How can machine safety open the door to more profitability?

Safety Integrated is the fast and easy way for you to achieve safe machines – at highest productivity.

Answers for industry.
The Fast and Easy Way to Safe Machine Concepts

New regulations and increasing requirements – choose the productive approach of Safety Integrated to fulfill the safety requirements. Safety Integrated supports seamless integration in the standard automation, offering decisive advantages to machine manufacturers and system operators: Thus, Safety Integrated offers the easier and faster way to safe and productive machine concepts, both for machine manufacturers and plant managers.
**Integrated safety technology saves costs**

Safety Integrated is the consistent implementation of safety technology in accordance with the concept of Totally Integrated Automation. On the one hand, this refers to the direct integration of safety-related functions in our standard products and, on the other hand, to the consistent and comfortable integration of safety concepts in the standard automation. This offers various advantages both for machine manufacturers and plant managers, particularly in terms of efficiency.

Integrated safety allows machine manufacturers to benefit from the decisive competitive advantage of eased engineering. This allows for a considerably faster realization of machines and systems and facilitates their easy adjustability to new requirements.

This concept also bears advantages for plant managers as it does not only support the faster provision of safe machines and systems, but also enhances their productivity. Due to improved diagnostics, a harmonized overall system of safety technology and standard automation reduces downtimes and thus increases the system availability.

As opposed to conventional safety technology, Safety Integrated also facilitates conversion and modernization. On the basis of flexible and modularly expandable concepts, existing machines and systems can be upgraded to state-of-the-art technology. This advantage pays off throughout the entire lifecycle.

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**Reduced expenditures and increased efficiency with Safety Integrated**

The integration of safety technology into standard automation offers the following sustainable advantages:

### Increased efficiency
- A single system for standard and safe automation minimizes variety of types
- One bus and one engineering system for standard and safety technology reduce costs
- Software solutions allow for an eased reproduction of series machines

### Increased productivity
- Fast troubleshooting and extensive diagnostics functions reduce downtimes
- Fast restart after required system modifications
- Our additionally offered safe and fault-tolerant systems allow for production without downtimes

### Standardization
- Standard and safety technology come with uniform user interfaces
- Libraries improve re-usability
- Integration reduces the variety of control cabinets for machines
- Bus systems ease the installation technology in systems

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“The prevention of accidents must not be understood as a regulation required by law, but as a precept of human responsibility and economic reason.”

Werner von Siemens, 1880
Know-how and Support with Standards and Regulations

As a partner for all safety-related concerns, we do not only support you by offering adequate safety-related products and systems. We also provide you with the most current know-how on international standards and regulations. We offer comprehensive training and services for machine manufacturers and plant managers throughout the entire lifecycle of safety-related systems and machines.

Know-how for international implementation

For best realization of safety-related tasks, it is essential to comply with the regulations of the country in which the respective machine or system is operated. Sometimes, this seems to be quite challenging. The so-called EU machinery directive for example requires a carefully documented risk assessment and, if necessary, risk minimization of machines prior to their commissioning. Both the machine’s acceptance by a test center as well as the exclusive proof of safety entail increased testing and documentation efforts.

With Safety Integrated, this process is significantly simplified and accelerated. In the planning phase, our portfolio already supports you with products that are consistent with the country-specific regulations, with functional examples, and with know-how of the current standards. In addition, we ease engineering by directly integrating safety technology into standard automation. If required, we offer relevant trainings and services to guide you throughout the entire process right to the point of approval – and beyond.

Global harmonization of standards

To facilitate an even easier and faster realization of future machine concepts and to promote the free exchange of goods on global markets, we have consistently been working on the standardization of safety-relevant standards for many years. This commitment has contributed to the international acceptance of European directives and the harmonization of the international safety standards IEC 61508 and EN 954 as well as EN 62061 and EN ISO 13849-1, which facilitate a more efficient realization of safety tasks by machine manufacturers and plant managers.
Reduced risks due to functional safety: the EN 62061 standard

The introduction of the IEC 61508 standard has characterized the term “functional safety,” i.e. the protection against hazards caused by incorrect functions. The new standard EN 62061 “Safety of Machinery – functional safety of electrical, electronic and programmable control systems for machinery” calls for an accurate calculation of failure rates for all relevant electro-mechanical components. For the first time, one standard covers the entire safety chain, from the sensor to the actuator. To attain a safety integrity level such as SIL 3, a certification of the individual components is no longer sufficient. Instead, the safety function must comply with the defined requirements as a whole. For the calculation of the relevant SIL, we offer B10 values for our products. Based on these values, you can calculate the components’ failure rates.

The EN ISO 13849-1 standard

The EN ISO 13849-1 standard “Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design” will replace the EN 954-1 at the end of 2011, but is state of the art already today. This standard covers the complete chain of safety functions, dealing with all devices involved in the execution of such functions. The EN ISO 13849-1 also introduces a quantitative assessment of the safety functions. The standard describes the determination of the performance level (PL) for safety-related parts of control systems on the basis of provided architectures for the destined service life. For the combination of multiple safety-related parts in an overall system, the standard specifies calculation data for determination of the resulting PL. The standard may be applied to all safety-related parts of control systems (SRP/CS) and all types of machines, irrespective of the employed technology and energy – be it electrical, hydraulic, pneumatic, mechanical, etc.

More information on standards is available in our brochure “Functional Safety of Machines and systems” as well as in our courses listed at www.siemens.com/sitrain-safetyintegrated.
Safe and Future-Proof Machine Concepts: Innovations for Seamless Safety

You can prepare the safety technology of your machines and systems for future requirements already today – with our full-range, certified Safety Integrated portfolio.

It does not only offer innovative product highlights for maximum safety, but also represents the optimum platform for future-proof and consistent safety solutions.

New: SIMATIC Technology controller for safety technology

The new SIMATIC CPU 317TF-2DP facilitates the realization of motion control, safety and standard tasks in a single controller. This technology controller is particularly suitable for automation tasks with coupled motions of multiple axes which require functional machine safety. Considerable time and cost savings are supported by the uniform engineering of all functions and the elimination of external safety hardware and laborious wiring.

New: Fail-safe software controller SIMATIC WinAC RTX F

With the fail-safe S7 software controller SIMATIC WinAC RTX F, control and PC applications are executed on a joint platform. You can thus integrate your safety system in any PC. With the SIMATIC embedded bundles, a PC platform with already pre-installed SIMATIC WinAC RTX F as well as Windows XP Embedded is offered.

Fail-safe modules in explosive applications for the ET 200iSP distributed I/O

The new fail-safe modules of the ET 200iSP for safety applications up to SIL 3/PL e can be directly installed and operated in Ex zone applications up to 1/21. Connected intrinsically safe sensors and actuators may be routed up to Ex zone 0/20 with the ET 200iSP. Applications can be realized without the use of Ex barriers.

Simocode pro: clever motor management for safe processes

SIMOCODE pro is a flexible and modularly designed motor management system. It unites protection, monitoring, integrated safety and control functions for optimum process control quality.

ASIsafe position switches for protective doors accelerate restart

The new SIRIUS 3SF1324 position switches for protective doors are equipped with innovative logics. The switches meet safety category SIL 2/PL and offer essential advantages for practical application, including additional magnet evaluation and rapid restart.

S45F ASIsafe modules with safe AS-i output

With the S45F SlimLine modules, safe distributed AS-i outputs are for the first time available for the safe switching of actuators. The safe output is controlled via the safety monitor. The S45F SlimLine modules, which are suitable for safety applications up to SIL 3 or PL e, also feature standard inputs and outputs, for example for the functional switching of actuators.

SINAMICS drives for power ratings from 0.12 kW to 4,500 kW

The SINAMICS drive range offers a broad portfolio of converters with integrated safety functions for the easy realization of modern and powerful safety concepts. Safety functions which can also be realized without sensors additionally ease the devices’ application.

SINUMERIK sets new trends for machine tools

Rotating spindles and feed axes bear high risk potentials and necessitate the implementation of powerful and efficient safety concepts, which can be optimally realized with the integrated safety functions of SINUMERIK Safety Integrated.

New: After SINUMERIK 840D sl and 840D, integrated safety functions are now also available for SINUMERIK 828D.
Safe machine concepts without detours – benefit from the Safety Evaluation Tool.

Fast and easy assessment of safety functions with the Safety Evaluation Tool

The Safety Evaluation Tool for the IEC 62061 and ISO 13849-1 standards facilitates the realization of safe machine concepts without any detours. This TÜV-tested tool rapidly and safely guides you through the safety functions’ calculation steps and supports the successive determination of the attained safety integrity (SIL/PL). The entire process is carried out online – from specification of the system structure down to component selection. The result: A standard-compliant report which can be integrated in your documentation as safety proof.

Your advantages:

- Time savings in terms of safety function assessment
- Calculation in accordance with current standards
- Comfortable archiving: Projects can be saved and called up again as required
- Fast and easy handling: comprehensive, pre-defined example libraries
- Fast access to product data
- Free use of the online tool*

* Only the usual costs for Internet access accrue.

Link to the Safety Evaluation Tool:

www.siemens.com/safety-evaluation-tool
Always By Your Side: 
Support Throughout the Entire Lifecycle

With our innovative and comprehensive safety technology 
product portfolio as well as competent support services, we provide 
substantial advantages – throughout all phases of the product 
lifecycle. For example in the realization of safety plans in 
accordance with IEC 62061.

- Comprehensive training programs
- Support with planning, conceptual design and risk assessment
- Consulting on the application / interpretation of safety-relevant directives and standards
- Safety Evaluation Tool supports calculation of the safety integrity
- All system components and broad service portfolio from a single source
- Modular solutions, tailored to various machines and systems
- Innovative technologies
- Globally applicable products and systems with the required approvals and in compliance with the EU directives
- Installation and commissioning
- Support in the preparation of machine acceptance
- Safety Evaluation Tool for standard-compliant report preparation
- Space-, time- and cost-saving design due to the integration of safety technology into standard automation
- Fast commissioning as a result of comprehensive diagnostics as well as pre-wired and certified components

* These services can be rendered directly by Siemens or by certified Siemens Solution Partners.
Safety plan – the guideline for the realization of safe machines

The structure of the safety plan as well as the respective compliance obligation are defined in the IEC 62061 standard. It supports you in the definition and implementation of all safety-relevant aspects and regulations for the construction and operation of a safe machine – throughout all phases of the product lifecycle.

Due to the systematic approach required by the safety plan, you are not only provided with a maximum degree of safety, but you can also benefit from considerable time savings over all phases – also with regard to the machines’ CE marking.

- Global presence due to on-site service
- Fast delivery of spare parts for low capital commitment
- TÜV-compliant operating manuals (German technical control board)
- Regular renewal of safety-relevant components
- Global presence thanks to on-site service
- Fast spare parts delivery for low capital commitment
- Fast fault diagnostics and trouble-shooting due to the Safety Integrated concept
- Fast fault diagnostics and rectification for increased productivity
- Eased handling due to a uniform operating concept
- Reduced downtimes and accelerated work flows thanks to integrated safety functions
- Fast fault diagnostics and trouble-shooting due to the Safety Integrated concept
- Long-term availability of components
- Easy expandability as a result of integration in the Totally Integrated Automation architecture
- Long product availability
Safe Communication Made Easy: Innovative Solutions

For fail-safe communication, Safety Integrated uses both the tried-and-tested field bus systems AS-Interface and PROFINBUS as well as the innovative Industrial Ethernet standard PROFINET, which allows for new approaches to safe and efficient machines and systems – such as wireless fail-safe communication via IWLAN.

Opt for efficiency: PROFINET, PROFINBUS and AS-Interface
With all communication solutions, the safety-relevant data are transmitted via the already available standard bus to allow for significant savings in terms of installation and engineering. Safe I/O modules can be combined with standard modules, safe data for diagnostic purposes can be re-used on the standard level and safe components of other manufacturers can easily be connected.

Satisfy high demands easily: PROFIsafe
PROFIsafe® was the first communication standard in accordance with IEC 61508 to allow for the transmission of standard and safety-related communication on a single bus cable. The advantage: Retrofitting is extremely easy as the existing wiring can be further used. For safe communication, PROFIsafe uses the PROFINET and PROFINBUS services. PROFINET and PROFINBUS with PROFIsafe meet highest demands up to category 4 in accordance with EN 954-1 and SIL 3 in accordance with IEC 61508. Thus, they are optimally suited for application in the production and process industry.

Flexible and multifunctional: SIRIUS 3RK3 Modular safety system
The Modular safety system is suitable for both individual applications as well as for comprehensive safety applications. The central module, which can be optimally adjusted to the respective application via expansion modules, forms the core of the flexible and multifunctional system. With the aid of the MSS ES software, safety functions can easily and rapidly be parameterized. For improved system diagnostics, the system can furthermore be connected to PROFIBUS. The SIRIUS MSS can be employed in safety applications up to category 4 in accordance with EN 954-1 or SIL 3 in accordance with IEC 61508/62061 and reaches Performance Level e in accordance with EN ISO 13849-1.

Easy and safe connection: ASIsafe
ASIsafe® is the safety-related version of the AS-Interface system. It allows for the integration of safety-related components such as EMERGENCY-STOP units, safety position switches and light curtains in AS-Interface. As with standard components, the connection is easily and rapidly realized via the yellow AS-Interface cable. Safe stations are installed and operated in a mixed network with the standard I/O modules. As isolated solution, safe stations can be operated with a safety monitor on the standard AS-i master under a standard PLC (ASIsafe Solution local). Or – as an overall, system-wide ASIsafe integration – with the help of the DPIAS-i F-Link under a fail-safe control (ASIsafe Solution PROFIsafe).

Efficient and user-friendly: SIRIUS safety relays
SIRIUS safety relays form essential components of the seamless Safety Integrated portfolio. The innovative relays analyze safety-related signals of sensors and automatically disconnect them in case of danger. With a broad portfolio – ranging from efficient standard devices to speed monitors – they cover various fields of application, e.g. EMERGENCY-STOP disconnection, protective door monitoring and speed and standstill monitoring. Integrated diagnostic tools and monitoring systems allow for fast troubleshooting, reduce downtimes and therefore ensure increased availability of machines and systems.
Detected

- Highly flexible machines with variable quantity structure
- Maschine with flexible, autonomous safety solution
- Maschine with distribute sensors and actuators
- Compact machine with locally restricted safety technology

Evaluating

- SIMATIC S7-400F
- SIMATIC S7-300F
- SIMATIC IPC427C-RTX F
- PROFINET / PROFIsafe

Reacting

- SINAMICS
- SINAMICS
- SIMATIC ET 200pro
- SIMATI ET 200S
- SIMATIC S7-300F
- SIMATIC S7-400F
- SIRIUS contactors
- SIRIUS safe relays 3TK28
Customized Solutions for All Requirements

What is the easiest and fastest way to realize safe and productive machine concepts which comply with the latest standards? This question is perfectly answered by our Safety Integrated concept on the basis of four typical machine examples. From compact to highly flexible – Safety Integrated facilitates the realization of safe and productive machines. No matter which safety tasks need to be solved – the concept entails only minimum expenditures and costs.

Compact, non-networked machine with locally restricted safety technology

Your requirements

You want to construct a safe and compact machine, whose safety technology can be realized through wiring without a PC and whose parameterization can be easily realized by using a screwdriver. Without expert engineering and installation know-how. With a small number of safety functions and minimum space requirements in the control cabinet.

Our solution

SIRIUS 3TK28 safety relays with up to 3 safety functions. For easy parameterization via screwdriver and diagnostics via front plate LED.

Your advantages

- Cost savings thanks to easy mounting and operation
- Narrow design

Components used in this example:

Detecting with SIRIUS EMERGENCY-STOP push button
Evaluating with SIRIUS 3TK28 safety relay
Reacting with SIRIUS contactor
Your requirements
You want to construct a safe machine with great expansion which comprises widely distributed safe sensors and actuators in the field. With one bus system for standard and fail-safe communication, without restriction of the standard communication. With an average number of safety functions and flexible safety logics, which can be parameterized via a graphical editor without any programming knowledge.

Our solution
An AS-i safety monitor on the basis of ASIsafe as well as a simple bus system facilitate safety-related and standard communication on a single bus line – supporting the realization of up to 8 safety functions with safe sensors and optional safe ASIsafe output modules. The logics can be interconnected without any programming knowledge via a graphical editor.

Your advantages
- Easy routing of the AS-i bus in accordance with the system’s mechanical design thanks to topology-free concept
- Cost savings thanks to intuitive graphical parameterization of the safety function on the basis of pre-defined, certified function blocks
- Easy mounting concept (IP67) and expandability

Components used in this example:
- Detecting with SIRIUS EMERGENCY-STOP push button, key switch and position switch
- Evaluating with ASIsafe safety monitor
- Reacting with SINAMICS G120 and SINAMICS S120 drives

Various application cases and comprehensive information on our solutions are available online:

www.siemens.com/safety-integrated
-> Factory Automation
-> Safety Concepts
Customized Solutions for All Requirements

Your requirements
You want to construct a safe machine whose flexible logics and design allow for optimum adjustability to your requirements. A universal, modular and parameterizable safety relay with an average number of safety functions. A machine whose hardware can be easily configured and whose safety functions can be rapidly parameterized without any programming knowledge – with the option of integrating diagnostics and process data in an automation system.

Our solution
The 3RK3 modular safety system with modular hardware concept. The logics are interconnected without any programming knowledge via a graphical editor. It can be integrated in the automation system’s process image. It supports the use of standardized diagnostics mechanisms and the realization of up to 25 safety functions.

Your advantages
- Time savings thanks to intuitive, easy parameterization and comprehensive online test options
- Efficiency thanks to modular hardware design
- Cost savings thanks to reduced variety of types as the functionality is only determined by the software, not by the hardware

Components used in this example:
- Detecting with light curtain and laser scanner, SIRIUS EMERGENCY-STOP pushbutton and position switch
- Evaluating with the SIRIUS 3RK3 modular safety system and SIRIUS 3TK2810 standstill monitor
- Reacting with SINAMICS S120 drive system and SIRIUS contactor

Machine with flexible, autonomous safety solution
Your requirements

You do not want to assemble a new safety technology system, but want to realize integrated and future-proof standard and safety-related functions without impairing your productivity. You attach importance to uniform engineering and the option of mixed standard and safety-related hardware assemblies. You want to comfortably compile the components required for the uniform and transparent overall system.

Our solution

The innovative and fail-safe SIMATIC S7 controller represents a future-proof system for standard and safety-related automation with mobile panel, web server, IWLAN and safety for Windows XP Embedded. It is certified for maximum safety requirements, offers optimum flexibility and can be efficiently applied even in systems with few safety functions.

Your advantages

- Cost reductions thanks to a single system for standard and safety-related automation
- One engineering concept with central data storage and integrated diagnostics
- Standard and fail-safe communication via the same network
- Reduction of employed components and interfaces
- Improved marketing opportunities thanks to application of the globally accepted PROFIBUS, PROFINET and PROFIsafe standards
- Investment protection thanks to long-term availability of the employed components
- Utilization of innovations in existing systems
- IWLAN, web server

Components used in this example:

- Detecting with light curtain, laser scanner, SIRIUS EMERGENCY-STOP push button, SIRIUS position switch, SIMATIC ET 200 I/O system and DP/AS-i F-Link
- Evaluating with fail-safe SIMATIC controller and SIRIUS 3TK2810 standstill monitor
- Reacting with SINAMICS G120 frequency inverter and SIRIUS contactor
Safe and Productive Application: Safety Integrated in Practical Use

Control-based safety concept for the Belare fire brigade corps in Belgium

The volunteer fire brigade corps in Belare (Belgium) sought for a way to upgrade the safety technology of a ladder truck with minimum cost expenditures. In order to comply with current standards, the outdated operating mechanisms had to be replaced by new “built-in” safety functions which reliably master the application’s complexity. The decision-makers opted for a control-based solution.

The solution
A SIMATIC CPU 315F-2DP forms the core of the employed safety concept. Fail-safe communication is realized via the distributed ET 200M I/O station, which is connected via PROFINET. The crew is able to visually control positions and movements via a touch panel inside the truck.

The advantages
- Ease of handling and maximum reliability in demanding environments and critical application situations
- Control-based safety concept facilitates fast response times, flexibility and easy adjustability

Flexible safety concept for water jet cutting systems by FRIMO Viersen GmbH

The new Duojet water jet cutting systems by FRIMO Viersen GmbH, a renowned manufacturer of punching machines, required an adjustable safety concept and is now equipped with ASIsafe. The short response times of the bus not only allowed for the optimization of the entire stepping-behind protection area, but also considerably reduced the required space.

The solution
A SIMATIC CPU 314 controls the cell with the water jet cutting robots and the turntable. Via PROFINET, the control is connected to a DP/AS-i-Link which monitors all slaves as AS-i master. Standard and safety-related signals, which are monitored by four safety monitors, are transmitted on the same AS-i string. In case of danger, the turntable, which is driven with 20 kW and weights one ton, stops within only one second.

The advantages
- Easy installation and engineering
- Short response times
- Comprehensive diagnostic options
- Flexible and modular expandability

Modular safety technology eases the safety concept for a new special machine of Ideal Maschinenbau GmbH

The Bavarian-based Ideal Maschinenbau GmbH machine construction company was in search for a suitable safety technology concept for the complex requirements of its new airbag folding machine. The company opted for the modular, software-based safety system MSS SIRIUS 3RK, which amongst others facilitates reduced space requirements and improved flexibility as well as minimized installation and commissioning expenditures.

The solution
MSS SIRIUS 3RK is based on a basic device with eight safety-related sensor inputs, one relay output as well as one electronic output. It can be expanded by up to seven modules and is consistently communication-capable via PROFINET. With the MSS ES software, not only all functions can be easily parameterized – also the entire safety technology can be realized on the software side up to Category 4 in accordance with EN 954-1, SIL 3 in accordance with IEC 61508/62061 and Performance Level e in accordance with EN 13849-1.

The advantages
- Tailored quantity structure for individual applications
- Modular assembly for rapid mounting and maximum flexibility in terms of system changes
- Space-saving, compact design
- Fast parameterization via MSS ES software
- Comfortable and user-friendly interface
Frequency inverter with safety functions ease plant modernization at BASF Catalysts Germany GmbH

BASF Catalysts Germany GmbH employs highly expensive materials for catalyst production. To ensure high process reliability and maximum production flexibility in the long run, a plant with conveyor routes for the production of catalysts and soot filters for cars and trucks had to be modernized. The decision-makers sought for an uncomplicated concept which supports maximum requirements in terms of the final safety concept.

The solution
The flexible SINAMICS G120 frequency inverters accommodate numerous important safety functions. Fail-safe communication is realized via PROFIsafe. The safety sensors are simply connected to the fail-safe control via the SIMATIC ET 200S distributed I/O station.

The advantages
- Future-proof as safety functions are already integrated in the drive concept
- Comfortable thanks to easy parameterization and diagnostics functions
- Space-saving thanks to distributed layout of the expansive plant

Drive system with integrated safety functions for textile printing machines of J. Zimmer Maschinenbau GmbH

J. Zimmer Maschinenbau GmbH is a globally leading company in the field of textile printing and coating machines. Its portfolio amongst others comprises systems for the imprinting of fleece fabrics using the rotary printing method. The special requirement: For safety-technical reasons, the fabric webs have to be braked down from 50 m/min to standstill within 2 seconds in case of EMERGENCY-STOP.

The solution
The company decided in favor of the multi-axis drive system SINAMICS S120 with completely integrated safety functions. The safety concept’s overall coordination is realized via the fail-safe control SIMATIC S7-317F. Safety-relevant data are transmitted between the drives and SIMATIC S7-317F via a standard field bus on the basis of the PROFIsafe profile.

The advantages
- Realization of safety functions on the basis of standard components
- No additional hardware components and wiring expenditures
- Minimum response times
- Faster restart after EMERGENCY-STOP

SIPA Berchi relies on integrated PC-based safety solution

With SINCRO TRIBLOC Isotronic, the Italian company SIPA Berchi realized a very compact filling machine for PET bottles, which for the first time attaches the labels prior to the bottles’ filling. As labeling is the most fault-prone substep, sorting out of the mislabeled bottles prior to filling results in considerably cost savings for the end customer. Further requirements: A PC-based safety solution which offers genuine added value to the customer.

The solution
The new fail-safe software controller SIMATIC WinAC RTX F and the modular embedded controller SIMATIC S7-mEC were jointly employed as automation solution. SIMATIC WinAC RTX F facilitates the easy realization of standard and fail-safe control tasks on PC-based solutions. It meets strictest safety requirements and complies with all relevant standards: EN 954-1 up to Cat. 4, IEC 62061 up to SIL 3 and EN ISO 13849-1 up to PL e. SIMATIC S7-mEC is the modular controller system in S7-300 design with state-of-the-art embedded PC technology – and thus combines the advantages of the tried-and-tested modular S7 controllers and PC technology in a single device.

The advantages
- Considerable time and cost savings thanks to uniform engineering for standard and fail-safe control systems in SIMATIC STEP 7
- Easy modernization of existing machines with fail-safe components thanks to the connection of safety sensors via PROFINET and the reduction of wiring costs
- TÜV-certification
- Improved performance for PLC and HMI applications on a PC-based platform
- Easy integration of fail-safe I/Os on PROFINET in the SIMATIC ET 200S
- Considerable time and cost savings in terms of engineering
<table>
<thead>
<tr>
<th>Products</th>
<th>Approval (max.)</th>
<th>Fail-safe communication options</th>
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<tbody>
<tr>
<td>SIRIUS position switches with separate actuator, without and with tum-</td>
<td>IEC 62061 (IEC 61508)</td>
<td>AS-Interface (ASIsafe)</td>
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<tr>
<td>bler, hinge switches, magnetically operated switches (contact-free)</td>
<td>ISO 13849-1</td>
<td>AS-Interface (ASIsafe)</td>
</tr>
<tr>
<td>SIRIUS commanding and signaling devices, EMERGENCY-STOP, cable-oper-</td>
<td>EN 954-1 or IEC/EN 61496</td>
<td>AS-Interface (ASIsafe) and PROFOBUS with PROFIsafe profile</td>
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<td>ated switches, two-hand operation consoles, foot-operated switches, sig-</td>
<td>Others</td>
<td>PROFINET with PROFIsafe profile, IWLAN with PROFIsafe</td>
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<td>naling columns and integrated signal lamps</td>
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<td>DPI/AS-i F-Link (ASIsafe solution PROFIsafe)</td>
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<td>SIMATIC mobile panel 277F IWLAN</td>
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<td>SIRIUS 3TK28 safety relays</td>
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<tr>
<th>Application/ safety function</th>
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<tr>
<td>For the mechanical monitoring of protective equipment, protective doors</td>
<td>EMERGENCY-STOP applications in the production and process industry; state signaling on machines and systems</td>
<td>Safe gateway for transfer of ASIsafe signals to the PROFIsafe telegram for safety applications in production automation</td>
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<td>or protective flaps; for accurate position sensing</td>
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<td>EMERGENCY-STOP applications in the production and process industry;</td>
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<td>for safety applications in production automation</td>
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<td>Machine-level operation and monitoring of production systems with safety-</td>
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<td>critical applications, realization of safety-relevant tasks, e.g.</td>
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<td>troubleshooting in running systems</td>
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<td>Safety functions:</td>
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<td>• EMERGENCY-STOP button</td>
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<td>• Two acknowledgement buttons (right/left)</td>
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<td>• Transponder identification and distance measuring for safe registration and operation</td>
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<td>Engineering:</td>
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<td>– Safety Advanced for STEP 7 V11 in the TIA Portal</td>
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<td>– Distributed Safety for STEP 7 V5.5</td>
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<tr>
<td>1) Monitoring of protective equipment, e.g. EMERGENCY-STOP commanding</td>
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<td>devices, position switches and contact-free sensors</td>
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<td>2) Safe standstill monitoring:</td>
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<tr>
<td>Standstill monitoring of motors without sensors</td>
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<tr>
<td>3) Safe speed monitoring:</td>
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<tr>
<td>– Three parameterizable limit values for standstill, setup speed and automatic speed</td>
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<tr>
<td>– Connection option for various sensors and encoders</td>
<td></td>
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<tr>
<td>– Integrated protective door monitoring</td>
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<tr>
<td>SIMOCODE pro 3UF7 motor management system with fail-safe expansion modules DM-F</td>
<td>ASIsafe</td>
<td>SIRIUS 3RK3 modular safety system</td>
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<tr>
<td>1) Safe input modules</td>
<td>2) Safety monitor (ASIsafe Solution local)</td>
<td>3) Safe AS-i outputs</td>
</tr>
</tbody>
</table>

Motor management with integrated safety functions for process automation:
- Safe motor disconnection
- **Fail-safe digital module DM-F Local**: For safe disconnection via hardware signal; 2 relay enabling circuits, jointly switching; 2 relay outputs, fail-safely disconnected common potential; inputs for sensor circuit, start signal, cascading and feedback circuit
- **Fail-safe digital module DM-F PROFIsafe**: For safe disconnection via PROFINET/PROFIsafe; 2 relay enabling circuits, jointly switching; 2 relay outputs, fail-safely disconnected common potential; 1 input for feedback circuit; 3 binary standard inputs
- Setting of the safety functions directly on DM-F Local or in STEP 7 (DM-F PROFIsafe)

Engineering:
- Via TIA Portal
- Via SIMOCODE ES

| PROFIBUS with PROFIsafe profile | AS-Interface (ASIsafe) | Diagnostics via PROFIBUS | PROFINET with PROFIsafe, IWLAN with PROFIsafe | PROFIBUS with PROFIsafe profile: all systems
- PROFINET with PROFIsafe profile: ET 200S, ET 200M, ET 200pro (IWLAN interface module available) |

| PROFIBUS with PROFIsafe profile | AS-Interface (ASIsafe) | Diagnostics via PROFIBUS | PROFINET with PROFIsafe, IWLAN with PROFIsafe | PROFIBUS with PROFIsafe profile: all systems
- PROFINET with PROFIsafe profile: ET 200S, ET 200M, ET 200pro (IWLAN interface module available) |

| PROFIBUS with PROFIsafe profile | AS-Interface (ASIsafe) | Diagnostics via PROFIBUS | PROFINET with PROFIsafe, IWLAN with PROFIsafe | PROFIBUS with PROFIsafe profile: all systems
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| PROFIBUS with PROFIsafe profile | AS-Interface (ASIsafe) | Diagnostics via PROFIBUS | PROFINET with PROFIsafe, IWLAN with PROFIsafe | PROFIBUS with PROFIsafe profile: all systems
- PROFINET with PROFIsafe profile: ET 200S, ET 200M, ET 200pro (IWLAN interface module available) |
| Products | Motor starters for:  
| • ET 200S (IP20)  
| • ET 200pro (IP65) | Frequency converters for:  
| • ET 200S  
| • ET 200pro FC | Frequency converters  
| 1) SINAMICS G120C (IP20)  
| 2) SINAMICS G120 (IP20)  
| 3) SINAMICS G120D (IP65) | Frequency converters  
| SINAMICS G130  
| SINAMICS G150 |

| Approval (max.) | IEC 62061 (IEC 61508) | Up to SIL 3 | Up to SIL 2 | Up to SIL 2 | Up to SIL 2 |
| ISO 13849-1 | Up to PL e | Up to PL d | Up to PL d | Up to PL d |
| EN 954-1 or IECEN 61496 | Up to Cat. 4 | Up to Cat. 3 | Up to Cat. 3 | Up to Cat. 3 |
| Others | NFPA 79, NRTL-listed |

| Application/safety function | All safety applications in production automation and distributed drive tasks as in conveyor technology or lifting drives  
| • Starting and safe disconnection with conventional and electronic switching technology  
| • Integrated motor protection  
| • Safe selective disconnection (ET 200S)  
| • All advantages of the SIMATIC ET 200S and SIMATIC ET 200pro systems | System-integrated, central drive (frequency converter) on standard asynchronous motors without encoders  
| Integrated, autonomous safety functions:  
| • Safe torque off  
| • Safe stop 1  
| • Safely limited speed | 1) Compact frequency converter for applications from 0.37 to 18.5 kW  
| 2) Modular frequency converter for applications from 0.37 to 250 kW  
| 3) Distributed frequency converter in high degree of protection (IP65) for applications from 0.75 to 7.5 kW |

The SINAMICS G120 devices are employed for the speed-variable application of asynchronous motors in applications involving conveyor technology, pumps, fans and compressors as well as other equipment such as extruders.

Integrated safety functions:
| • Safe torque off (STO)  
| • Safe stop 1  
| • Safely limited speed  
| • G120: Safe direction of rotation  
| • G120: Safe brake control  
| • G120: Safe speed monitoring |

1) The integrated safety functions can be utilized without sensors; SINAMICS G120C does not support any further safety functions besides STO.

| Fail-safe communication options | • Solution PROFIsafe: PROFINET with PROFIsafe profile  
| • Solution local: on-site safety application | PROFIBUS/PROFINET with PROFIsafe profile |

1) PROFIBUS with PROFIsafe profile, G120 and G120D also PROFINET: 
| PROFIBUS/PROFINET with PROFIsafe profile | PROFIBUS/PROFINET with PROFIsafe profile |
**SINAMICS S110 positioning drive**

1) Drive system SINAMICS S120  
2) Cabinet device SINAMICS S150  

Up to SIL 2  
Up to PL d  
Up to Cat. 3  
NFPA 79, NRTL-listed*

Integrated safety functions, partially also possible without sensors:  
- Safe torque off  
- Safe stop 1 and 2  
- Safe operating stop  
- Safely limited speed  
- Safe direction of rotation  
- Safe speed monitoring  
- Safe brake control

1) Drive system for high-performance control tasks from 0.12 to 4500 kW in machine and system production, e.g. for packing or plastic machines, handling devices, roller mills or paper machines

2) Demanding, speed-adjustable individual drives with high power ratings (75 to 1200 kW) such as test beds, sugar centrifuges, cross-cutters, cable winches, conveyor belts

Single-axis servo drive for simple positioning applications with synchronous/induction motors with power ratings from 0.12 to 90 kW

**SINUMERIK 840D sl CNC control for machine tools**

Up to SIL 2  
Up to PL d  
Up to Cat. 3  
NFPA 79, NRTL-listed

Integrated safety functions, partially also possible without sensors:  
- Safe torque off  
- Safe stop 1 and 2  
- Safe operating stop  
- Safely limited speed  
- Safe direction of rotation  
- Safe speed monitoring  
- Safe brake control

Numeric control with integrated safety technology in the control and drive for machine tools (rotating, milling, grinding, nibbling, ...)

Safety functions:  
- Safe torque off  
- Safe stop 1 and 2  
- Safe acceleration monitoring  
- Safe operating stop  
- Safely limited speed  
- Safely limited position  
- Safe brake management  
- Safe brake control  
- Safe brake test  
- Safe software cams  
- Safety-related inputs/outputs  
- Safe programmable logics  
- Integrated acceptance test

**SINUMERIK 828D CNC control for machine tools**

Up to SIL 2  
Up to PL d  
Up to Cat. 3  
NFPA 79, NRTL-listed

Integrated safety functions:  
- Safe torque off  
- Safe stop 1 and 2  
- Safe operating stop  
- Safely limited speed  
- Safe direction of rotation (in preparation)  
- Safe speed monitoring  
- Safe brake control

The SINUMERIK 828D is a panel-based CNC control for demanding applications on turning and milling machines, which are typically employed in workshops.

Integrated safety functions:
- Safe torque off  
- Safe stop 1 and 2  
- Safe operating stop  
- Safely limited speed  
- Safe direction of rotation  
- Safe speed monitoring  
- Safe brake control

**PROFIBUS/PROFINET with PROFIsafe profile**

PROFIBUS/PROFINET with PROFIsafe profile  
PROFIBUS/PROFINET with PROFIsafe profile  
PROFIBUS with PROFIsafe profile  
PROFIBUS with PROFIsafe Profile

* Only applicable to SINAMICS S120 booksize  
** Not applicable to S150 and S120 chassis devices
Service and Support

Information

Easy download of catalogs and information material

The latest catalogs, customer magazines, brochures, demo software and special bargain packages are available for download from our Information and Download Center. Amongst others, also our "Safety Integrated" catalog is available here.

www.siemens.com/safety-infomaterial

Configurators for easy handling

Our configurator selection is available at:

www.siemens.com/industrymall
-> Configurators overview

E-business

24/7-access to a comprehensive information and order platform for products and systems from our safety technology portfolio? Comprehensive information on our complete portfolio? Product selection, order tracking, service, support and training information? All of this can easily be found in our Mall at:

http://mall.automation.siemens.com

Planning

Ordering

Newsletter

Always up-to-date: our regular newsletter provides you with topical information on the subject of safety technology. Simply register at:

www.siemens.com/safety-integrated
-> Presales info
-> Newsletter

Online support

Technical data, functional examples, FAQs, documentation and much more – accessible anytime and worldwide.

http://support.automation.siemens.com
Training

Our training centers at numerous sites worldwide offer individual training programs covering all fields of automation and industrial solutions. Specifically for the subject of safety technology, we offer courses on the current standards and our broad product and solution portfolio.

More information on our comprehensive SITRAIN training program is available for download at: www.siemens.com/sitrain-safetyintegrated

Or contact us personally:
- **Via information hotline:**
  +49 1805 25 36 11*
- **or fax:**
  +49 1805 23 56 12

The new web-based training provides more detailed information on the fail-safe SIMATIC, its advantages and options. The training covers correct hardware configuration, structures of fail-safe programs and data exchange between standard and fail-safe programs.

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Online support

Our online support provides a comprehensive information platform covering documentations, applications, functional examples, FAQs and software updates. In addition, it offers the option of submitting online support requests as well as access to the technical forum.

http://support.automation.siemens.com

**Functional safety services**

We, for example, support you with the implementation of risk assessments, the SIL and PL verification of your existing concept, programming of the safety function or engineering verification. More information is available at www.siemens.com/safety-services

**Competent on-site support: Solution Partners**

To master the increasing requirements in the field of safety technology, Siemens also relies on selected “Siemens Solution Partners Automation”. These highly qualified partner companies provide professional consulting services and effective support for all relevant safety aspects of your automation projects.

www.siemens.com/automation/solutionpartner

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- Personally via telephone support: +49 180 50 50 222*
- Via fax: +49 180 50 50 223
- Via online support request: www.siemens.com/automation/support-request

The experts of our Technical Assistance will be pleased to help you with any questions pertaining to Industrial Controls:

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- Via e-mail: technical-assistance@siemens.com
- Via fax: +49 911 895-5907

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* € 0.14/min from the German fixed network
Step-by-step guide to standard-compliant machine documentation

Machine safety calculation – Siemens Safety Evaluation Tool

More information is available at: www.siemens.com/safety-evaluation-tool