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SIPROTEC 7UT87

Transformer Differential Protection

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Description

The SIPROTEC 7UT87 transformer differential protection has been designed specifically for the protection of multi-winding transformers (up to 5 sides). Furthermore, it is to be used where numerous measuring points (up to 11 3-phase current measuring points) are required. Another application is simultaneous protection of two parallel transformers (additional fast backup protection). The SIPROTEC 7UT87 is the main protection for the transformer and contains many other protection and monitoring functions. The additional protection functions can also be used as backup protection for subsequent protected objects (such as short cables. and lines, reactance coil (shunt reactors)).. With its modular structure, flexibility and the powerful DIGSI 5 engineering tool, SIPROTEC 7UT87 offers future-oriented solutions for protection, control, automation, monitoring and PQ basic.

Main function	Up to 3 differential protection functions with additional stabilization (in different transformer function groups); up to 5 ground fault differential protection functions. For auto transformer applications, two differential protection functions can be processed in an auto transformer function group Interoperability of SIPROTEC 4 and SIPROTEC 5-line protection devices when using the line differential protection function in the 7UT85, 86, 87
Usable measuring points	11 x 3-phase current measuring points, 11x 1- phase current measuring points, 11x 3-phase and 11 x 1- phase voltage measuring points
Inputs and outputs	2 predefined standard variants with 20 current transformers, 4 voltage transformers, 15 to 27 binary inputs, 22 to 38 binary outputs
Hardware flexibility	Flexibly adjustable and expandable I/O quantity structure within the scope of the SIPROTEC 5 modular system.
Housing width	2/3 × 19" - 2/1 × 19"

Applications

- Protection of special transformers (phase shifter, FACTS and converter transformers, arc furnace transformers, HVDC transformers)

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- As backup protection for motor and generator differential protection applications
- For the protection of short cables and lines
- Voltage control for two- and three-winding transformers with parallel control
- As additional line protection function such as distance and line differential protection

Functions

DIGSI 5 permits all functions to be configured and combined as required. In SIPROTEC 7UT87, two transformer function groups can be used.

- Transformer differential protection for multi-winding transformers with versatile, additional protection functions (multi-winding transformers are typical in power converter applications (such as HVDC))
- Transformer differential protection for phase angle regulating transformers of the single core and two core types, and special transformers
- Transformer protection applications with up to 11 3-phase current measuring points
- Simultaneous differential protection for 3 parallel transformers (such as 3 two-winding transformers)
- Universal usability of the permissible measuring points
- Applicable from average up to extra high voltage
- Protection of standard power transformers, auto transformers, short lines, cables, shunt reactors, and motors

Modular and flexible

- Typical properties of a transformer differential protection such as flexible adaptation to the transformer vector group, control of inrush and overexcitation processes, safe behavior in case of current-transformer saturation with different degrees of saturation
- Fault locator plus for accurate fault location with inhomogenous line sections and targeted automatic overhead-line section reclosing (AREC)
- Arc protection
- Voltage controller function ANSI 90V for two-winding transformers, three-winding transformers and grid coupling transformers with parallel control (master/follower, circulating reactive current minimization)
- Adaptive adaptation of the operate curve to the transformer tap position
- Point-on-wave switching
- Additional current and voltage inputs can be supplements for standard protection functions, such as overcurrent, voltage frequency, etc.
- Dynamic Voltage Control (DVC) to adapt the voltage target value via a power direction dependent characteristic curve with strong infeed of regenerative energies
- Up to 4 pluggable communication modules, usable for different and redundant protocols (IEC 61850-8-1, IEC 61850-9-2 Client, IEC 60870-5-103, IEC 60870-5-104, Modbus TCP, DNP3 serial and TCP, PROFINET IO, PROFINET IO S2 redundancy)
- Virtual network sharing (IEEE 802.1Q - VLAN)
- Reliable data transmission via PRP and HSR redundancy protocols
- Extensive cybersecurity functionality, such as role-based access control (RBAC), protocolling security-related events, signed firmware or authenticated network access IEEE 802.1X
- Simple, fast and secure access to the device via a standard Web browser to display all information and diagnostic data, as well as vector diagrams, single-line and device display pages
- Secure serial protection data communication, also over great distances and all available physical media (optical fiber, two-wire connections and communication networks)
- PQ-Basic: voltage unbalance; voltage changes: overvoltage, dip, interruption; TDD, THD and Harmonics
- Capturing operational measured variables and protection function measured values for the evaluation of the system, to support commissioning, and to analyze faults
- Frequency tracked protection functions over a wide frequency range (10 Hz to 90 Hz) and the option to assign the protection functions in a single device to different frequency tracking groups
- Phasor Measurement Unit (PMU) for synchrophasor measured values and IEEE C37.118 protocol
- Powerful fault recording (buffer for a max. record time of 80 sec. at 8 kHz or 320 sec. at 2 kHz)
- Flexibly adjustable I/O quantity structure within the scope of the SIPROTEC 5 modular system

Benefits

- Safe and reliable automation and control of your systems
- Purposeful and easy handling of devices and software thanks to a user-friendly design
- Cybersecurity in accordance with NERC CIP and BDEW Whitepaper requirements
- Highest availability even under extreme environmental conditions by standard coating of the modules
- Full compatibility between IEC 61850 Editions 1, 2.0 and 2.1

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