INGESYS IC3

Automation Systems



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The **INGESYS®IC3** process controller is part of the **INGESYS®** platform designed to meet the automation requirements of all types of applications, from the simplest to the most demanding in terms of processing capacity, performance, reliability and cost.

**INGESYS®IC3** is the result of over thirty years' experience in developing automation products and in carrying out installations for a wide range of applications and activity sectors: continuous process control, energy generation, transport and distribution, rail and marine transport, water treatment and distribution and the chemical sector.

**INGESYS®IC3** offers high-performing automation solutions with a wide range of connectivity options whilst combining functional power, reliability and user-friendliness with noteworthy features for speeding up commissioning and system maintenance.

**INGESYS®IC3** offers you a control solution adapted to your needs, open to new market trends and demands and which integrates advanced functional features to guarantee the success of your current and future projects while assuring your investment.

## Main features

- **Power and flexibility** in order to offer solutions adapted to the processing capacity and budgetary requirements of each specific control application.
- **High availability** with a wide range of scalable redundancy configurations: power sources, processing units, communication networks and acquisition modules.
- A system with **scalable** features, both for simple and complex applications.
- A wide range of standard-based **connectivity** interfaces for integration with both field devices and control and supervision systems.
- **Reliability and robustness** assured by exhaustive quality control tests on 100% of the units manufactured, rigorous environmental and vibrational tests, UL certification and CE marking.
- **Powerful, user-friendly engineering tool** based on the IEC61131-3.
- Additional features such as integration with **MATLAB®/SIMULINK®** and the option of incorporating user-developed functions and libraries written in C and Visual Basic .NET.
- **Modular system** which is **easy to install and to maintain** (Hot Swap, poka-yoke, remote maintenance functional features, etc.) and which also includes advanced hardware and software diagnostics mechanisms.
- Direct **customer support** and training service offered by highly-qualified, dedicated personnel.
- Harsh environment applications. **EN50155** compliant.

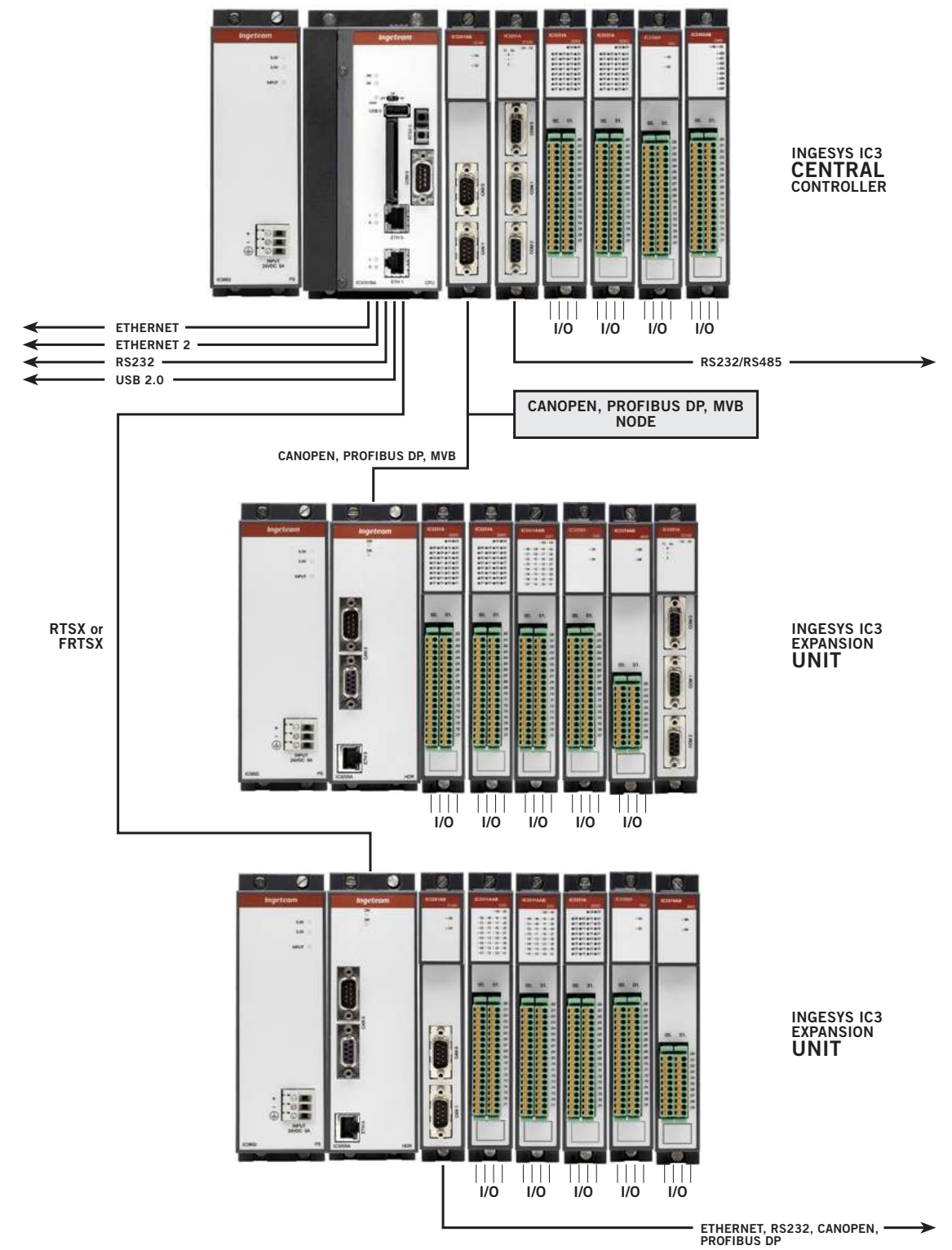Ingeteam

## Power and flexibility

Thanks to its modular, flexible character, **INGESYS®IC3** offers custom-made solutions for each individual control application and application sector.

**INGESYS®IC3** lets you define a wide range of both local and distributed input/output topologies.

**INGESYS®IC3** lets you design architectures with up to 16 modules per local or remote set and up to 255 star-connected remote sets. Furthermore, for environments requiring high availability, **INGESYS®IC3** offers a wide range of redundancy solutions in terms of power sources, processing units, communication networks and input/output modules.

**INGESYS®IC3** offers a range of processors based on powerful 32-bit Pentium microprocessors with scalable capacities depending on the processing (500MHz -1,400MHz) and memory requirements of each individual installation.

With such characteristics in terms of memory and processing power, the system is able to achieve logic instruction runtimes less than 0.125ms and regulation loops in less than 1ms. **INGESYS®IC3** also lets you configure an unlimited number of cyclical tasks with separate scan times for controlling the most complex of processes.

**INGESYS IC3 CENTRAL CONTROLLER**

ETHERNET
ETHERNET 2
RS232
USB 2.0

I/O  I/O  I/O  I/O

RS232/RS485

CANOPEN, PROFIBUS DP, MVB NODE

CANOPEN, PROFIBUS DP, MVB

RTSX or FRTSX

**INGESYS IC3 EXPANSION UNIT**

I/O  I/O  I/O  I/O  I/O

**INGESYS IC3 EXPANSION UNIT**

I/O  I/O  I/O  I/O  I/O

ETHERNET, RS232, CANOPEN, PROFIBUS DP

CANopen    PROFI BUS    INTERBUS    EtherCAT    Modbus-IDA    OPC

## TWO WORLDS IN ONE: PAC
## PLC reliability + advanced functional features

**INGESYS®IC3** offers a wide range of advanced services as an extension to the realtime processing functional features of a PLC, thus equipping the system with greater added value.

**INGESYS®IC3** enables the integration of Model Based Design via MATLAB®/SIMULINK®, Automation tasks based on CoDeSys, Monitoring functionality and HMI functionality based on an embeded Web Server

**MATLAB SIMULINK®**

### REALTIME FEATURES

· Tasks < 1 ms
· Flexible and robust
· Modular and scalable
· Highly connective
· Redundancy
· User-friendly programming
· Wide range of functional features for reducing engineering time
· Advanced Control Applications based on MATLAB®/SIMULINK®
· Industrial environment operation

### NON-REALTIME FEATURES

· Permits system expansion
· Facilitates the inclusioin of added value by means of developing embedded .NET applications
· Information publication using WEB Services

**INGESYS®IC3** includes a web server and an FTP server, making it possible to expand the PLC control tasks with operation and display functions or other advanced applications. Thus, for example, you can view HTML pages with realtime data on processes, system diagnostics and on the equipment itself using a standard web browser.

These services can be used to facilitate and optimise the equipment's remote monitoring and maintenance tasks, representing an attractive, cost-effective alternative to using SCADA systems for non-assisted environments.

**INGESYS®IC3** also lets you run Visual Basic .NET applications. This functional feature opens up a wide range of options to enable each engineering company to extend and adapt the system's capacity to the needs of each project and field of application, thus increasing the product's added value.

**Microsoft® .net**

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## Highly-connective

**INGESYS®IC3** offers a wide range of standard-based connectivity interfaces for integration with both field devices and control and supervision systems.

· For accessing field devices, **INGESYS®IC3** offers different connectivity solutions based on CANOpen, Profibus-DP, Interbus-S, TCN and EtherCAT buses, as well as traditional point-to-point or network communications based on RS232 and RS485 interfaces.

· **INGESYS®IC3** also offers mechanisms for integration with supervision systems, process controllers and production management systems using TCP/IP protocols such as Modbus/TCP, SINEC or MMS.

· **INGESYS®IC3** is also FTP-compatible and can act as a web server, allowing you to parameterise and configure the system by remotely viewing user-created web pages in the system, an attractive functional feature when it comes to facilitating and speeding up management and maintenance tasks and which reduces the cost of your investment to a minimum.

· **INGESYS®IC3** offers a wide range of communication protocols enabling RTU functionality (MODBUS RTU/TCP, IEC61870-101, 104, IEC61850, DNP 3.0, etc.)

## Reduced engineering times

**INGESYS®IC3** is a product whose design always has the client in mind, be it an engineering company or an end user.

**INGESYS®IC3** is not only characterised by its power and reliability; its other key features include its user-friendliness and simple design, aimed at reducing engineering times and facilitating system commissioning and maintenance tasks.

The full **INGESYS®IC3** range includes advanced mechanisms for error diagnostics both at I/O level and bus and system level.

Mechanically, **INGESYS®IC3** has a compact, modular design, incorporating poka-yoke solutions for inserting modules, input/output modules with status LEDs on the front, a wide variety of connection options to reduce system cabling times and the possibility of checking cabling using a web application built into the system. **INGESYS®IC3** also lets you replace functioning modules without stopping the process (hot swap).

As regards programming and configuring the **INGESYS®IC3** system, there is a simple, user-friendly software tool available, based on the IEC 61131-3 standard, offering a intuitive programming environment with advanced options for monitoring, detecting errors and debugging applications.

**INGESYS®IC3** also includes innovative features for making repetitive engineering and maintenance tasks easier. By simply connecting a memory to the USB port of **INGESYS®IC3**'s CPU, you can copy of its configuration information, thus quickly and easily creating an identical unit and avoiding any type of error to ensure that the system is immediately available and functional.

The results of these built-in advanced functional features include significantly reduced costs and times in terms of engineering, maintenance and training times, cutting down the number of stoppages, repair times, the need for staff and call outs to a minimum.

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## Easy, ergonomic programming tool

**INGESYS®IC3** includes a powerful, high-performance, user-friendly programming tool (**INGESYS®IC3** Servicer) with a wide range of functional features.

· Global system configuration, including field buses and interfaces
· Standard IEC61131-3 programming in all five different languages (Function Block Diagram (FBD), Instruction List (IL), Ladder Diagram (LD), Structured Text (ST) and Sequential Function Chart (SFC)
· Continuous function chart (CFC)
· Object-oriented programming using program blocks (Function Blocks) and user libraries, which facilitate reusing code in future projects
· Debugging functions for detecting errors:
  · Single step
  · Single cycle
  · Break points
· Simulation functions without needing to have a PLC connected
· Extensive diagnostic functions
· Wide range of mechanisms to help with programming and configuration (browse, help, search, error detection and monitoring)

**INGESYS®IC3** Servicer is based on Codesys, extending its functional features to minimise and facilitate the training for and the development of new projects based on **INGESYS®IC3** control systems.

**INGESYS®IC3** Servicer also includes extensions with information and tools specifically developed to make programming and developing **INGESYS®IC3** easy: automatic variables, data types and system architecture simplification and field bus configuration.
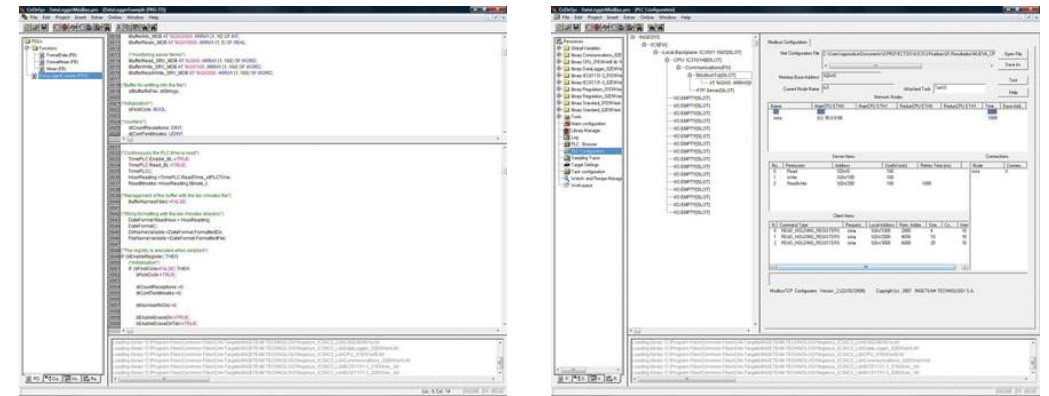


**INGESYS®IC3** lets you design and integrate your own functions and libraries in any of the standard's languages or even in C language, so as to extend the system's capacities and complement the system's own extensive ex-factory functions library and without the need for translating or adapting the code, thus minimising development times and error sources.

Likewise, in order to facilitate and speed up the development of user applications complementary to the realtime control software itself, **INGESYS®IC3** lets you run applications developed in Visual Basic .NET. This opens up a whole range of possibilities so that each engineer can extend and adapt the system's capacities to the needs of each project and field of application (logs, variable processing and connectivity to remote databases).

All of these extendibility mechanisms provide the system with the versatility, flexibility and adaptability required by the most demanding and diverse field applications.

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## Maintenance

**INGESYS®IC3** is the result of INGETEAM Technology's extensive experience, acquired over the years during the development of their products for the world of automation and during their implementation in a wide range of sectors and applications. Thus, **INGESYS®IC3** has been designed from the outset to be a product which, besides being powerful and reliable, offers the most advanced features aimed at facilitating and speeding up system installation, management and maintenance.

· **Insertion/Removal of functioning modules ("Hot Swap"): INGESYS®IC3** lets you replace elements without switching them off or stopping the process ("Hot Swap"), thus preventing unnecessary stoppage times.

· **Poka-yoke solutions** for inserting modules and a wide range of different connection options, with the possibility of checking cabling using a web application integrated in the system.

· **Processor SW replication via direct USB. INGESYS®IC3** provides advanced features specifically designed so that repetitive tasks carried out by engineering and maintenance staff become automatic, simple and rapid. Hence, errors, costs and the time taken to carry out these tasks are reduced to a minimum without needing highly-qualified staff to perform them.

· **Remote system maintenance. INGESYS®IC3** has a built-in web server and ftp server. Thus, the process's own variables as well as the system's diagnostics information can be seen online from any standard browser installed on a remote terminal. This facilitates and speeds up maintenance tasks, hence reducing reaction times and costs arising from management and repair tasks.

## Advanced diagnostics

**INGESYS®IC3** offers features specifically designed to speed up error detection and decision making. This notably reduces the number of stoppages and repair times and consequently the cost associated to these tasks and their effect on the performance of the process to be controlled:

**Autodiagnostics tools** which speed up error detection, simplify maintenance tasks and facilitate the safe management of installations during failures, thus allowing you to continuously monitor the system's status.

Supervision in all scans of the correct functioning of both the processing units and the input/output modules makes it possible to instantaneously detect any system failure and register it in an internal diagnostics buffer. **INGESYS®IC3** also has status signalling LEDs in each module and processor unit.

The system also informs you on the diagnostic of each of its elements using specific function blocks so that you can program the responses to each failure situation.

**I/O module autodiagnostics:**
- · Supervision of field power supplies.
- · Detection of digital output short-circuits.
- · Signal adaptation stages diagnostics.
- · DAC and ADC diagnostics in analog signals.
- · Supervision of correct CPU functioning using watchdogs in I/Os.

**Processor autodiagnostics:**
- · Memory use and CPU performance diagnostic.
- · Supervision of the correct functioning of program logic.
- · Centralised diagnostics information on the whole system. Information is accessible in realtime, enabling the PLC logic to act and report the problem before anything breaks.

**I/O access bus autodiagnostics:**
- · Diagnostic of each CPU access to I/O modules and correct access decoding.
- · Star architecture allowing the CPU to univocally determine the erroneous module reducing the system stoppage time in the event of I/O module breakdowns.

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## Reliability and robustness

**INGESYS®IC3** is specially designed to work in industrial surroundings with demanding environmental conditions. The extended range variant is also available.

Exhaustive quality control tests and rigorous environmental and vibrational tests vouch for its reliability and robustness.

The most demanding verification and validation processes have been applied both in the equipment's design and manufacturing phases.

100% of the units manufactured are tested on INGETEAM Technology sites before being delivered to our clients.

**INGESYS®IC3** is UL-certified and CE-marked.

## Customer service and proximity

As a product manufacturer, one of INGETEAM Technology's priorities is being on hand and close to our clients. These strategic values take the form of different actions constituting our greatest added value asset:

· Participation and consultancy with the client in terms of choosing the solution that best fits their requirements.
· Direct customer support and training service offered by highly-qualified, dedicated personnel.

## Comprehensive automation solution for all types of applications
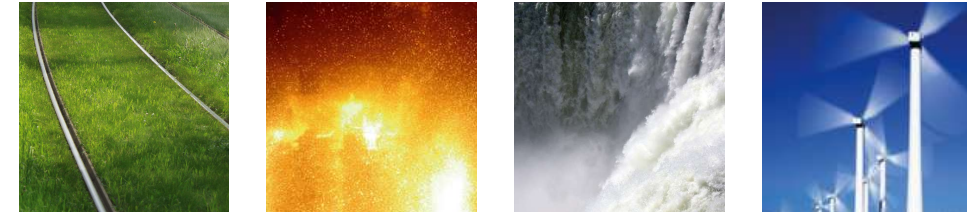
**INGESYS®IC3** is an integral part of the **INGESYS®** control and automation platform offered by INGETEAM Technology for automating all types of processes in a wide range of activity sectors:

· Energy sector: wind, solar and hydraulic energy generation.
· Process control.
· Assembly lines.
· Control and supervision of transport and electricity networks.
· Transport and logistics systems.
· Food industry.
· Mechanical industry.
· Chemical and petrochemical industry.
· Environmental industry.
· Pharmaceutical industry.
· Water treatment and distribution.
· Wood, paper and glass industry.
· Robotic systems.
· Remote control.
· Domotics.

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