6 essential questions



FANOX

Safely protected



Characteristics that a Self-powered Relay must have to guarantee the adequate protection in a Renewable Energy installation.

1. Why a Self-powered Relay is needed on wind farms?



Depending on the market practices, the economic costs, and the impact on network stability, there are different approaches to managing the wind farms.

Using traditional relays, any failure of the power supply system would imply either the stop of the turbine or, what is worse, a non-protected generation scenario.

The electrical protection of the generator cannot be left in the hands of an auxiliary powered relay to ensure non-stop safety.

Self-powered protection relays maintain the WTG under protection whenever the turbine is connected to the MV network, including the energizing process. Other devices of the generator are still in the powering up process.



2. Why second harmonic blocking is needed? ?

The constant increase in Turbines and Inverters' nominal power implies not only the need for more complex protection functions. In some cases (such as overvoltage or over/under frequency, if the generator is connected directly to the network), it also needs to avoid tripping due to harmonics at the energizing moment.

The traditional way to avoid this event is to delay the trip and set the overcurrent protection between six and ten times the nominal current (the higher the transformer's power, the lower the relation between peak and nominal currents).

The second part of the problem involves neutral overcurrent, as the unbalance on the current of the three phases can cause a trip from this function, which usually is solved by the same method.

But the increasing complexity of turbines and inverters and the need for sharp selectivity demand more sophisticated solutions that jeopardize neither the selectivity nor the protection.

The peak current values are higher for more powerful transformers. This becomes a problem to set the overcurrent protection eight or ten times over the nominal value to coordinate with the farms' complete protection system.

The best way to avoid tripping due to inrush current is to detect that the measured current includes a critical percentage of second harmonic component regarding the fundamental 50 or 60 Hz wave.

This feature should be included in protection and control relays for the sake of selective well-coordinated but safe protection.



3. Remote communication in self-powered relays?

The introduction of Smart Grids into medium voltage distribution grids for automation and supervision purposes has made necessary the development of new solutions to address the evolving requirements of the grid.

The self-powered feature becomes a must for this application, as in many cases the installations are not equipped with any external battery. Additionally, the relay must have the ability to provide and keep certain indications (alarms / interlocks) in power-failure conditions and communications.

Remote access to the Intelligent Electronic Devices (EIDs) can provide very useful data to the SCADA. The real status of the switchgear or local alarms are important data to be known by the SCADA, as well as the measurements of Current at the connection point and the remote operation of the switchgear. All this information can be gathered and sent to the SCADA by Protection and Control relays if connected to the communications network of the Farm. Moreover, in case of faults, a remote access to the relay' s event log and fault records, allows to clarify the reason and decide whether a remote closing order can be sent and continue producing energy.



4. Why different Settings Groups?



It is essential for maintenance and energizing purposes to have the option to change the settings of the protection relays in order to perform those activities safely.

The use of different settings groups allows the user to switch to more sensitive settings via an HMI, communications, or via digital inputs. At the same time, maintenance work is being performed at an energized panel or device.

The more sensitive settings provide greater security for maintenance personnel and help reduce the possibility of injury.

On the other side, during energizing, some functions (as overcurrent protections) may need to be set eight or ten times over the nominal value to avoid tripping during the system's initial power consumption.

These different needs are easily achieved by using different Settings Groups.



5. Advantages of a compact and reliable solution.



SIA-B CTs Specifics

The space assigned to each function is limited. Therefore, increasing the size of the components to allow new functionality is not an option, and modern Protection & Control relays must keep the size of older ones even if performing enhanced functions.

This type of relay and the extended range of nominal currents for a defined package Relay+CT makes this solution very adaptable to manage installations with different rated power with the same components.

The same relay and CT' s can be used in all the installations for the sake of standard engineering. This allows us to apply the same device worldwide, independently of power or earthing method, reducing engineering costs, stock of material, and simplifying the process.



6. Connection to the Grid. Grid code compliance?

Grid Codes are a technical specification that a facility connected to the public power system needs to fulfill at Point of Common Coupling (PCC).

- Typically specifies the behavior of the generator under normal conditions as well as during disturbances.
- Traditionally, required only for large conventional power plants.
- The increasing amount of distributed generators connected to the lower voltage levels has created the need to revise and upgrade Grid Codes.

Grid Codes vary depending on the country, type, and size of generation unit and international workgroups targeting harmonizing different national Grid Codes, as an example ENSTO-E in Europe.

But all the changes have something in common: more complex and reliable control and protection functions are needed. The decision-making process will involve several protection functions, working simultaneously (Undervoltage + Directional reactive power + frequency drop). And fast communication protocols (GOOSE on IEC61850 for example) to coordinate the response to a faulty situation and relays as SIL-G or SIR-A can fulfill those requirements.



FANOX

Safely protected

Parque Científico Tecnológico de Bizkaia

Astondo Bidea, Building, 604

48160 DERIO – BIZKAIA—SPAIN

www.fanox.com

t. +34 944 711 409

