

# SIEMENS

*Ingenuity for life*

## SIPROTEC 7SD86

Combined line differential and distance protection

[www.siemens.com/siprotec](http://www.siemens.com/siprotec)

### Description

The SIPROTEC 7SD86 line differential protection device has specifically been designed for the protection of lines. With its modular structure, flexibility and the powerful DIGSI 5 engineering tool, the SIPROTEC 7SD86 device offers future-oriented system solutions with high investment security and low operating costs.

Main function	Differential 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

The combined line differential and distance protection device SIPROTEC 7SD86 is a universal protection, control and automation device on the basis of the SIPROTEC 5 system. It is especially designed for the protection of feeders and lines.

Typical applications are:

- Line protection for all voltage levels with 3-pole tripping
- Phase-selective protection of overhead lines and cables with single- and multi-ended infeeds of all lengths with up to 6 line ends
- Also used in switchgear with breaker-and-a-half layout configuration



Line differential protection device SIPROTEC 7SD86

- Transformers and compensating coils in the protection zone
- 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
- Phasor Measurement Unit (PMU)

### Functions

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

- Minimum tripping time: 9 ms
- Directional backup protection and various additional functions
- Arc protection
- Power protection, configurable as active or reactive power protection

# Communicative and modular

- 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
- Detection of ground faults of any type in isolated or arc-suppression-coil-ground systems using the following functions: 3I0>, V0>, fleeting contact, Cos-/SinPhi, harmonic, dir. detection of intermittent ground faults and admittance
- Ground fault detection using the pulse location method
- Automatic frequency relief for load shedding in case of underfrequency, taking account of changed infeed conditions due to decentralized power generation
- Detection of current-transformer saturation
- Reactive power-undervoltage protection (QU protection)
- Detection of current and voltage signals up to the 50<sup>th</sup> 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, 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 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

## Benefits

- Compact and cost effective line differential 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
- Full compatibility with IEC 61850 Edition 1 and 2



## Siemens AG

Energy Management Division  
Freyeslebenstraße 1  
91058 Erlangen, Germany

SIPROTEC 7SD86 Profile E7.5.docx  
Printed in Germany | © 09.17 Siemens AG

E-Mail: [support.energy@siemens.com](mailto:support.energy@siemens.com)  
Tel: +49 180 524 70 00

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](http://www.openssl.org)), cryptographic software written by Eric Young ([eay@cryptsoft.com](mailto:eay@cryptsoft.com)) and software developed by Bodo Moeller.