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SIPROTEC 7SL86

Combined line differential and distance protection

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Description

The combined SIPROTEC 7SL86 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, the SIPROTEC 7SL86 device offers future-oriented system solutions with high investment security and low operating costs.

Main function	Differential and Distance Protection
Tripping	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 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
- Transformers and compensating coils in the protection zone
- Detection of ground faults in isolated or arc-suppression-coilground power systems in star, ring, or meshed arrangement



SIPROTEC 5 Device with Expansion Module

- Protection data communication over different distances and physical media, such as optical fiber, two-wire connections, and communication networks
- Phasor Measurement Unit (PMU)

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
- 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

Efficient and modular

- Adaptive power-swing blocking, out-of-step protection
- Detection of ground faults of any type in compensated or isolated electrical power systems using the following functions: $3I_0>$, $V_0>$, fleeting contact, $\cos \phi$, $\sin \phi$, harmonic, dir.
- Detection of intermittent ground faults and admittance
- Ground fault detection using the pulse detection method
- Detection of current-transformer saturation for fast tripping with high accuracy
- Arc protection
- Automatic frequency relief for underfrequency load shedding, taking changed infeed conditions due to decentralized power generation into consideration
- Directional 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
- 3-pole automatic reclosing function
- 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, twowire connections and communication networks (SDH networks, MPLS electrical power systems, for example using IEEE C37.94, and others), including automatic switchover between ring and chain topology.
- Reliable data transmission via PRP and HSR redundancy protocols
- Extensive cyber security functionality, such as role-based access control (RBAC), protocolling security-related events or signed firmware
- Simple, quick and secure access to device data via a standard Web browser - without additional software
- 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 simple tests and commissioning
- Flexibly adjustable I/O quantity structure within the scope of the SIPROTEC 5 modular system

Benefits

- Safety due to powerful protection functions
- Highest availability even under extreme environmental conditions by "conformal coating" of electronic boards
- Powerful communication components warrant safe and effective solutions
- High investment security and low operating costs due to future-oriented system 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.