Transformer protection RET650
Relion® 650 series Ver. 1.3

Features
- Fully IEC 61850 compliant
- Parallel Redundancy Protocol (PRP) according to IEC 62439-3 Ed.2
- Protection, control and monitoring integrated in one IED
- Extensive self-supervision including analog channels
- Four independent parameter setting groups
- Large HMI for visualization of single line diagrams and on-line measurements
- Ethernet interface for fast and easy communication with PC
- Accurate time-synchronization via SNTP, DNP 3.0, IEC 60870-5-103 and IRIG-B serial interface
- Signal matrix for easy configuration of binary and analog signals
- User management and authority handling
- Activity logging
- Available in customized and configured solutions

Configured solutions
- Two winding transformer in single breaker arrangements
- Three winding transformer in single breaker arrangements
- Voltage control for two parallel transformers

Most important protection functions
- Transformer differential protection
  - Percentage bias restraint
  - Waveform and second harmonic restraint for transformer inrush
  - Fifth harmonic restraint for overexcitation
  - Automatic CT ratio matching and vector group compensation
  - High sensitivity for interturn faults
- Low impedance restricted earth-fault protection
  - Extremely fast operation
- Current
  - Instantaneous phase overcurrent protection
  - Instantaneous residual overcurrent protection
  - Four step directional phase overcurrent protection with definite and inverse time characteristics with 2nd harmonic blocking
- Low impedance restricted earth-fault protection
  - Extremely fast operation
- Voltage
  - Two step phase- and residual overvoltage protection with definite and inverse time characteristics
  - Two step undervoltage protection with definite and inverse time characteristics
  - Overexcitation protection
  - Loss of voltage check
- Secondary system supervision
  - Fuse failure supervision
  - Breaker close/trip circuit monitoring
- Frequency protection
  - Under- and overfrequency protection
  - Rate-of-change frequency protection

- Four step residual non-directional/directional overcurrent protection with definite and inverse time characteristics and with voltage, current or dual polarization, based on zero sequence or negative sequence quantities with 2nd harmonic blocking
- Negative sequence directional overcurrent protection
- Broken conductor check
- Thermal overload protection
- Breaker failure protection
- Pole discordance protection
- Power functions
  - Directional under- and overpower protection
- Voltage
  - Two step phase- and residual overvoltage protection with definite and inverse time characteristics
  - Two step undervoltage protection with definite and inverse time characteristics
  - Overexcitation protection
  - Loss of voltage check
- Secondary system supervision
  - Fuse failure supervision
  - Breaker close/trip circuit monitoring
- Frequency protection
  - Under- and overfrequency protection
  - Rate-of-change frequency protection

Power and productivity for a better world™
Control functions

- Voltage control for single or two parallel transformers
- Automatic voltage control for two parallel transformers based on the minimum circulating current principle or master-follower principle up to a maximum of four in the parallel group
- Selectable operator place allocation
- Control of up to four circuit breakers from local/remote
- Versatile switch with two positions
- Selector switch with up to 32 positions

Logic

- Tripping logic
- Trip matrix logic
- Configurable logic blocks
- Configurable logic blocks with quality and time

Monitoring

- Disturbance recorder
  - 100 disturbances
- 40 analog channels (30 physical and 10 derived)
  - 96 binary channels
- Event list for 1000 events
- User activity logging for 2048 entries
- Disturbance report
- Event and trip value recorders
- Event counters
- Supervision of AC input quantities
- Insulation gas monitoring function
- Insulation liquid monitoring function
- Circuit breaker condition monitoring
- Station battery supervision
- Indication of up to 135 binary signals via 15 three-color-state indication LEDs

Measurements

- U, I, P, Q, S, f and cos ϕ
- AC input quantities with accuracy better than 0.5%

Metering

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

Communication

- IEC 61850-8-1 including GOOSE messaging
- DNP 3.0 slave protocol
- IEC 60870-5-103 serial communication
- Parallel Redundancy Protocol (PRP) according to IEC 62439-3 Ed.2

Setting, configuration and disturbance handling

- Protection and control IED manager PCM600

Hardware

- 1/1 x 19" width, 3U height case
- 10-20 analog inputs depending on the configured solution
- Universal 1A/5A CT inputs
- Choice of communication and processor module with
  - 12 binary inputs, TCP/IP optical, IRIG-B, galvanic RS485 and optical serial communication ports
  - TCP/IP optical with PRP redundancy, IRIG-B, galvanic RS485 and optical serial communication ports
- Binary input/output modules with 9 inputs and 9 outputs
- Possibility to add two optional binary input/output modules (configured solutions for two winding transformer in single breaker arrangements and voltage control for two parallel transformers)
- I/Os customizable to
  - 10 analog inputs (selected combinations of CT/VT inputs) and up to four binary input/output modules
  - 20 analog inputs (selected combinations of CT/VT inputs) and up to two binary input/output modules
- Power supply modules from 24 to 30 V DC, 48 to 250 V DC or 100 to 240 V AC with 9 outputs, 3 of which with trip circuit supervision
- Connector types: compression type or ring-lug type

Technical details are available in the RET650 Product Guide.

For more information please contact:

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