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IEEE Guide for Breaker Failure Protection of Power Circuit Breakers

IEEE Power Engineering Society

Sponsored by the
Power System Relaying Committee

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Abstract: This guide compiles information on the application considerations for breaker failure protection. The reasons for local backup protection are described. Breaker failure schemes are discussed. Issues relating to the settings of current detectors and timers are discussed for various applications.
Keywords: breaker failure, local backup, protection, relay application, relaying

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Introduction

This introduction is not part of IEEE Std C37.119-2005, IEEE Guide for Breaker Failure Protection of Power Circuit Breakers.

Currently, there are no guidelines for applying breaker failure protection. The last IEEE PSRC document was a summary update of practices written in March 1981. This guide was written to help engineers arrive at the proper breaker failure protection scheme for their system.

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Contents

IEEE Guide for Breaker Failure Protection of Power Circuit breakers

1. Overview

In general, backup relay protection has been used on power systems for many years. Typically, all parts of the protection system including the relays, voltage and current transformers, circuit breakers, and control power source are vulnerable to failure. All of these components must work properly to effectively clear a fault. Breaker failure schemes are specifically employed to provide backup protection in the event that a circuit breaker fails to operate properly during fault clearing.

This guide will review generally accepted breaker failure schemes used on utility transmission systems. Many of the characteristics of these schemes also apply to the use of breaker failure on utility distribution systems. Schemes will be carefully examined so that advantages as well as disadvantages can be compared. Application examples and testing practices are also included.

The guide is written for engineers who have a working knowledge of power-system protection but require a better understanding of breaker failure applications. It can also be used as an evaluation tool when comparing alternative breaker failure options.

1.1 Scope

This guide is intended to help the relay engineer understand the application considerations when applying breaker failure protection (BFP) to power circuit breakers. The discussion is limited to those instances where the breaker does not clear the fault after a protective relay has issued a command to open (trip) the circuit breaker. Failure to close, failure while closed, and failure while open are not discussed. The intent of this guide is not to give the reader methods of protecting a power circuit breaker from failing; rather, it is to give the reader a guide in how to detect that a breaker has failed to clear a fault, and how to electrically isolate the fault after the breaker has failed to clear the fault.