

Reliability & Security of Supply MV-HV Networks & Smart Grids



CIRCE has more than 10 years of experience working for the reliability and security of Power Systems (generation, transmission and distribution), using the most advanced software tools to carry out all kinds of studies for planning, setting, coordination, analysis and maintenance of the protective system of the network.

Service Offer

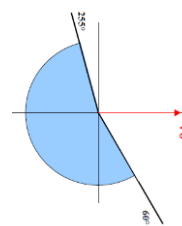
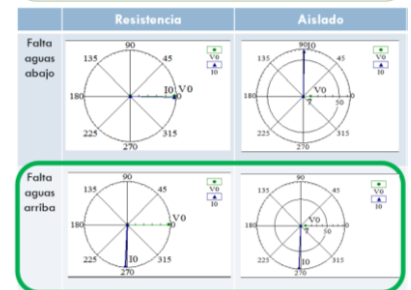
The reliability and security of supply-related services include:

- ✓ Protection relay setting calculation and coordination studies.
- ✓ Analysis of incidents in electrical installations.
- ✓ Analysis of conditions, operation criteria and automation of the network.
- ✓ Automation of studies, settings calculation and data import/export processes.
- ✓ Network elements modelling including parameters calculation for: overhead lines, underground lines, power transformers, generators.
- ✓ Modelling of protection devices and fault detectors.
- ✓ Database creation for protections simulation tools, including protective equipment, setting parameters, trip logics and instrument transformers.
- ✓ Training courses for users of the software tools.

Adaptation to needs

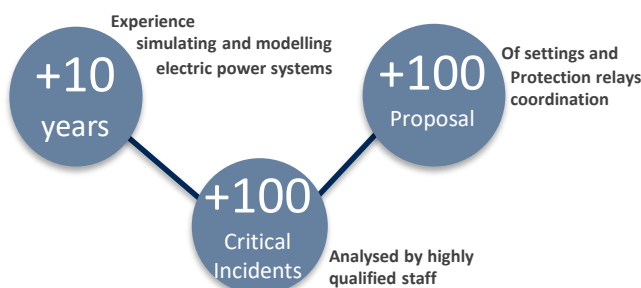
We adapt the simulation tools to different scopes:

- ① Study regime: stationary, dynamic, transitory.
- ② Nature of the required studies:
 - Protection relays coordination
 - Short-circuit analysis
 - Power-flow analysis
 - Line parameters calculation
- ③ Extension of the network and level of detail required.
- ④ Number of protection functions expected to be used.
- ⑤ Depth of the studies (upstream and downstream networks).
- ⑥ Number of consecutive events to be considered in the studies.



Fault passage indicators study

Key figures



Aimed to

System operators, engineering companies, utilities, developers, etc.

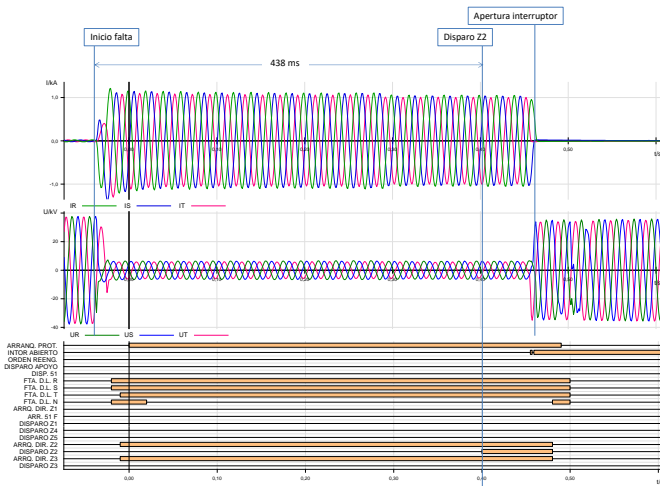
Simulation Tools

- ✓ DlgSILENT Powerfactory, CAPE, PSS/E (SIEMENS), PSCAD/EMTDC, etc.

Highlighted studies

The service of Reliability and Security of supply **includes but is not limited to:**

- ✓ Power systems protection relay settings calculation and coordination studies (generation, transmission and distribution installations):
 - New installations.
 - Refurbished or modified installations.
 - Considerations for future scenarios.
- ✓ Incident analysis:
 - Analysis of oscillography and events.
 - Determine fault characteristics and evaluation of protections performance.
 - Solutions proposal and implementation.
- ✓ Management of simulation tools data base (network models and/or protection elements models):
 - Creation from scratch.
 - Updating.
 - Maintenance.
- ✓ Development of ad-hoc macros.
- ✓ Protection criteria and automatism evaluation and proposal.



Incident analysis through field measurements

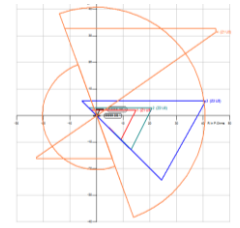
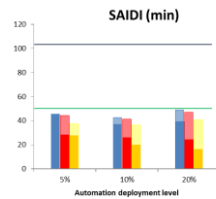
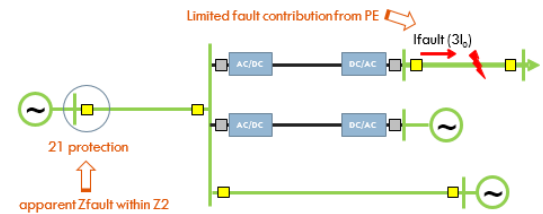
R&D Projects developed on this field:

- **DISCERN** – European project for the development of smart grid solutions in distribution networks. Includes demonstrators in medium and low voltage networks in four European countries.
- **PRICE** – National Project with the aim of study solutions of automatization in the network for two national distribution companies.
- **Smartcity Malaga** –CDTI project for the development of a demonstrator in a distribution network to increase the use of renewable energy resources, approaching the generation to consumption and supporting a rational and efficient consumption.
- **MIGRATE** – European Project for the development and validation of innovative solutions that contribute to the improvement in the European electric system management.

Objectives & Benefits

The service of Reliability and Security of supply is **oriented to:**

- ✓ Obtaining setting parameters for protection relays and fault detection devices of the Power System with the aim of protecting it according to the system operator (TSO o DSO) criteria.
- ✓ Enhancing planning and operation of the electric distribution / transmission system, taking into account its characteristics.
- ✓ Analyzing events causes and proposing solutions to avoid them and in any case prepare the system to be resilient against the analyzed events.
- ✓ Design of algorithms for: protection, fault detection and restoration of power supply.



Study and improvement of the behaviour of a protective system, focused on the improvement of the continuity of supply indicators

Facilities



CIRCE has a laboratory that allows to validate results using Hardware In the Loop techniques (RTDS)

Work References

CIRCE has broad experience nationally, as well as a wide participation in research projects at international level in the execution of reliability and security of supply and has worked with companies such as:



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