INGESYS IT

INGESYS eFS

Substation automation software

Ingeteam

POWER GRID AUTOMATION
SUBSTATION AUTOMATION

+4,000 INSTALLATIONS ★★★

350 WIND FARMS

200 SOLAR PLANTS

+25 YEARS IMAGINING THE GRID

At Ingeteam we have been designing and developing different automation solutions for more than 25 years, installed in more than 4,000 substations up to 500 kV.

The experience gained during this time and the continuous contact that we maintain with our clients endorse us as one of the leading manufacturers in substation automation and control systems.

In order to meet all the requirements that customers need, INGESYS™ product range software solutions adapt to the requirements set for each installation, being able to cover the entire process:

Engineering & programming

Operation & Supervision

Maintenance & analysis

Index

INGESYS IT

Real-time system supervision and operation software

INGESYS™ IT

Set of software tools consisting of all the modules needed to develop Supervisory Control And Data Acquisition (SCADA) systems, making it possible to manage information efficiently and intuitively and offering all the advantages associated to objetc-oriented systems (SmartOCSObjects®).

It provides a powerful tool for the development of monitoring, supervision and real-time operation systems for electrical substations and automated installations.

Versatile and flexible

· Comprehensive supervision and control system
· Able to grow to meet the requirements of each client
· It evolves to adapt to the latest technological and market trends
· Guaranteed investment in the short and long term
· Custom-made solutions for a wide range of applications and business sectors
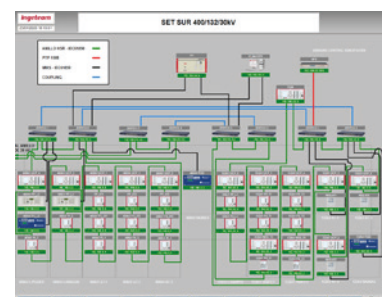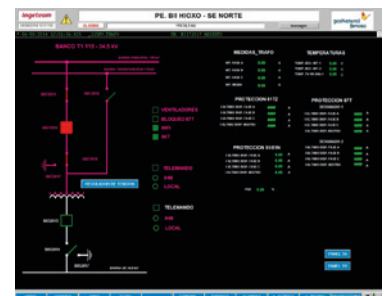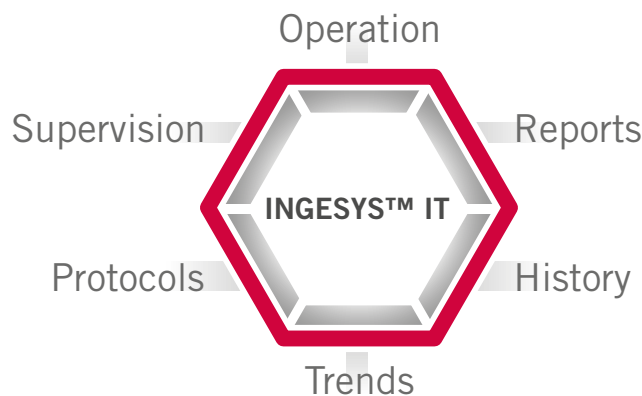
Scalability and availability

· Based on a flexible, open client-server architecture
· Scalable architecture: from a simple application, based on an isolated node, to a large supervision and management centre composed of multiple redundant nodes
· User-transparent redundancy mechanisms for communications, nodes and servers

Total integrability

· Based in widely-recognised standards: COM/DCOM, OPC, ActiveX, XML, Web Services...
· Capacity to communicate with a wide range of industrial devices
· Integration with third-party software: ERP, MES...
· Integration with office applications: Microsoft Excel, Microsoft Word...

Easy and efficient configuration

· Powerful configuration and display environment to model any type of process easily and efficiently
· Powerful system configuration features and SmartOCSObjects® technology make it possible to considerably reduce the project development time
· Simplification of the maintenance and training tasks, offering the reusage of engineering for developing future projects

Operation

Supervision — INGESYS™ IT — Reports

Protocols — History

Trends

Real-time system supervision and operation software

Main features

· Graphical representation of data and measurements with simulation of the substation's dynamic mimic diagrams.
· HTML5 based web operation panels with JavaScript support, compatible with the latest browsers
· Local substation control
· Presentation, management, acknowledgement and storage of substation alarms and events
· Alarms organised into areas depending on their level of severity
· Alarm notification via email or SMS, based on shift calendar and severity rules
· Management of communications with all the position control units via an IEC 61850 client for controlling, operating, configuring and signalling all the positions in the substation
· Exporting of alarms and events logs to text files
· Management of user access levels based on profiles, with restricted controls, access configurations, etc.
· Store and display of historical metering data logging
· Periodic Excel reports based on historical data

Environment organised into a hierarchy of pages

· Substation mimics
· Pages with trend curve measurements, and historical data logs
· Active alarms pages
· Alarms pending acknowledgement pages
· Historical alarms pages
· Events pages
· Historical events pages
· Alarms and events reports
· Pages with substation and position mimic diagrams
· System status pages
· Historical data pages, trend curves
· Reports pages

INGESYS IT — Real-time system supervision and operation software
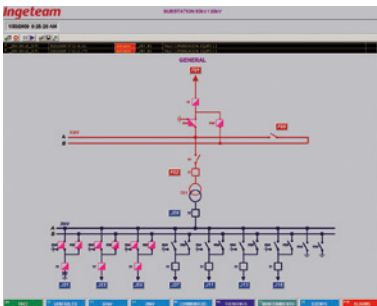
Communications

- SNMP for managing the communications network, substation unit alarms integrated into the panels, and system alarms
- High availability thanks to redundant communication mechanisms and to the node's redundancy
- SNTP synchronisation
- Communication with different VLANs via IEEE 802.1Q

Supported protocols

- IEC 61850 (client / server)
- IEC 60870-5-101 (master / slave)
- IEC 60870-5-103 (master / slave)
- IEC 60870-5-104 (master / slave)
- DNP3 TCP/IP and DNP3 serial (master / slave)
- PROCOME (master)
- MODBUS TCP/IP and MODBUS RTU (master / slave)
- OPC DA (client / server) and OPC-XML-DA (client / server)
- OPC UA (client / server)

INGESYS™ eFS

Powerful, native IEC 61850 framework, specifically developed by Ingeteam to support the IEC 61850 standards and derived standards simply and intuitively. INGESYS™ eFS facilities engineering tasks in automation systems.

Main features

· Compliance with the IEC 61850 standard and derived standards: IEC 61400-25, IEC 61850-7-410, etc.
· Very user-friendly graphical working environment
· A single engineering, development, and programming environment, unrelated to the manufacturer, is used for smart integration of all the tools and applications needed to configure all of the substation's devices and automation
· Compliance with the directives stipulated by the OPC standard, enabling the integration of third-party clients/servers
· Significant reduction in engineering times thanks to graphics tools, templates, task wizards, etc.

Covered concepts

· Protection functions
· Control functions
· Telecontrol functions
· Logic programming in accordance with the IEC 61131-3 standard
· Measurements
· Architectural design and electrical diagrams
· Definition of operational concepts
· Transfer of information and configurations
· Integration of other communication protocols
· Regulatory configuration files

Configuration
Analysis
Diagnosis
INGESYS™ eFS
Emulation
Adjustment
Maintenance
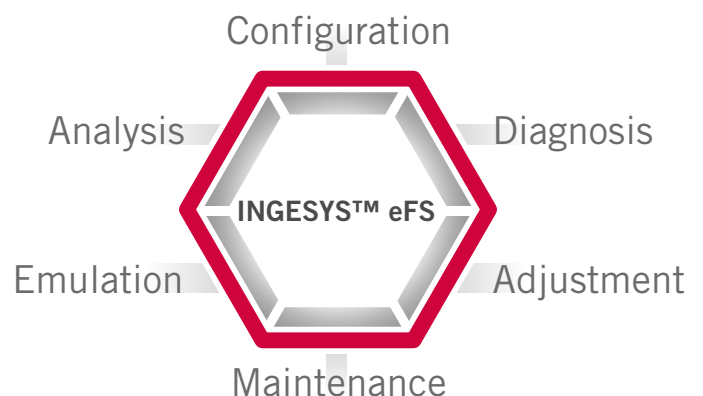
INGESYS™ eFS: iedFactory

Tool that permits the definition of data models associated to any IED based on the directives stipulated by the IEC 61850 standard.
The various elements that compose the IEC 61850 information model (logic devices, logic nodes, data, common data classes, etc.) have been modelled as different blocks from classes and types specified in the standard itself.

Main functions

· IED graphics tool
· Easy creation of complex information models
· Modelling based on drag and drop actions
· Internal storage of all the IEDs modelled
· All the models created can be reused
· Dictionary with the definitions included in the standard to make understanding the models easier
· Creation and modification of datasets and control blocks
· Quick assignment of initial values and descriptions
· Graphical display of the information model in the form of a tree or data list with powerful filtering functions
· Import and export of standard configuration files (ICD files)

INGESYS™ eFS: substationFactory

Software that allows you to integrate devices modelled using the iedFactory tool in the database of the installation to configure, in accordance with the IEC 61850 communications standard.

Main functions

· Instantiation of the substation's IEDs using the library defined in the iedFactory
· IEC 61850 substation graphics engineering tool
· Network topology and communication parameter configuration
· Graphical display of the information model in the form of a tree or data list
· Generation of standard configuration files: CID, SCD files
· Automatic documentation
· Setpoint description configuration
· Dataset and control block editing: report control block, GOOSE control block, etc.
· Powerful filtering mechanism for displaying/modifying initial values, descriptions, etc.
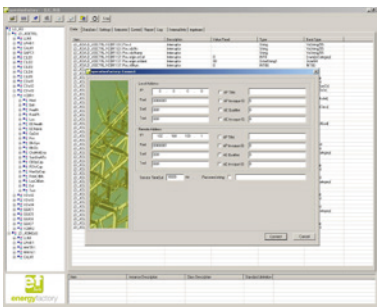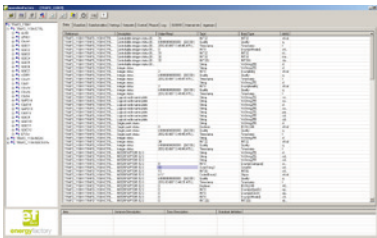
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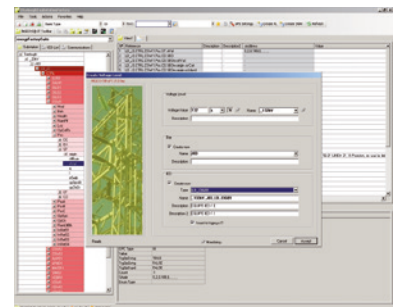
INGESYS™ eFS: operationFactory

Tool emulating an IEC 61850 client, facilitating communication configuration tests of any equipment which has IEC 61850 server functionality.

Main functions

- · IEC 61850 client application
- · Application configuration based on the following: CID files, IED database in the substationFactory tool or IEC 61850 self-descriptive services
- · Option to store the information displayed in files compatible with Excel
- · Powerful report monitoring mechanisms
- · Goose monitoring
- · Log management
- · MMS file browser

Available services

- · Data and dataset monitoring
- · Modification of setting points and setting groups
- · Retrieval and configuration of events (reports or logs)
- · Control services
- · Access to files based on browser appearance

Device identification

- · Acknowledgement of devices based on the self-description of standard services and the automatic generation of an SCL (CID) file
- · Import and export of standard configuration files: CID, SCD

INGESYS eFS

## INGESYS™ eFS: emulationFactory

Tool that emulates an IEC 61850 server, facilitating communication configuration tests of any device which has IEC 61850 client functionality. It permits the execution of multiple instances of the program itself, thus emulating various servers simultaneously.

Main functions

· IEC 61850 server application
· Emulates the behaviour of a real device
· Application configuration based on the following: CID files or IED database in the substationFactory tool
· Goose generation
· Log server
· Graphical display of the information sent to clients
· Easy browsing through the server information model
· Data exchange sequence and configurable event generation
· Configurable control services response for emulating different types of behaviour
· Generation of dynamic IP address

Available services

· Self-descriptive services
· Data model
· Configuration model
· Reports with buffer / without buffer
· Control models: normal, extended, direct and SBO control security based on SCL load
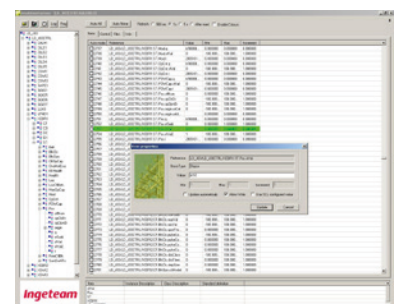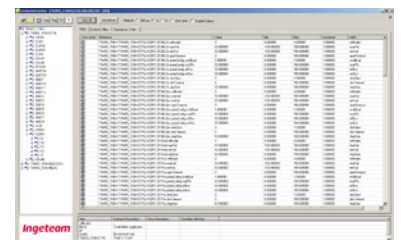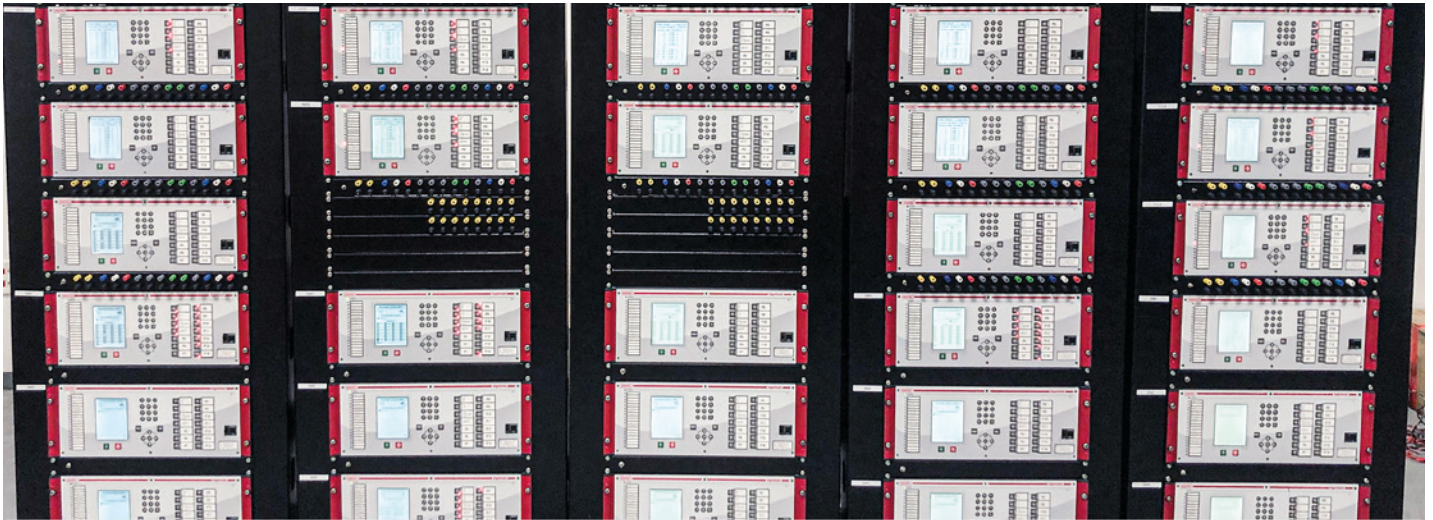
INGESYS™ eFS: gooseScan

Tool that analyzes all the GOOSE messages from the substation simultaneously. It decodes the communications showing for each GOOSE a summary window with configuration details, last values, expiration of the GOOSE, etc. Additionally, it is possible to import multiple SCL files (CID or SCD) to decode the received GOOSE, identifying the signal of each message.

It is therefore a very useful tool during the commissioning and maintenance of the facilities.

Main functions

· GOOSE message analyzer
· Configuration of the application based on: SCL files (CID / SCD)
· Multi-window display of the status of each GOOSE
· Identification of GOOSE refreshed and expired
· Recognition of updated GOOSE for quick identification

INGESYS™ eFS: mergeFactory

Comparison tool that uses two SCL files (ICD, CID, SCD) in connected trees to quickly show the differences between two SCL files of one IED or multiple IEDs. It compares the different sections of the SCL file: Substation, Communication, IED, DataType Templates. All the properties are compared, one by one, allowing any discrepancy to be identified.

Useful during engineering and commissioning of the substation to identify discrepancies between different versions of SCL files.

Main functions

· Navigation in the IEC 60850-6 directory tree
· Connection between both trees
· Summary presentation of the differences
· Comparison of standard sections: Communications, substation, IED and Data Type Templates
· Comparison of SAddr initialization, settings, DataSet and control block, descriptions, etc.
· Comparison of private sections
· Automatic reordering of contents where they are not relevant in the semantics of the file: IED, Types, initializations, etc.

INGESYS eFS

INGESYS™ eFS: pacFactory

Powerful tool for configuring and managing Ingeteam devices based on the IEC 61850 standard. It can be completely integrated with all of the other tools in the INGESYS™ eFS environment or it can work independently. Using a highly user-friendly interface, pacFactory lets you configure protection and control IEDs of the INGEPAC™ product range.

The tool permits the auto-detection of the Ingeteam units connected to the communications network and automatic retrieval of the configuration file (CID) stored in the unit, while generating the database needed for configuration.

Main functions

· Configuration of communication parameters: network parameters, IP address, mask, etc.
· IEC 61850 protocol configuration:
   Datasets
   Report control blocks
   GOOSE messages
· Initial settings configuration
· CID file generation
· CID file transfer via sFTP to the device
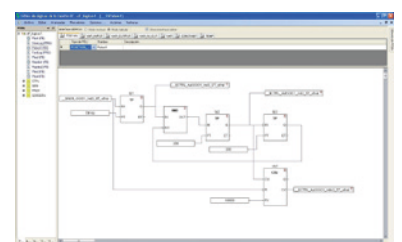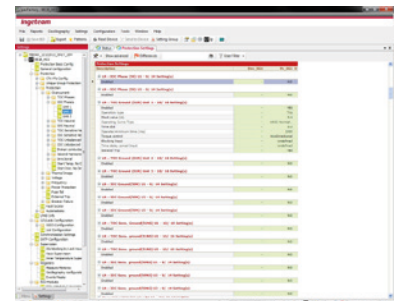
INGEPAC™ EF is the product range of intelligent electronic devices designed by Ingeteam under the IEC 61850 standard, for electric network protection and control applications, with more than 85,000 devices installed in medium and high voltage substations.

INGESYS™ System elements
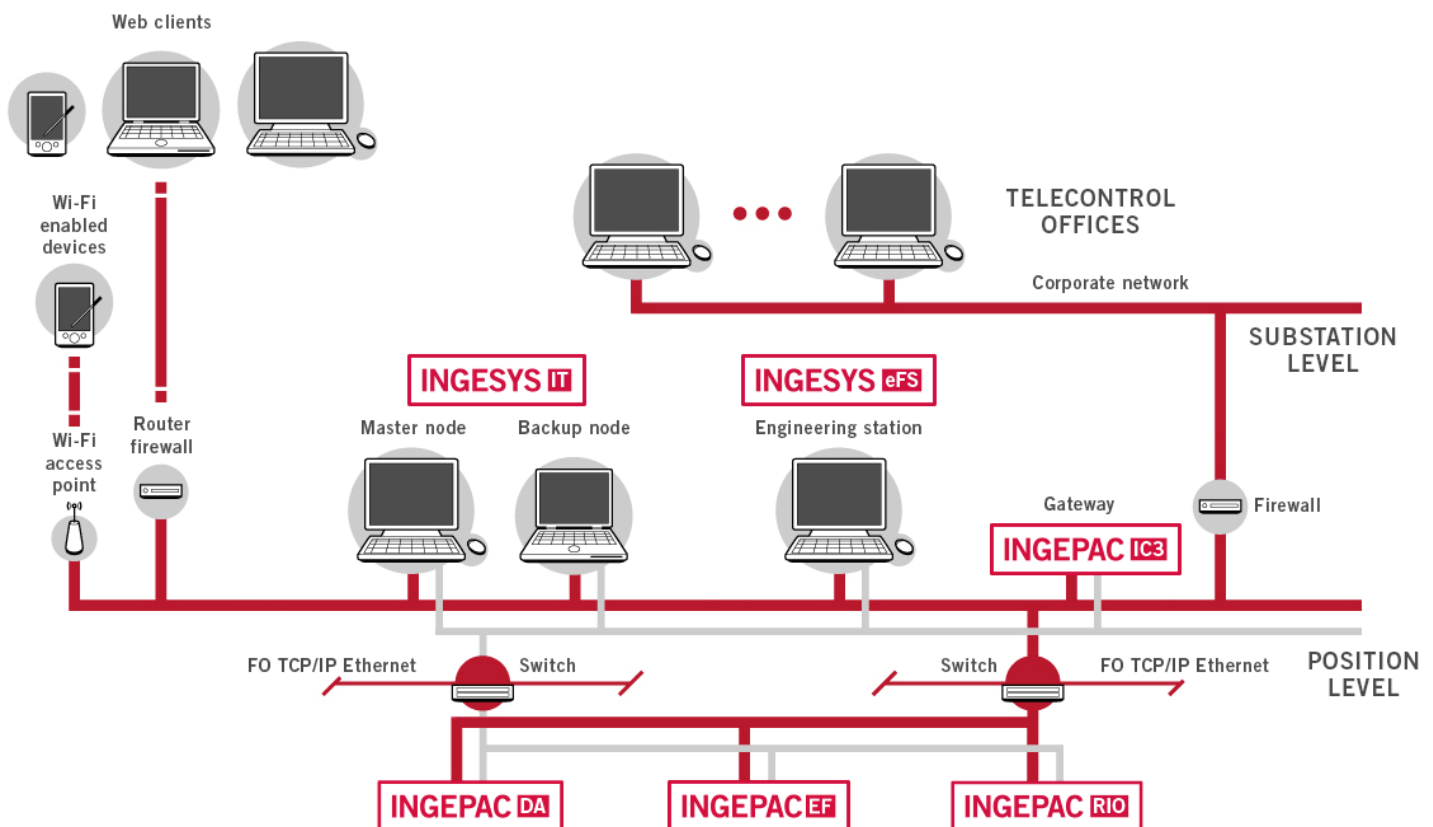
Hardware requirements

	Minimum	Recommended
Processor	1 GHz or faster processor or SoC for Windows 10	Multi-core processor
RAM	1 GB for Windows 10 32 bits 2 GB for Windows 10 64 bits	4 GB
Hard disk	16 GB for Windows 10 32 bits 20 GB for Windows 10 64 bits	300 GB SSD
License USB dongle	1	1
Graphics card	DirectX 9 or later with WDDM 1.0 driver (minimum required for Windows 10)	

Optional hardware

Monitor	1024x768, 16 million colours. Multiple screen allowed.
Ethernet communication ports	Multiple ports allowed. Required for TCP/IP, UDP/IP and GOOSE drivers and RTUs. Intel® NIC Teaming recommended (never USB adapters) 10/100/1000 Mbits. 100/1000 Mbits recommended.
Serial ports	Multiple RS-232/RS-485/RS-422 ports allowed. Required for serial drivers and RTUs. Any communication speed allowed. On-board ports recommended (non-USB adapters).

Supported operating systems

Windows Server 2016	Up to version 1607
Windows 10	Up to version 20H2
Windows Server 2019	Up to version 1809

Ingeteam