

Time synchronization method for relay protection tester



Overview

Testing relays at the ends of a transmission line must include the presence of two synchronized time pulses, one at each end of the line, to generate a verifiable test result. GPS based precision clocks can provide the master time source required. Time synchronization for substations with integrated protection- and system control functions, as well as data. This detailed guide explores the best practices, challenges, methodologies, and the role of advanced data analytics in synchro-check processes, backed by insights from DataCalculus. Relay protection engineers play a vital role in maintaining the stability and safety of electric power grids. To keep an electric power distribution network in operation, power utility companies have to maintain a large quantity of protection relays and power quality recorders.



Article Content

Oct 08, 2025

(PDF) The Research of Intelligent Substation Time

According to some relay protection malfunction examples caused by time synchronization system fault, analyze the influence of time synchronization

Oct 20, 2025

Essential Guide to Calibration of Protection Relays

Calibration of protection relays is critical to the reliability and safety of electrical power systems. This guide is designed to inform engineers, power

Apr 26, 2026

Synchrocheck Function in Protection Relays | Theory, Logic & Test

Scenarios Description: In this video, we explore the theory and logic behind the Synchrocheck function—a critical safety feature in power system protection to ensure safe synchronization between ...

Aug 17, 2025

Synchro Check Schemes: Key Techniques and

Synchro Check Schemes and Relays In power systems, synchronization is a fundamental requirement for connecting two sources of

Jul 16, 2025

Time Synchronization of Power Protection Devices at the Chemistry

This pilot project shows a simple and cost effective way to retrofit already installed protection relays independently of the time synchronization method required by these devices.

Oct 17, 2025

Understanding the Impacts of Time Synchronization and Network

DSS, an Ethernet network is used to exchange time synchronization and Sampled Values (SV) data between devices. For prote yzes the impacts of time synchronization and network issues on

Nov 26, 2025

Relay Protection Engineer: Synchro-check and Synchronizing

Explore best practices in synchro-check and synchronizing for relay protection engineers in electric power transmission, powered by DataCalculus insights.

Dec 26, 2025

Operation, maintenance, and field test procedures for

Operation, maintenance, and field test procedures for protective relays and associated circuits (photo credit: Omicron) The protection circuits

Oct 22, 2025

The Perfect Time: An Examination of Time-Synchronization Techniques

Time synchronization can be accomplished through communications network technologies that are becoming more prevalent in utility and industrial power facilities.

Sep 10, 2025

Protection Relay Testing and Commissioning

Since type testing of a digital or numerical protection relay includes software and hardware testing, the type testing procedure is very complex and more challenging than a static or electromechanical relay.

Jun 04, 2026

PSRC WG J20 Report

Anticipating the closing time allows synchronization to occur when there is a near zero-degree difference between the generator and the interconnecting system. This helps minimize synchronizing torque

Nov 24, 2025

Three-Phase Relay Protection Tester – Test Methods

The three-phase relay protection tester is a key device for verifying the correct operation of power system relay protection devices. The following is

Oct 04, 2025

Implementing PTP in substations

Substation automation systems are now using Ethernet to communicate between SCADA systems and protection relays. Precision Time Protocol (PTP) is a time synchronisation system that uses the

Jan 30, 2026

PROTECTIVE RELAY TESTING

A comprehensive testing program should simulate fault and normal operating conditions of the relay. Acceptance testing, commissioning, and startup will include control power tests, current transformer

May 22, 2026

Practical Test of Synchronization Relay

Numerical relays have such functions as protection, control, measurement, recording and communication and Have to work appropriately compliant with the specifications and operating

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End to End Relay Testing

Testing relays at the ends of a transmission line must include the presence of two synchronized time pulses, one at each end of the line, to generate a verifiable test result. GPS based precision clocks

Apr 11, 2026

Microsoft Word

Abstract This paper presents enhanced learnings gathered during power system events analysis and testing where detailed knowledge of communication channel and time synchronization characteristics

Dec 07, 2025

PowerPoint Presentation

Adequate Test Equipment Should: Account for all utilized CT and PT inputs simultaneously Have equal or better rated signal accuracy than the protective relay (V, I, F, Phase

Aug 11, 2025

Relay Testing Standards | Delgado Relay Protection Reference

Suppose we are testing an overcurrent relay used for feeder protection in a high-voltage transmission system. The relay has a pickup threshold of 100 Amps and a time delay of 0.2 seconds.

Feb 07, 2026

Preparation of Papers in a Two-Column Format

The instantaneous overcurrent protection feature of Schweitzer Engineering Laboratories Relay SEL-421 is used for complete standalone and RT-HIL testing. For RT-HIL testing, the test case is modeled in

Nov 24, 2025

Practical Test of Synchronization Relay

In This paper addresses the operation of the synchronization relay, which is generally used to interconnect two zones of the power system together. In addition, a practical test of the

Dec 06, 2025

Protection Relay Testing and Commissioning

This is a test to check the maximum length of time that the protection relay can withstand an interruption in the auxiliary supply without de-energizing, e.g. switching off, and that when this time is surpassed

Feb 21, 2026

IMPROVED PROTECTION RELIABILITY WITH PTP MASTER

IEC 61869-9 recommends using either Precision Time Protocol (PTP) or one pulse per second (1PPS) inputs to achieve the required accuracy. PTP has emerged as the preferred synchronization method

May 16, 2026

Protection Relay Testing and Commissioning

ROUTINE FACTORY PRODUCTION TESTS These tests are done to show that protection relays are free from defects during manufacturing process. Testing will be done at several stages during

Aug 04, 2025

Document tag

Introduction This guideline applies to protection, control and monitoring devices and systems at all transmission stations 100kV and above, at associated generating units 30MVA and above and at

Jan 26, 2026

Methods of Time Synchronization

Conclusions are presented regarding which timing method is preferred for different applications. Tables are provided to allow direct comparisons of application methods to assist in applying the best method

Aug 29, 2025

Protection Relay Test Solutions IEC61850 Test Solutions Amplifier for ...

Working together with PONOVO relay testing device, PSS01 is to be used to simulate the circuit breaker operation for checking the relay scheme performance. Complicated software settings can be avoided

Jan 09, 2026

Protection Relay Testing

To achieve a high degree of automation in protection testing, you need both adaptable test templates for protection relays from different manufacturers and

Contact Us

For more information, pricing, or custom solutions, please contact us:

Website: <https://regen-power.co.za>

Email: info@regen-power.co.za

Phone: +49 176 845 2036

Address: Taunusanlage 15, 60325 Frankfurt am Main, Germany

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