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IEEE Guide for the Protection of Shunt Capacitor Banks

IEEE Power and Energy Society

Sponsored by the
Power System Relaying Committee

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Abstract: The protection of shunt power capacitor banks and filter capacitor banks are discussed in this guide. The guidelines for reliable application of protection methods intended for use in many shunt capacitor bank designs are included. Also, a detailed explanation of the theory of unbalance protection principles is provided. Discussions on the protection of pole-mounted capacitor banks on distribution circuits or capacitors connected to the terminals of rotating machines are not included as they are outside the scope of this standard.
Keywords: bank configuration, externally fused, filter bank, fuseless, IEEE C37.99™, internally fused, overcurrent, overvoltage, relay, shunt capacitor bank, unbalance protection

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Introduction

This introduction is not part of IEEE Std C37.99-2012, IEEE Guide for the Protection of Shunt Capacitor Banks.

IEEE Std C37.99-2012 incorporates significant additions and changes since the last revision in 2000. These additions include the theory of unbalance protection methods, impedance measurement techniques, and settings examples as Annex E. Detailed discussion on grounding has now been reduced to address concerns related to protection, and the reader has been directed to refer to IEEE Std 1036™-2010[a] for more details.

This guide was revised by the shunt capacitor bank protection revision working group of the substations protection subcommittee of the Power Systems Relaying Committee of the IEEE Power and Energy Society.

[a] Information on references can be found in Clause 2.

Contents

IEEE Guide for the Protection of Shunt Capacitor Banks

1. Overview

1.1 Scope

This guide applies to the protection of shunt power capacitor banks and filter capacitor banks. Included are guidelines for reliable applications of protection methods intended for use in many shunt capacitor applications and designs. The guide does not include the protection of pole-mounted capacitor banks on distribution circuits or capacitors connected to the terminals of rotating machines.

1.2 Purpose

This guide has been prepared to assist protection engineers in the application of relays and other devices for the protection of shunt capacitor banks used in substations. It covers methods of protection for many commonly used shunt capacitor bank configurations including the latest protection techniques. Additionally, this guide covers the protection of filter capacitor banks and large extra-high-voltage (EHV) shunt capacitor banks.