



Ingeteam

MODULAR BUILDING FOR PC&M SYSTEMS
INGESYS™ E-HOUSE SOLUTION

Ingeteam

INGETEAM

E-HOUSE SOLUTION



Ingeteam has supplied protection, control and automation solutions for electrical substations for more than 25 years. More than 6000 installations with our technology have been performed for the energy transmission and distribution and renewable energy generation industries.

Ingeteam places a network of professionals, covering 4 continents, at the disposal of our customers to offer both service and assistance during each phase of their projects, from the initial project definition phase to the end of the life cycle of the equipment.

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PLUG&PLAY DIGITAL CONTROL ROOM

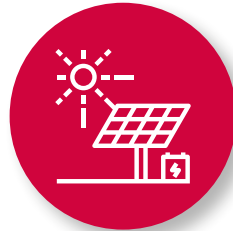
INGESYS™ E-House is a complete plug&play solution that runs all the **protection, control and measurement functions** associated with an electrical substation. It can be adapted to a variety of requirements and configurations thanks to its **modular design and flexibility**.

Our prefabricated control rooms, or E-Houses, provide an alternative solution to traditional control rooms by offering **greater design efficiency** and **shorter project running cycles**.

Since they are more compact, not only do they require **minimal civil work** for installation, but their **environmental footprint** is much smaller, so they meet the increasing demand for more **efficient and sustainable** electrification.

INGESYS™ E-House systems are supplied completely **wired and tested**. They are practically **ready to be assembled** and connected to the **external power source** and require only a few simple tasks that can be performed quickly and efficiently.

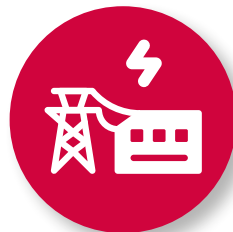
Sectors of application



Photovoltaic plants



Wind farms



Utilities



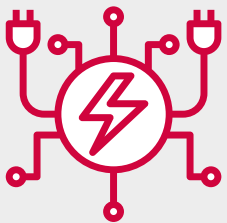
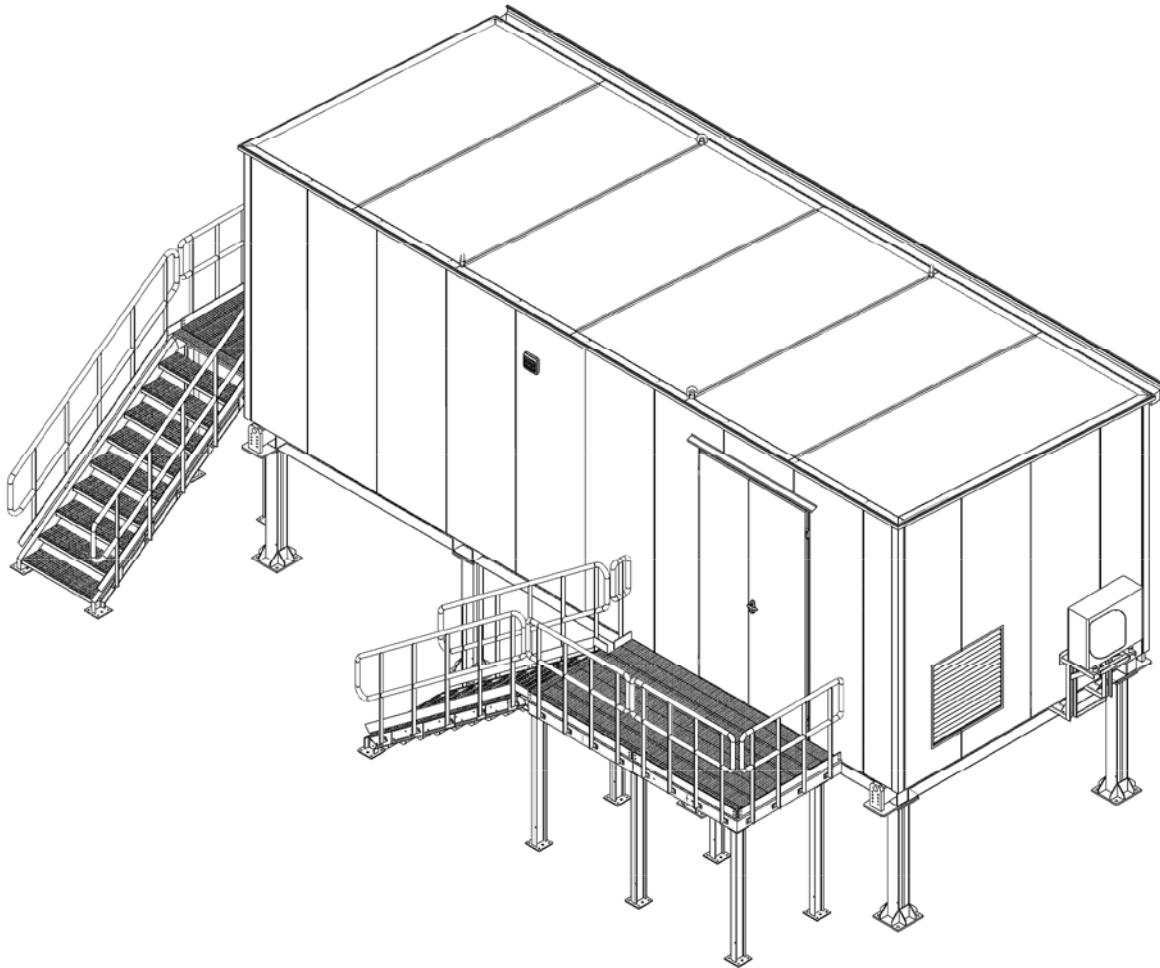


Benefits

- Facilitates project management
- Simplifies design and engineering tasks
- Minimizes civil works execution times and costs
- Reduces execution and commissioning times
- Increases system reliability
- Safer installations
- The equipment is delivered fully wired and tested
- Smaller physical space than conventional solutions, thereby reducing the physical and environmental impact
- Solutions that are robust, transportable and can be relocated

MODULAR BUILDINGS

Ingeteam offers control solutions based on the **IEC 61850 standard**, comprised by intelligent electronic devices (IEDs) that control each electrical position and supply the collected data to a **SCADA** system, enabling operations, programming, analysis and reporting of all substation data, both locally and remotely.



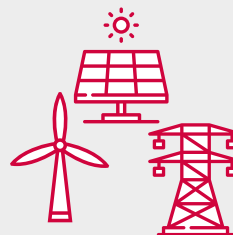
Plug&play system



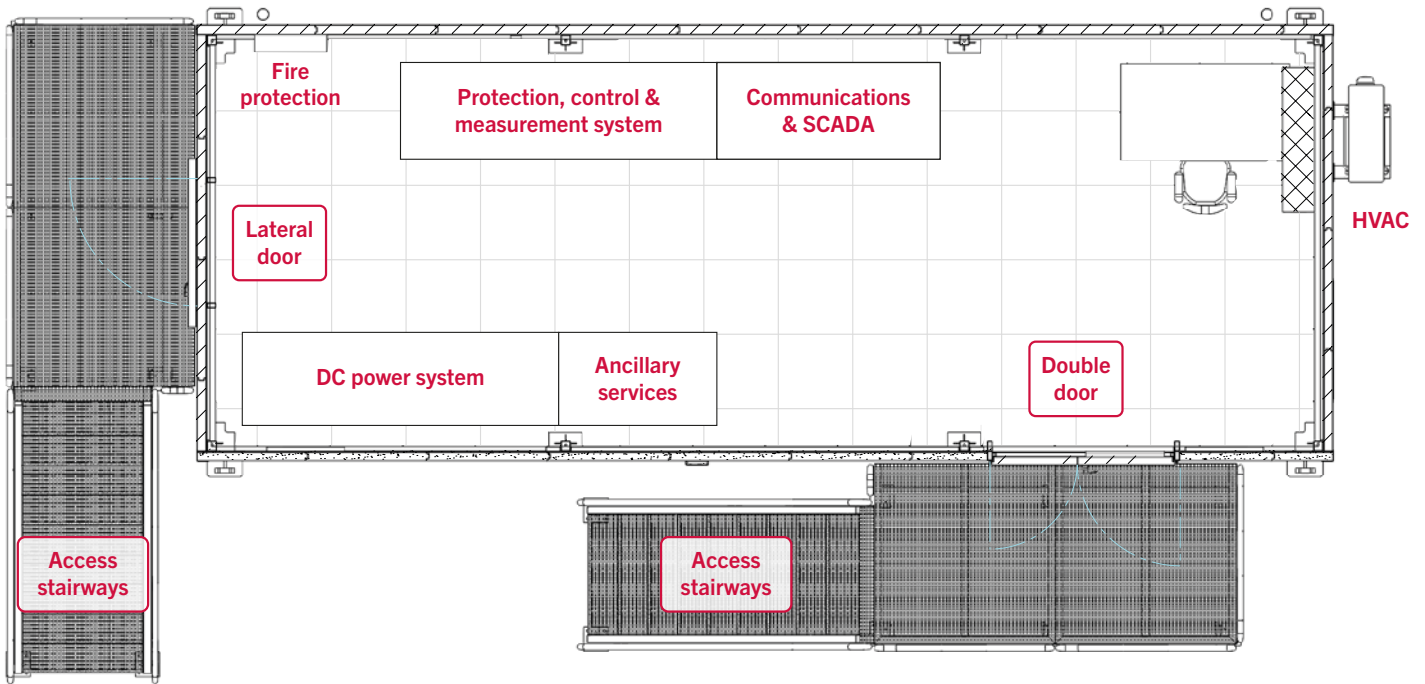
Reduces project execution times



Flexible design



Applicable in a variety of sectors



Components

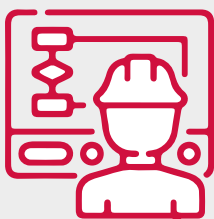
- Protection, control and measurement cabinets
- Ancillary services cabinets
- System control, monitoring and communications cabinet
- DC power system
- HVAC system
- Fire protection system (FPS)
- Access stairways and platforms
- Above ground structure for the room
- Communications cabinet
- SCADA for the plant



Competitive solution



Digital system that can be accessed remotely



Projects that are simpler and more flexible



Solution with a smaller environmental footprint

STRUCTURE



Construction

The modular building is made of **structural steel profiles**, forming a rigid, stable and robust external design in accordance with current **regulations**. It also takes into consideration the **weather** (temperature, humidity) or **location** (dust, seismic activity) conditions of the installation site.

The container has two doors equipped with **locks**. These are accessed via a **stairway** that spans the distance of the structure raised above ground level.





Internal

The necessary **conduit and cabling systems** are installed inside the building, where the wiring required to power and communicate the **equipment and systems** installed on the inside is laid out.

Ground connections are also installed to limit voltage and reduce the risk derived from malfunctions or failures in the electrical components.

The containers are designed so they can be transported and handled **safely and efficiently**.



AUXILIARY EQUIPMENT

Fire detection and extinguishing systems

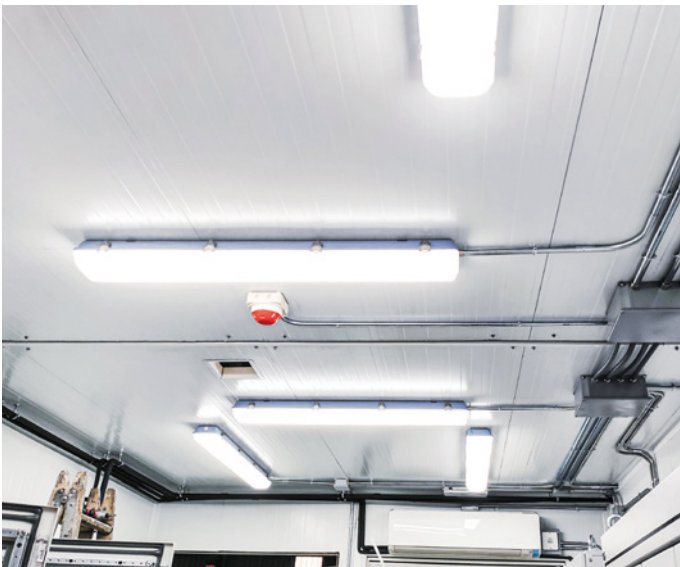
Supply and assembly of a fire extinguishing system is included, in addition to a **CO₂ extinguisher** and a **powder extinguisher** placed near the doors.



Lighting

The container has **interior lighting** and **electrical sockets** distributed at various points. **Emergency lighting** is also installed, consisting of **autonomous emergency battery-powered light fixtures** that switch on when the voltage drops.

Spot lights are installed on the outside, over the doors, powered by a **twilight switch** to enhance **night-time building access** and visibility.



HVAC system

The INGESYS™ E-House systems are installed in outdoor weather conditions, which makes it necessary to protect the equipment against adverse elements, such as **dust** and **extreme temperatures**.

Our solutions include systems that dissipate the heat generated by the equipment through **ventilation grilles** and **air-conditioning systems**.

These systems adjust the room temperature and renew the air to prevent the appearance of **condensation** and **humidity**.



DC system

A direct current electrical system is installed in the house to power the necessary systems.



PROTECTION AND CONTROL SYSTEM

Protection, control and measurement cabinets

Ingeteam offers control systems based on the **IEC 61850 standard**, consisting of intelligent electronic devices: **INGEPAC™ EF** or **INGEPAC™ DA**.

These devices control each electrical position and send the collected data to a **SCADA system (INGESYS™ IT)** used to operate, program, analyze and report the data from the entire substation. This operation is performed locally and remotely through the **INGESAS™ IC3 communications gateway**, which can handle all of the most common remote control protocols.

The **INGESYS™ E-House** solution includes the protection, control and measurement system cabinets of the substation, perfectly installed, wired and tested, which reduces commissioning tasks for the entire system to a minimum.

The medium voltage equipment is located in a switchgear house adjacent to the E-House, using a minimal **fibre optic** connection with the PC&M equipment.



Protection and control system cabinets



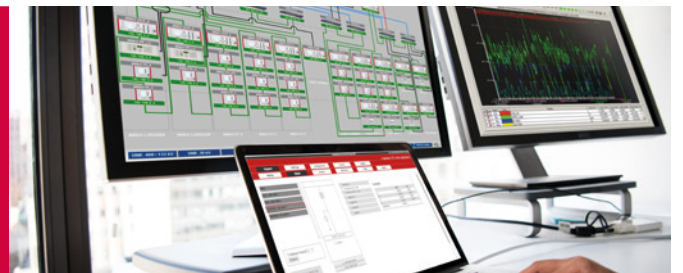
INGEPAC™ DA



INGEPAC™ EF



INGESAS™ IC3

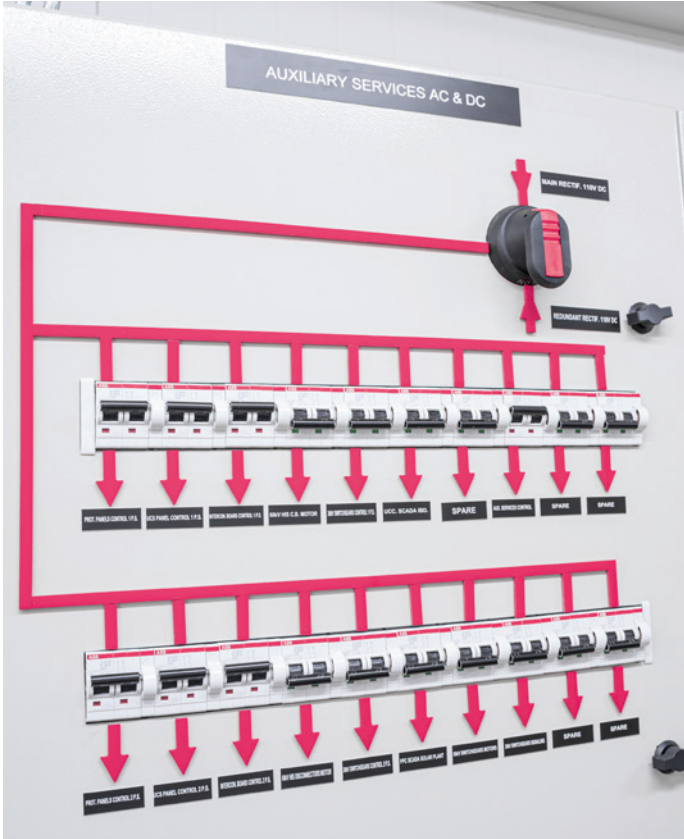


INGESYS™ IT & INGESYS™ eFS

The supplied system includes all the functions needed for **local and remote control** of the protection and control system.

An industrial PC is included and embedded in one of the cabinets. This displays the **single-line diagram** of the substation implemented with the **INGESYS™ IT** software. The PC is also used to view and manage alarms, events, measurements, adjustments and any other parameters monitored by the **INGEPAC™ EF** and **INGEPAC™ DA** IEDs, in accordance with the **IEC 61850 standard**.

- Real-time monitoring
- Automation of substation components
- Remote access from PC, mobile phone, iPad, etc.
- Secure access control: credentials, access levels, password
- Alarm management and notification: asset maintenance and control



Ancillary services cabinets

TRANSPORT AND INSTALLATION



Transport

INGESYS™ E-House solutions offer all the components of a traditional electrical control room in a **prefabricated building** that is easy to transport and relocate. This makes these solutions highly flexible and reduces their impact on other work carried out in the facility.

Their **compact design** make them ideal for installation in the most suitable location for each application. Their design has also taken into consideration the limits established for **road transport**.

Installation

The modular building has **eyebolts** or a **lifting system** in place to facilitate transport and installation at the plant, as well as **tow points** at the base to displace the building laterally if necessary.



Civil works

The **cost** and **time** of civil works for the installation of the INGESYS™ E-House are drastically reduced when compared to traditional substations.

The building is anchored to the foundation using **anchoring plates** prepared for on-site fastening to an auxiliary structure with **chemical dowels or bolts**. The number and size of the through holes vary from case to case.

The **anchoring plates** must be easy to access so the work can be performed on the floor.

Wiring

The **wiring from the plant** is accessed through the bottom of the building, which is provided with the necessary holes.



SERVICES OFFERED

Thanks to the fact that all the associated services are performed entirely by **Ingeteam staff**, INGESYS™ E-House facilitates all the tasks involved in the design, planning, manufacturing, equipping, assembly and testing of the electrical system.



Mechanical engineering

- Design and calculation of the structure and reactions needed for the civil works
- Structural drawings
- Floor, elevation and section plans
- Descriptive reports on construction solutions and materials
- Structural calculation report

Electrical engineering

- Lighting design and calculation
- Interior surface design

Protection and control engineering

- Simplified single-line diagram
- Single-line diagram of the position
- Completed single-line diagram
- Interconnection diagrams
- Logical diagrams
- Inclusion of medium-voltage cells and/or GIS operation diagrams
- List of hoses
- Cabinet front and lists of materials
- Control and protection cabinet connections

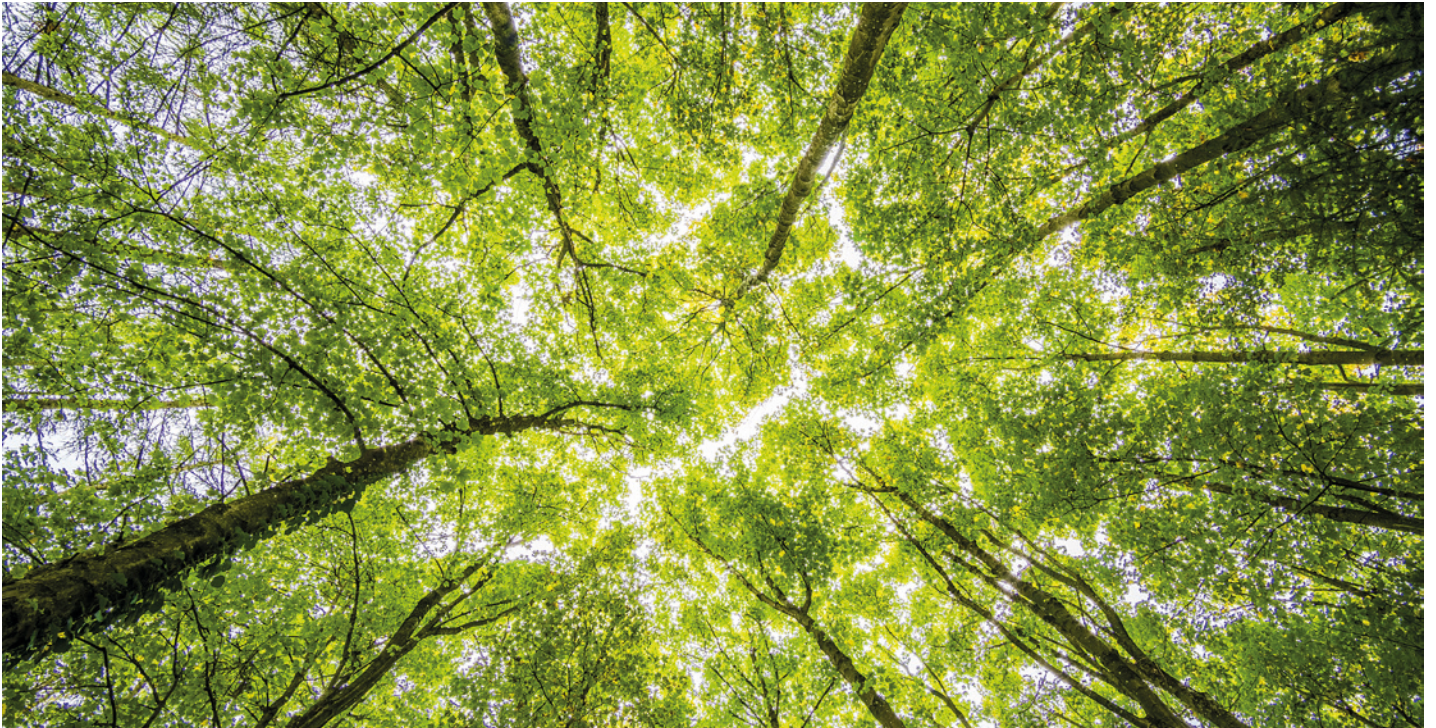


Remote control test



Protection devices test

DOCUMENTATION AND QUALITY



Documentation

Ingeteam supplies **all the information associated** with the project after construction of the INGESYS™ E-House is completed, including the following:

- Engineering drawings
- Technical studies
- Certifications
- Technical manuals of equipment and systems
- Operation and maintenance manual
- Lifting procedure
- As-Built engineering
- Technical quality dossiers:
 - FAT results
 - Tests
 - PPIs
 - Paint certificate
 - Non-conformity reports

Quality

Ingeteam is committed to quality and **customer satisfaction**. Therefore, it applies these processes and performs comprehensive tests on all the equipment it manufactures to ensure compliance with the most demanding **quality standards** and regulations. The equipment and material used in its projects are certified by **independent external laboratories** to comply with **international standards** on electrical, climate and mechanical tests, thereby ensuring optimal operational performance.

Ingeteam Power Technology, S. A. holds the **ISO 9001** certification, which guarantees that it meets applicable legal and regulatory requirements and implements continuous improvement processes. It also holds the **ISO 14001** certification, which specifies environmental management requirements and ensures Ingeteam's commitment to the environment, as well as the **ISO 27001** certification on information security and privacy, thereby guaranteeing the confidentiality and integrity of the information managed by the company.



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www.ingeteam.com