EcoStruxure™
Innovation At Every Level

Control and safety in one high integrity and high-availability controller

EcoStruxure™
Triconex® General Purpose System [Tri-GP]

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EcoStruxure Triconex – TriGP

The Triconex General Purpose System is an SIL2-certified, high-value entry point into the market-leading EcoStruxure Triconex Safety Systems product line and is based on industry-leading TMR technology.

When your success depends on safe and reliable operations

Schneider Electric is the world's leading supplier of safety instrumented systems for high-hazard industries. When the safety and protection of your most valuable assets is critical to the success of your business, you can rely on EcoStruxure Triconex.

For more than 30 years EcoStruxure Triconex Safety Systems has been delivering safety for life, protecting people, the surrounding communities, the environment, and keeping equipment and production operating safely and continuously for the life of the asset.

Triconex General Purpose System — Protecting your most valuable assets

The Triconex General Purpose (TRI-GP) System is a continuously safe, secure, and highly available Safety Instrumented System (SIS), certified by TÜV Rheinland for use in safety applications up to Safety Integrity Level 2 (SIL2). The fail-safe and fault-tolerant architecture maximizes availability and complies with international safety standards, such as IEC 61508:2010.

Based on proven EcoStruxure Triconex technology, the Tri-GP System is an extension of the field-proven EcoStruxure Triconex – Trident safety system. It is certified to SIL2 where, until now, price concerns had kept processes tied to the operating restrictions of lower availability architectures. The Tri-GP breaks through budget barriers and provides customers with a powerful, cost-effective solution and an alternative control strategy to maximize both high-reliability and high-availability applications.

The proven technology delivers exceptional levels of availability, fault tolerance, and lowest overall total cost of ownership leading to increased profitability and productivity throughout the operating life of the asset.

Proven benefits

EcoStruxure Triconex Safety Systems benefits include:

- Compliance with international standards
- Maximized efficiency through simplicity of design
- Safer, more reliable, uninterrupted operations
- Increased plant uptime and productivity
- Minimized unscheduled downtime
- Maximized reliability, availability, performance, and productivity

19,000

high-availability triple modular redundant (TMR) safety systems supplied worldwide in more than 80 countries.

1 billion

hours of safe operation without a dangerous failure upon demand.

>650

dedicated safety engineers on our global team.

A lower total of cost of ownership than safety PLCs for industry specific applications.

Tri-GP provides a superior alternative to safety PLCs and is approved for used in rigorous safety and critical control applications. Based on industry-leading TMR technology, it is easy to operate and maintain.

Key capabilities

- TÜV certified for SIL2 applications to international standard IEC 61508
- High-availability architecture for continuous operation
- Fault-tolerant architecture for continuous operation even under fault conditions
- Online module replacement ensures continuous operation and plant availability
- Integration with Foxboro™ Evo process automation systems
- Easily integrated with all major distributed control systems
- Works in both centralized and distributed and remote I/O applications
- Comprehensive family of I/O modules
- Centralized and distributed I/O configurations
- Expertise available from our dedicated team of functional safety engineers and experts

One platform for all of your safety needs

Tri-GP is approved for use in rigorous applications such as Emergency Shutdown, Fire and Gas, Burner Management Systems as well as Turbomachinery Control (TMC) and other critical control applications.

Continuously safe operation without halting production

Tri-GP provides you with the assurance of continuous operation. There are no time restrictions even when running under fault conditions.

The unique diagnostic approach in the Tri-GP System allows greater fault coverage and localization. A 32-channel I/O module is capable of tolerating up to 64 faults while preserving full safety levels. A faulty module can be replaced online at any time without halting production, achieving the highest levels of system availability and reliability possible.

Optimized for small- to medium-sized applications

A key feature of the system design is scalability. Tri-GP supports small, localized applications (as low as 32 I/O points per system) up to large, distributed applications in excess of 40,000 I/O points.

Separation, segregation, and distribution

Up to 63 Trident nodes can be networked together using a highly secure TÜV-certified SIL3 peer-to-peer network. Any node can share data over the same SIS network. This makes it highly suited for applications that require plant unit segregation and separation for operational and maintenance reasons.

High performance for time-critical applications

Each Tri-GP system is capable of executing the application logic (in and out) as fast as 50 msec, making it ideal for mission-critical applications requiring a fast response to process upset conditions.

Tri-GP is easy to operate and maintain. Diagnostics are built-in. No user programming is required.

Suitable for harsh environments

The Tri-GP System operates in extreme ambient temperature conditions, from as low as -20 °C to highs of +70 °C. It is also protected against corrosive environments and is conformal coated as standard to harsh G3 level per ISA S71.04.

Freedom of choice — Open connectivity

All of our solutions are easily integrated into all major DCSs, human machine interfaces, and programmable logic controllers.

Tri-GP solutions support industry protocols: Modbus TCP/IP master and slave, RS485 Modbus master and slave, OPC UA (Unified Architecture), and TSAA protocol for tight integration with EcoStruxure Foxboro DCS. This freedom of choice allows you to select the best connectivity for your needs without compromising performance.

Safe and secure

Tri-GP supports a “defense in depth” approach to ensure that the system is immune to the threats of cyberattack.

Tri-GP is approved to Achilles level 1 as standard with additional protection available using the EcoStruxure Triconex – Tofino firewall if required.

The system can be configured to reject all unauthorized “write” commands from external systems.

The TriStation programming environment supports both standard and enhanced security in accordance with stringent NERC cybersecurity standards. The latest communications module also supports X.509 security encryption and user authentication.

Operating principals

Tri-GP can be used for both fail-safe (de-energize to trip) applications and energize to trip applications

Tri-GP at a glance

Certification
TÜV-certified SIL2

Applications
Emergency Shutdown
Fire and Gas detection
Burner management
Boiler protection
Turbine protection
Control of critical equipment

Operating principals
Fail safe — De-energize to trip
Energize to Trip

Compliance with all major standards
TÜV Rheinland
IEC 61508, Parts 1-7, 2010
IEC 61511:2004
IEC 61131-2:2007
IEC 61326-3-1:2008
ANSI/ISA-84.00.01-2004 (IEC 61511-1 Mod)
EN50156-1:2004
EN 50178:1998
NFPA 72:2007
NFPA 85:2007
NFPA 86:2011
EN 298:203
EN 54-2:1997/A1:2006a

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

Operating conditions
Operating temperature:
-4 to +158 °F (-20 to 70 °C) ambient
Storage temperature:
-40 to +185 °F (-40 to 85 °C)
Relative humidity: 5 to 95% noncondensing
Corrosive Environment: Class G3 per ISA S71.04

Operating parameters
System power supply: 24 Vdc, redundant
Logic Power, Main Processor: 8 watts
Logic Power, Communications: 8 watts
Logic Power, I/O module: 3 watts

Baseplate dimensions
MP, CIM, CM, HART AI, HART AO:
9.79” x 9” (H x W) (249 mm x 229 mm)
I/O: 9.79” x 7” (H x W) (249 mm x 178 mm)

Capacity
Baseplates: 25 I/O baseplates
Main processors: 3
Communications modules: 2 (redundant pair)
Analogue input channels: 416
Analogue output channels: 20
Digital input channels: 640
Digital outputs channels: 320
Pulse input channels: 30
Relay output channels: 640 (supervised)
I/O bus length: 650 ft (200 meters)
Remote I/O: 6500 ft (2 km) max (multimode fiber optic)

Lock lever
Lock lever: All modules

Terminations
Direct termination
External termination panel

Communications
SIL3 peer-to-peer (63 nodes)
OPC DA and A&E (embedded server)
Modbus TCP/IP master and slave
Modbus Serial master and slave
Triconex TSAA
Copper and fiber optic media

Tri-GP at a glance

Model number	Description	
Processors		
5101S2	Main processor TriPak	
Communications		
5101S2	Communications module (CM) TriPak	
5211S2	Communications integration module (CIM) TriPak	
Combined analog input/digital input module		
5361S2	AI/DI TriPak	16 channels 4 – 20 mA, 16 channels 24 Vdc
Analog input modules		
5351S2	Analog input TriPak	32 channels, commoned, 4 – 20 mA
5352S2	Analog input TriPak	32 channels, RTD/TC/4 – 20 mA
5354S2	Analog input TriPak	32 channels, commoned, 4 – 20 mA, HART
5354AS2	Analog input TriPak	32 channels, commoned, 4 – 20 mA, HART, hazardous location
Analog output modules		
5481-1S2	Analog ouput TriPak	4 channels, 4 – 20 mA
5482-1S2	Analog ouput TriPak	4 channels, high current 4 – 40 mA
5483S2	Analog ouput TriPak	4 channels, 4 – 20 mA, HART
5483AS2	Analog ouput TriPak	HART, hazardous location
Digital input modules		
5301S2	Digital input TriPak	32 channels, commoned, 24 Vdc
5311S2	Digital input TriPak	32 channels, commoned, 24 Vdc, high resolution 1mS SOE
5312-FS2	Digital input TriPak	32 channels, commoned, high resolution 1 mS SOE, high voltage
5302-FS2	Digital input TriPak	32 channels, commoned, 115 Vac high voltage
Digital output modules		
5401S2	Digital output TriPak	16 channels, commoned, 24Vdc
5401LS2	Digital output TriPak	16 channels, commoned, 24Vdc, low current
5411HS2	Digital output TriPak	16 channels, commoned, supervised, high current
5402-FS2	Digital output TriPak	16 channels, 115 Vac high voltage
5451S2	Digital output TriPak	32 channels, commoned in pairs, solid-state relay output
Pulse input modules		
5382-1S2	Pulse input TriPak	6 channels, single ended or differential, 0.5 Hz to 32,000 Hz, enhanced
5382AS2	Pulse input TriPak	6 channels, single ended or differential, 0.5 Hz to 32,000 Hz, enhanced, hazardous location

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