DATASHEET

Line distance protection REL670

Relion® 670 series version 2.2

Application
- Full scheme distance protection for power lines with high sensitivity and low requirements on remote end communication
- Complete protection for two lines in one device
- High speed functionality with sub-cycle fault clearance and meeting functional requirements of IEC 60255-121 standard
- Auto recloser and synchro check function for high-speed or delayed reclosing
- Additionally supports circuit breaker/disconnector control, circuit breaker condition monitoring
- Easy integration to conventional or digital substations

Features
- Fully IEC 61850 compliant, Edition 1 and Edition 2
- Extensive I/O capability
- Protection, monitoring and control of several primary objects integrated in one IED
- Extensive self-supervision including analog channels
- Six independent parameter setting groups
- Ethernet interface for fast and easy communication with PC and SA system
- Large number of Ethernet ports to support several system topologies and redundancy methods
- Large HMI for visualization of single line diagrams
- Settings via IEC 61850 for some protections
- Cyber security support for compliance to NERC CIP and IEC 62351-8 with Centralized Account Management using Microsoft Active Directory

Pre-configured solutions
- Pre-configured and type-tested solutions including default settings for:
  - Single breaker, 1/3 phase tripping, isolated or high-impedance earthed systems
  - Single breaker, 1/3 phase tripping
  - Multi breaker, 1/3 phase tripping
  - Single breaker, 1/3 phase tripping with PMU functionality

Most important protection functions
- Distance protection
  - Full-scheme distance protection with quadrilateral, Mho compensation characteristics for up to 7 zones with load encroachment discrimination and compensation of mutual coupling from parallel line. Consisting of 2 fixed zones, one each for reverse and forward, while 5 zones settable as forward or reverse
  - Series/non-series compensated lines
    - Power swing detection
    - Phase preference logic
    - Pole slip protection

- 3-phase high impedance differential protection for tee-feeders
- Additional security logic
- Voltage functions
  - Two step phase- and residual overvoltage protection with definite and inverse time characteristics
  - Two step undervoltage protection with definite and inverse time characteristics
  - Voltage three-phase differential protection for capacitor banks
  - Radial feeder protection
  - Overexcitation protection
  - Loss of voltage check
- Current functions
  - Instantaneous phase- and residual overcurrent protection
  - Four step phase- and residual directional overcurrent protection
  - Average power based transient earth fault protection
  - Sensitive directional earth-fault protection
  - Broken conductor check
  - Over current protection with binary release
  - Thermal overload protection
  - Breaker failure protection
  - Stub protection
  - Pole discordance protection
  - Voltage controlled/restraint overcurrent protection
  - Average power based transient earth fault protection
- Power functions
  - Directional under- and overpower protection
- Secondary system supervision
  - Fuse failure supervision
  - Fuse supervision based on voltage differential
  - Current circuit supervision
  - Current/Voltage/Real Value based delta supervision
- Frequency functions
  - Under- and over frequency 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. Sub-Synchronous Resonance (SSR)
  - General current and voltage protection

- Scheme communication
  - Scheme communication logic
  - Phase segregated scheme communication logic for distance protection
  - Current reversal and weak-end infeed logic
    - Local acceleration logic

Control functions
- Auto recloser for single or multiple breakers
- Synchronizing, synchro check and energizing check
- Control and interlocking for up to 15 switching devices
- Selectable operator place allocation
- Software based multi-position selector switches

Logic
- Tripping and trip matrix logic
- Extensive math and logic block library for application customization

Monitoring
- Phasor monitoring for up to 8 phasor values
- Adjustable breaker monitoring with capability to handle multiple breaker types
- Monitor mechanical stresses on transformer via advanced transformer through fault monitoring and reporting functionality
- Monitoring and reporting of currents and voltages during faults
- Disturbance recorder with disturbance report supporting COMTRADE 1999 and 2013 formats
  - 200 disturbances
  - 40 analog channels (30 physical and 10 derived)
    - 352 binary channels
  - All protection settings during a disturbance
- Event list for 5000 process and 10240 security events
- Event and trip value recorders
- Fault locator
- Event counters
- Current/Voltage based harmonic monitoring
- (up to 9th order) including total harmonic distortion
- Running hour meter
- 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 Φ
- Frequency measurement with accuracy of ± 2 mHz
- 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 62439-3 High-availability Seamless Redundancy (HSR)
- IEEE 802.1D Rapid Spanning Tree Protocol (RSTP)
- IEC/UCA 61850-9-2LE Process bus for up to 8 MUs
- Phasor monitoring reporting via IEEE 1344 and IEC/IEEE 60255.118 (C37.118)
- IEC 60870-5-103, DNP 3.0, SPA, LON protocols
- Remote end communication for signal transfer
  - 64 kbps: 3 analogs & 8 binary or 192 binary
  - 2 Mbps: 9 analogs & 192 binary

Engineering, testing, commissioning and maintenance
- Protection and control IED manager, PCM600, for configuration, parameterization, Ethernet port/protocol configuration, 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 670 series model

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 ± 20 %
- TRM modules each with 12 analog inputs protection class and optionally measurement
- 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 heavy-duty 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 or ring-lug
- Accurate time-synchronization through
- PTP (IEC/IEEE 61850-9-3), GPS, SNTP, DNP 3.0, IEC 60870-5-103 or IRIG-B
- Remote end data communication modules for C37.94, galvanic X.21 up to 10 m, fiber for direct connection up to 130 km or via multiplexer
- Up to six Ethernet ports (optical LC or RJ45) that can be freely configured as single or redundant pairs

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 REL670 Product Guide.