Transformer protection RET670
Relion® 670 series Ver. 2.0

Features
• Fully IEC 61850 compliant, Edition 1 and Edition 2
• Extensive I/O capability
• Protection, monitoring and control integrated in one IED
• Extensive self-supervision including analog channels
• Six independent parameter setting groups
• Ethernet interface for fast and easy communication with PC
• Large HMI for visualization of single line diagrams
• Cyber security support for compliance to NERC CIP and IEC 62351-8
• Protection of several primary objects with a single IED

Pre-configured solutions
• Pre-configured and type tested solutions for:
  − 2 winding transformer in single breaker arrangements
  − 2 winding transformer in multi breaker arrangements
  − 3 winding transformer in single breaker arrangements
  − 3 winding transformer in multi breaker arrangements
  − Voltage control for up to 2/8 parallel transformers
  − Back-up protection for transformers and shunt reactors

Most important protection functions
• Transformer differential protection
  − High sensitivity for interturn faults
  − Fast differential protection with up to 6 restraint CT inputs
  − Automatic CT ratio matching and vector group compensation
  − Waveform and second harmonic restraint for transformer inrush
  − Fifth harmonic restraint for overexcitation
• 3-phase high impedance differential protection
• Restricted earth-fault protection
  − Extremely fast operation
  − High and/or low impedance based
• Distance protection
  − Full-scheme distance protection with quadrilateral, mho- or series compensation characteristics with load encroachment
• Current
  − Instantaneous phase- and residual overcurrent protection
  − Four step phase- and residual directional/ non-directional overcurrent protection with definite and inverse time characteristics
  − Four step directional negative sequence overcurrent protection
  − Two step negative sequence non-directional overcurrent protection
  − Sensitive directional earth-fault protection
  − Thermal overload protection
  − Breaker failure protection
  − Pole discordance protection
  − Capacitor bank protection
• Power functions
  − Directional under- and overpower protection
• Voltage
  − Two step phase- and residual overvoltage protection
  − Two step undervoltage protection
  − Overexcitation protection
  − Loss of voltage check
• Secondary system supervision
  − Fuse failure supervision
  − Fuse supervision based on voltage differential principle
  − Current circuit supervision
• Frequency functions
  − Under- and overfrequency protection
  − Rate-of-change frequency protection
• Multi-purpose function
  − Multi-purpose filter with possibility to detect, alarm, and trip for special operating conditions, e.g. SSR
  − General current and voltage protection
  − Voltage controlled/restraint overcurrent protection
Control functions
- Automatic voltage control for a single transformer
- Automatic voltage control for up to 8 parallel transformers based on the minimum circulating current principle or master-follower principle
- Tap position reading via mA or BCD code
- Control and interlocking for up to 30 switching devices
- Ready to use interlocking for different switchgear arrangements
- Several alternatives for reservation functionality
- Selectable operator place allocation
- Synchronizing, synchrocheck and energizing check
- Software based multiple position selector switches

Logic
- Tripping logic
- Trip matrix logic
- Extensive logic block library for application customization

Monitoring
- Adjustable breaker monitoring with capability to handle multiple breaker types
- Disturbance recorder
  - 100 disturbances
  - 40 analog channels (30 physical and 10 derived)
  - 96 binary channels
- Event list for 1000 events
- Disturbance report
- Event and trip value recorders
- Fault locator
- Event counters
- Supervision of AC and mA input quantities
- Large HMI with virtual keyboard, function push buttons, and three color LED indications with alarm descriptions

Measurements
- U, I, P, Q, S, f and \( \cos \phi \)
- Frequency measurement with accuracy of \( \pm 2 \) mHz
- Tap changer position
- Inputs for mA measuring

Metering
- Energy metering function for energy statistics
- Pulse counting support for energy metering

Communication
- IEC 61850-8-1 including GOOSE messaging
- IEC 62439-3 parallel redundancy protocol (PRP)
- IEC 61850-9-2 LE Process bus
- IEC 60870-5-103 serial communication
- DNP 3.0, SPA, LON protocols
- Remote end communication for transfer of up to 192 binary signals in each direction

Engineering, testing, commissioning, and maintenance
- Forcing of binary outputs
- Protection and control IED manager PCM600 for setting, configuration and disturbance handling

Hardware
- 1/1 x 19", 3/4 x 19" or 1/2 x 19", 6U height case selected according to the number of required I/O modules
- Power supply modules from 24 to 250 V DC \( \pm 20\% \)
- TRM module with 12 analog inputs and optional measurement transformers
- Up to 14 I/O modules in 1/1 x 19" case
- Binary input module with 16 inputs
- Binary output module with 24 outputs
- Static binary output module with 6 static and 6 change-over outputs
- Binary input/output module with 8 inputs and 12 outputs
- mA input module with 6 transducer channels
- Connector types: compression type or ring-lug type
- Accurate time-synchronization through GPS time module, SNTP, DNP 3.0, IEC 60870-5-103, or IRIG-B-module
- Remote end data communication modules for C37.94, direct fiber up to 130 km or via multiplexer
- Supports highest EMC requirements
- Independent laboratory certified

Accessories
- COMBITEST test system
- COMBIFLEX auxiliary relays
- Mounting kits

Documentation
- Role based documentation for high efficiency in engineering, commissioning, operations and maintenance

Technical details are available in the RET670 Product Guide.

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