# Line distance protection REL650
# 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

- Single breaker with single-phase tripping
- Single breaker with three-phase tripping
- Double breaker with three-phase tripping

## Most important protection functions

- 5 zone full-scheme line distance protection
  - Quadrilateral or mho characteristic, or both
  - Scheme communication logic
  - Load encroachment discrimination
  - Selective phase selection and automatic switch on to fault logic
  - Current reversal and weak end infeed logic
  - Power swing detection and blocking
  - Phase preference logic
- Current
  - Instantaneous phase overcurrent protection
  - Instantaneous residual overcurrent protection
  - Four step non-directional/directional phase overcurrent protection with definite and inverse time characteristics with 2nd harmonic blocking
  - 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
  - Two step negative sequence based directional overcurrent protection
  - Directional residual overcurrent protection with scheme communication logic
  - Sensitive directional earth-fault protection
  - Two step undercurrent protection
  - Broken conductor check
  - Thermal overload protection
  - Breaker failure protection
  - Stub 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
  - Loss of voltage check
- Frequency protection
  - Under- and overfrequency protection
  - Rate-of-change frequency protection
- Power system supervision
  - Loss of voltage check configured based on undervoltage protection
  - Dead line detection included in fuse failure supervision and switch on to fault logic
- Secondary system supervision
  - Current circuit supervision
  - Fuse failure supervision
  - Breaker close/trip circuit monitoring

### Control functions
- Selective single-phase and three-phase autorecloser
- Synchronizing, synchrocheck and energizing check
- Selectable operator place allocation
- Control of up to two 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
- Fault locator presenting distance to fault in percentage/ kilometers/miles
- 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 analog inputs (5 CT and 5 VT inputs) or 20 analog inputs (10 CT and 10 VT inputs) in configured solutions
- 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 depending on the selected configured solution
- 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 REL650 Product Guide.**

For more information please contact:

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