Safety Instrumented Systems
The Smart Approach
The Emerson Approach to Safety

More than ever, running your plant productively and safely requires the right technologies and experience. With increasingly stringent regulations and international-standard best practices, safety instrumented systems perform a critical role in providing safer, more reliable, process operations.

The Smart Approach

Safe operations include many aspects—material handling procedures, plant operations and safety instrumented systems (SIS). Yesterday’s SIS solutions considered only the logic solver and left it to your maintenance organization to manually test the entire safety loop.

Only Emerson Process Management, an Emerson business, takes a holistic new approach by continuously diagnosing the sensors and logic solvers’ ability to perform on demand as required for a smart SIS solution. Now you can minimize the costly practices of ongoing manual proof tests with the embedded predictive diagnostics and the digital communications of the PlantWeb™ architecture.
Complete Solutions—One Source

When it comes to safety applications like emergency shutdown and burner management systems, our trained global professional safety personnel and project services organizations have the knowledge to perform and expertise to assist you with safety instrumented system design, implementation, and commissioning.

Emerson provides the only smart, easiest-to-use, safety instrumented system for the lowest lifecycle cost.
Past solutions for safe operations may no longer be sufficient. New international standards for safety, like IEC 61508 and IEC 61511, are prompting a re-examination of safety practices. Planning is required to meet increased regulatory requirements across the globe.

Companies that don’t plan for and manage process operational risks face fines, production outages, equipment damage and serious injury or loss of life. With today’s technology and best practices, there is no reason not to put safety first.

There are key international standards and concepts you and your solutions providers must know to effectively implement safer operations. It’s important that you work with a supplier that has safety instrumented system sensors and logic solvers that meet IEC 61508 standards to help you follow IEC 61511 best practices.
IEC 61508
Used by suppliers of safety-related equipment, IEC 61508 defines a set of standards for functional safety of electrical/electronic/programmable electronic safety-related systems. Emerson has the broadest range of IEC 61508-certified process safety devices, including pressure, flow, and temperature sensors as well as the logic solver. Process manufacturers who implement SIS equipment need to do so in accordance with best practices, as defined by IEC 61511.

IEC 61511
The SIS user community has formally collected best practices in safety applications aligned with IEC 61508. The result of this work is the IEC 61511 standard. Only Emerson provides:
- Transmitters and logic solvers certified to IEC 61508
- Services certified to IEC 61511
Emerson delivers a state-of-the-art safety solution that reduces risk and increases plant availability.

ANSI/ISA-84.00.01-2004
In 2004 the S84 committee of ISA formally adopted the IEC 61511 standard for use in the USA. The two standards are identical except for a grandfather clause that the S84 committee added to the American version which requires owner/operators to determine that existing equipment is designed, maintained, inspected, tested, and operating in a safe manner.

Key Safety Regulatory Standards

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The ideal SIS takes a new approach to help you reduce risks and use the intelligence embedded in the sensors and logic solvers to increase safety.

Risk reduction

The ideal SIS begins with field devices. Smart field devices:
• Proactively communicate maintenance alerts from intelligent sensors
• Support advanced diagnostic capabilities for sensors and logic solvers for both self-test and detection of abnormal situations in the surrounding process.

Easier regulatory compliance

The ideal SIS is designed in accordance with IEC 61508 and is certified by a recognized certification agency, such as TÜV, exida, or FM. To help you address the IEC 61511 standard more easily, an ideal SIS should have:
• Safety logic signature authorization
• Change management of safety logic and field device configuration/calibration
• Security authorization of online trip point or bypass changes.

Increased availability

An ideal SIS increases the availability of an operating process. It:
• Increases system availability through redundancy as required
• Reduces operator response time with advanced alarm management
• Manages bypasses during startup sequences.

Reduced project capital

With pressure on power plants to increase their return on capital, the ideal SIS reduces the engineering and installation effort by providing:
• Simplified safety logic development and testing with powerful certified algorithms
• Certification for use in SIL 1, 2 and 3 applications without restriction
• A flexible architecture for centralized or decentralized deployment
• Ability to fully test safety logic before deployment
• Integrated Basic Process Control System (BPCS) and SIS data without mapping or handshaking logic while keeping these functions separate per IEC 61511
• Common engineering tools for the BPCS and SIS.
Reduced operations and maintenance costs

Like capital budgets, operating and maintenance budgets are under constant pressure. The ideal SIS reduces operations and maintenance costs by:

- Providing a common engineering and operator interface for both BPCS and SIS
- Synchronizing time and collecting events between BPCS and SIS
- Performing continuous diagnostics of sensors and logic solvers.

It’s important to consider ongoing support when multiple suppliers are involved. When one supplier has the full range of products and services for your BPCS and SIS, you have only one place to go for the answers and support you need.
Applications that require safety instrumented systems to reduce risk come in all sizes and topologies. You need an SIS offering that can handle the smallest to the largest application and one that has the flexibility to address widely distributed architectures.

**Flexible architecture**

Ovation SIS scales to provide you with the safety coverage you require for your SIL 1, 2 and 3 SIFs. Unlike other approaches, the modular logic solver hardware scales in steps of 16 configurable I/O to allow you to accommodate any sized application. This means you automatically add memory and CPU every time you add a logic solver. The days of running out of memory or CPU power are over.

The architecture of Ovation SIS allows you to concentrate on the design of each SIF—each logic solver is a container for a small number of SIFs and there can be no unplanned interaction between them. This is very different from the traditional approach where hundreds of SIFs are all placed in a single safety PLC and the effect of changing a single register could affect all of the logic.

Ovation SIS scales as the number of SIFs scales—simply add logic solvers to contain more safety functions with no impact on the performance of the existing system. On a large plant these logic solvers can be placed in nodes close to the unit being protected; an intuitive design with fewer opportunities for maintenance errors that has the added advantage of wiring savings.

Given this scalability, Ovation SIS is ideally suited for all safety applications up to SIL 3.
Configuration, alarm management, device maintenance, and operator interface are all integrated into the standard Ovation toolset.

Configuration/Communication Network

SISnet—A redundant fiber optic network spanning kilometers.

Ovation SIS easily scales to fit the size and distribution of your safety applications.
If you already have an Ovation system or are considering one as your Basic Process Control System (BPCS), the Ovation SIS solution provides the true integration you’ve always wanted between your BPCS and SIS, with the separation required by IEC 61508 and IEC 61511 standards.

**Architecturally independent**
The PlantWeb architecture for safety applications fits easily with your Ovation BPCS. The power supplies, communication channels, hardware, and real-time operating systems are completely independent of the standard Ovation I/O modules and the controller, maintaining the separation required by IEC 61508.

All operations, engineering and maintenance functions for the two systems are integrated including:
- alarm handling
- configuration
- time synchronization
- user security
- device health monitoring.

The integrated configuration environment simplifies and streamlines the engineering effort. This integrated approach eliminates time-wasting, difficult to maintain data mapping, and handshaking logic that is common in existing solutions.

Operators have one common operating environment for both the Ovation BPCS and Ovation SIS to more effectively operate the plant. Unlike any other SIS solutions, engineering, operating, and maintaining the Ovation SIS integrated-yet-separate architecture is easy.

SIS information can be displayed and alarmed like any BPCS data.

Ovation BPCS and SIS are configured and operated with the same software.
Emerson leads the industry in providing services throughout the lifecycle of your operations, no matter where you operate on the globe. From project planning, through plant commissioning, to optimizing and supporting your operations, Emerson has the experience you can depend on to be successful.

**Emerson—proven experience**

Safety instrumented systems play an important role in your overall plant control strategy. Emerson Process Management, a global leader in process automation, delivers the technology and expertise required for safer, more reliable operations.

With a heritage of financial strength, Emerson has the stability to invest in the technologies required to help you reduce risk in your process, while lowering the costs. Emerson is the global leader in transmitters and actuators with online, self-testing capabilities—keys to a more robust SIS solution.

**Differentiated safety services**

Emerson has extensive global coverage for MAC (Main Automation Contractor) services worldwide. These services include all aspects of your automation project from concept through:

- Proven scalable project process for Integrated Control and Safety System to MAC scope
- Compliance to IEC 61511 best practices:
  - Services covering the entire lifecycle from conception to decommissioning
  - Global coverage with same IEC 61511 practices in place
  - Emerson field safety engineers available in your locale for the support and maintenance of your SIS.

Emerson Process Management has the technology, expertise, and experience for your process automation and safety needs.

Ovation SIS can be configured in both horizontal and vertical layouts.