Continuous and secure power generation.
Upgrade your generator and transformer protection.
Committed to protecting your investment.

ABB’s latest Relion REG670 Intelligent Electronic Device (IED) takes generator protection to a new performance level, ensuring unrivaled selectivity and sensitivity. Thanks to our extensive domain expertise, our lifecycle management services also ensure the upgrade of existing equipment to the latest technology is a simple and efficient process.

With more than 100 years of engineering knowledge, our grid automation products will empower your business for many years to come. The state-of-the-art IED’s have inherited their philosophy and algorithms from previous generations of proven ABB technology. Ensuring you can be completely confident in the performance of your power plant for many years to come.

Since 1964, more than 13,000 generator protection systems have been delivered globally. A total of 4,000 REG670 numerical protection system units have been supplied so far. Its renowned flexibility and adaptability to accommodate customer needs are unique and make it the world’s most advanced generator protection solution.
Generator and Transformer Protection. IED Lifecycle Management.

ABB offers a complete portfolio of services to ensure trouble-free operation and long product lifetimes. These services cover the entire life cycle, from pre-purchase advice, through installation, maintenance and spare parts, to migration and upgrades. Local support is provided via a global network of ABB service centers and certified partners.
A successful upgrade starts with proper planning to ensure that the implementation meets the schedule and commitment for on-time power production:

- The upgrade system REG670 can be connected to the existing hardware interfaces.
- Reuse of the terminal blocks in the existing cubicle reduces drawing design for the interconnection to the primary equipment.
- Well-maintained CTs, VTs and wiring can be reused.
- The REG670 can be adapted to modifications in the primary equipment during the entire life cycle, e.g. the subsequent installation of a generator circuit breaker.

Depending on the customer’s needs, the upgrade may be performed in different ways:

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ABB offers:

- Upgrade protection systems including engineering
- Complete cubicle with upgrade system(s) mounted, wired, and tested
- Consulting
- Site survey, studies, and reports
- Project management
- Engineering and design
- Installation, commissioning, and start-up activities
- Training, education, and support

ABB service teams ensure the complete success of the upgrade in close cooperation with you the customer.
Aramon is located in southern France, and produces electricity from oil to provide essential flexibility to the generated supply. While the bulk of France’s electricity comes from nuclear sources, other, more flexible generation sources are needed to keep pace with changes in demand for electricity. This is where high-performance fossil-fuel stations like Aramon come into play.

The protection system used at Aramon had been supplied by Brown, Boveri & Cie (BBC), and was based on GSX5 generator protection hardware. In 1988 BBC merged with ASEA to form ABB, so EDF came to ABB looking for a replacement.

**ABB solution**

The decision to use ABB wasn’t based on the historical work, but rather on more-recent installations at EDF’s other generation facilities. Those installations comprised REG670 generator protection devices, which comply with the highest regulatory standards, i.e., for use in nuclear fueled plants. While Aramon is not a nuclear plant, EDF wanted the highest-spec protection devices for the oil-fired power plant.

Two REG670 relays have been installed at Aramon to protect the main transformer in the station, with two more protecting the generator. The auxiliary transformer and generator are similarly protected, making for a total of four REG670 installations across the plant, providing full redundancy.

**Customer benefits**

With the GSX5 equipment at the end of its operational life, the customer needed an effective replacement, fitted with the minimum of operational impact. With the REG670 the customer got a good deal more.

As part of the Relion® family the REG670 supports the core values of the IEC 68150 standard, providing additional functionality as well as future-proofing the installation.

**ABB advantage**

It was ABB’s experience with high-spec installations that impressed EDF, along with the professionalism of the installers and the operational effectiveness of the equipment. ABB was able to bring in the engineers who had fitted out a nearby high-spec facility, bringing not only their irreplaceable experience of installing and operating the equipment, but also photographs of the installed hardware to simplify the siting and physical design.

With that technical knowledge, and experience working with EDF, the installation of the new REG670 IEDs was accomplished with the minimum of disruption.

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**REFERENCE**

Aramon thermal plant draws on former experience. Better protection no matter the source.

Thermal power plant Aramon has been generating power since 1977, and in 2009 fed 240GWh of power into the national grid, but aging protection hardware needed replacing as part of a major refit to the station. The owner, EDF, wanted to replicate a new high-specification installation delivered to its other facilities by ABB.
Enhanced Generator and Transformer Protection
A generator protection system with REG670 meets the requirements for maximum dependability and availability. The differential protection internal/external fault discriminator is based on negative sequence current values, enabling fast and selective operating decisions. The unique main protection functions are able to selectively detect and clear all fault types over 100% of the stator winding. The detection criteria can be used to create intelligent, application-specific functions to enhance your protection system, enabling it to meet very specific requirements, for instance, when the operating conditions of the plant change.

**Unique functional integration**
REG670 integrates parallel algorithms with advanced logic and communication. Up to 24 analog inputs permit integration of main and back-up protection in one IED. This allows you to protect several objects with a single REG670 IED. For instance, by integrating several differential protection functions, one single REG670 IED can protect a complete generator-transformer unit. The under-impedance protection function can also be used as back-up protection for faults within the unit or external faults in the power network.

Alternatively, additional objects, such as transformers, can be included in the generator protection scope. This enables full duplication of the protection in main one and main two. This reduces the number of IEDs needed to protect the entire generating station, whilst increasing availability. The selector switch can replace an external mechanical selector switch which allows you to directly select the position you desire. In addition, these switch functions can be operated from a remote control system.
Enhanced generator and transformer protection

Versatile communication capabilities
REG670 IEDs allow you to use several communication protocols in parallel. This means you can communicate with the plant control system, monitoring system or relay protection engineering office at the same time. They are designed for IEC 61850, implementing all aspects of this standard and thus ensuring open, futureproof and flexible system architectures, with state of the-art performance. These capabilities also provide new opportunities for utilizing signaling and tripping schemes in generator protection.

As REG670 is IEC 61850 compliant, it can easily be integrated in any power plant control system that is compliant with this standard. Additionally, they enable the transfer of binary and analog data to any subscriber.

In demanding applications, such as pump-storage plants, the unit has several operating modes: generating, pumping, starting or breaking. In such applications, the protection IED needs to adapt to the actual operating mode. The logical programming capability of the REG670 allows it to automatically detect the actual operating mode of the unit and adapt its operation accordingly. The selected operating mode can be shown on the built-in HMI, which is useful especially during commissioning and testing.

By using patented algorithm REG670 (or any other product from 670 series) can track the power system frequency in quite wide range from 9Hz to 95Hz (for 50Hz power system). This feature is essential for proper operation of the protection during generator start-up and shut-down procedure.

The distance between the generator and the high voltage substation can in many cases be substantial and yet many binary signals need to be exchanged between the two locations. REG670 features a dedicated fiber optic communication link to exchange analog and binary signals with another 670 series IED located in the high voltage substation. Up to 192 binary signals for indication, alarming and tripping purposes can be sent in both directions simultaneously. This exchange of analog and binary signals can be used for example for the protection of the cable/line between the step-up transformer and the switchyard by using only one cable differential relay of the 670 series.

The right information for the right action
The integrated HMI of REG670 provides you with a quick overview of the status of the power plant with position indications and service values. Using a library of symbols, you can easily configure the graphical display to correspond to your needs and to your station. The built-in disturbance recorder, capable of storing data in COMTRADE format, provides you with valuable data for post fault analysis and corrective actions to increase the security of your power plant.

Fast and efficient system integration
REG670 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. An IED connectivity package contains a complete description of the specific IED, consisting of data signals, parameters, addresses and IED documentation.
Enhanced generator and transformer protection

01 REG670 based protection scheme for medium-sized generator-transformer unit connected to a solidly earthed high voltage system.

02 REG670 IED with 24 analog inputs for advanced generator protection including overall differential protection, split-phase differential protection and 100% stator earth-fault protection based on injection principle. Redundancy is obtained by duplication.

03 REG670 IED with 24 analog inputs is able to protect the entire generator-transformer unit including generator differential and transformer/overall differential protection. Redundancy is obtained by duplication.
04 Unit protection

Including generator and generator transformer protection with 24 analog inputs in full 19" case size. Optional pole slip protection and 100% stator earthfault protection can be added.

Complete Generator-Transformer unit protection

- Full 19" rack
- 9I+3U & 6I+6U
- BIM + BOM
- Small or medium IED
- HMI
- Up to 9 optional I/O boards
- Optional 78