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SIPROTEC 7SL87

Combined line differential and distance protection

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Description

The combined SIPROTEC 7SL87 line differential and distance protection has specifically been designed for the protection of lines. With its modular structure, flexibility and the powerful DIGSI 5 engineering tool, SIPROTEC 7SL87 device offers future-oriented system solutions with high investment security and low operating costs.

Main function	Differential and Distance Protection
Tripping	1-pole and 3-pole, minimum tripping time: 9 ms
Inputs and outputs	12 predefined standard variants with 4/4 or 8/8 current/voltage transformers, 5 to 31 binary inputs, 8 to 46 binary outputs
Hardware flexibility	Flexibly adjustable I/O quantity structure within the scope of the SIPROTEC 5 modular system
Housing width	1/3 × 19 inch to 2/1 × 19 inch

Applications

- Line protection for all voltage levels with 1-pole and 3-pole tripping
- Phase-selective protection of overhead lines and cables with single-ended and multi-ended infeed of all lengths with up to 6 line ends
- Also used in switchgear with breaker-and-a-half layout configuration
- Transformers and compensating coils in the protection zone
- Phasor Measurement Unit (PMU)



Combined line differential and distance protection device SIPROTEC 7SL87 (housing width: 1/3 × 19" to 2 × 19")

- Detection of ground faults in isolated or arc-suppression-coil-ground power systems in star, ring, or meshed arrangement
- Protection data communication over different distances and physical media, such as optical fiber, two-wire connections, and communication networks

Functions

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

- Minimum tripping time: 9 ms
- Main protection function is differential protection with adaptive algorithm for maximum sensitivity and stability even with the most different transformer errors, current-transformer saturation and capacitive charging currents
- 1-/3-pole automatic reclosing function

Efficient and modular

- Several distance-protection functions selectable as backup protection or secondary main protection: Classic, reactance method (RMD), impedance protection for transformers
- Directional backup protection and various additional functions
- Adaptive power-swing blocking, out-of-step protection
- Detection of ground faults of any type in isolated or arc-suppression-coil-ground systems using the following functions: $3I_0>$, $V_0>$, fleeting contact, $\cos/\sin\Phi$, harmonic, dir. detection of intermittent ground faults and admittance
- Ground fault detection using the pulse location method
- Detection of current-transformer saturation for fast tripping with high accuracy Arc protection
- Automatic frequency relief for load shedding in case of underfrequency, taking account of changed infeed conditions due to decentralized power generation
- Reactive power-undervoltage protection (QU protection)
- Detection of current and voltage signals up to the 50th harmonic with high accuracy for selected protection functions (such as thermal overload protection) and operational measured values
- Control, synchrocheck and switchgear interlocking protection
- Graphical logic editor to create powerful automation functions in the device
- Single line representation in small or large display
- Integrated electrical Ethernet RJ45 for DIGSI 5 and IEC 61850 (reporting and GOOSE)
- Up to 4 optional pluggable communication modules, usable for different and redundant protocols (IEC 61850, IEC 60870-5-103, IEC 60870-5-104, Modbus TCP, DNP3 serial and TCP, PROFINET IO)
- Serial protection data communication via optical fibers, two-wire connections and communication networks (SDH networks, MPLS networks, for example using IEEE C37.94, and others), including automatic switchover between ring and chain topology
- Redundancy protocols PRP and HSR
- Cyber security to with NERC CIP and BDWE Whitepaper requirements
- Phasor measurement unit (PMU) for synchrophasor measured values and IEEE C37.118 protocol
- Time synchronization using IEEE 1588
- Powerful fault recording (buffer for a max. record time of 80 sec. at 8 kHz or 320 sec. at 2 kHz)
- Auxiliary functions for easy tests and commissioning
- Flexibly adjustable I/O quantity structure within the scope of the SIPROTEC 5 modular system

Benefits

- Compact and cost effective line differential and distance protection device
- High-performance protection features guarantee safety
- Data security and transparency throughout the entire life cycle of the system save time and reduce costs
- Clear and easy-to-use devices and software thanks to user-friendly design
- Increased quality and reliability of the engineering process
- High degree of overall safety and security based on thorough implementation
- High-performance communications components guarantee safe and effective solutions



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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 (eay@cryptsoft.com) and software developed by Bodo Moeller.