

SIEMENS

SIPROTEC 7VE85

Paralleling device

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Description

Paralleling device SIPROTEC 7VE85 is specifically designed for the synchronization of generators (power plant units) with the power grid or synchronization of 2 electricity-supply systems.

The 1.5- and 2-channel synchronization function is the made function of the SIPROTEC 7VE85. To warrant a high level of security and reliability, the software works with various monitoring functions. In addition, the most important hardware components are duplicated. Two different measuring algorithms are used in accordance with the multi-channel redundancy. This avoids overfunctions through systematic errors. At the same time, the different methods of measurement are applied and processed independently of each other with different memory areas. The high level of reliability and flexible options to adapt to the equipment requirements allow a wide variety of applications.

Main function	1.5- and 2-channel synchronization function
Inputs and outputs	predefined standard variants with up to 8 current transformers, 8 voltage transformers, 7 to 15 binary inputs, 14 to 20 binary outputs
Hardware flexibility	Flexibly adjustable and expandable I/O quantity structure within the scope of the modular SIPROTEC 5 system; 1/6 expansion modules can be added, available with large or small display, or without display
Housing width	1/3 × 19 inches to 2 × 19 inches

The SIPROTEC 7VE85 recognizes the operating conditions automatically and reacts in accordance with the settings. In the **Switching synchronous electrical power systems** operating mode, the frequency difference is measured with a high level of accuracy. If the frequency difference is almost 0 for a long time, this is referred to as a synchronous electrical power system for which a wider switching angle can be permitted.



SIPROTEC 7VE85 (width: 1/3 x 19" to 2 x 19")

If asynchronous conditions occur, such as when synchronizing the generators, the speed is automatically adjusted to the power frequency and the generator voltage is adjusted to the voltage in an electrical power system. It is then switched in the synchronization point, considering the circuit-breaker closing time.

The 1.5-channel parallel switching function (synchronization function and synchrocheck) is provided for use in small to medium-sized generators and in electrical power systems. This function is more secure than a 1-channel paralleling device and can also be used for synchrocheck applications. For larger generators and electrical power systems with high safety requirements, the 2-channels parallel switching function is recommended. In this example two distinctly independent methods of measurement decide on the switching conditions.

Furthermore, SIPROTEC 7VE85 offers additional current, frequency, power and voltage protection functions and many other control and monitoring functions. With its modular structure, flexibility and the powerful DIGSI 5 engineering tool, the SIPROTEC 7VE85 offers future-oriented system solutions with high investment security and low operating costs

The following modes of operation are covered:

- Switching synchronous/asynchronous electrical power systems

Efficient and modular

- Switching to de-energized line or dead busbar
- Synchrocheck function
- Adjusting commands for voltage and frequency (speed)

Benefits

- Safe and reliable synchronization of generators and electricity-supply systems by multichannel redundancy
- Purposeful and easy handling of devices and software thanks to a user-friendly design
- Cost savings as no external switchover of synchronization and voltage measuring points is required
- Cybersecurity in accordance with NERC CIP and BDEW Whitepaper requirements
- Highest availability even under extreme environmental conditions by standard coating of the modules

Functions

DIGSI 5 permits all functions to be configured and combined as required.

- Stabilization function for the output of adaptive frequency control pulses
- Synchrocheck function for manual synchronization
- Analog output of operational measured values*
- Commissioning (measurement of the operating time of the circuit breaker, sample synchronization)
- Functionality for protection and network decoupling tasks
- Undervoltage protection (ANSI 27) and overvoltage protection (ANSI 59)
- Voltage differential protection (ANSI 60)
- Overcurrent Protection (ANSI 50/51)
- Rate-of-frequency-change protection (ANSI 81R)

- Instantaneous high-current tripping (ANSI 50HS)
- Instantaneous tripping at switch upon error
- Vector Jump
- Overfrequency and underfrequency (ANSI 81)
- Power protection active/reactive power (ANSI 32/37)
- Power-plant disconnection (ANSI 37)
- Circuit-breaker failure Protection (ANSI 50BF)
- PQ - Basic: Voltage unbalance; voltage changes: over-voltage, dip, interruption; TDD, THD, and harmonics
- Circuit breaker reignition monitoring (RBRF)
- Extensive cybersecurity functionality, such as role-based access control (RBAC), logging of security-related events, signed firmware, or authenticated IEEE 802.1X network access.
- Simple, fast, and secure access to the device via a standard Web browser - without additional software to display all information and diagnostic data, vector diagrams, singleline and device display pages
- Optional, pluggable communication modules, usable for different and redundant protocols (IEC 61850-8-1, IEC 61850-9-2 Client, IEC 61850-9-2 Merging Unit, IEC 60870-5-103, IEC 60870-5-104, Modbus TCP, DNP3 serial and TCP, PROFINET IO, PROFINET IO S2 redundancy)
- Virtual network partitioning (IEEE 802.1Q - VLAN)

Applications

- Synchronization of generators (power plant units) with the electricity-supply system under consideration of the vector group of transformers and transformer tap
- Synchronization of 2 electricity-supply systems
- Operation of up to 8 synchronizing points without external switchover



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For all products using security features of OpenSSL, the following shall apply:

This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (www.openssl.org), cryptographic software written by Eric Young (eyay@cryptsoft.com) and software developed by Bodo Moeller.