



## Summary

The Triconex Tricon Safety Instrumented System is designed to meet the needs of safety and critical control applications in oil and gas, power, refining, chemicals, pharmaceutical and biotech industries. It is based on industry leading TMR technology, is easy to operate and maintain and provides the lowest total cost of ownership.

## Business Value

Triconex safety systems help customers protect their production assets and comply with rigorous environmental standards; in turn customers meet and exceed production targets by maintaining maximum process uptime by safely operating their plants.



# Tricon Safety Instrumented System (SIL3)

## ENSURING OPERATIONAL CONTINUITY AND MANAGING OPERATIONAL RISKS

InvenSYS is the only automation company with the experience and track record in safety and critical control as demonstrated by our 27 years of experience in safety systems, in excess of 8,000 installed systems, the only approved Nuclear Regulatory Commission Commercial off-the-shelf controller for Nuclear 1E applications, large number of TÜV certified Functional Safety Experts and Engineers, deployed world wide, and patented Triple Modular Redundant (TMR) technology.



Triconex Tricon

A powerful, scalable design with assurance of continuous operation, the Tricon system complies with international safety standards such as IEC61508 and fulfils the requirements for applications such as Emergency Shutdown (ESD), Fire and Gas Protection (F&G), Burner Management (BMS), High Integrity Pressure Protection (HIPPS) and Turbomachinery Control (TMC). The redundant high availability architecture provides a flexible, robust, reliable and powerful solution that is ideal for clients looking to achieve environmental and safety excellence.

The Tricon system is a must for clients who need to maximize the safety and performance of their assets. If you are challenged with reducing investment and lifecycle costs, meeting new safety standards, combating tough competitive pressure in your markets as well as the welfare of your employees and the environment, then the Tricon system is designed for you.

## BENEFITS

- Maximizing process/plant uptime, productivity and yield
- Increased reliability and availability, performance and profitability
- Lowers investment and lifecycle costs
- Complies with International safety standards
- Meets safety targets
- Mitigates environmental impact
- Assists you in avoiding penalties or fines for non-compliance
- Enable you to achieve competitive advantage in your markets

## KEY CAPABILITIES

- TÜV Certified up to SIL3 applications in accordance with International standard IEC61508
- Easily integrated with all major Distributed Control Systems
- On-line module replacement ensures plant availability by hot-swapping of modules
- Works with both centralized and distributed applications
- Comprehensive family of I/O modules
- HART protocol pass through to Asset Management Systems
- Fast program cycle time for TMC applications
- Expertise available from our TÜV certified Functional Safety Experts and Engineers
- Certified for use in non-incendive applications

## TRICONEX TRIPLE MODULAR REDUNDANCY

Tricon operation is based on the principle of safety and high plant availability, which identifies and compensates for failed control system elements and allows on line replacement while continuing its assigned task without interrupting the controlled process. Fault Tolerance is achieved through TMR technology.

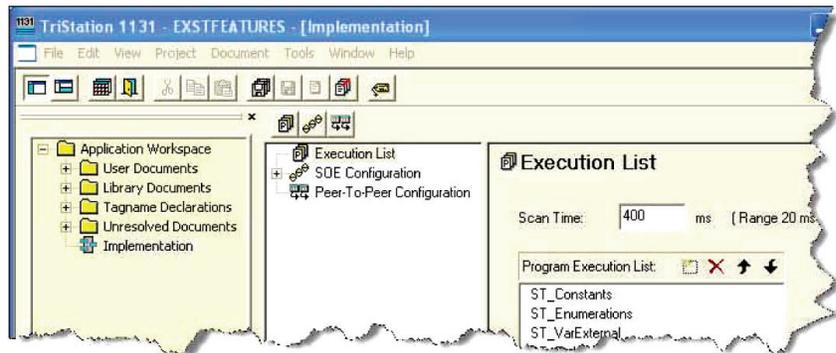
TMR employs three isolated, parallel control systems and extensive diagnostics integrated into one system. The Tricon system uses two-out-of-three (2oo3) voting to provide high integrity, error-free, uninterrupted process operation with no single point of failure. Setting up applications is simplified with the Tricon, because the TMR system operates as a single control system from the user's point of view. The extensive diagnostics are inherent and transparent to the programmer.

Use of the Tricon continues to expand into new industries and applications as customers require increased system safety and/or high availability. Today, Invensys has delivered and installed Triconex safety system solutions in over 70 countries, providing increased safety and high process uptime.



## SAFETY SOFTWARE SUITE

Triconex' comprehensive suite of software solutions provides clients with a set of robust and user-friendly tools to help manage and maintain their safety systems. Having the right information at the right time can help clients mitigate risks, avoid costly process downtime, comply with regulations and help achieve your production targets.



The suite of intelligent applications offers clients the visibility and leverage needed to maintain their process operating safely, efficiently and make decisions in a timely manner. Our Safety Software Suite includes:

### TriStation 1131

An IEC1131-compliant configuration and application development environment for Triconex fault tolerant controllers.

### Enhanced Diagnostics Monitor

The Enhanced Diagnostic Monitor is an application which monitors the hardware health of Triconex controllers and allows users to effectively troubleshoot the safety system during maintenance.

### Sequence of Events Recorder

A sequence of event data retrieval software application that retrieves events recorded by the Triconex controller and organizes them in user readable view for trip analysis.

### Dynamic Data Exchange Server

A Windows application that enables DDE-compliant clients (Human Machine Interface, or HMI) to request data from Triconex controllers.

### TriLogger Suite- High Speed Event Recorder

Provides unmatched ease, speed, and reliability in recording, playing back, and analyzing operating data from your Tricon and Trident system.

### Emulator

A software application that allows customers to emulate and execute TriStation 1131 applications without physically connecting to a Triconex controller. Using the Emulator, customers can test applications in an offline environment, without exposing online processes to potential application errors.

### TRISIM Plus

A "Virtual Simulation" of Triconex controllers combined with the Base modeling capability from DYNMIM. TRISIM Plus allows simulator access in the emulator available in TriStation 1131 series software.



### APPLICATIONS

- Emergency Shutdown (ESD)
- Burner Management Systems (BMS)
- Fire and Gas Systems (F&G)
- High Integrity Pressure Protection systems (HIPPS)
- Turbomachinery Controls (TMC)
- Critical Control

### OPERATING PRINCIPALS

- Fault Tolerant
- Fail Safe–De-energise to trip
- Energise to trip

### COMMUNICATIONS

- Peer to Peer
- OPC DA and A&E (embedded server)
- Modbus TCP/IP Master and Slave
- Modbus Serial Master and Slave
- Triconex System Access Application (TSAA)
- Achilles Level 1 Certified

### CERTIFICATION

- IEC 61508
- DIN V 1925
- DIN V VDE 0801
- EN 54
- NFPA 72
- DIN V VDE 0116
- NFPA 8501
- NFPA 8502
- EMC Directive 89/336/EEC
- ATEX 94/9/EC
- Canadian Standards Association (CSA)
- Factory Mutual Research (FM)
- G3 Corrosion level

### OPERATING CONDITIONS

- Operating Temperature:
- 32° to 140°F (0 to 60°C) ambient
- Storage Temperature:
- -40° to 167°F (-40°C to 75°C)
- Relative Humidity:
- 5% to 95% non-condensing

Model	Description
3501E/T	115Vac/Vdc Digital Input
3502E	48Vac/Vdc Digital Input
3503E	24Vac/Vdc Digital Input
3504E	24/48Vdc Digital Input
3505E	24Vdc Digital Input
3564	24Vdc Digital Input (simplex)
3511	Pulse Input
3515	Pulse Totalizer
3601E/T	115Vac Digital Output
3603B/E/T	120Vdc Digital Output
3604E	24Vdc Digital Output
3607E	48Vdc Digital Output
3611E	115Vac Digital Output
3617E	48Vdc Supervised Digital Output
3623E/T	120Vdc Digital Output
3624	24Vdc Supervised Digital Output
3625	24Vdc Digital Output
3664	24Vdc Digital Output (Dual)
3674	24Vdc Digital Output (Dual)
3636R/T	Relay Output
3700A	0-5Vdc Analogue Input
3701	0-10Vdc Analogue Input
3703E	0-5, 0-10Vdc Analogue Input
3704E	0-5, 0-10Vdc (high density) Analogue Input
3706A	Thermocouple Analogue Input
3708E	Thermocouple Analogue Input
3720	0-5Vdc Analogue Input
3721	0 to 5 or -5 to +5Vdc Analogue Input
3805E/H	4-20mA Analogue Output
3806E	4-20mA and 20-320mA Analogue Output
3807	-60 to +60mA Bipolar Analogue Output
2770H	Analog Input Interface Module
2870H	Analog Output Interface Module

*For detailed product specifications, please refer to the Tricon Safety Instrumented System Technical Product Guide.*



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