

Inter-Relay Communication (R2R) and Special Schemes for Emergency

SIPROTEC 7SA6 distance protection relay with inter-relay communication

■ The starting situation

As the power supply systems are getting more and more complex, special schemes for emergency situations have to be implemented.

In these special schemes, communication between substations is a necessary feature.

The 7SA6 distance protection relay provides a communication functionality that allows an easier implementation of special schemes.

In the case study described below, a customer started to construct a CIC substation to ensure power transmission from a thermal power station with GG-1/ 2 and GT1.

However, the substation did not get ready on time, and the CSN consumer was not connected to the bus. Therefore, the loads on the CCO –side of the system proved to be too small.

With this situation, load loss on the transmission line between the substations GRL and CCO would in fact mean an overloading of the transmission line between GRL and CSO (see Fig. 2). This is usually the case, when the power generated in the thermal power station is above 290 MVA at the fault occurrence time. Therefore, an additional load had to be connected to the system.

■ The concept

The solution was to implement a connection between the GRL substation and the UMB substation.

In case of faults on the GRL-CCO transmission line, this line will be disconnected and the TL GRL-UMB transmission line will be connected. Since the TL GRL-UMB has a higher thermal limit, this new configuration helps to solve the problem.

The 7SA6 communication function was used to exchange the information between the GRL and CCO substations.

When the main circuit-breaker or the load transfer breaker in the CCO substation opens due to a trip, the GRL relay receives the information by inter-relay communication. The “Special Emergency Scheme” is activated and then the relay output is reset.

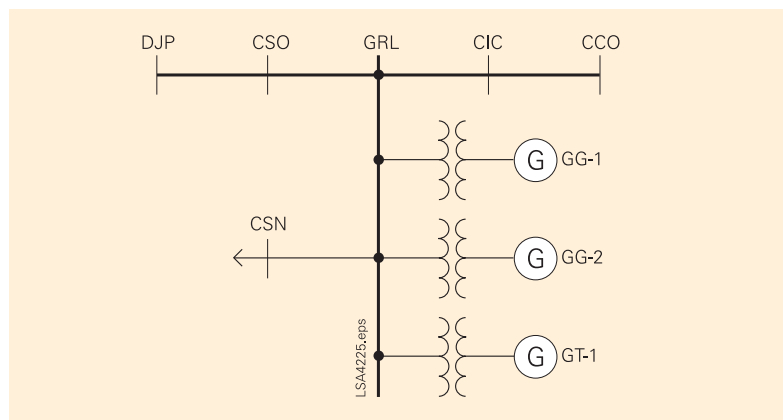


Fig. 1 System configuration

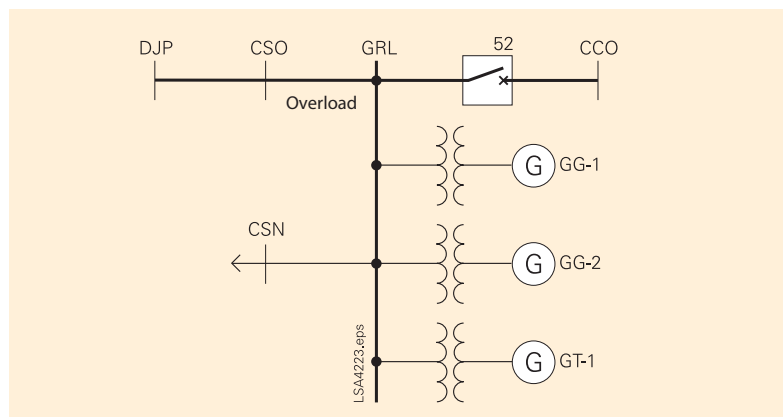


Fig. 2 System configuration under overload condition

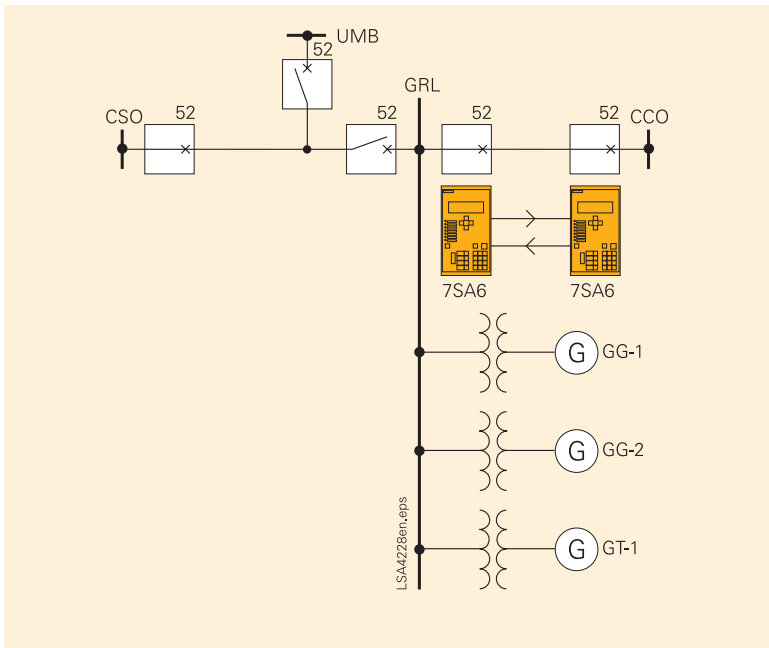


Fig. 3 Solution with inter-relay communication

■ **Special advantages**

The inter-relay communication is used to simplify exchange of information between the substations and relay-internal carrying-out of the logic sequences.

This application uses only 2 remote signals, leaving another 26 signals for further applications. The 7SA6 work with a fast and very reliable protocol.

Due to the flexibility, upward and downward compatibility is provided at all times and communication via various communication media is also possible (see Fig. 4).

■ **Conclusion**

As shown in this case study, Siemens configured the “Special Emergency Scheme” for the customer by use of the SIPROTEC 7SA6 distance protection relay for all voltage levels. All requirements of the customer were met. This new scheme allows communication between the substations and therefore – if necessary - the automatic activation of special emergency schemes.

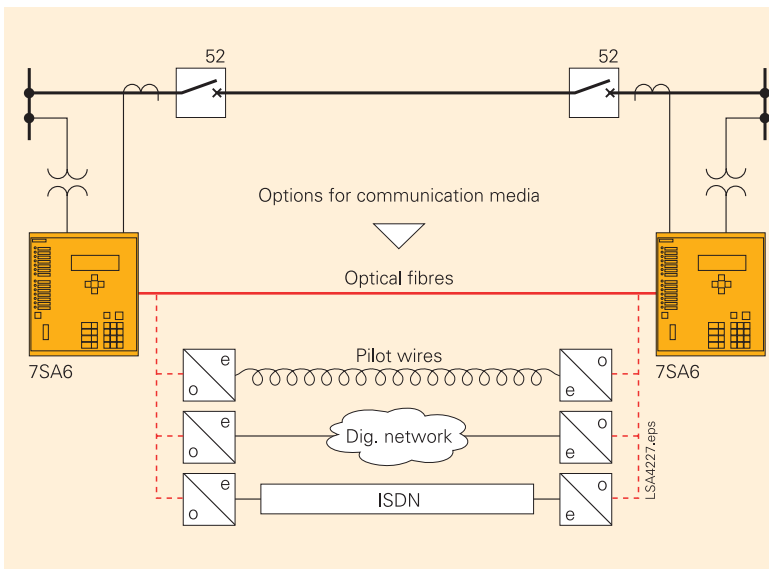


Fig. 4 Options for communication media