

Prevent hazardous conditions from causing unsafe incidents

EcoStruxure™
Triconex®
Emergency Shutdown Systems

schneider-electric.com/triconex

Life Is On

Schneider
Electric



When the safety and protection of your production facilities is critical to the success of your business, you can rely on EcoStruxure Triconex Safety Systems

Prevent hazardous conditions from causing unsafe incidents

Government regulatory agencies as well as insurance companies, place the highest criteria on the safety of company personnel, communities, and the environment. Consequently, they require companies to perform process hazards analyses to determine the measures necessary for maximum safety.

A vital layer of protection, emergency shutdown is key to providing safe operations and is a vital layer of protection. If hazardous conditions occur, immediate actions must be taken, shutting down the facility to a safe state protects personnel, the environment and the asset.

EcoStruxure Triconex emergency shutdown (ESD) systems monitor, protect, operate and maintain all of your plant's production assets safely, reliably and securely. Our solutions are proven to protect people and the environment while keeping production operating safely and continuously for the operating life of the asset.

As a world leader in safety, our comprehensive blend of safety certified products, together with our team of safety professionals make us the ideal partner for your emergency shutdown needs. Schneider Electric is the world's leading supplier of triple modular redundant (TMR) safety systems, with over 18,000 systems operating safely for more than 1 billion hours.

EcoStruxure Triconex represents the best possible decision for your emergency shutdown needs:

- Safer, more reliable, uninterrupted operations
- Increase plant uptime, minimize unplanned downtime and potential production loss
- Avoid costly harm to plant assets, reputational damage, regulatory compliance fines
- Lower operational risk, impact on health, safety and the environment
- Maximize value of ownership
- Potentially lower insurance costs



Unprecedented experience
and knowledge

01 | Experience

Why is a reliable emergency shutdown system vital?

Although safety is of primary concern, in today's environment it is also important to have an ESD system designed for availability. The economic impact of a spurious or nuisance trip of an ESD system can be disastrous. Unlike a process control system, an ESD system represents a layer of protection that mitigates and prevents a hazardous situation from occurring. An ESD system must be extremely reliable and function on demand. During an emergency, it must shutdown the process in a safe and orderly fashion.

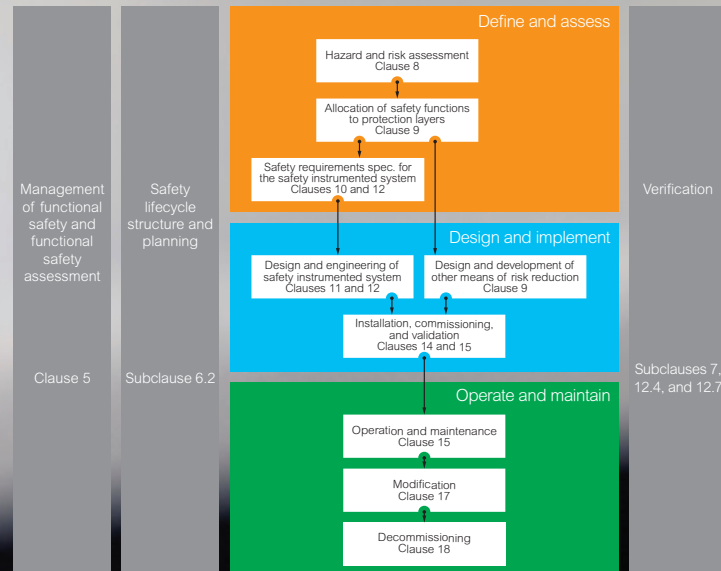
When selecting or replacing an ESD system, consider the following:

- Is it more cost-effective to run and maintain than your current system?
- Does it comply with current government regulations and industry standards?
- What would it cost your company if inferior technology causes a shutdown of your operation?
- Can you, with conviction, say that your employees, equipment, and the environment will be protected in the event of an emergency?
- What costs could you incur in the event of an accident due to the use of inadequate safety technology?

By choosing EcoStruxure Triconex Safety Systems, you will receive a solution, which ensures that no single point of failure will cause a nuisance trip or unwanted shutdown.



Invest in the right solution



With an EcoStruxure Triconex ESD, you get a reliable system that can reduce your operating expenses and avoid production outages.

Improve bottom line performance

An EcoStruxure Triconex ESD system substantially reduces project implementation time and provides a highly cost-effective instrumented solution:

- These ESD systems are fault tolerant — certified to function safely in the presence of one or several faults, thereby eliminating nuisance trips attributed to other safety systems with lower redundancy.
- Using the EcoStruxure Triconex - TriStation 1131™ application development tool, you can implement your project at a fraction of the time it would take with competitive systems.
- TriStation 1131 features a library of ESD function blocks and CEMPLE™, our easy-to-use cause and effect matrix programming editor. CEMPLE allows the user to define the complete processing of sensor inputs, shutdown logic, and outputs to the final control elements on one CEM editor screen.
- The EcoStruxure Triconex controller's remote input/output (I/O) capability, using fibre optics, dramatically reduces costs associated with long cable runs, making it superior to conventional systems.
- Outstanding diagnostics capabilities quickly identify failed instruments, load faults or faulted modules, simplifying replacement, and improving overall safety and availability of your process.

02 | Expertise

Providing expertise every step of the way

Implementing a successful emergency shutdown system involves more than just reliable technology. ESD systems can be complex and require in-depth and specialist knowledge. They require a team of engineers with technical expertise and project management knowledge to bring these components together into a properly functioning system.

We provide complete turnkey solutions that function as stand-alone or tightly integrated system as part of an overall plant control strategy.

All of our services are delivered by competent, knowledgeable, and experienced safety experts. Many are TÜV certified Functional Safety Engineers as well as accredited Functional Safety Experts who have proven skills and competencies to carry out the activities for which they are accountable.

Our knowledgeable and experienced professionals keep pace with technology changes and industry requirements allowing us to handle diverse project scopes and sizes, for new or retrofit upgrades. The processes and procedures that they follow are also certified by TÜV in alignment with IEC61511.

Supported by a global infrastructure, you are assured to be supported by a partner with the expertise and commitment every step of the way.

03 | Lifecycle services

Expertise, solutions and services for life

Supported by a global infrastructure, you are assured of a partner with the expertise and commitment every step of the way, where ever and when ever you need them. We offer full range of services including:

- Functional safety gap assessment and closure
- Process hazard analysis (PHA)
- Layer of protection analysis (LOPA)
- Independent protective layer (IPL) and safety integrity level (SIL) selection
- SIS front-end loading (FEL)
- Quantitative risk assessment (QRA)
- SIL determination and verification calculations
- Safety requirements specification (SRS) generation
- Functional safety management planning (FSMP)
- Front-end engineering design
- Project management services
- End-to-end BMS design
- Detailed engineering, system configuration, build, test and documentation
- Installation, commissioning and startup assistance
- Training to ensure the competencies and skills are available at site
- Post-delivery support such as expert hotline, spare parts management, on-site support, system maintenance, and system upgrades



04

Technology you can depend on

Technology you can depend on

EcoStruxure Triconex Safety Systems are renowned throughout the world for safety, availability and security, and can be used for all major safety and critical control applications as well as emergency shutdown.

Availability: a major goal for every operator is to safely maximize unit availability since downtime results in lost revenue and increased operating costs. The unsurpassed availability of EcoStruxure Triconex Safety Systems reduce unscheduled downtime due to a spurious trip or control system error. The architecture, diagnostics, and online repair capability eliminate costly shutdowns and downtime.

Reliability: EcoStruxure Triconex Safety Systems are designed to reliably operate in the harsh conditions of extreme temperatures, humidity, corrosive atmospheres, shock, vibration, and electrical interference. The MTTF spurious of a typical TMR system is shown to exceed 1,000 years.

Maintainability: embedded diagnostics are executed automatically, allowing the system to quickly detect a wide range of system issues. No special programming is required. System diagnostics are easily displayed on engineering stations, reducing the time to trouble shoot issues.



05

Certified and tested

Compliant with all major standards*

Our proven family of high availability and high integrity systems Tricon, Tricon CX, Trident, Tri-GP are rigorously tested to meet the stringent needs of applications in high hazard industries and are certified to all relevant standards, including:

IEC

IEC 61508, Parts 1-7, 2010

IEC 61511:2004

IEC 61131-2:2007

IEC 61326-3-1:2008

ISA

ANSI/ISA-84.00.01-2004
(IEC 61511-1 Mod)

EN

EN50156-1:2004

EN 50178:1998

EN 298:203

EN 54-2:1997/A1:2006a

NFPA

NFPA 72:2007

NFPA 85:2007

NFPA 86:2011

Canadian Standards Association

CAN/CSA-C22.2 No.0-M91

CSA Std C22.2 No.0.4-M1982

CAN/CSA C22.2 No 1010.1-92

UL 3121-1 1998-07-14

European Union CE Mark

IEC 61131-2

Factory Mutual

3611

3810

3600

Bureau Veritas

BV NR467:2013, Part C, Ch 2-3

* Please check the individual product specifications for applicable certifications.

Tricon CX



Tricon



Trident



Safety instrumented systems

Tri-GP



Field devices and valve positioners

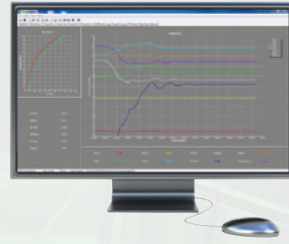


Industrial displays

Priority alarms and bypasses

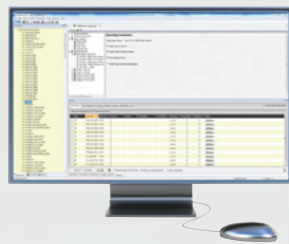


Displays, alarms, data logging



Engineering and maintenance tools

Configuration, test, sequence of event, maintenance and diagnostics





06

Programming and configuration

Powering engineering productivity and performance

TriStation TS1131 is the engineering and maintenance software toolset for the EcoStruxure Triconex family of logic solvers specifically designed to help you throughout the safety lifecycle. TriStation tools are easy to learn, efficient to program and test, and require minimal training.

TriStation TS1131 allows you to:

- Define the controller configuration
- Create programs, functions and function blocks.
- Test and validate applications
- Download and monitor applications

The inherent error checking helps users avoid mistakes and speeds up the engineering process.

TriStation 1131 has powerful emulation capability for testing and troubleshooting the application program. Software changes are done offline, tested, and then downloaded into the running application.

Benefits

- Software license is the same cost regardless of tag size
- No hard lock licence required
- IEC61131-3 compliant
- TÜV Certified, including TÜV approved functional blocks

Easy diagnostics for status and health analysis

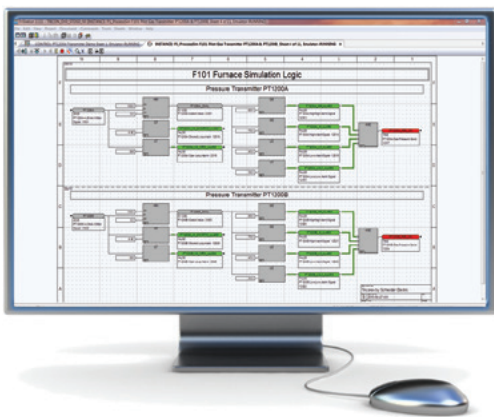
The EcoStruxure Triconex - Enhanced Diagnostic Monitor (EnDM) software application monitors the status and health information of the EcoStruxure Triconex controllers. Comprehensive system diagnostics within the Triconex controllers are automatic and logged, no user code is required. The Enhanced Diagnostic Monitor is quick and simple to use, providing more detailed information and insight into:

- System information
- Diagnostics and health information
- Module status health including field/power/voter health
- System alarms

Clear indication, health classification together with colour coding aid quick analysis to determine any potential remedial actions.

Benefits

- Saves valuable time to identify system health conditions
- Avoid costly downtime
- Efficient to operate
- Minimizes the likelihood of human error



Test applications in an offline environment

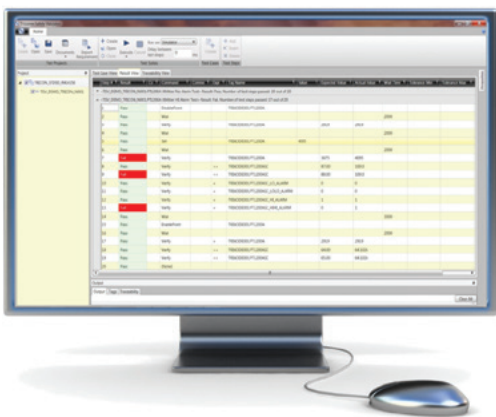
The TriStation Emulator allows you to emulate and execute TriStation TS1131 application logic without connecting to the physical Tricon CX, Tricon, Trident or Tri-GP controller. Using the emulator, you can test your application logic in an offline environment, without exposing your online processes to potential application errors.

Benefits

- Identify application logic errors or anomalies early in the project
- Avoid costly re-work
- Avoid potential operational issues or upsets
- Ideal for testing modification prior to implementing on the controller
- Can be used with EcoStruxure Triconex - Safety Validator for automated application logic testing and validation

07

Testing and validation



The quick and easy way to test application logic

EcoStruxure Triconex - Safety Validator provides the easiest and quickest way to test and validate Triconex application logic.

The powerful, easy to use TÜV certified application automatically verifies that the application logic running in your Tricon controller is working as intended. Safety Validator automatically documents the results, saving effort, time and money.

Automated testing is a valuable way to perform testing of Triconex application logic, ensuring that the functionality, new features or modifications operate as intended.

Automated testing compliments manual testing methods. No programming is required — simply configure Safety Validator for your specific test requirements.

Tests, test cases and test scripts are quickly and easily created. Tests can be run on the TriStation TS1131 emulator or on the Tricon controller. Test results are self-documented, making it ideal for use on new projects or when revalidating the safety system at periodic intervals.

Test any application

Safety Validator can be used to test:

- Emergency shutdown applications
- Fire and gas applications
- High integrity pressure protection applications
- Burner management applications
- Boiler protection applications
- Pipeline protection applications
- Turbomachinery safety and protection applications

Features

- TÜV certified
- Automatically test and document Tricon application logic
- Easy-to-create test procedures
- Quick and easy to use tests, test cases and test scripts
- Run a single test, set of tests, or subset of tests

Benefits

In addition to saving time, money and effort, Safety Validator also:

- Can be up to 50% faster than traditional manual testing
- Increases test accuracy and test coverage
- Optimizes test resources
- Increases test efficiency

Life Is On

Schneider
Electric

Schneider Electric

35 rue Joseph Monier
92500 Rueil-Malmaison, France
Tel: +33 (0)1 41 29 70 00

schneider-electric.com/triconex

May 2018

© 2018 Schneider Electric. All Rights Reserved.
All trademarks are owned by Schneider Electric Industries SAS or its affiliated companies.
998-19869228_GMA-US_A4