Line differential protection RED650
Relion® 650 series Ver. 2.1

Product features
• Line differential protection with back-up distance protection and autoreclose functionality
• Synchrocheck
• Current and voltage back-up protection
• Control for 1 circuit breaker
• Extensive self-supervision including analog channels
• Six independent parameter setting groups

Communication features
• Fully IEC 61850 compliant, Edition 1 and Edition 2
• IEC 61850-5 Edition 2 GOOSE performance class P1 (3 ms)
• IEC 62439-3 parallel redundancy protocol (PRP)
• Ethernet interface for fast and easy communication with a PC and substation automation system (SAS)
• IEEE C37.94 single- / multimode optical line data communication

A configured and type-tested solution
• A ready-made application for a single breaker with single or three phase tripping, with 2 or 3 line ends

Most important protection functions
• Line differential protection
  − Power transformer can be included in the protected zone
  − Time synchronization with the echo-method or IRIG-B
• Distance protection
  − Full-scheme distance protection with quadrilateral, or mho characteristics for up to six zones
  − Load encroachment
  − Switch onto fault detection
  − Current reversal and weak-end infeed logic
  − Scheme communication logic
• Current
  − Instantaneous phase overcurrent protection
  − Four-step positive (phase) and zero (residual) sequence overcurrent protection with definite and inverse time characteristics
  − Breaker failure protection
  − Pole discordance protection
• Voltage
  − Two step undervoltage protection with definite and inverse time characteristics
• Secondary system supervision
  − Fuse failure supervision
  − Current circuit supervision
  − Open CT detection
• Multipurpose function
  − General current and voltage protection

Monitoring
• Disturbance recorder and disturbance report
  − 100 disturbances
  − 40 analog channels
  − 128 binary channels
• Event list with 1000 events
• Event and trip value recorders
• Fault locator
• Event counters
• Circuit breaker monitoring
• Gas / liquid medium supervision
• Running hour meter
• Large HMI with virtual keyboard, function push buttons, and three color LED indications with alarm descriptions
Logic
- Tripping logic
- Trip matrix logic
- Extensive logic block library for application customization

Control functions
- Synchrocheck, energizing check and synchronizing
- Autorecloser
- Control for 1 circuit breaker, including IEC 61850 data model
- Control for up to 20 additional switching devices through software based multiple position selector switches
- Selectable operator place allocation

Measurements
- U, I, P, Q, S, f and cos φ
- Frequency measurement with accuracy of ± 2 mHz

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

Communication
- IEC 61850-8-1 including GOOSE messaging
- IEC 62439-3 parallel redundancy protocol (PRP)
- 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
- Protection and control IED manager PCM600 for configuration, parameterization, online debugging and disturbance handling
- Forcing of binary inputs and outputs for faster and easier test and commissioning
- Flexible product naming by mapping utility IEC 61850 model to that of 650 series model

Hardware
- 1/2 x 19”, 6U height case
- Power supply module from 24-60 or 90-250 V DC ± 20 %
- TRM input module with 12 analog inputs
- Up to three I/O modules
  - Binary input module with 16 inputs
  - Binary output module with 24 outputs
  - Binary input/output module with 8 inputs and 12 outputs
- Compression or ring-lug connector types for analog inputs
- Accurate time-synchronization through SNTP, DNP 3.0, IEC 60870-5-103, or IRIG-B
- Remote end data communication modules for C37.94, single- or multimode optical fiber
- 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 RED650 Product Guide.

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