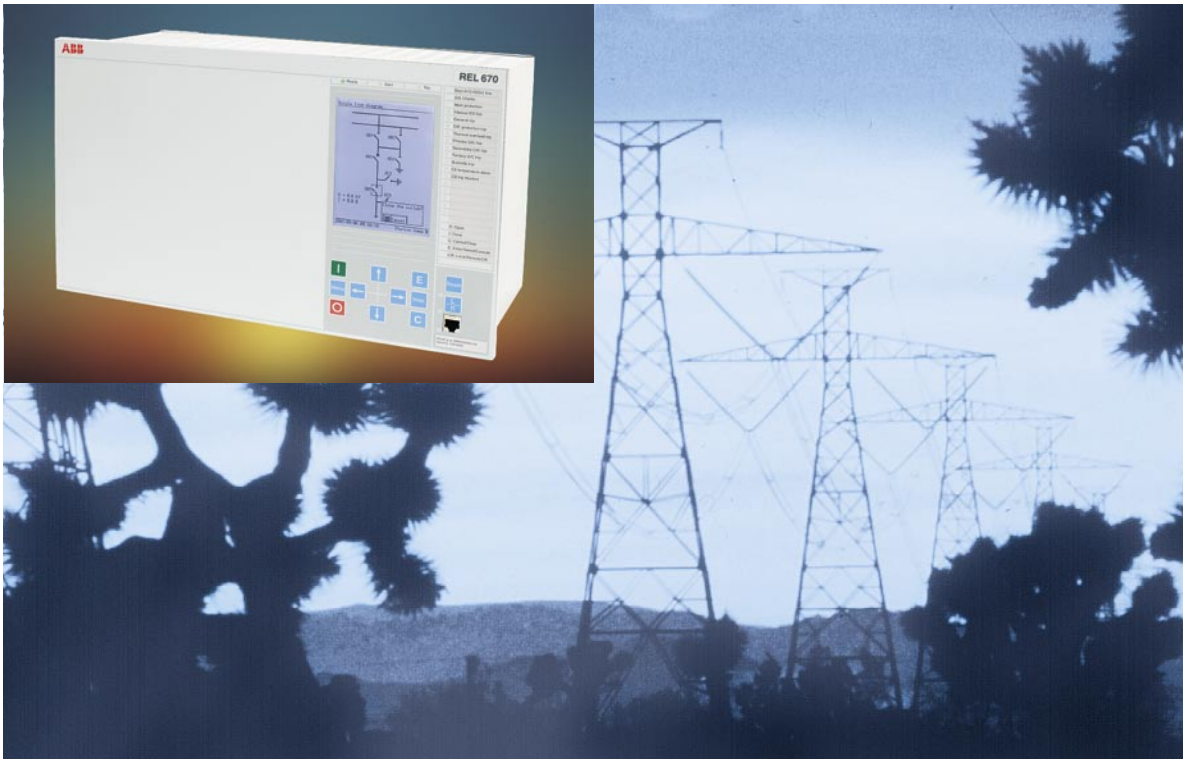
Line distance protection IED REL 670

Innovation from ABB



Extensive application opportunities
The REL 670 IED (Intelligent Electronic Device) is designed for protection, monitoring and control of overhead lines and cables. It provides **extensive functionality with diverse application opportunities, as well as expandable hardware** to meet your specific requirements. The powerful IED provides distance protection for a complete double circuit, parallel operating line.

REL 670 features full scheme distance protection with independent phase selection, power swing detection and a wide range of scheme communication logics. The five zone distance protection for phase to phase and phase to earth faults enables you to protect and control several objects, for instance a line and a transformer with a single IED. As a result, **this IED increases both the reliability and profitability of your entire power system**.

For **maximum reliability** of your **power system**

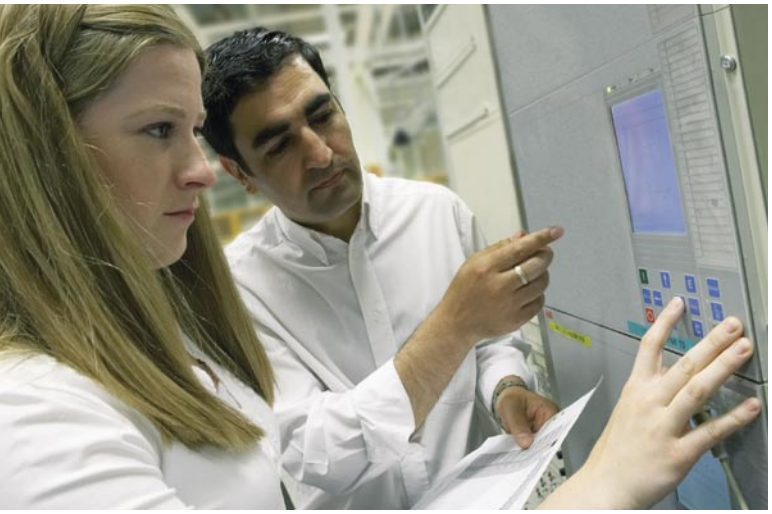
Ready to use IEDs

The REL 670 IEDs are delivered **pre-configured, type tested and with default parameters for easy handling of products** – from ordering, engineering and commissioning to reliable operation. These IEDs are equipped with complete functionality adapted for four different configuration alternatives: single pole breaker or multi-breaker arrangements with single or three phase tripping. If needed, they can be easily adapted to meet your power system's specific requirements.

Extensive protection for lines and cables

REL 670 provides protection of power lines with high sensitivity and low requirements for remote end communication. Measurements and setting of all five zones with six setting groups are realized completely independently to ensure high reliability for all types of lines, including **series compensated lines**. **The REL 670 distance protection is further enhanced with load encroachment, which increases the ability to detect high resistive faults on heavily loaded lines**.

You can also increase the functionality of your REL 670 IEDs with **optional back-up and multipurpose protection functions**. A high impedance differential function provides protection for tee-feeders in a multi-breaker arrangement based on the measurements from the feeders. Furthermore, an integrated power swing detection function prevents unwanted operation during power system oscillations caused by disconnection of heavy loads or tripping of large generators.

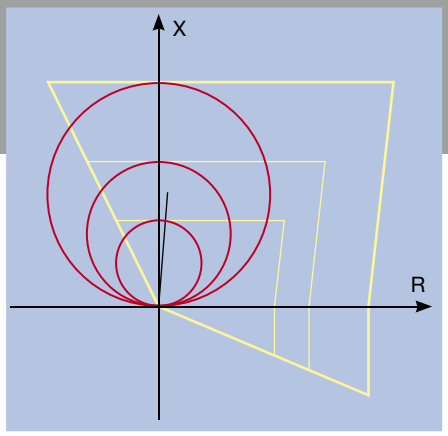


Versatile overcurrent and thermal overload functions provide additional back-up protection. **Breaker failure protection allows high speed back-up tripping of surrounding breakers and re-tripping of the own breaker**, for instance, to avoid operational mistakes during testing. The distance and earth-fault protection functions can communicate with the remote end in any communications scheme.

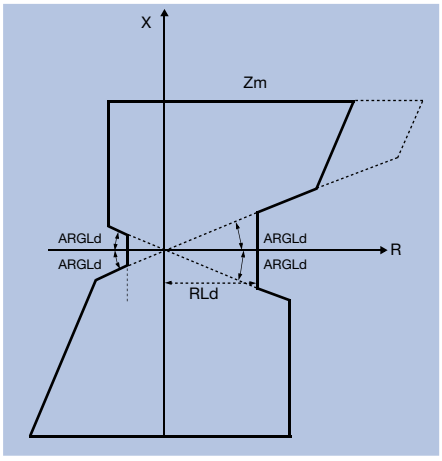
Integrated protection and control

REL 670 is designed for IEC 61850, implementing all the aspects of this standard and thus ensuring open, future-proof and flexible system architectures, with state-of-the art performance. It features extensive functionality and expandable I/O. As a result, **you can benefit from applications with multiple algorithms and comprehensive bay control functionality**, including synchronizing, synchro-check, deadline detection and auto-reclosing.

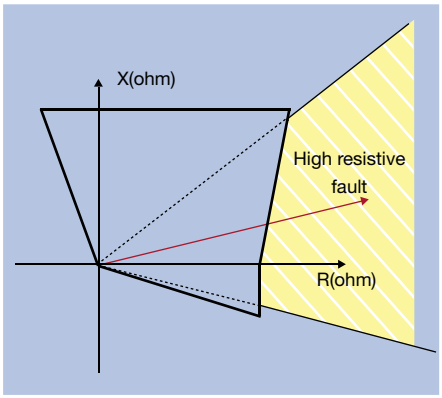
Application examples



REL 670 provides distance protection with quadrilateral or Mho-characteristics.



The load encroachment function allows REL 670 IEDs to efficiently detect high resistive faults without interference with the load impedance.



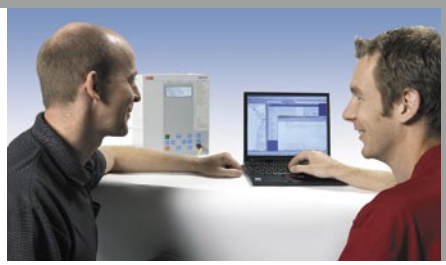
Optional phase segregated high resistance function ensures single pole operation for all faults.

The advanced interlocking functionality of REL 670 allows you to **avoid dangerous or damaging switchgear operations and to ensure personnel safety**. REL 670 performs secure bay- and station-wide interlocking using an easy-to-use reservation functionality. This prevents simultaneous operation of disconnectors and earthing switches and ensures that the interlocking information is correct at the time of operation. The control is based on the select before operate principle to assure secure operation and to avoid human mistakes.

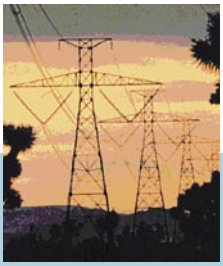
The integrated HMI of REL 670 allows secure and quick local control for stand-alone applications and provides back-up control for substation automation systems. It also enables **instant access to important data**, such as settings, events and disturbance information. You can easily configure the graphical display to correspond to your substation using a library of symbols.

The two-position versatile switch and the 32-position selector switch functions enable you to easily manage switching operations via an icon on the IED HMI. The versatile switch function allows you to directly change, for instance, the autorecloser function from on to off or vice versa without changing the configuration. The function also presents an indication of the selected position.

The selector switch replaces an external mechanical selector switch and allows you to directly select the position you desire, for instance, to change the autorecloser mode between 1-pole, 3-pole or 1-&3-pole modes. In addition to the IED HMI, these switch functions can be operated from a remote system.



The REL 670 IEDs provide you with a **future-proof concept** based on wide application flexibility, which makes these IEDs an excellent choice for both new and retrofit installations.



INCREASE GRID RELIABILITY – INVEST IN AN ALL IN ONE SOLUTION

- REL 670 provides efficient substation automation solutions in terms of performance and redundancy for any high voltage application
- REL 670 provides solutions for integrated protection, control and monitoring
- REL 670 provides improved availability through efficient information management
- REL 670 enables significant savings in configuration, setting, erection, commissioning and maintenance cost as well as in space requirements

Fast and efficient system integration

REL 670 IEDs are **more than just devices**. They utilize ABB's unique connectivity package concept, which simplifies the system engineering and reduces the risks of errors in system integration. A connectivity package contains a complete description of the specific IED, consisting of data signals, parameters, addresses and IED documentation.

The signal data is configured automatically based on the information provided by the connectivity package to efficiently integrate the IEDs in ABB's MicroSCADA Pro automation system.

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REL 670 Technology summary:

Features
- Fully IEC 61850 compliant
- Control, monitoring and protection integrated in one IED
- Extensive self-supervision including analog channels
- Six independent parameter setting groups
- Large HMI for visualization of single line diagrams
- Ethernet interface for fast and easy communication with PC
- Signal matrix for easy configuration of binary and analog signals
- User management and authority handling

Pre-configured solutions
- Pre-configured and type-tested solutions including default settings for:
  - Single breaker with selective single or three phase tripping
  - Multi-breaker with selective single or three phase tripping
  - 1½ circuit breaker arrangements with selective single or three phase tripping
  - Sub-transmission non-directly earthed systems (single breaker)

Most important protection functions
- Distance protection
  - 5 zone full-scheme high-speed line distance protection with quadrilateral, Mho- or series compensation characteristics, and with scheme communication logic and 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
  - Pole slip protection
- High impedance differential protection for tee-feeders
- Current
  - Instantaneous phase- and residual overcurrent protection
  - Four-step phase- and residual directional overcurrent protection with definite and inverse time characteristics
  - Directional residual overcurrent protection with scheme communication logic
  - Sensitive directional earth-fault protection
  - Broken conductor
  - Thermal overload protection
  - Breaker failure protection
  - Stub protection
  - Pole discordance 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
- 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
  - Fuse failure supervision
  - Current circuit supervision
- Frequency functions
  - Over- and under frequency protection
  - Rate-of-change frequency protection
- Multipurpose function
  - General currrent and voltage protection

Logic
- Tripping logic
- Trip matrix logic
- Configurable logic blocks

Monitoring
- Disturbance recorder
  - 100 disturbances
  - 40 Analogue channels 30 physical and 10 derived
  - 96 Binary channels
- Event list for 1000 events
- Disturbance report
- Event and trip value recorders
- Fault locator
- Event counters
- Supervision of AC and mA input quantities
- LED indications with 6 red and 9 yellow LEDs

Metering
- U, I, P, Q, S, f, and cosφ
- AC input quantities with accuracy better than 0,5%
- Inputs for mA measuring
- Energy metering function for energy statistics
- Pulse counting support for energy metering

Control functions
- Apparatus control for 8 or 15 apparatuses
- Ready to use interlocking modules for different switchgear arrangements
- Several alternatives for reservation functionality
- Synchronizing, synchro-check and energizing check
- Auto-recloser
- Versatile switch with two positions
- Selector switch with up to 32 positions

Communication
- IEC 61850-8-1 including GOOSE messaging
- IEC 60870-5-103
- DNP 3.0 slave protocol
- LON
- SPA
- Remote end communication for transfer of 192 binary signals

Setting, configuration and disturbance handling
- Protection and Control IED Manager PCM600

Hardware
- 1/1 x 19", ¾ x 19" or ½ x 19" case selected according to the number of required I/O modules
- Power supply modules from 24 to 250 V DC ± 20%
- 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 12 outputs (6 static)
- Binary input/output module with 8 inputs and 12 outputs
- mA input module with 6 transducer channels
- Accurate time-synchronization through GPS module or IRIG-B-module
- Remote end data communication modules for C37.94, X21 and G.703/G.703E1
- Test switch module

Technical details are available in the REL 670 Buyer's Guide.

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