

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

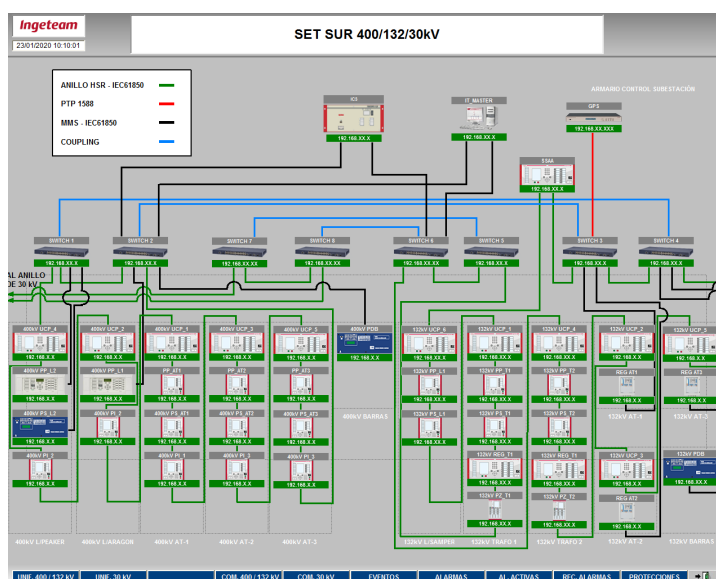
400/132/30kV Sur SS, 132/30kV Samper SS, 132/30kV Peaker SS and 132/30kV Chiprana SS, are part of the macro-project, **Escatrón, Chiprana & Samper de Calanda PV solar project**, located between the provinces of Zaragoza and Teruel in Spain.

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 **INGESYST™** 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

Overview

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

Control and protection devices

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