



Substation Automation Products

Busbar protection REB670 Relion® 670 series

State-of-the-art protection – for your equipment and your people

The REB670 IED (Intelligent Electronic Device) features excellent application flexibility. It is designed for the protection and monitoring of busbars, T-connections and meshed corners from medium to extra high voltage levels. Due to its extensive I/O capability, REB670 protects single and double busbars with or without transfer bus, double circuit breaker or one-and-half circuit breaker arrangements.

The REB670 IED provides selective, reliable and fast fault clearance for all types of internal phase-to-phase and phase-to-ground faults in solidly grounded or low impedance grounded power systems. It can also handle all internal multi-phase faults in isolated or high-impedance grounded power systems.

REB670 features complete busbar protection, which in addition to differential protection includes flexible dynamic zone

selection (disconnecter replica) integrated in one IED. This enables dynamic CT connections to differential zones, as well as selective busbar and breaker failure tripping, disconnecter and circuit breaker status supervision. Due to its unique measuring principle, this IED has very low CT requirements compared to other numerical differential protection devices.

In-depth busbar protection knowledge

The REB670 IED continues ABB's strong track record in busbar protection, starting from analog busbar protection relays INX2/5, RADSS, REB 101/103. So far, these relays have been successfully installed for over 40 years. ABB also has more than 10 years of experience of numerical busbar protection based on REB500 and RED521. All these devices have shown an impressive track record with no false operation due to incorrect IED functioning. Today, more than 20,000 zones equipped with ABB busbar protection are in service throughout the world.



Increase grid reliability – invest in deep busbar protection knowledge

- REB670 operates correctly for all types faults
- REB670 provides maximum safety for your substation personnel
- REB670 enables significant savings in configuration, setting, erection, commissioning and maintenance costs as well as in space requirements

Always correct behavior

REB670 is **fast and stable simultaneously** – such a unique combination is essential for effective busbar protection. This IED features **extremely short operate time**, typically 12 ms, for most internal faults, regardless of the number of connected feeders. At the same time, it **maintains complete stability for external faults**, even when heavy CT saturation occurs. It also has very low CT requirements compared to other numerical differential protection devices due to its unique measuring principle, which allows the sharing of CT circuits with other protection relays and thus saves costs. The low CT requirements guarantee stability and correct operation as long as the CT is not saturated for at least two milliseconds during each power system cycle. Furthermore, the REB670 provides **superior sensitivity to internal faults**, thus protecting your power system objects from extensive damage and long repair times. Additionally, it effectively recognizes and **operates correctly for all types of evolving faults**.

Optimized performance

The REB670 IED features multiple algorithms in a single device. It features **two differential protection functions**: one basic and one with a sensitive operational level. The latter is able to detect internal busbar ground faults in low impedance grounded power systems, where a neutral point reactor or resistor limits the ground-fault current typically from 300A to 2000A. In addition, you can utilize the sensitive operation level when energizing the bus via long line, since this requires high sensitivity from busbar differential protection.

The innovative and fast measuring algorithm **detects and blocks incorrect operation during open CT circuits**. The supervision of open CTs of the IED allows you to design reset logic for the automatic re-start of the IED when the CT is re-connected. This supervision functionality can also generate alarms and trigger the disturbance recorder.

The integrated overall check zone feature can be used in double busbar stations to secure stability of the busbar differential protection in cases where status indication of a busbar disconnector is entirely wrong in any of the feeder bays.

REB670 integrates zone selection functionality into a single IED and therefore no external equipment for CT switching and busbar protection trip routing is needed. The flexible zone selection allows **automatic linking of CTs to the actual differential protection zone** at any time.

REB670 provides maximum safety for your substation personnel in a fault situation. It also allows you to easily take a bay out of service for maintenance, and yet keep the busbar protection in operation during the maintenance period. You can disconnect the bay via the IED HMI or a selector switch. To sum up, REB670 is **the most reliable solution** for protecting the most precious assets of your power system: the most essential objects and your people.

Easy to handle

REB670 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.

The REB670 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 three different configuration alternatives in three- and one-phase variants. They can be applied for differential protection of busbar sections from four up to 24 CT inputs. All variants have two low-impedance differential protection zones and check-zone. You can use the graphical configuration tool Protection and Control IED Manager PCM600 to easily and intuitively adapt the pre-configured REB670 IEDs to your specific busbar arrangement.

The **integrated large HMI** provides a quick overview of the magnitude and phase angle of all individual bay currents. It also presents the magnitude of differential and total through-load currents, bay CT connections towards two differential zones and check-zone. You can also access information about the actual status of primary switchgear objects, as well as trip signals and open CT indications. All this facilitates fast and efficient commissioning and consequently correct behavior of the busbar protection.

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 enable, for instance, the bay out of service feature or to directly disable a whole differential zone. The switch function also presents an indication of the selected position.

The selector switch can replace an external mechanical selector switch and allows you to directly select the position you desire. In addition to the IED HMI, these switch functions can be operated from a remote system.

Cost-efficient extensions

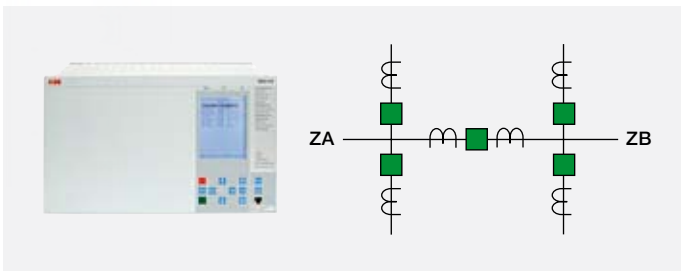
You can easily integrate extension bays into your existing REB670 IED. The station extensions can be done bay-by-bay **without any software or hardware modifications** within the protection IED. For instance, if you have a nine-bay station you can, by ordering a 12-bay variant, have everything included and prepared for all 12 bays. Thus, when extending your substation, all you need to do is to connect the wiring for the new bays and enable relevant functionality in the REB670 IED.

Save space and money

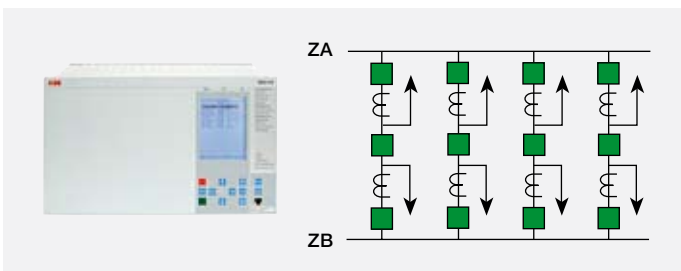
REB670 provides complementary integrated functionality in a single device. The integrated breaker failure protection for all breakers in any type of station layout allows easy implementation of **complete back-up protection**.



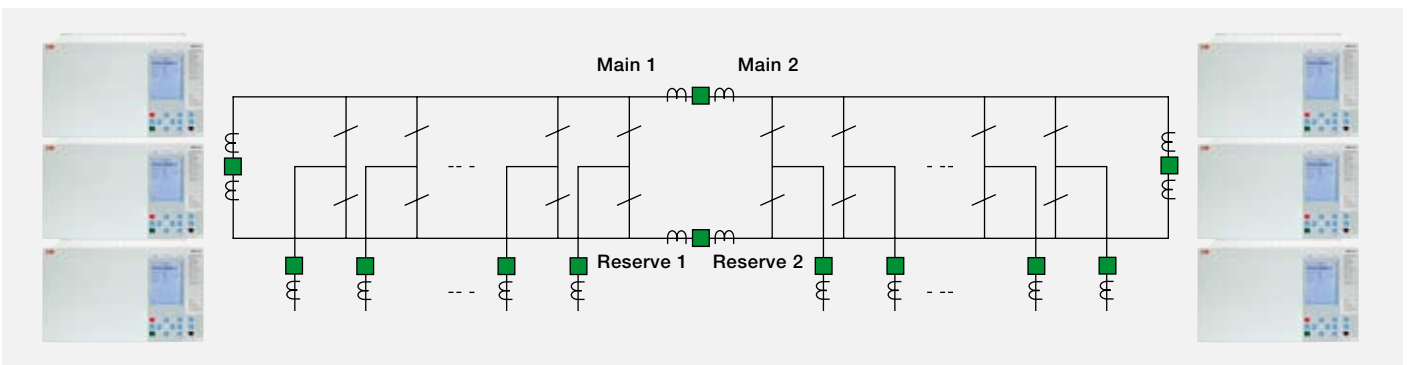
Application examples



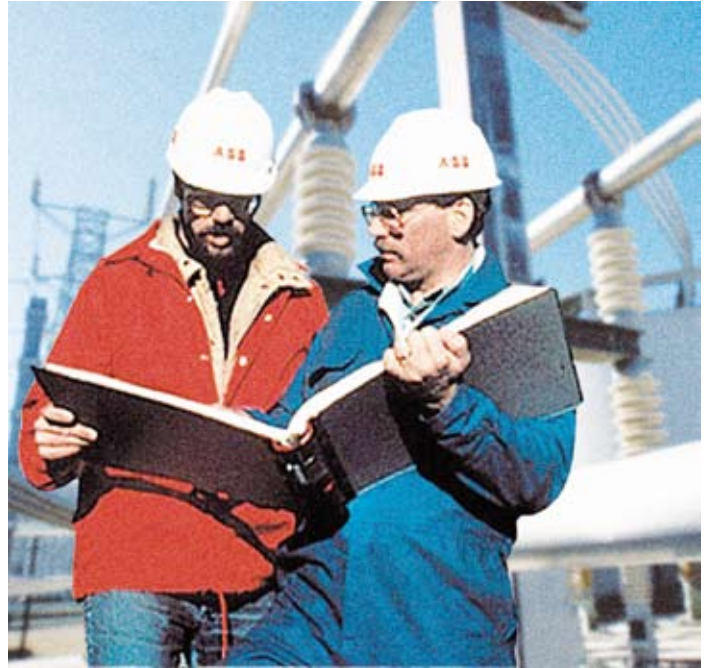
H-type station.



1 1/2 breaker stations.



Double busbar – single breaker station with two bus-coupler CBs and two bus-section CBs.



Furthermore, overcurrent protection provides back-up protection for feeders. This function can also be applied for **end-fault protection**, i.e. detecting short-circuits between the feeder circuit breaker and feeder CT when the circuit breaker is open. This functionality together with the communication capabilities of REB670 allows for the sending of a fast overcurrent trip signal to the remote end, thus preventing a trip from the busbar differential protection function.

The **autoreclosing** function provides high-speed and delayed three-pole autoreclosing. This function can be used for delayed busbar restoration after busbar protection operation.

Fast and efficient system integration

Fast and efficient system integration REB670 IEDs are **more than just devices**. They utilize ABB's unique connectivity package concept, which simplifies system engineering and reduces the risk of errors in system integration. This 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 into ABB's MicroSCADA Pro automation system.

Relion® 670 series IEDs support IEC 62439 standard redundant communications on the station bus. The solution from ABB utilizes the IEC 62439-3 **standardized Parallel Redundant**

cy Protocol (PRP). PRP improves the communication system reliability and features a unique capability of zero seconds' recovery time in case of communication failures. This means that there will be **no interruption in communication** if one link fails as the other link instantaneously takes over the communication. As a result, there is no data lost when communication failures have occurred.

The **supervision of communication links** provides real-time status information about both communication links individually. If a failure occurs, an alarm is sent to the IED HMI and the substation automation system. This also allows for maintenance of the station bus while it is in operation. Thus, redundant communication further **improves personnel safety** and ensures that the **necessary information** about the system is available **for operators in all situations**.

Relion® – Complete confidence

Busbar protection REB670 is a member of the Relion® protection and control product family. The Relion product family offers the widest range of products for the protection, control, measurement and supervision of power systems. To ensure interoperable and future-proof solutions, Relion products have been designed to implement the core values of the IEC 61850 standard. With ABB's leading-edge technology, global application knowledge and experienced support network, you can be completely confident that your system performs reliably – in any situation.

REB670 Technology summary:

Features

- Fully IEC 61850 compliant
- Monitoring and protection integrated in one IED
- Extensive self-supervision including analog channels
- Six independent parameter setting groups
- Signal matrix for easy configuration of binary and analog signals
- Ethernet interface for fast and easy communication with PC
- Built-in HMI for easy on-line visualization of bay to zone connections and primary switchgear object status
- Pre-configured and type tested solutions including default settings for:
 - Single busbar, one-and-a-half breaker and double breaker arrangements
 - Double busbar-single breaker arrangements
- User management and authority handling

Most important protection features

- Two busbar differential protection zones
 - Sensitive differential protection level
 - Automatic detection and selective busbar protection blocking for troubles in CT secondary circuits
 - Extremely fast operation
 - Full stability for all external faults
 - Correct operation for all types of evolving faults
- Overall check zone
- Integrated, software driven zone selection (i.e. disconnector replica)
- Breaker failure protection
- Selective tripping for busbar and breaker failure protection
- Four-step, non-directional, phase overcurrent protection with definite and inverse time characteristics
- Autoreclosing function for busbar restoration after IED operation
- Configurable logic blocks
- Summation principle with additional auxiliary CTs

Monitoring

- Disturbance recorder
 - 100 disturbances
 - 40 analog channels, 30 physical and 10 derived
 - 96 binary channels
- Event list with 1000 events
- Disturbance report
- Event and trip value recorders
- Event counters
- Supervision of AC and mA input quantities
- Small and large HMI in local language
- LED indications with 6 red and 9 yellow LEDs

Control functions

- Versatile switch with two positions
- Selector switch with up to 32 positions

Measurements

- Currents in all bays, differential currents, busbar through-going currents
- AC input quantities with accuracy better than 0,5 %

Metering

- Pulse counting support for energy metering

Communication

- IEC 61850-8-1 including GOOSE messaging
- Individually supervised redundant station bus with zero seconds recovery time
- IEC 60870-5-103
- DNP 3.0 slave protocol
- LON
- SPA
- Remote end communication for transfer of up to 192 binary signals

Setting, configuration and disturbance handling

- Protection and Control IED Manager PCM 600

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 \pm 20%
- ADM module
- Up to 11 I/O modules in 1/1 x 19" case
- Binary input module, 30 mA and 50 mA, with 16 inputs
- Binary output module with 24 outputs
- Static binary output module with 12 outputs (6 static)
- Binary input/output module, 30 mA and 50 mA, with 8 inputs and 12 outputs
- Accurate time-synchronization through GTM, GPS time module, IRIG-B-module, SNTP and DNP 3.0
- Remote end data communication modules for C37.94, X.21 and G.703/G.703E1
- COMBITEST test switch module

Technical details are available in the REB670 Product Guide.

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