with soft starters, while MCCBs or motor circuit protectors typically achieve Type 1 coordination, offering basic protection but slower response

Article Content

May 20, 2026

SEL-700G Generator Protection Relay | Schweitzer Engineering

The SEL-700G is the right solution for utility and industrial generator protection, with autosynchronizer, flexible I/O, and advanced

Apr 25, 2026

SSR start-lock relay | ehb electronics gmbh

SSR start-lock relay ehb5040x The ehb start-block relay (SSR) provides optimum protection for the starter, pinion and motor ring

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What are Protective Relays?

Protective relay work as a sensing device, it senses the fault, then known its position and finally, it gives the tripping command to the

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Protection issues for under-impedance relay used as starting ...

The historical solution of using an under-impedance relay (ANSI code 21) for starting supervision can give some

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Basic protection relay knowledge

A fast and selective arc fault mitigation for air-insulated LV & MV switchgear and Relion protection and control relays and sensor

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Protective Relaying Philosophy and Design Guidelines

3.7 Protection during Start-Up or Shut-Down Since some relays are frequency-sensitive, each of the relay's operating characteristics

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SSR start-lock relay | ehb electronics gmbh

It prevents erroneous starting when the motor is already running or is still running down. The SSR can be

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AC Motor Protection

If the protection relay can be provided with an adequate voltage signal, stall protection can be suppressed during re-acceleration

Dec 26, 2025

Distribution Automation Handbook

Time-graded protection is implemented using overcurrent relays with either definite time characteristic or inverse time characteristic.

Jun 30, 2026

HV motor stall protection at start-up

@ GordS and aolalde: The speed sensing relay was not installed for process reasons, it is there just to protect the

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Protective Relaying Principles and Applications

Protective Relaying Principles and Applications The article provides an overview of protective relaying principles and their

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White Paper

With jam protection, the relay must be smart enough to know when the motor is in startup mode, when it temporarily disables the jam

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Technical Explanation for Motor Protective Relay

With an instantaneous Motor Protective Relay, the motor is considered to have started when motor current exceeds the rating by at

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WhitePaper_MotorProtection_July_15_Final.pdf

With jam protection, the relay must be smart enough to know when the motor is in startup mode, when it temporarily disables the jam

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The Ultimate Guide to Start Relays: Function, Types, and Applications

Start relays are indispensable for single-phase motor systems, ensuring reliable startups and protecting against

Feb 03, 2026

PowerPoint Presentation

Semi-conductor fuses (High speed fuses) are the only type of fuses that are fast enough to achieve a fully type 2 coordination when

Aug 10, 2025

Power System Protective Relays: Principles & Practices

Abstract: Protective relays and devices have been developed over 100 years ago to provide “last line” of defense for the electrical

Mar 27, 2026

What is Protection Relay?

A protection relay is a crucial component of electrical systems that safeguard infrastructure, employees, and

May 21, 2026

Induction motor analysis for Start-up protection

The overcurrent relay or the impedance relay protects the motor from an abnormal current due to short-to-ground faults and motor

Dec 04, 2025

Transformer Protection Application Guide

Transformer Protection Application Guide This guide focuses primarily on application of protective relays for the protection of power

Aug 11, 2025

Protection Relay : Circuit, Working, Types, Codes & Its Uses

Relays are generally available in different types like reed, protective, thermal, electromagnetism, reed, Buchholz relay,

May 29, 2026

Installing and Maintaining Protective Relay Systems

Introduction Relay systems protect high-voltage equipment and transmission lines to ensure safe, stable systems. Although failure of

Nov 10, 2025

Relay Maintenance and Testing

Ensure optimum system performance, efficiency, and safety with preventive relay maintenance and testing Today's challenges in

May 01, 2026

The Role of Protection Relays in Power Systems and an

Protective relays are critical in power systems because they serve as decision-making devices that ensure the safe

Apr 11, 2026

What to Know About Protective Relays | EC& M

Protective relays are arguably the least understood component of medium voltage (MV) circuit protection. In fact, some believe that

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Protective Relays: Types, Working Principle & Uses

Learn how protective relays detect faults, trip breakers, coordinate protection zones, and

Apr 01, 2026

Relay triggers unwanted on startup

I've made a relay board to switch a relay using this simple diagram I found on circuitdigest On startup it briefly

Nov 14, 2025

Basic protection relay knowledge

For example, unselective protection operation during a medium voltage network fault will cause an outage for an unnecessarily large

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What is a Start Relay? Basics Updated

A start relay is an automatic switch that utilizes electromagnetic force or thermal resistance to control the high-current

Dec 30, 2025

Protection issues for under-impedance relay used as starting ...

In the technical literature the application of an under-impedance relay (ANSI code 21) is suggested to protect the motor

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Introduction to Protective Relaying | Electric Power

Introduction to Protective Relaying What are Protective Relays, or Protection Relays?
Protective relays are

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SEL-2664S Stator Ground Protection Relay | Schweitzer Engineering ...

Protect high-impedance grounded generators from ground faults at standstill, during startup, and while running by using the multisine

Mar 20, 2026

Relays Part 4: The Protective Relay Basic Theory

The types of protective relays that exist are overcurrent, electromechanical, directional, distance, pilot, and differential

Jul 17, 2026

Power System Protective Relays: Principles & Practices

These curves can be used in conjunction with the motor time-current curve for a normal start to set protective relays and breakers for

Oct 03, 2025

Motor Starting Current and Protection: Complete Guide

Protection relays provide thermal modeling that accounts for motor heating during starting,

Oct 14, 2025

PROTECTIVE RELAY TESTING

A comprehensive testing program should simulate fault and normal operating conditions of the relay. Acceptance testing,

Aug 23, 2025

Power transformer protection relaying (overcurrent, restricted ...

Transformer protection vary with the application and importance of the power transformer (overcurrent, restricted

Contact Us

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