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
- Autorecloser and synchrocheck 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

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 six zones and with load encroachment discrimination
  - 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
  - Sensitive directional earth-fault protection
  - Broken conductor check
  - Thermal overload protection
  - Breaker failure protection
  - Stub protection
  - Pole discordance protection
  - Voltage controlled/restraint overcurrent 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 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. Sub-Synchronous Resonance (SSR)
  - General current and voltage protection
- Scheme communication
  - Scheme communication logic
  - Scheme segregated scheme communication logic for distance protection
  - Current reversal and weak-end infeed logic
  - Local acceleration logic

Control functions
- Autorecloser for single or multiple breakers
- Synchronizing, synchrocheck 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 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
• Disturbance recorder with disturbance report
  - 100 disturbances
  - 40 analog channels (30 physical and 10 derived)
  - 352 binary channels
  - All protection settings during a disturbance
• Event list for 1000 events
• Event and trip value recorders
• Fault locator
• Event counters
• Current/Voltage based harmonic monitoring (up to 5th 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)
• IEC/UA 61850-9-2LE Process bus for up to 8 MUs
• Phasor monitoring reporting via IEEE 1344 and 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 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.