CASE STUDY

Photovoltaic project - 800 MW
Escatrón, Chiprana and Samper de Calanda (Spain)

Applications

· Photovoltaic, wind, cogeneration,
  oil and gas, water treatment, etc.
· Medium and high voltage substations

400/132/30kV Sur SS, 132/30kV Samper SS, 132/30kV Peaker SS and 132/30kV Chiprana SS, are part of the macro-project, **Escatrón, Chiprana & Samper de Calanda PV solar project**, located between the provinces of Zaragoza and Teruel in Spain.

Energized in early 2020, this project comprises the **largest photovoltaic complex in Europe**, reaching a combined capacity of **800 megawatts (MW)**, in a total of 3,100 hectares among the 18 plants that make it up.

Ingeteam has participated in this project with the **engineering, supply and commissioning** of the **protection and control system** of the four substations that integrates the power generated into the grid, using **INGEPAC™**, **INGESAS™** and **INGESYS™** equipment.

The control architecture is based on the **IEC 61850** standard with **HSR communications redundancy**, which guarantees high system availability and reliability.

Substation protection and control for power plants
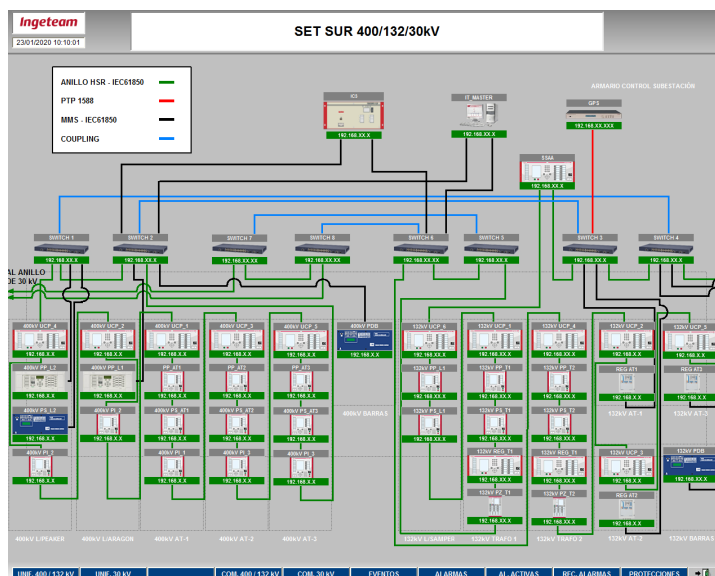
Glass FO Ethernet network
with HSR redundancy

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Overview

Control and protection devices

4 x Substation control	INGESAS™ IC3 (RTU) - Gateway control unit INGESYS™ IT eFS - HMI for substation monitoring with display and operation software 1 GPS for synchronisation 2 switches for Ethernet communications INGEPAC™ EF CD - BCU for ancillary services
2 x 400 kV line	INGEPAC™ EF CD - Bay control unit INGEPAC™ EF BF - Breaker failure protection relay
3 x 132 kV line	INGEPAC™ EF CD - Bay control unit INGEPAC™ EF LD - Line differential protection INGEPAC™ EF ZT - Distance protection
3 x 400/132 kV autotransformer	INGEPAC™ EF CD - 400 kV bay control unit INGEPAC™ EF BF - Breaker failure protection relay INGEPAC™ EF TD - Main transformer differential protection INGEPAC™ EF TD - Backup transformer differential protection INGEPAC™ EF CD - 132 kV bay control unit
2 x 132/30 kV transformer	INGEPAC™ EF CD - 132 kV bay control unit INGEPAC™ EF TD - Main transformer differential protection INGEPAC™ EF TD - Backup transformer differential protection INGEPAC™ DA PT - Reactance INGEPAC™ EF CD2 - Automatic voltage regulator controller
2 x 132/30 kV line-transformer	INGEPAC™ EF BF - Protection and bay control unit INGEPAC™ EF LD - Line differential protection INGEPAC™ EF ZT - Distance protection INGEPAC™ EF TD - Main transformer differential protection INGEPAC™ EF TD - Backup transformer differential protection INGEPAC™ DA PT - Reactance protection INGEPAC™ EF CD2 - Automatic voltage regulator controller
60 x 30 kV switchgear	INGEPAC™ DA PT - Control and protection relay

Engineering services

· System control programming under IEC 61850 standard with HSR redundancy
· Database configuration and programming by means of IEC 870-5-104 and Modbus protocol
· Integration of third party protection relays into Integeam's SCADA system by means of IEC 61850
· FAT
· Control and protection commissioning
· Point-to-point tests in order to check the correct communication with the Control Center

Highlights

· System according to IEC 61850 standard with High-availability Seamless Redundancy (HSR) protocol, that provides seamless failover against failure with the minimum number of switches in the Ethernet network

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