Introduction

Set new productivity standards for lasting competitive advantages – with Totally Integrated Automation

Integrated technologies for greater customer benefits

Throughout industry, the growing importance of comprehensive integration of all technologies is clear – across almost all industries and markets, regardless of their level of development. This concerns all planning, engineering and production processes, the mechanical and electrical systems and the information technology components. The aim of this integration is to achieve maximum added value along the entire process chain. Siemens Industry has been accompanying its customers toward this goal with its automation and drive technology since the 1990s, offering a portfolio of products, systems and services that work together optimally thanks to software- and hardware-based integration along the entire value chain.

The associated recipe for success is called Totally Integrated Automation (TIA), an integrated range of automation products for the entire production process. The open system architecture comprises hardware and software components with shared features: Consistent data storage, global standards and standardized interfaces.

TIA is founded on these comprehensive automation solutions:

- Integrated Engineering
- Industrial Communication
- Industrial Data Management
- Industrial Security
- Safety Integrated
**Integrated Engineering**

Maximum engineering efficiency – in all phases of production process

The complexity of our customers' products and plants are increasing more and more. Optimizing the engineering process provides many advantages and optimizes productivity. The new engineering framework, the Totally Integrated Automation Portal (TIA Portal), seamlessly combines different engineering tools for parameter assignment and commissioning of automation and drives technology. It is unique in the field of automation and provides assets previously regarded as impossible. The TIA Portal is based on intuitive user interfaces and uniform library concepts that stay the same over many automation projects, as well as a common data basis for configuration, communication and diagnostics.

In addition, Siemens offers the efficient, object-oriented plant management software solution COMOS and the successful SIMATIC PCS 7 process control system. Siemens facilitates integrated engineering with central data management for plant designers and operators over the entire lifecycle. This data consistency ensures that there is an information flow without gaps or data loss. Thanks to the object-oriented data management, correct and up-to-date information is available to the user at any time.

**Industrial Communication**

Maximum data transparency spanning all automation levels – on the basis of well-proven standards

With Totally Integrated Automation (TIA) you create the prerequisite for full integration of communication – and thus for maximum transparency spanning all levels, from the field and control level via the operations management level all the way up to the corporate management level. The use of SCALANCE network components makes communication possible even in difficult environmental conditions.

**Industrial Data Management**

Shared data storage and integrated data management in production shorten the time-to-market and create the basis for greater transparency and higher productivity.

With Totally Integrated Automation you benefit from the shared data. In other words, data only has to be entered once and is then available to you through the system. No data has to be entered twice, errors are avoided and the configuration time is shortened – so you get your products onto the market faster. For you, integrated data management in production means: faster access to all relevant information regarding diagnostics, asset management and key performance indicators (KPI) of your plant such as material inventories, production figures and energy consumption in the form of meaningful reports. This provides you with a completely transparent overview of your production and puts in your hands a decision-making aid for subsequent optimization of your plant.
Introduction

**Industrial Security**

Industrial Security for your machines and systems – integrated into the automation solution.

With the increasing use of Ethernet connections all the way down to the field level and the advantages of central data management, the associated security issues are also becoming a more urgent topic for industry. After all, open communication and increased networking of production systems involve not only huge opportunities, but also high risks.

Fully in line with Totally Integrated Automation, we help you to protect the investments you have made against unauthorized access and manipulation – from secure remote access that can be configured using the Security Configuration Tool integrated in Step 7, to the protection against copying and security of knowledge at the controller level.

SIMATIC Logon is an efficient user management system for engineering and control systems. It provides plant personnel with the capability of assigning access rights based on roles. All control interventions and changes can be traced back to their origins.

**Safety Integrated**

Protection of personnel, environment and systems within the framework of an integrated complete system.

The following applies for mechanical equipment manufacturers and operators alike: There must be absolutely no compromising of safety for personnel or machinery. The solution: Our Safety Integrated concept based on Totally Integrated Automation.

Whether for simple safety functions or highly complex tasks – our program offers you maximum safety. Safety Integrated is a unique, comprehensive, and integrated safety program that covers all tasks in the area of safety engineering - from acquisition, analysis and response, and from the switchgear and control technology to the drives. Our products meet the applicable industrial safety standards, including IEC, ISO, NFPA and UL, and are certified according to the current safety standards.

More information is available under: [www.siemens.com/safety-integrated](http://www.siemens.com/safety-integrated)
Products and Systems

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SIMATIC industrial automation systems

The innovative solution for all automation tasks

SIMATIC controllers offer integrated functionality and numerous options for performance scaling, which readily enable the increasing demands of your applications to be met.

If you want to automate your machines and plants economically and flexibly you need optimal solutions for every application. We have the answers: SIMATIC controllers!

The SIMATIC series comprises modular controllers such as the S7-1200 and S7-1500, embedded systems such as the embedded controller and the PC-based controllers WinAC RTX (F).

For applications with extremely high safety requirements, the controllers are also available in high-availability and fail-safe versions. In addition, extended functions such as Motion Control are integrated into the controllers in order to offer the greatest precision, dynamics, and processing speed – standard and fail-safe automation in one system.

The benefits to you:

- Scalable, flexible system for a host of applications, all on the basis of the same range of controllers
- Increased machine and plant performance thanks to high-performance CPUs
- Solution with a single controller for integrated control functions such as logic and motion control
- Minimization of downtimes due to integrated monitoring and diagnostics
- Ensured system availability due to high-availability systems that ensure smooth operation
- Fail-safe SIMATIC controllers permit the integration of safety technology in standard automation
- Optimized engineering workflow due to comprehensive software

More information is available under: www.siemens.com/controller

Modular controllers

SIMATIC S7-1200
The mini controller for efficient and individual solutions in automation.
- With PROFINET-IO controller functionality

SIMATIC S7-1500
Modular, scalable, and universally applicable system with IP20 degree of protection.
- Maximum performance with excellent usability
- Configurable exclusively in the Totally Integrated Automation Portal with STEP 7 Professional V12
- Security Integrated for protecting your investment
Automation systems

Modular controllers

**SIMATIC S7-300**
Optimized for the automation of machines and plants in the manufacturing industry.
- With integrated functions (e.g. high speed counters, closed-loop controls, motion control)

**SIMATIC S7-400**
The powerful PLC for system solutions in the manufacturing and process industries.
- For extremely complex and high-speed applications
- "Configuration in RUN" and hot-swapping of modules

**Distributed controller based on ET 200S, ET 200pro**
Distributed intelligent automation as far as the field level.
- For the construction of complex system architectures from master/slave controllers for the distribution of automation tasks

Fail-safe controllers

**SIMATIC S7 fail-safe controllers**
- For product environments that make greater demands on the safety of personnel, machinery and environment
- Standard and fail-safe applications in one system
Also see chapter on safety technology, page 42.

**Safe, fault-tolerant, and redundant SIMATIC S7-400H/FH controller**
- Redundant system configuration, including I/O and communication
- All changes can be performed in online mode – both CPUs are automatically updated

For extreme ambient conditions

**SIPLUS extreme**
Refined standard modules, based on SIMATIC.
- Temperature range from -40/-25 °C to +60/70 °C
- 100% humidity, dewing, condensation, and ice formation permissible

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Automation systems

SIMATIC PC-based controllers

**Complete system in hardware and software**
- Safety on the PC with the first fail-safe software controller
- Complete integration of PC world and S7 program: permits the flexible utilization of PC high-level languages for integrating PC hardware and software into the S7 program

**SIMATIC WinAC RTX (F)**
The strength of a controller combined with the openness and performance of a PC – even for fail-safe applications, for applications with high data volumes and for vertical integration.

**Ready-to-use embedded bundles**
- Utilize the openness of PC-based systems
- Offer an increased level of ruggedness
- Controller also available in a fail-safe version
- PC applications and, if applicable, visualization run on the same rugged platform, without the use of rotating parts, such as hard disks or fans.

**SIMATIC S7 modular embedded controller**
- Comprises the CPU EC31 and the optional EM PC and EM PCI-104 expansion modules
- Interfacing to the I/O is possible decentralized as well as centralized with the SM modules of the S7-300 family

**SIMATIC IPC227D bundles**
Open embedded PC platform in nano format (approx. 1 liter volume) for the simplest control, HMI, communication, gateway and data concentrator tasks.

**SIMATIC IPC427C bundles**
- Ultra-compact design for fanless and maintenance-free use directly on the machine
- Use with remote screen or operator-free (“headless operation”)

**SIMATIC HMI IPC277D bundles**
- Open embedded Nano panel PC platform for the simplest control and HMI tasks
- Rugged widescreen fronts from 7” with high resolution
## Automation systems

### SIMATIC PC-based controllers

<table>
<thead>
<tr>
<th>SIMATIC HMI IPC477C bundles</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ultra-compact and fanless Panel PC</td>
</tr>
<tr>
<td>• Brilliant displays from 12” to 19” with touch screen or keyboard, also as an IP65 version with all around protection for use without a control cabinet</td>
</tr>
</tbody>
</table>

### Technological tasks (SIMATIC)

<table>
<thead>
<tr>
<th>Technology controllers: Integrated functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Counting, measuring, closed-loop control and positioning with PROFINET interface integrated as tasks into the operating system</td>
</tr>
<tr>
<td>• For compact machines with few axes and countercontrol channels</td>
</tr>
<tr>
<td>• No additional hardware / software or safety components are required</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distributed ET 200S function modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Technological tasks are executed largely autonomously, i.e. independently of the CPU</td>
</tr>
<tr>
<td>• Parameterization in STEP 7</td>
</tr>
<tr>
<td>• Optimal performance with decentralized technology tasks</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technology modules for S7-1500</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Counting and measurement functions</td>
</tr>
<tr>
<td>• Integrated technology objects permit simple and convenient configuration and support during commissioning</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Function modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Coprocessor modules with dedicated function for demanding counting, measuring, closed-loop control, positioning, and CAM control tasks (S7-300, S7-400 and ET 200M)</td>
</tr>
<tr>
<td>• Maximum precision and dynamic response</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freely configurable application modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configurable coprocessor modules offer ultimate flexibility and performance.</td>
</tr>
<tr>
<td>• Overcomes even the most complex closed-loop control, cam control, motion control, positioning, and high-speed counter applications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SIMATIC TDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Modular system structure with scalable hardware – also for the largest and most complex applications</td>
</tr>
<tr>
<td>• Extremely fast sampling times of 100 µs for dynamic control tasks</td>
</tr>
</tbody>
</table>
Automation systems

Distributed I/O

The right solution for any requirement

The trend in industrial automation is toward placing the distributed I/O nearer to the process or machine. At the same time, there is a requirement for distributed I/O devices that offer a higher level of automation intelligence, so that a truly distributed automation can be achieved.

The SIMATIC ET 200 series is available in a host of different sizes and versions:

- Modular I/O systems with low to high channel density
- For installation in cabinets with IP20 protection
- For cabinet-free installation directly at the process with IP65/67 protection
- For installation in hazardous areas with atmospheres containing dust or gas
- Safety and standard in one system

In addition, various modules are available that can be integrated directly into the distributed I/O system:

- Motor starters
- Intelligent modules with control functionality for intelligent distributed automation solutions
- Pneumatic modules
- Various technology modules and much more

Another positive point: The devices offer communication options via PROFIBUS or PROFINET. In addition, special versions are available for fail-safe, redundant and intrinsically safe applications which are optimized for energy consumption.

The SIMATIC ET 200 distributed I/O system offers you the right solution for every application – tailored to your requirements!

More information is available under www.siemens.com/et200

Distributed I/O

SIMATIC ET 200SP

The scalable and extremely flexible distributed I/O system SIMATIC ET 200SP is very compact and easy to outfit with wiring thanks to push-in terminals.
Distributed I/O

**SIMATIC ET 200S**
The flexibility of discretely modular I/O (IP20) and the power of a high-performance module with a full range of functions, high availability and minimal space requirement.

**SIMATIC ET 200MP**
The modular I/O system SIMATIC ET 200MP (IP20) for universal use, offering the same system advantages as the S7-1500. The SIMATIC ET 200MP permits extremely short bus cycles and very fast response times, even with large quantity structures.

**SIMATIC ET 200M**
Perfectly suited for cabinet installation: Modules with high channel density (IP20), communication and function modules.

**SIMATIC ET 200ISP**
Intrinsically safe I/O system (IP30).
- Direct installation in areas in which there is a danger of gas or dust explosion.

**SIMATIC ET 200pro**
The multi-functional, modular I/O system (IP65/67) for extreme ambient conditions and for use directly on the machine.

**SIMATIC ET 200eco PN**
Extremely compact block I/O (IP65/67) that can be used directly on the machine.

**SIMATIC ET 200eco**
- Easy to connect, easy to start up, and inexpensive to buy and operate
- Rugged block I/O (IP65/67)

**SIPLUS extreme**
Refined standard modules, based on SIMATIC.
- Temperature range from -40/25 °C to +60/70 °C
- 100% humidity, dewing, condensation, and ice formation permissible
Automation systems

Intelligent logic module – LOGO!

Save time, money and space in small switching and control applications

- Replace a host of conventional switching devices with a variety of configurable LOGO! models
- Extremely fast setup, installation, and wiring – enabling you to resume production in the shortest possible time
- Even more user-friendly operation and monitoring of the plant thanks to an additional external text display

- Both displays provide
  - Adjustable backlight
  - Bar chart and I/O status display
  - Scrolling text for up to 32 characters in 4 lines
  - Menu and message texts with support in 10 languages and 6 different character sets

- Programming via the keyboard or the user-friendly configuration software
- Resistant to interference, vibration, or extreme ambient conditions due to rugged design
- Expansion of the well-proven 0BA6 generation with two new LOGO! 0BA7 basic units for:
  - Ethernet interface for programming and interconnecting LOGO! or connecting LOGO! to S7-CPPUs and HMI communication
  - 400 blocks of programming memory
  - Macro function
  - Data logging

- Standard SD card for copying programs and for data logging

More information is available under:
www.siemens.com/logo
Automation systems

SIMOTION Motion Control System
Products and solutions that enhance the productivity of machines

Even faster product changes in the manufacturing industry call for more flexible and easily convertible production machines. As a result of this trend, mechanical components, such as cam discs, are replaced by servo drives and the respective motion control systems. The design and engineering overhead is therefore reduced in favor of the "electrical" side, that is, programming.

Siemens motion control systems (e.g. SIMOTION) take into account these more stringent requirements by providing a high degree of functionality and flexibility in conjunction with user-friendly operation thanks to Wizards and graphical programming languages. This ensures that the time and effort involved in engineering and programming can be kept to a minimum despite ever more exacting requirements. The motion control solutions offered by Siemens include controllers, PCs, and drive-based systems. SIMOTION offers automation solutions for production machines in the following industries:

- Textiles
- Plastics
- Wood
- Glass/ceramics
- Metal forming technology
- Packaging
- Converting
- Printing
- General mechanical engineering.

More information is available under: www.siemens.com/simotion
## Automation systems

### Motion Control

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SIMOTION P</strong>&lt;br&gt;PC based</td>
<td>Motion control, PLC and HMI on a single platform.</td>
<td>• For data-intensive applications and vertical integration</td>
</tr>
<tr>
<td><strong>SIMOTION D</strong>&lt;br&gt;Drive-based</td>
<td>Motion control and PLC directly in the drive.</td>
<td>• Compact design due to the integration of motion control, PLC and drive control for the SINAMICS S120 drive system all in one unit</td>
</tr>
<tr>
<td><strong>SIMOTION C</strong>&lt;br&gt;Controller-based</td>
<td>Modular motion control system based on the field-proven design of the SIMATIC S7-300. Available in two variants:</td>
<td>• With PROFINET interface onboard&lt;br&gt;• With analog and encoder interfaces for analog drives in the case of retrofit or hydraulic applications</td>
</tr>
<tr>
<td><strong>SIMATIC technology controllers</strong></td>
<td>The powerful controllers for technology and motion control functions, optionally with safety</td>
<td>State-of-the-art motion control functionality (e.g. position control, geared synchronous motion, curve synchronization, travel to fixed stop, print mark correction, path/time-dependent switching).</td>
</tr>
<tr>
<td><strong>SIMATIC FM 458-1 DP</strong>&lt;br&gt;Controller based Motion Control with PROFINET interface.</td>
<td>High-performance motion control coprocessor for the SIMATIC S7-400.</td>
<td>• Library for technology functions and motion control with more than 300 function blocks&lt;br&gt;• Scalable number of controlled axes (more than 100 axes possible)</td>
</tr>
</tbody>
</table>
SINUMERIK CNC system

The right CNC equipment every time

With the SINUMERIK CNC, Siemens offers high-productivity automation solutions for the workshop, job order manufacture and mass production. Whether for individual parts or mass production, simple or complex workpieces – SINUMERIK controls offer the appropriate solution for every machine design – from simple standard CNC machines, by way of standardized machine concepts, to premium modular machine concepts.

The integrated operating philosophy of SINUMERIK Operate offers the greatest convenience of operation at the machine tool. Thanks to its variety of programming methods, SINUMERIK CNC combines all CNC programming methods required worldwide.

More Information is available under: www.siemens.com/sinumerik

SINUMERIK CNC system

SINUMERIK 828D and SINUMERIK 828D BASIC
The compact CNC for standardized machine concepts

The SINUMERIK 828 controls are ideally suited for standardized machine concepts that are manufactured with low levels of modularity and simultaneously high quantities.

• Panel-based compact CNC
• Technologies: Milling and turning
• Up to 8 axes / spindles
• 1 machining channel
• 8.4" / 10.4" color display
• S7-200 PLC

SINUMERIK 840D sl
The open CNC for modular machine concepts

The SINUMERIK 840D sl offers the absolute maximum level of openness and flexibility.

• Drive-based modular CNC
• Multi-technology CNC
• Up to 93 axes / spindles
• Up to 30 machining channels
• Modular panel concept up to 19"
• Color display
• SIMATIC S7-300 PLC
• SINUMERIK MDynamics 3-axis/5-axis technology packages
Automation systems

Automation software

Our automation software provides you with a development environment for the plant-wide engineering of your automation solution.

Fierce competition and technological advances have led to the expectation that systems for production and process automation should achieve greater performance at a lower cost. The demand for automation systems continues to rise – together with the demand for increasingly extensive user programs, integrated control environments, data transparency throughout the entire company, and increased utilization of distributed intelligence.

While the automation hardware offers continuously higher levels of performance at a steady price, engineering costs still play a key role in determining how the overall costs are to be kept in check. With the SIMATIC software developed by Siemens, you are able to minimize your engineering times and to respond to changing market requirements quickly. This allows you to reduce the overall engineering costs during the lifecycle of your plant.

- Efficient development environment for all SIMATIC controllers for supporting the entire production process
- Logic, motion control, drives, and process automation can be integrated into a single, scalable control platform
- Integrated system and configurable process diagnostics for a fast commissioning procedure and high plant availability thanks to the early recognition and quick clearance of faults.
- Safety in the same program as Standard for efficient engineering.

More information is available under:
www.siemens.com/tia-portal

Totally Integrated Automation Portal

TIA Portal
An integrated engineering framework for all automation tasks

The TIA Portal is a new engineering concept that offers a uniform engineering environment for programming and configuring control, visualization and drive solutions.

SIMATIC STEP 7 in the TIA Portal
Intuitive and efficient engineering – from the microcontroller to the PC-based controller – standard and safety engineering in one system.

- SIMATIC STEP 7 Basic V12
  Option:  STEP 7 Safety Basic V12
- STEP 7 Professional V12
  Options:
  – STEP 7 Safety Advanced V12
  – PID Professional V12
  – Easy Motion Control
Automation systems

Totally Integrated Automation Portal

Configuration of the SINAMICS drive series integrated into the TIA Portal
Startdrive
Startdrive provides a tool integrated into the TIA Portal for the configuration, commissioning and diagnostics of the SINAMICS series of drives.

Programming and configuration in the TIA Portal

SIMATIC S7-SCL
Programming in a high-level language
S7-SCL is particularly suitable for the programming of complex algorithms and mathematical functions.

SIMATIC S7-GRAPH
Graphical sequential programming
Intuitive flowchart for programming sequential functions.

SIMATIC S7-CFC
Programming of function block diagrams
Function block diagram programming for continuous processes, motion control, and PID control.

SIMATIC S7 PLCSIM
Simulation of SIMATIC controllers
Checking and testing of your applications prior to commissioning (for S7-1500, S7-1200, S7-300, S7-400).

Safety Integrated Engineering
Programming software for fail-safe SIMATIC systems
Certified approach for the configuration of safety applications for all SIMATIC controllers with Safety Basic V12 and Safety Advanced V12.

SIMATIC software packages

Integrated process diagnostics
SIMATIC S7-PDIAG/SIMATIC ProAgent
The process diagnostics are configured as an extension to the standard function blocks – this means no additional programming is required any more.
## Automation systems

### SIMATIC software packages

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Software</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access protection, data security and traceability</td>
<td>SIMATIC LogOn, SIMATIC VersionTrial, SIMATIC Version Cross Manager</td>
<td></td>
<td>Expansion of the Windows user administration to include SIMATIC.</td>
</tr>
<tr>
<td>Generation of components</td>
<td>SIMATIC iMap</td>
<td></td>
<td>Graphical configuration of the relationships between individual machines in one plant-wide architecture.</td>
</tr>
<tr>
<td>Engineering software for the integration of drives</td>
<td>Drive ES</td>
<td></td>
<td>Integrated communication, configuration, and shared data storage for automation and drive systems.</td>
</tr>
<tr>
<td>PLC-based motion control</td>
<td>Easy Motion Control with SIMATIC</td>
<td></td>
<td>Flexible, software-based solution for positioning and gearing with the SIMATIC S7-300, S7-400, and WinAC.</td>
</tr>
<tr>
<td>Extended control options</td>
<td>Loadable function blocks</td>
<td></td>
<td>For positioning or closed-loop control applications (with auto-tuning) that have been implemented with SIMATIC controllers and corresponding software.</td>
</tr>
<tr>
<td>Creating the project documentation</td>
<td>SIMATIC S7 DOCPRO</td>
<td></td>
<td>Creating and managing plant documentation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Permits structuring of project data, preparation in the form of wiring manuals, and the printout in a specified print format</td>
</tr>
<tr>
<td>Technical product data for CAx applications</td>
<td></td>
<td></td>
<td>Library with supporting documentation for the creation of design drawings</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Product data for controllers and distributed I/O, device dimension drawings</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Interface for the export of data to CAD/CAE systems</td>
</tr>
</tbody>
</table>
SIMATIC software packages

Software Update Service
Always up-to-date
- Utilization of the latest technologies and functionalities for efficient engineering.
- Accountable costs for software updating

Programming devices

Industrial notebook
SIMATIC programming devices
SIMATIC Field PG M4 – the rugged industrial notebook optimized for configuring, commissioning, servicing and maintaining your automation system.

SIMOTION

Motion Control Engineering Software

SIMOTION SCOUT
The engineering system for SIMOTION P, C and D
- One engineering system for the entire machine automation system: From configuration to startup and diagnostics, via programming and tests.
Operator control and monitoring systems

Operator control and monitoring with SIMATIC HMI

Gain transparency and reduce costs

The interface between human and machine – the human machine interface or HMI for short – connects the world of automation with the individual requirements of the operator. Operator control and monitoring is about managing the process, about optimizing machine and system operation, and therefore about availability and productivity.

With SIMATIC HMI, we offer a complete range of innovative and low-cost products and systems for the multi-faceted tasks of operator control and monitoring:

Ranging from operator panels and visualization software for operator control and monitoring at the machine through to the SIMATIC WinCC SCADA system for widely differing requirements in process visualization.

Intelligent and efficient energy management solution

- SIMATIC powerrate and B.Data options for WinCC and PCS 7
- Seamlessly integrated into the operating and monitoring level as well as into the control or process control level

For special requirements

- Optimally adapted products are offered such as especially rugged operator panels with all-round IP65 protection for mounting on support arms/pedestals, or operator panels with stainless steel fronts for use in the food and beverages industry
- Individual, customer-specific requirements can also be implemented

SIMATIC WinCC in the Totally Integrated Automation (TIA) Portal is part of a new, integrated engineering concept that offers a uniform working environment for the programming and configuration of controller, visualization and drive solutions.

More information is available under:

www.siemens.com/hmi
Operator control and monitoring systems

<table>
<thead>
<tr>
<th>HMI panels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HMI Key Panels</strong></td>
</tr>
<tr>
<td>Innovative operator panels for use in PROFINET networks.</td>
</tr>
<tr>
<td>SIMATIC HMI KP8 / KP8F / KP32(F)</td>
</tr>
<tr>
<td>More information is available under: <a href="http://www.siemens.com/key-panels">www.siemens.com/key-panels</a></td>
</tr>
<tr>
<td><strong>HMI Basic Panels</strong></td>
</tr>
<tr>
<td>Low-cost entry-level series for compact applications.</td>
</tr>
<tr>
<td>SIMATIC KP300 Basic,</td>
</tr>
<tr>
<td>KP300 mono PN</td>
</tr>
<tr>
<td>KTP400 Basic mono PN</td>
</tr>
<tr>
<td>KTP400 Basic color PN</td>
</tr>
<tr>
<td>KTP600 Basic mono PN</td>
</tr>
<tr>
<td>KTP600 Basic color DP / PN</td>
</tr>
<tr>
<td>KTP1000 Basic color DP / PN</td>
</tr>
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<td>TP1500 Basic Color PN</td>
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<td>More information is available under: <a href="http://www.siemens.com/basic-panels">www.siemens.com/basic-panels</a></td>
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Operator control and monitoring systems

SIMATIC HMI software

Flexibility in any HMI application – from Basic Panels through to process visualization

SIMATIC WinCC in the TIA Portal, the HMI software within the TIA Portal, is part of a new, integrated engineering concept that offers a uniform engineering environment for the programming and configuration of control, visualization and drive solutions.

The SCADA system SIMATIC WinCC V is available for extremely complex applications featuring Plant Intelligence solutions, integrated archive servers or redundant architectures, whereas WinCC Open Architecture addresses applications with demanding customization requirements, also on non-Windows platforms.

More information is available under: www.siemens.com/wincc

SIMATIC WinCC in the TIA Portal

SIMATIC WinCC V12 engineering software

WinCC V12 engineering software includes innovative engineering tools for the end-to-end configuration of all SIMATIC HMI devices and is available in a number of versions differentiated by price and performance:

- WinCC Basic
- WinCC Comfort
- WinCC Advanced
- WinCC Professional

SIMATIC WinCC V12 runtime software

The runtime software is included in the SIMATIC HMI devices and offers different HMI functionalities and quantity structures depending on the hardware configuration of the device.

- WinCC Advanced Runtime
- WinCC Professional Runtime

For more info, see: www.siemens.com/simatic-wincc-tia-portal

SIMATIC WinCC SCADA system

SCADA software for plant intelligence

SIMATIC WinCC

Scalable system that can be adapted to the requirement at any time – from single-user systems to distributed SCADA systems with redundant servers and web-based solutions.

Extension of the SCADA software functionality

Specialized solutions for many technologies. Options and add-ons for extending the SCADA functionality with

- WinCC Options, see also: www.siemens.com/simatic-wincc-optionen
- WinCC Add-ons, see also: www.siemens.com/simatic-wincc-addons
Operator control and monitoring systems

Energy management with SIMATIC WinCC and PCS 7

**SIMATIC powerrate**
The option for the SIMATIC WinCC SCADA system and SIMATIC PCS 7 process control system standardizes, visualizes, and archives mean values for energy and power and reduces energy costs by capping performance peaks.

- Fast and precise overview
- User-friendly analysis and monitoring
- Integrated load management

**SIMATIC B.Data**
SIMATIC B.Data enables seamless monitoring, checking the originators of energy and material flows and allocating costs to individual cost centers or products.

- Company-wide transparency
- Flexible interfaces
- Maximum independence
- Optimum consulting
- Option for SCADA system SIMATIC WinCC and process control system SIMATIC PCS 7

**SENTRON PAC3200**
- Total integration of the SENTRON PAC3200 power monitoring device into SIMATIC WinCC via PROFIBUS
- Obtain and display of measured values and device data

**SIMATIC Maintenance Station**

**SIMATIC Maintenance Station**
Option for SCADA system SIMATIC WinCC and process control system SIMATIC PCS 7. Plant-based asset management by visualizing the signals and alarms relevant to maintenance of all connected control components, switching devices, drives, etc., for a plant.

**SIMATIC WinCC Open Architecture**

**SIMATIC WinCC Open Architecture**
Thanks to its flexible data point concept, the scalable and expandable SCADA system is particularly suited to systems with large volumes of data, up to 10 million data points.
Object-orientation supports efficient engineering and flexible plant expansions.
Platform-independent and available for Windows, Linux and Solaris.

For more info, see: [www.siemens.com/wincc-open-architecture](http://www.siemens.com/wincc-open-architecture)
Operator control and monitoring systems

**SIMATIC WinCC Open Architecture**

**SIMATIC WinCC Open Architecture options**

Special functions and add-ons for extending the SCADA functionality, e.g.:

- Integration of video management systems
- Hot-standby redundancy and disaster recovery system ensure maximum failure-safety and availability
- Web/Thin Client: For operation by means of a Web browser
- Extensive driver and interfacing options: XML, OPC, TCP/IP, Modbus, IEC 60870-5-101/104, DNP3
Industrial identification systems

RFID systems and code reading systems

SIMATIC identification systems for more cost-effective production and logistics processes

Identification systems help companies to assert themselves in markets that are becoming more and more dynamic: The automatic data acquisition by means of RFID or 1D and 2D codes makes it possible to meet the constantly increasing requirements for production control, material flow control, asset management, tracking & tracing, and supply chain management. Siemens offers the key technology for this.

As the world’s leading supplier of identification systems with more than 25 years of well-founded technology and industry-specific expertise, under the name of SIMATIC Ident we offer a comprehensive range of RFID systems and code reading systems - all from a single source. With us, partners can count on simple system integration at the automation and IT levels and technology-neutral application consulting.

More information is available under: www.siemens.com/ident

RFID systems

The right RFID system every time
Identification is performed either directly on the object or indirectly via the workpiece holder, skid, container, box, pallet or outer packaging.
- SIMATIC RF200, SIMATIC RF300, SIMATIC RF600
- MOBY D, MOBY U

Code reading systems

Flexible reading and verification of 1D/2D codes, as well as OCR text recognition
SIMATIC code readers for reliable, flexible reading and verification of 1D/2D codes, as well as optical character recognition. They offer clear, part-specific identification and documentation, simple integration into the automation system and reliable verification.
- Stationary code reading systems of the SIMATIC MV420 and MV440 product series
- Handheld readers, e.g. SIMATIC MV340
Industrial communication

SIMATIC NET Industrial Communication

Components for constructing a communications infrastructure

Critical production data can be used throughout the corporation

The main trends emerging in industry today include rising profitability and efficiency in production, the shortening of time to market of new products, and the improvement of quality. These requirements can only be met if all machines in your plant interact perfectly.

This can only be achieved by means of open, transparent communication that not only takes place at the production level, but also incorporates all company management levels and business systems. This is the only way to avoid isolated automation and IT solutions.

The products of the SIMATIC NET series designed for industrial communication provide you with precisely the technology you need in order to:

- set up a distributed automation system,
- achieve data transparency from the field level to the corporate management level,
- exploit the advantages of industrial wireless communication,
- integrate IT systems.

Industrial Ethernet

Ethernet today is the number one network in the global LAN environment. Ethernet provides you with important functions and features that can offer significant advantages for your application:

- Fast commissioning thanks to the simplest connection method
- Almost unlimited communication performance with scalable performance due to switching technology and continuously rising data transmission rates
- Suitable for networking the widest variety of applications (e.g. applications from the office and production environments)
- Global communication thanks to Industrial Remote Communication via private networks, mobile communication networks (GSM / UMTS ...) or the Internet (e.g. GSM/GPRS).  
- Wireless data exchange via Industrial Wireless LAN

SIMATIC NET is based on the tried and tested Ethernet technology and offers essential additions for the industrial environment:

- Network components for use in extreme industrial environments

1) Note:

With plant networking, suitable protective measures (including IT security such as network segmentation) must be taken to ensure safe operation of the plant. You can find more information on the topic of Industrial Security on the Internet at:

www.siemens.com/industrialsecurity
Industrial communication

- Fail-safe networks through high-speed redundancy
- Continuous monitoring and diagnosis of the network components
- Fail-safe and simple connection method on site

More information is available under:
www.siemens.com/simatic-net

PROFINET

Industrial users are very interested in being able to use the standardized IT functionality of Ethernet, without having to do without the advantages of a rugged fieldbus system. Meeting this requirement, however, calls for a lot more than simply embedding the fieldbus protocol in an Ethernet framework. In this respect, PROFINET offers a unique solution, as PROFINET considers the automation solution as a whole, instead just focusing on the communication level.

PROFINET is the open, cross-vendor Industrial Ethernet standard for automation that is standardized and specified in the largest fieldbus organization in the world – PROFIBUS & PROFINET International (PI) – with 5.8 million installed nodes in the field.

With PROFINET, Siemens applies the Ethernet standard to automation. PROFINET enables high-speed and secure data exchange at all levels, making it possible to implement innovative machine and plant concepts. Thanks to its flexibility and openness, PROFINET offers users maximum freedom when engineering and structuring their plant architectures.

More information is available under: www.siemens.com/profinet

Your advantages at a glance

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Industrial communication

Connection of controllers to Industrial Ethernet

Communications processor with extended functions (Security Integrated)
CP 1543-1 for SIMATIC S7-1500
- Secure connection of the S7-1500 to Industrial Ethernet by means of integral firewall
- Additional communication options:
  - File transfer and e-mail
  - Use in an IPv6-based infrastructure

Communications processors with standard functions
CP 243-1 for SIMATIC S7-200,
CP 343-1 Lean and CP 343-1 for SIMATIC S7-300,
CP 443-1 for SIMATIC S7-400
- For use in harsh industrial environments
- High-speed transfer even with large volumes of data (10/100 Mbit/s)

Communications processors with extended functions
CP 343-1 Advanced for SIMATIC S7-300,
CP 443-1 Advanced for SIMATIC S7-400
- Can be used as a PROFINET IO controller with real-time characteristics
- With Gigabit connection, including routing functionality (10/100/1000 Mbit/s)
- Security functionality, firewall and VPN

Access to databases

Connections to databases without time-consuming programming of the controller
The CP 343-1 ERPC communications processor connects the SIMATIC S7-300 controller directly to databases over Industrial Ethernet and converts the data between formats as required. ERPC stands for Enterprise Resource Planning Connect.
Industrial communication

Connection of PC to Industrial Ethernet

PC-based products for industrial applications offer, for example:
• A long product life cycle,
• A standardized, successful system,
• Scalable system performance and an expandable platform
• Easy combination of control and HMI functionality
• Consistency in the plant thanks to uniform network topologies

Intelligent cards:
HARDNET cards with internal microcontroller
CP 1604 (PCI-104), CP 1613 A2 (PCI 32 bit),
CP 1616 (PCI 32 bit), CP 1623 (PCIe x1)
• Constant data throughput through protocol processing on the CP
• Use in large network configurations

Simple cards:
SOFTNET cards without internal processor
CP 1612 A2 (PCI 32 bit)
• Easy installation and startup
• For diagnostics and commissioning
• Use in small network configurations

Communication module with security for PCs
CP 1628
• Comprehensive, reliable protection (firewall, VPN) for PCs requiring no specialist knowledge of the operating system
Industrial communication

SCALANCE X Industrial Ethernet switches

Switches are active network components that specifically distribute data to the relevant addressees, i.e., network stations. The SCALANCE X product family comprises several product lines with varying scopes of functions, tailored to the respective automation task.

Industrial Ethernet switches offer industry-standard FastConnect connections for RJ45, M12 or fiber-optic cables for any installation location, inside or outside of the control cabinet.

These switches offer various interfaces, either optical (glass/POF/PCF) or electrical - also for Gigabit Ethernet - and support numerous IT standards such as VLAN and IGMP.

Switches

Compact Switch Modules CSM
More connections to SIMATIC
Interface expansion directly at the SIMATIC and for integrating machines into existing plant networks.

SCALANCE X-000
Space-saving, low-cost, industry-standard, entry-level solution
The switches of the SCALANCE X-000 product line are unmanaged Industrial Ethernet Switches with IP20 and IP30 degree of protection.

SCALANCE X-100
For a reliable network solution with all of the equipment details
These switches are unmanaged Industrial Ethernet switches with various port characteristics.

SCALANCE X-200 managed
For all network structures, from machine-level applications to networked subsystems
These user-friendly and universally applicable switches increase plant availability because the configuring and diagnostics are integrated into STEP 7.

SCALANCE X-200IRT
Operating in hard real time
Compact switch for connection to the enterprise network.
Industrial communication

**Switches**

**SCALANCE X-300 managed**  
Convincing performance – compact or modular  
Flexible solutions for high-performance network structures - even under extreme conditions.

**SCALANCE X-400 managed/Layer 3**  
Segmentation at all levels  
Seamless integration of automation networks into existing office networks.

**SCALANCE X-500 managed 2/ Layer 3**  
Construct high-performance plant networks and connect to the IT world  
- Networking from control level to management level  
- Permits high level of plant availability with extensive diagnostics options and high transmission speeds

**Security modules and SOFTNET Security**  
SCALANCE S (V3) and SOFTNET Security Client  
- Additional security functions for cell protection and secure remote access  
- DMZ port for secure connection of a DSL modem or as a service interface

**Industrial Wireless LAN**

**SCALANCE W**  
Installation of a plant-wide wireless network  
- Industrial Wireless LAN components are suitable for wireless communication according to IEEE 802.11a/b/g/n  
- Wireless communication uses 2.4 GHz or 5 GHz and for each wireless interface a gross bandwidth of up to 450 Mbit/s is achieved  
- The SCALANCE W series offers products with a combination of reliability, ruggedness and safety  
- The products are suitable for any installation location, inside or outside the control cabinet; the access points and client modules offer industry-standard connections such as copper (Fast-Connect RJ45 & M12) or fiber optic (SFP)  
- iFeatures for real-time data transmission via wireless LAN (requirement for Profinet IO)  
- Central management of SCALANCE W controller-based access points is possible in combination with the SCALANCE WLC711

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Industrial communication

Industrial Wireless LAN

Connection of PROFIBUS to IWLAN
IWLAN/PB Link PN IO

- Direct substitution of solutions with Power Rail Booster for PROFIBUS by means of contact-free data transmission using IWLAN; no wear of sliding contacts
- Protect your investments by integrating your PROFIBUS field devices into an IWLAN radio network
- Cross-network PG/OP communication by means of S7 routing

For extreme ambient conditions

SIPLUS extreme
Refined standard modules, based on SIMATIC NET for extreme ambient conditions

Communications processors:
- SIPLUS CP 342-5
- SIPLUS CP 343-1 / CP 343-1 LEAN / CP 343-1 ADVANCED
- SIPLUS CP 443-1/ CP 443-1 ADVANCED / CP 443-5

Media converters:
- SIPLUS SCALANCE X 101-1 / X 104-2

Switches
- SIPLUS SCALANCE X 202 2PIRT / X 204-2 /
  X 204-2LD / X 212-2
- SIPLUS SCALANCE X 308-2
PROFIBUS

The PROFIBUS network technology offers numerous advantages for practically every application in the field of industrial automation.

PROFIBUS is used at the field level in both production automation and process automation. PROFIBUS is therefore excellently suited to hybrid plants.

PROFIBUS is an ideal solution for the entire industrial field:

- Both standard and safety-oriented communication over one bus system
- Fail-safe communication takes place via the PROFIsafe profile
- Possibility of increasing plant availability through redundant design
- PROFIBUS PA is used for connecting process field devices (communication and supply voltage on the same cable)

Siemens offers a wide range of PROFIBUS-compatible products for this purpose. This, of course, includes the network and communications software that you require for implementing your system architecture.

More information is available under:
www.siemens.com/profibus
Industrial communication

Connection of controllers to PROFIBUS

Make your controller fit and ready for connection to PROFIBUS

- Use PROFIBUS for the networking of distributed devices, peer-to-peer communication, and programming the controller CPU
- A number of communications processors can be used for segmenting the distributed devices
- Support of redundant I/O in connection with redundant controller

Communications processors

For SIMATIC S7-1200:
- CM 1242-5
- CM 1243-5

For SIMATIC S7-1500:
- CM 1542-5

For SIMATIC S7-300:
- CP 342-5
- CP 342-5 FO
- CP 343-5

For SIMATIC S7-400:
- CP 443-5 BASIC
- CP 443-5 Extended

Connection of PC to PROFIBUS

PC-based products for industrial applications offer, for example:

- A long product life cycle
- A standardized, successful system
- Scalable system performance and an expandable platform
- Easy combination of control and HMI functionality
- Consistency in the plant thanks to uniform network topologies

Intelligent cards:

HARDNET cards with internal microcontroller
CP 5603 (PCI-104), CP 5613 A2 (PCI 32-bit),
CP 5614 A2 (PCI 32-bit), CP 5623 (PCIe x1),
CP 5624 (PCIe x1)

- Constant data throughput through protocol processing on the CP
- Use in large network configurations

Simple cards:

SOFTNET cards without internal processor
CP 5512 (Cardbus 32-bit), CP 5711 (USB V2.0),
CP 5612 A2 (PCI 32-bit), CP 5622 (PCIe x1)

- Easy installation and startup
- For diagnostics and commissioning
- Use in small network configurations

Cards for programming device online functions
AS-Interface

AS-Interface (AS-i) gives you the capability to connect all sensors and actuators located in the lowest field level with an effective and powerful bus. It is unmatched in term of security, convenience and compatibility! AS-interface is very cost-effective and delivers data to and from PROFIBUS and PROFINET, easy to engineer and standardized in accordance with EN 50295 and IEC 62026-2. All relevant components from Siemens match the AS-i specification and are tested and certified accordingly. The AS-i standard is vendor-neutral. (ASIsafe, see also Safety Integrated, page 42).

More information is available under: www.siemens.com/as-interface

Master for the SIMATIC
AS-Interface networks can easily be connected to SIMATIC controllers or to distributed I/O. For this purpose there are so-called CPS or CMs. Incorporating these is just as convenient as incorporating other SIMATIC modules.

Routers (Network transitions)
In addition to incorporating AS-Interface directly, it is also possible to hook it up to distributed higher-level bus systems. Use links to establish and operate lower-level AS-i networks, even before the central controller is in operation.

Slaves
Up to 62 standard slaves or up to 31 safe slaves can be connected to one AS-i network; all exchanging data with the higher-level AS-i master. The scope of our AS-i slaves includes, for example, simple I/O modules and even motor starters and frequency converters.

Power supply units and data decoupling
The power packs supply the AS-i network and all connected slaves with energy originating from one source. They are integrated into the AS-i network. If a data decoupler is used, it is possible to conduct data and energy with just one two-strand wire.

ASIsafe
Depending on the requirements, you have a choice between the „small solution“ denoted „ASIsafe Solution local“ and the large-scale plant-wide „ASIsafe Integration“, the latter uses SIMATIC AS-i F-Links, to connect ASIsafe with PROFINet in conjunction with a fail-safe PLC.
Industrial communication

IO-Link

Seamless communication down to the last meter

IO-Link is the smart concept for the standardized linking of switching devices and sensors to the control level by means of an economical point-to-point connection. The new communications standard IO-Link below the fieldbus level allows central fault diagnosis and location as far as the actuator/sensor level and simplifies both commissioning and maintenance by allowing the parameter data to be modified dynamically, direct from the application.

The advantages at a glance:

- Uniform wiring through the use of a standard
- Reduction of the wiring overhead required for actuators and sensors
- A host of IO-Link products exists and the IO-Link standard is flexible to use
- IO-Link and the SIMATIC S7-PCT Tool permit fast and efficient parameterization. Together with STEP 7, direct access is possible to configuration, parameterization and tests
- IO-Link safeguards the diagnosis up to the last meter before the process
- IO-Link devices are automatically parameterized when replaced
- IO-Link enables the energy data of actuators to be recorded, measured and displayed

More information is available under: www.siemens.com/io-link

IO-Link products from Siemens

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More information is available under: www.siemens.com/io-link
Industrial communication

Routers

- **Bridge to PROFIBUS**
  - IE/PB Link PN IO
  - Vertical integration of PROFIBUS-based devices into Industrial Ethernet and PROFINET.

- **Bridge to WirelessHART**
  - IE/WSN-PA LINK
  - Vertical integration of WirelessHART field devices into Industrial Ethernet

- **Bridge to PROFIBUS PA**
  - DP/PA coupler and link
  - Integration of the process instrumentation into the plant-wide architecture.

- **Bridge to FOUNDATION Fieldbus**
  - FF link and coupler
  - Integration of the process instrumentation into the plant-wide architecture.

- **Bridge to AS-Interface**
  - DP/AS-i LINK 20E
  - Connection of AS-Interface to PROFIBUS.

- **Bridge to AS-Interface**
  - DP/AS-i LINK Advanced
  - Connection of AS-Interface to PROFIBUS.

- **Bridge to AS-Interface**
  - IE/AS-i LINK PN IO
  - Vertical integration of AS-i into Industrial Ethernet and PROFINET.
Industrial communication

Industrial Remote Communication - Telecontrol

Industrial plants are often spread across large areas, even beyond national boundaries. Substations and measuring stations along an oil pipeline, for example, can be several thousand kilometers away from the central plant or control center.

To save time and resources, Siemens provides remote access solutions that enable distant substations to be securely monitored and, if necessary, controlled from a central control room over a telecommunications network (Wide Area Network, WAN), regardless of the size of the application or plant.

Industrial PCs

Remote management
SIMATIC Industrial PCs can be operated by secure remote access and facilitate global service concepts without the need for on-site service calls.

The products:
- SIMATIC IPC with Intel Core i7/i5 processors
- SIMATIC IPC Remote Management Software

Telecontrol

Telecontrol Basic
Cost-effective solution for monitoring and controlling simple telecontrol tasks over GPRS/Internet.
GPRS technology with economical volume-based tariffs (= low operating costs).

The products:
- CP 1242-7 GPRS for SIMATIC S7-1200
- Telecontrol Server Basic (software)

Telecontrol
Automatic monitoring and control of distributed stations via a wide area network.

The products:
- Communications modules, modems
- GSM modem / SCALANCE M routers
- Telecontrol protocols
- ST7, DNP3, IEC-870-5

For extreme ambient conditions

SIPLUS extreme
Refined standard modules based on SINAUT for extreme ambient conditions. The products:
- SIPLUS ST7 TIM 3V-IE
- SIPLUS ST7 TIM 4R-IE
- SIPLUS ST7 MD2
- SIPLUS MD720-3*
- SIPLUS MD741-1*  * Approval only for Europe
Industrial communication

Industrial networking software

**Network management**

---

**SNMP-OPC Server**

Reliable monitoring and fast, accurate diagnosis of both wired and wireless networks

The SNMP OPC Server network management product supports you with the main network management tasks in industrial environments.

**SOFTNET Security Client**

Security for Industrial Ethernet

Secure data transmission according to certified standards for protection against data espionage and manipulation.

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Safety technology

Safety Integrated

Integrated safety technology from a single source

All Safety Integrated products or systems can be seamlessly integrated into the standard automation system and drives. This makes them especially flexible and cost-effective. They accelerate engineering, increase plant availability and enable practice-oriented machine operation. And thanks to an extensive range of products, support, and services, you’re always on the safe side with Safety Integrated.

We will be pleased to support you with our training courses on safety standards, risk assessment and safety products. Thanks to numerous function examples, you will arrive at the right safety solution more quickly. And you can use the Safety Evaluation Tool to generate the safety certificate for your machine easily.

For more information refer to: [www.siemens.com/safety-integrated](http://www.siemens.com/safety-integrated)

### Fail-safe communication

PROFIBUS and PROFINET with PROFIsafe profile

PROFIBUS or PROFINET – Standard and safety-related data on a single fieldbus.

- PROFIsafe permits innovative approaches such as wireless fail-safe communication over IWLAN and PROFINET

ASIsafe Solution PROFIsafe

SIMATIC AS-i F-Links

The SIMATIC AS-i F-Links allow you to take advantage of comprehensive AS-i safety functions. These links operate AS-Interface together with fail-safe SIMATIC and SINUMERIK controllers. These bus-based links convert ASIsafe telegrams into the PROFIsafe protocol - and vice versa.

ASIsafe Solution Local

Modular safety system 3RK3

The local ASIsafe solution requires only a few components: One modular safety system MMS and safe slaves. Fail-safe PLCs or special masters are not required. The MMS monitors the safe sensors (e.g. EMER OFF), evaluates the results according to its programmed behavior and ensures secure disconnection.
Safety technology

Acquisition

**3SF1**
Position switch with integral ASIsafe electronics
- Quick and easy connection to the AS-Interface network
- The entire spectrum of 3SE5 position switches is available with integrated ASIsafe electronics

**Emergency stop mushroom-head momentary switches**
You can incorporate emergency stop switches of type 3SB3 directly into the standard AS-Interface network. The communications are safety-oriented.

Evaluation

**Fail-safe controllers**
Modular, PC-based or embedded controllers
Standard and safety controller combined, in a centralized or distributed configuration, PC or PLC-based – over PROFINET or PROFINET with PROFIsafe profile. The new SIMATIC S7-1500 is top-notch and convincing in performance.

**Modular fail-safe I/O system**
SIMATIC ET 200SP F and ET 200S
The safety-oriented scope of the ET 200S includes digital I/O, relays, distributed F-CPU, power modules and motor starters.
The new ET 200SP provides even more functions and requires less space.

**Fail-safe I/O system with high packaging density**
- SIMATIC ET 200M
Fail-safe digital and analog I/O modules supplement the wide range of standard modules – for all your requirements.

**Modular, fail-safe I/O for hazardous areas**
- SIMATIC ET 200iSP
The safety-related range comprises two digital modules (8- and 4-channel) and one analog HART module.

**Fail-safe block I/O with high degree of protection**
SIMATIC ET 200eco
For installation directly at the machine – enabling you to reduce the installation costs for fail-safe signals.
Safety technology

Evaluation

Modular, fail-safe I/O with high degree of protection – SIMATIC ET 200pro
The distributed fail-safe I/O system with IP65/67 protection for distributed expansion of the safety-related S7 controller, optionally via PROFINET or PROFIBUS.

SIRIUS modular safety system
3RK3 Basic
3RK3 is a modular, software-programmable safety relay consisting of central unit, expansion modules, DP interface module, diagnostic display, and parameterization software.

Flexible, fail-safe motor management
SIMOCODE pro 3UF7
Integrated safety functions for safe shutdown of motors in automated processes.

Safety relays SIRIUS 3SK1
For low-performance safety requirements, employable in new and existing installations. They offer much flexibility and savings potentials.

Für harsh ambient conditions
SIPLUS extreme
These hardened SIMATIC modules are based on standard modules and exhibit special properties to make them suitable for extreme environments.

Reaction

Frequency inverter for single drives up to 250 kW
SINAMICS G120C, G120, G120D
Standard drives with integrated safety functions for variable-speed operation of asynchronous motors in conveyor systems, pumps, fans, compressors and other equipment units (saws, extruders).

Fail-safe positioning drive
SINAMICS S110
AC/AC device for positioning a drive axis with synchronous or asynchronous motors.
  • Rapid response to safety problems
Safety technology

**Fail-safe drive system**
**SINAMICS S120**
Drive system for high-performance single/multiple-axis applications with integrated self-test routines for the detection of errors and faults.

**Fail-safe drive**
**SINAMICS G130 / SINAMICS G150**
Frequency converter for single drives of medium to high performance with integrated self-test routines for the detection of errors and faults.

**Fail-safe drive**
**SINAMICS S150**
Converter cabinet for demanding, variable-speed single drives with integrated self-test routines for the detection of errors and faults.

**Safety numeric control**
**SINUMERIK 840D sl**
Numeric controller and drive with integrated safety technology. It operates safely and conveniently under all conceivable operating conditions, and also under set-up and test conditions.

**ASIsafe Module S45F with fail-safe AS-i output**
More flexibility – use ASIsafe to switch off safely. This fail-safe SlimLine module denoted as S45F lets you switch distributed actors safely through AS-Interace.
Industrial controls

Intelligent power monitoring

Innovative automation contributes considerably to cost savings in production

Various products for power distribution can be integrated into the power monitoring. These include hardware and software components such as the energy data management system as an add-on to SIMATIC power-rate for PCS 7 and WinCC, 7KM PAC measuring devices, communication-capable 3WL/3VL circuit breakers, the SIMOCODE pro motor management system (see page 60), and protection devices such as SIPROTEC.

**Reduction in operating costs**

- Identification of loads with high energy consumption in order to implement more energy-efficient measures
- Support of energy purchaser through provision of historical requirement profiles and energy consumption patterns
- Optimization of capital expenditure for plant expansion projects through localization of hidden reserves in power distribution
- Improvement in energy cost awareness in the departments through exact allocation of costs
- Avoidance of peak loads through automatic load management

**Increase in plant availability**

- Increase in operating times through immediate and automatic recognition of critical conditions (e.g. alarm and event logs)
- Avoidance of overload situations through early recognition of the capacity limits of your power distribution
- Safeguarding of quality of electrical energy through continuous monitoring and analysis
- Optimization of maintenance requirements through analysis of the usage of your power distribution components

More information is available under: www.siemens.de/lowvoltage/energiemonitoring

**SIMATIC-based Power Data Management System**

Power distribution for efficient energy use
Integration of other power distribution products, e.g. communication-capable 3WL/3VL circuit breakers, 7KM PAC measuring devices, the SIMOCODE pro motor management system, or protection devices such as SIPROTEC as well as sensors for energy media such as oil, gas, water and compressed air.

**7KM PAC measuring devices**

Accurate overview of electrical parameters and energy
Comprehensive energy measurement and flexible communication.
- 7KM PAC3100 measuring device, for low-cost entry in digital measurement
- 7KM PAC3200 measuring device, the specialist for accurate energy acquisition
- 7KM PAC4200 measuring device, the professional for communication and monitoring
3WL/3VL circuit breakers

Modular circuit breakers with built-in communication interface to your automation system

Circuit breakers are now more than just high-quality switching and protective devices. Via standardized bus systems, the 3WL communication-capable air circuit breakers and 3VL molded-case circuit breakers send measured values, switch status information, important diagnostic, fault, maintenance or cost center management information to a central control room or an automation system.

The circuit breakers of the SENTRON family fit seamlessly into the automation architecture and increase the availability of your plant. Plus, you can optimize the energy distribution process with a networked power management solution. Never before have circuit breakers been so versatile and so simple to use.

Communication-capable circuit breakers

3WL air circuit breakers
from 630 A up to 6300 A
Integrated communication via PROFIBUS DP and Modbus RTU.

3VL molded-case circuit breakers with COM20/COM21
from 25 A to 1600 A
Communication between 3VL and COM module via PROFIBUS DP and Modbus RTU.

Software

Commissioning and diagnostics software
powerconfig
Software tool for efficient commissioning and diagnostics for 3WL/3VL circuit breakers with communication capability and 7KM PAC measuring devices.

powermanager power monitoring software
The powermanager software is the control center of the PC-based power monitoring. It functions using PCs and measuring devices (7KT / 7PM PAC series) with an Ethernet connection.
See also Catalog LV 10 2013, page 13/16.

Energy management
3WL/3VL block library for SIMATIC PCS 7
see "Process control systems", page 50.
In the demanding environment of industrial machines and plants, SIMATIC IPCs are in their element, because they have everything that you need for an industrial application: modern industrial design, compliance with industry standards with full industrial functionality and high system availability.

Thus they are designed to perform their tasks reliably 24 hours a day while withstanding loads such as vibrations, cold, dust and heat.

Due to their strong resistance to vibration and shocks they ensure the smooth and precise execution of industrial processes and thereby minimize the risk of a process standstill. The reliability of SIMATIC IPCs is achieved, among other things, by special hard disk suspension systems, rugged metal enclosures with high electromagnetic compatibility (EMC) and interlocked plug-in connectors. In addition, special card retainers and fixings ensure that the modules or an internally inserted USB Flash-Drive cannot work loose.

The wide operating temperature range from 0 to 55 °C (customerspecific 65 °C on request) allows flexible use in a wide variety of applications. This is made possible, for example, by special diskless CFC or SSD systems that also withstand severe shocks and vibrations.

With SIMATIC IPCs you utilize innovative PC technologies with high continuity, long-term availability, and increased investment protection due to

- the use of new Intel processors (Atom up to Core i7 3rd Gen.) and DDR3 memory technology, optionally with integrated ECC error correction
- rugged PC components and mainboards which will be available for a long time and are developed and produced in-house
- assured supply of spare parts for several years

Another positive point: The devices are available in a wide variety of different designs and sizes and thus fulfill any requirement – regardless of whether you would like to install them directly on the machine or in the control room.

SIMATIC IPCs offer more networking options with the PROFINET interface integrated on the mainboard, freeing up a slot for expansions with other PC cards. The integrated 3-port switch facilitates the flexible and easy construction of line, tree or ring topologies. Real-time, IT communication as well as TCP/IP are thus possible on a single line.

SIMATIC IPC – the more industrial PC.

More information is available under: www.siemens.com/ipc
### Industrial PCs

<table>
<thead>
<tr>
<th>Embedded industrial PCs</th>
<th>SIMATIC IPC227D and IPC427C/427D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultra-compact, flexible, and maintenance-free for the DIN rail.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Compact for universal application</th>
<th>SIMATIC Box PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact and rugged diskless systems with CompactFlash drive and solid-state drive for universal use.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>For mounting in control cabinets, consoles and switchboards — SIMATIC Panel PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powerful industrial PCs with brilliant displays for on-site operator control and monitoring.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mounting in 19&quot; racks</th>
<th>SIMATIC Rack PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-quality components with a high MTBF (mean time between failures) and overpressure ventilation with temperature-controlled fans.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Thin Client</th>
<th>SIMATIC Industrial Thin Client</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powerful operator terminals with high-resolution 12&quot;, 15&quot;, 19&quot; and 22&quot; widescreen touch displays for client-server architectures.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Completely protected HMI devices</th>
</tr>
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<tbody>
<tr>
<td>Flexible mounting and installation concepts with IP65 degree of protection.</td>
</tr>
<tr>
<td>All devices with touch displays, in the designs SIMATIC Multi Panel PRO, SIMATIC Thin Client PRO, Flat Panel Monitor PRO, SIMATIC HMI IPC477C.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Brilliant monitors for industrial use</th>
<th>SIMATIC Industrial Flat Panel monitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rugged industrial monitors with widescreen displays of 15&quot;, 19&quot; and 22&quot;, ideal for use mounted directly on the machine.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Brilliant monitors for industrial use</th>
<th>SIMATIC HMI SCD1900</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-cost SCD monitor in 19&quot; widescreen format (1440 x 900 pixels) and with user-friendly operation thanks to touch functionality.</td>
<td></td>
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</tbody>
</table>
Process control systems

SIMATIC PCS 7

Products, systems and solutions – seamlessly integrated into the plant-wide automation and information architecture

SIMATIC PCS 7 is a homogenous process control system with a unique scalable architecture and outstanding system characteristics that combines flexible modular redundancy and high performance with consistent data storage, communication, and configuration.

The flexible system architecture enables specific expansion of process control functions through the seamless integration of extensive additional functionality, e.g. for batch processes, material transport, asset management, security applications, process data analysis/management or MES tasks.

More information is available under: www.siemens.com/pcs7
The SIMATIC PCS 7 process control system with the seven system properties offers you the following benefits:

- Reduction of TCO (Total Cost of Ownership) through integration
- Higher performance due to increases in system reliability and availability
- Scalability of systems from hundreds up to 100,000 inputs/outputs
- Protection of the automation investment through modernization
- Risk avoidance thanks to integrated safety and security
- Continuous technological innovation
- A worldwide network of experts and Solution Partners
Process control systems

SIMATIC PCS 7 system components

**Engineering System and Management Console**
Efficient and system-wide engineering over all phases of the production lifecycle. Software administration and system inventory using the PCS 7 Management Console.

**Operator System**
User-friendly process control and a high degree of operational reliability for reducing production downtimes.

**Process data archiving and reporting**
Long-term archiving of process data in real time and customer-specific generation of reports.

**Maintenance station**
Minimization of the total cost of ownership over the complete lifecycle of the plant.

**Automation systems**
Controllers proven a million times over – optimally tailored to the demanding requirements of the process industry.

**SIPLUS extreme**
Refined standard modules based on SIMATIC PCS7 for extreme ambient conditions.

**Innovative and integrated fieldbus solutions for process automation**
Optimum availability due to ring redundancy for PROFIBUS PA and FOUNDATION Fieldbus.

**Process I/O**
The right solution for any requirement.
- Redundancy (I/O modules, fieldbus)
- Hot swapping

**Batch automation with SIMATIC BATCH**
Comprehensive batch functionality – seamlessly integrated into SIMATIC PCS 7:
- Plant- and equipment-neutral hierarchical recipes in accordance with ISA S 88.01
Process control systems

SIMATIC PCS 7 system components

Routing with SIMATIC Route Control
Cost-effective and flexible solution for material transport – homogeneously integrated into SIMATIC PCS 7.

Telecontrol with SIMATIC PCS 7 TeleControl
• Integration of remote stations (RTUs) into the process control system via telecontrol protocols
• Protocols: SINAUT ST7, Modbus, DNP3, IEC 870-5 (serial / TCP), SIMATIC S7 EDC

Additional components of SIMATIC PCS 7

Motor management
SIMOCODE pro function block library for SIMATIC PCS 7
Standardized motor blocks for easy integration and optimized operation.

AS-i library for PCS 7
The AS-Interface block library integrates itself into SIMATIC PCS 7 and enhances SIMATIC PCS 7 with the capability to integrate AS-Interface.

PowerControl
Integration of medium-voltage switchgear according to IEC 61850 into SIMATIC PCS 7.

Energy management
SIMATIC powerrate for PCS 7 and B.Data
Reduction of operating costs through increased transparency of energy flows.

Power Management
Blocks for SENTRON 3WL/3VL and PAC3200/4200
For seamless integration of SENTRON circuit breakers and power monitoring devices into the process environment.

Compact process control system
SIMATIC PCS 7 BOX
Complete process control system on an industrial PC: controller, operator system and engineering system (ES).
Process control systems

Additional components of SIMATIC PCS 7

1. **Automation for the laboratory**
   SIMATIC PCS 7 LAB
   Connection of laboratory equipment (dosing units, measuring instruments, pumps, agitators, etc.) via I/O.

2. **Fault-tolerant process control**
   SIMATIC S7-400FH
   Safe, fault-tolerant controller for critical processes.

3. **I/O system for a high level of plant safety**
   SIMATIC ET 200S / ET 200M
   A wide range of fail-safe I/O modules for critical processes.

4. **Safety Lifecycle Engineering**
   SIMATIC S7-F systems and SIMATIC Safety Matrix
   Certified engineering of process safety applications.

5. **Migration of legacy process control systems**
   Tailored migration products for those switching from Siemens control systems and for users of non-Siemens control systems.
Sensor systems

Precision all along the line

With sensor systems, we bundle our process sensors complete with process instrumentation, process analysis and weighing technology to create a complete product range for all industries.

As the innovation leader in automation with many years of experience, we ensure that our devices fulfill the requirements of a wide range of applications and the most exacting requirements with perfect precision and total reliability.

For measurement and sensing, analyzing, monitoring processes, controlling or detection – whatever the task, our sensor systems are always optimally tuned to your individual requirements.

Our complete sensor portfolio for maximum efficiency and productivity:

- Process instrumentation with pressure, temperature, fill-level and flow meters as well as valve position controllers
- Process analysis with gas chromatographs and gas analyzers
- Weighing and dosing systems

Process instrumentation

Precision measurements and reliable control of the process procedures are important factors for achieving highly efficient process engineering plants and excellent product quality.

Powerful process sensors measure and sense pressure, temperature, fill level and flow; they also weigh and dose, analyze and monitor the process.

The extensive product range of process instruments, process analyzers and weighing devices always offers the right process sensors for widely differing applications and industries.
## Sensor systems

### Process sensors

<table>
<thead>
<tr>
<th>Category</th>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level transmitters</strong></td>
<td>SITRANS L</td>
<td>Level measuring instruments for liquids, solids, slurries and interfaces.</td>
</tr>
</tbody>
</table>
| **Positioners** | SIPART PS2 | Accurate positioning of control valves.  
  - Intelligent electropneumatic positioner for linear or part-turn actuators |
| **Flow meters** | SITRANS F | Suitable for all types of fluids and a host of measuring methods: Coriolis, vortex flow measurement, orifice, rotary piston, ultrasonic, variable area, or magnetic-inductive methods. |
| **Process controllers** | SIPART DR | The field-proven, high-performance controller family for all tasks in process engineering.  
  - With a continuous output signal or as a step controller |
| **Pressure gauges** | SITRANS | Wide range of instruments – also suitable for extreme chemical and mechanical loads, as well as loads caused by electromagnetic interference. |
| **For extreme ambient conditions** | SIPLUS extreme | Refined standard modules based on SIWAREX for extreme ambient conditions. |
| **Temperature transmitters** | SITRANS T | Wide range of instruments.  
  - For use as control room, field or head-mounted transmitter.  
  - Cost-effective, high-precision measurement |
| **Weighing technology** | SIWAREX | Precision weighing and batching for integration into your automation system.  
  - For complex batching and filling applications |
Sensor systems

Process analysis

Gas analyzers
Highly accurate and reliable gas analyzers for emission monitoring in waste incinerators, power plants, chemical processing, rotary kilns, automotive, and many more applications.

Gas chromatographs
MicroSAM, SITRANS CV, MAXUM Edition II
Process gas chromatographs with extended functions for all applications, even under extreme ambient conditions.

Rotary encoders

SIMODRIVE sensors
Optoelectric encoders
- acquire the position, angle, rotational speed, and velocity of machines
Incremental encoders
- generate a defined number of steps (increments) per revolution
Absolute encoders
- supply absolute position values even immediately after power-on and without reference point approach
SITOP stabilized power supplies

Reliability all the way

A reliable, power supply, available 365 days a year, is essential to every efficient plant operation. This is assured by the high quality and excellent functionality of the SITOP primary switched power supplies. They provide the standard 24 V automation voltage as well as other DC voltages. The output is precisely regulated, even in the event of large power fluctuations.

The SITOP modular, smart, SIMATIC design and LOGO! Power product lines offer rail-mounted power supplies to suit various different requirements and outputs. DC-UPS and add-on modules also protect against different primary-side and secondary-side faults or offer even all-round protection.

More information is available under: www.siemens.com/sitop

SITOP

The modular power supply
SITOP modular
Technology power supply for demanding solutions in a rugged, compact metal enclosure.

- 1-phase/2-phase: 24 V / 5, 10 A
- 1-phase: 24 V / 20, 40 A
- 3-phase: 24 V / 20, 40 A, 48 V / 10, 20 A

The powerful standard power supply
SITOP smart
For standard automation applications.

- 1-phase: 24 V / 2.5 A, 5 A, 10 A
- 3-phase: 24 V / 10, 20, 40 A

The slim-line power supply
SITOP compact
For control boxes.

- 24 V / 0.6 A, 1.3 A, 2.5 A, 4 A, 3.7 A NEC Class2
- 12 V / 2 A, 6.5 A

In LOGO! design

The flat power supply
LOGO! Power
- Flat design for distribution boards
- Wide-range input of 85 V...264 V for almost all 1-phase grids, also on DC systems from 110 to 300 V DC
Power supplies

In SIMATIC design

Power supplies for SIMATIC S7-1200, S7-300, S7-1500, ET 200pro

The optimum supply for SIMATIC S7 and more.
- PM1207 power module: The compact power supply with 24 V/2.5 A for the SIMATIC S7-1200.
- S7-300 design: 24 V/2 A, 5 A and 10 A, PS307 compact system and load power supplies.
- SIMATIC ET200pro – The power supply unit with IP67 degree of protection is used as an electronics/encoder supply and load voltage supply of the I/O device.
- Design S7-1500 – The SIMATIC PM1507 24 V/3 A and 8 A load power supply units supply the CPU modules, the communications modules, input/output modules as well as connected sensors and actuators.

DC-UPS and add-on modules

For uninterruptible power supplies, redundancy and selectivity in the output circuit

The optimum supply for SIMATIC S7 and more.
- SITOP modular buffer module for 24 V buffering in the seconds range
- Maintenance-free DC UPS with long-lasting capacitors for 24 V buffering in the minutes range
- DC UPS with battery modules for supplying 24 V in the hours range
- Now also with PROFINET interface and full integration into TIA
- Redundancy module for decoupling SITOP power supply units of the same type
- Selectivity module for sharing the load current among several 24 V feeders and monitoring for overload

For extreme ambient conditions

SIPLUS extreme

Refined standard modules based on SITOP for extreme ambient conditions.
- SIPLUS LOGO! PS
- SIPLUS S7-200 PS, SIPLUS S7-1200 PM1207, SIPLUS S7-300 PS, SIPLUS S7-400 PS
- SIPLUS PS smart, SIPLUS PS modular, SIPLUS POWER
- SIPLUS PS signaling module
- SIPLUS PS redundancy module
- SIPLUS PS DC-UPS
Drive technology

The right drive for almost any application

Wide range of drives – from the standard to the motion control drive

Drive products and systems play an increasingly important role in industrial automation architectures. Leveraging this technology provides tremendous potential for improvement in drive control, as well as energy savings.

The Siemens portfolio of drive products and systems covers the entire range of drive applications.

This scalable range of products is available for a wide output range. Our state-of-the-art technologies provide optimal dynamic performance and superior functionality to accommodate applications in all industries.

The devices are available for both centralized and distributed solutions in a variety of different types of design.

Integration into the overall automation architecture is implemented via standard fieldbuses, such as PROFIBUS and PROFINET. The Siemens tools, drive products, and solutions described on the following pages can help you achieve the goals of your automation strategy.

More information is available under: www.siemens.com/drives

Motor management and control devices

Flexible motor protection and control

SIMOCODE pro
Motor management system

- Simple and direct connection of the motors to the automation system
- Control, monitoring and parameterization of all drives from a central location
- Greater process transparency thanks to more diagnostics information for every motor feeder
- Intelligent full motor protection autonomously from the control system with optimal utilization of the motor power
- Safety-related shutdown of drives, through integrated safety functions

SIMOCODE ES
Parameterization and service software for SIMOCODE pro
See "Network management", page 72.
Motor and soft starters

For use in the control cabinet

- **SIRIUS 3RW44 soft starter**
  for High Feature applications
  SIRIUS 3RW44 handles even complex starting and stopping operations easily and smoothly.

- **SIRIUS 3RA2 load feeders and SIRIUS 3RA6 compact starters**
  Optimally coordinated switching devices for a very compact configuration.

- **ET 200S motor starters**
  Combination of starter circuit breaker, electronic overload protection and contactor or soft starter up to 7.5 kW.

- **ET 200S safety motor starters (PROFIsafe)**
  A safety-oriented range comprises digital inputs and outputs, relays, distributed F-CPUs, power modules and motor starters.

For applications in the field

- **ET 200pro motor starters**
  The intelligent ET 200pro motor starters are used for starting and protecting motors and loads of up to 5.5 kW (electromechanical direct-on-line and reversing starters as well as High Feature electronic motor starters).

- **ET 200pro safety motor starters (PROFIsafe)**
  Distributed fail-safe I/O system in IP65/67
  For distributed expansion of the safety-related S7 controller, via PROFIBUS or PROFINET

- **SIRIUS M200D motor starters**
  Rugged, compact motor starter, fully integrated into TIA. Parameterization via STEP 7 or using the Motor Starter ES commissioning software (see page 72).

- **ECOFAST motor starters**
  ECOFAST motor starters are distributed devices used for switching and protecting three-phase current loads (400 V AC).
Drive technology

For applications in the field

<table>
<thead>
<tr>
<th>SIRIUS MCU motor starters</th>
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<tbody>
<tr>
<td>This series of motor starters with a high degree of protection is a system solution for cabinet-free controlling of three-phase current loads for use in the field.</td>
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</tbody>
</table>

Inverters/converters

Low-voltage inverters/converters

<table>
<thead>
<tr>
<th>SINAMICS G110</th>
</tr>
</thead>
<tbody>
<tr>
<td>The versatile single drive for low outputs</td>
</tr>
<tr>
<td>Ideal for use with LOGO! and SIMATIC S7-200 controllers.</td>
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</table>

<table>
<thead>
<tr>
<th>SINAMICS G110D</th>
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<tbody>
<tr>
<td>Simple drive tasks (e.g.: conveyor systems)</td>
</tr>
<tr>
<td>Stepless speed control for three-phase asynchronous motors.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>SINAMICS G120C, G120, G120D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency inverter for single drives up to 250 kW</td>
</tr>
<tr>
<td>Standard drive for variable-speed operation of asynchronous motors.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>SINAMICS G120P</th>
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</thead>
<tbody>
<tr>
<td>Standard drive for pumps, fans, and compressors</td>
</tr>
<tr>
<td>Ideal for building management systems, the water industry and the process industry (HVAC).</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>SINAMICS G130/G150</th>
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</thead>
<tbody>
<tr>
<td>The universal drive solution for high-performance single drives</td>
</tr>
<tr>
<td>U/f control and vector control with or without sensor.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>SINAMICS S110</th>
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<tbody>
<tr>
<td>The single-axis drive for positioning tasks</td>
</tr>
<tr>
<td>AC/AC device for positioning single axes with synchronous or asynchronous motors.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>SINAMICS S120</th>
</tr>
</thead>
<tbody>
<tr>
<td>The modular drive system for demanding drive tasks in single-axis and multi-axis applications</td>
</tr>
<tr>
<td>Available in various designs.</td>
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</table>
Drive technology

### Low-voltage inverters/converters

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SINAMICS S150</strong></td>
<td>For sophisticated, high-performance single drives: test bay drives, elevators and cranes, cross-cutters and shears, conveyor belts, presses, cable winches, and centrifuges</td>
</tr>
<tr>
<td><strong>SINAMICS G180</strong></td>
<td>The specific drive solution for oil and gas, chemical and process industries</td>
</tr>
<tr>
<td><strong>MICROMASTER</strong></td>
<td>AC inverters for a wide range of applications – from simple speed control to complex torque control</td>
</tr>
<tr>
<td><strong>SIPLUS extreme</strong></td>
<td>Refined standard modules based on MICROMASTER for extreme ambient conditions</td>
</tr>
<tr>
<td><strong>SIMODRIVE POSMO A</strong></td>
<td>Intelligent positioning motor for PROFIBUS DP Servo motor and integral drive for direct installation at the machine.</td>
</tr>
<tr>
<td><strong>SIPLUS extreme</strong></td>
<td>Refined standard modules based on MICROMASTER and SIMODRIVE POSMO A for extreme ambient conditions</td>
</tr>
</tbody>
</table>

### Medium-voltage converters

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SINAMICS Perfect Harmony</strong></td>
<td>The Number 1 medium-voltage converter Most compact medium-voltage converter with an output range from 150 kW to 15 MW.</td>
</tr>
<tr>
<td><strong>SINAMICS GM150</strong></td>
<td>The universal drive solution for single drives in the medium-voltage range Output range 820 kW to 18 MW.</td>
</tr>
<tr>
<td><strong>SINAMICS SM150</strong></td>
<td>A sophisticated drive solution for single and multi-motor drives in the medium-voltage range Output range 2.8 MW to 31.5 MW.</td>
</tr>
</tbody>
</table>
Drive technology

Medium-voltage converters

SINAMICS GL150
Rugged single drive for synchronous machines with maximum performance
Specifically for synchronous machines up to 85 MW.

SINAMICS SL150
The cycloconverter for high-performance, high-torque asynchronous and synchronous motors
Output up to 36 MW.

DC converters

SIMOREG DC Master
Fully integrated into any automation environment
Permissible supply voltages: 400 V...950 V.

SINAMICS DC Master
The scalable, reliable and future-ready solution for DC drives in all performance classes
Rated direct current from 15 to 3000 A.
Motors

The right motor for any application

The Siemens range of motors offers the right solution for any drive task. From just a few watts to over 100 megawatts, and across all performance levels, the motors are perfectly harmonized with any Siemens drive.

The motors are designed to meet even the most exacting dynamic and mechanical requirements of your machine.

A range of innovative motor protection and control functions is also available enabling seamless integration in your automation system.

Choose from the wide range of SIMOTICS motors:
• Low-voltage motors for mains-fed and converter-fed operation,
• Motors for motion control applications,
• DC motors,
• High-voltage motors.

www.siemens.com/simotics

### SIMOTICS low-voltage motors

**SIMOTICS GP**
Asynchronous motor with aluminum housing – unsurpassed reliability, performance, and economy
Lightweight, compact motors, e.g. for pumps, fans, and compressors.
Output range from 0.09 kW to 45 kW.

**SIMOTICS SD**
Asynchronous motors with cast iron housing
For use in harsh environments and under demanding conditions, e.g. with mixers and mills in the process industry.
Output range from 0.75 kW to 315 kW.

**SIMOTICS HT**
High-torque motors with torques of up to 42,000 Nm
Gearless, permanently excited synchronous motors for applications in the paper and steel industries, for example, with outputs of up to 2,100 kW and torques of up to 42,000 Nm.
Drive technology

SIMOTICS low-voltage motors

SIMOTICS TN
Trans-standard motors for powerful drive performance in the low-voltage range
The robust trans-standard motors guarantee reliable operation in the output range from 200 to 1,250 kW even under harsh conditions.

SIMOTICS DP
Industry- and customer-specific motors for special applications
Marine, crane, roller table, smoke extraction motors and a variety of customized definite purpose (DP) motors for efficient operation under special conditions or in specific applications.

SIMOTICS XP
Explosion-proof motors for use in sensitive environments
Explosion-proof versions for Ex Zones 1, 2, 21, 22 for safe, energy-efficient operation.

SIMOTICS motors for motion control

SIMOTICS S servo motors
Servo motors with maximum dynamic response and precision properties.

SIMOTICS M main motors
Main motors with a world-beating range of performance and flexibility of selection thanks to their modular construction.
Drive technology

SIMOTICS motors for motion control

SIMOTICS L linear motors
Linear motors for extreme dynamic response, peak power and precision in linear movements.

SIMOTICS T torque motors
Torque motors offering maximum precision across the entire torque range in an extremely compact design for rotary axes.

SIMOTICS DC motors

SIMOTICS DC - Low-maintenance DC motors
Ideally suited for use with SINAMICS DCM converters with outputs from 31.5 kW to 1,610 kW.

SIMOTICS high-voltage motors

SIMOTICS HV asynchronous and synchronous motors with outputs up to 100 MW
Motors for maximum reliability and longevity, above all in coordinated system solutions using SINAMICS frequency converters.
Drive technology

Geared motors

The right geared motor for any application

Siemens offers a comprehensive range of geared motors designed for any application up to and including high-dynamic motion control.

Our low-voltage asynchronous geared motors are available in energy-saving and explosion-proof versions. They offer high power density, whether worm gear, helical gear, parallel shaft gear, bevel helical gear, helical worm gear, or planetary gear motors.

www.siemens.com/geared-motors

Geared motors

MOTOX
Geared motors for mains-fed and converter-fed operation
Helical, parallel shaft, bevel helical, helical worm, and worm geared motors.

Motox configurator
Selection and configuration of geared motors
Step-by-step guide for the user, making it easy to select the specific geared motor.
Tools

Calculate the potential for energy savings and amortization time

**SinaSave**
The quick and easy way to determine potential savings
SinaSave helps to simplify and speed up the decision-making when assessing the most efficient way to invest in energy-efficient motors and converters.
[www.siemens.com/sinasave](http://www.siemens.com/sinasave)

Selection and configuration of drive technology products

**DT configurator**
The DT configurator provides support for selecting the optimum products for your application – from motors to converters, covering all available options. In addition, drive systems for pump, fan and compressor applications can also be configured. Comprehensive documentation from the data sheet and the operating instructions through to 2D/3D dimension drawings and certificates can be called up in addition.
[www.siemens.com/dt-configurator](http://www.siemens.com/dt-configurator)

Configuration software

**SIZER**
The SIZER configuration software aids in the configuration of a complete drive system and allows the handling of the drives, from single drives to complex multi-axle drives.
[www.siemens.com/sizer](http://www.siemens.com/sizer)

Commissioning software

**STARTER**
For commissioning all drives in the SINAMICS family
Menu-guided, graphically supported configuration and commissioning of the drive components.
[www.siemens.de/starter](http://www.siemens.de/starter)
Always the right solution: FLENDER gearboxes

As the world’s largest supplier of industrial gearboxes, we have the ideal solutions for your applications. Thanks to our many decades of experience, we have extensive expertise in nearly all of the fields of material acquisition, industry, and further processing. The FLENDER portfolio of gearboxes ranges from a universal standard gearbox program and application-specific gearboxes to customer-specific solutions. The technology, which has been proven thousands of times over, and more than 110 years of experience prove our competence.

Standard gearboxes – universal, with solid performance and adaptable
The standard gearbox program was developed for use in almost all areas of mechanical drive technology. Maximum efficiency, fast worldwide availability and appealing pricing – the decisive advantages of the world’s most comprehensive standard gearbox portfolio. The portfolio encompasses gear drives, planetary gearboxes, and CAVEX worm gearboxes. Thanks to the various gearbox concepts and designs, this series of models offers a nearly endless variety in design versions in the torque range of 2,300 to 2,600,000 Nm.

The modular system allows exceptionally short delivery times. Important mounting parts are already included in the standard portfolio, which means that adapting the gearbox to the needs of the customer does not negatively impact the delivery times.

Gearbox portfolio

FLENDER gearboxes
Helical, bevel and bevel-helical gearboxes
With FLENDER gearboxes, Siemens offers the most comprehensive range of industrial gearboxes in the world.

FLENDER planetary gearboxes
Gearbox solutions for the higher performance range
Torque ranges up to 2,600,000 Nm and gear ratios up to 4,000:1.

CAVEX worm gearboxes
Industrial worm gearboxes/motors
Torque ranges up to 360,000 Nm, efficiency up to 95% and gear ratios up to 30,000:1.

FLENDER application-specific gearboxes
Proven standard and special-purpose solutions
References from all around the world prove our multi-faceted industry competence.

FLENDER customer-specific gearboxes
In close cooperation with our customers, we implement individual solutions that are ideally attuned to their specific needs.
Couplings

FLENDELDER

Couplings
Quality and flexibility in a range of products that is unparalleled worldwide
Torque range from 10 to 10,000,000 Nm

FLENDELDER X.CAT product configurator
Selection guide for FLENDELDER gearboxes and couplings
Comprehensive configuration of gearboxes and couplings (in more than 10 languages) with automatic checking of the configuration consistency.

Condition Monitoring Systems

Planned maintenance instead of spontaneous repair

With the Condition Monitoring System from Siemens, you can constantly monitor your machines and plants. Maintenance procedures can be planned better and only performed when they are actually necessary - preventative maintenance.

Condition Monitoring System

SIPLUS CMS
Investment protection thanks to the constant monitoring of machines and processes
Early detection of damage and optimum utilization of the service life of the units.

SIPLUS CMS4000
Scalable condition monitoring:
Highly dynamic monitoring and analysis
Easy integration into higher-level maintenance and SCADA systems.

SIPLUS CMS1000
Easy and compact condition monitoring:
Switch on, teach, monitor
No specialist knowledge required, complete diagnostics at a glance.
Drive technology
Selection and engineering tools

**Network management**

**SIMOCODE ES**
Parameterization and service software for the SIMOCODE pro motor management system
- Easy parameterization reduces engineering costs and shortens commissioning time
- Integrated graphical editor for device parameterization using drag and drop technique

**WinSoft Starter**
Selection and simulation program for soft starters
WinSoft Starter is a quick and highly accurate selection and simulation program that allows you to select the right SIRIUS soft starter for the right application.

**Soft Starter ES**
Parameterization and evaluation software for soft starters
The Soft Starter ES software allows you to parameterize, monitor, and perform diagnostics during servicing for SIRIUS 3RW44 High Feature soft starters quickly and easily.

**Motor Starter ES**
Parameterization and evaluation software for motor starters
The Motor Starter ES software allows you to parameterize, monitor, and perform diagnostics during servicing for SIRIUS motor starters quickly and easily.

**Switch ES Power**
SENTRON Low Voltage Distribution
Parameterization, diagnostics and monitoring of the SENTRON circuit breakers via the PROFIBUS DP network.
Global competition, shorter innovation cycles, tighter regulations regarding safety and environmental protection and the growing demand for individual products present enormous challenges to plant designers and operators. For this reason, innovative solutions such as COMOS are much in demand, as they enable productivity, quality and flexibility to be optimized – over the entire lifecycle of a plant.

**New prospects through efficient data management**

With COMOS, Siemens is the only supplier in the world to offer a software solution for the integrated management of a plant project – from the planning and operation to the modernization and ultimate dismantling. COMOS ensures that planners and operators can access all project-relevant data at any time, across all levels of corporate organization and all project phases. As access is always made to the same database and COMOS guarantees a seamless flow of information, all data is always up to date: it always corresponds with the actual as-built status of the plant. In this way, COMOS creates the conditions for greater certainty of decision-making and more efficient processes throughout the company – thereby ensuring sustainable improvement of competitive capability.

With the COMOS portfolio of products we are offering you sophisticated software solutions that are perfectly coordinated with one another.
Industry Software

These cover all phases of the plant lifecycle and can be deployed both as complete and as standalone solutions.

COMOS at a glance:

- Integrated plant management over the entire lifecycle
- Software basis for object-oriented, globally consistent management of data
- Process engineering solutions for concept design, as well as 2D/3D planning and design of plants
- Consistent EMSR planning and automation systems
- Professional plant management in the operating and maintenance phase
- Comprehensive documentation and information management

More information is available under: www.siemens.com/comos

Integrated Engineering with COMOS and SIMATIC PCS 7

To counter the increasingly intense global competition in industry, along with the enormous cost and time pressures, it is becoming more and more important to perform different tasks efficiently at the same time while reducing costs as well as saving resources. Therefore a secure, IT-based data and document management system is more important today than ever before.

With COMOS and the successful process control system SIMATIC PCS 7 Siemens offers an integrated engineering with central data management for plant engineers and operators. COMOS unites all the disciplines involved in a plant project in one central database and ensures that there is an information flow without inconsistencies or data loss. Thanks to the object-oriented data management, correct and up-to-date information is available to any user at any time. SIMATIC PCS 7 is based on tried-and-tested standard automation components and thus provides maximum availability and reliability as standard. Due to the seamless inclusion in Totally Integrated Automation, you benefit from a complete range of optimally coordinated system components for the integrated automation of the entire production process.

Planning and engineering with COMOS in conjunction with SIMATIC PCS 7 allows the merging of data from parallel working processes and workflows. At the touch of a button, the entire plant structure is generated in the control system from the engineering data. This availability of all plant data and information simplifies decision-making and supports modern, cost-optimized plant management. In the event of changes, the engineering data and all documents are continuously updated in COMOS during operation. Due to a consistent data flow, the integration of both systems meets the specific requirements of plant engineers and operators, management and partners throughout all project phases. Integrated engineering throughout the entire lifecycle brings the worlds of plant engineering and operation closer together.

More information is available under: www.siemens.com/integrated-engineering
Industry Software

Manufacturing Execution Systems

The competitiveness of a company depends on a quick response to market requirements and optimization of the supply chain. At the interface between production and management, Manufacturing Execution Systems (MES) ensure uniform optimization of corporate processes – and therefore greater efficiency, integrated transparency and consistent quality.

With SIMATIC IT, Siemens has one of the most powerful and flexible MES systems on the market. As a component of Totally Integrated Automation, SIMATIC IT is based on consistent standardization of interfaces and clear ISA-95-compatible structuring and works homogeneously with all commonly available ERP and process control systems. The unique modular and scalable concept from Siemens for integration of the MES system matched to the specific requirements of the company also supports maximum flexibility.

The range of software services offered, from the normal technical support to predictive and preventive support and maintenance, helps the customer to optimize the availability of IT systems in production, whether via automatic management of software updates or the prediction of possible server problems.

- **SIMATIC IT Production Suite**
  The SIMATIC IT Production Suite consists of predefined and easily configurable modules for completely closing the gaps between ERP systems, process automation and controllers.

- **SIMATIC IT R&D Suite**
  Research and development
  SIMATIC IT R&D Suite links R&D to manufacturing.

- **SIMATIC IT Intelligence Suite**
  Production transparency through data acquisition and analysis
  The SIMATIC IT Intelligence Suite links the production data acquired in real time with the data from the business systems.

- **SIMATIC IT components**
  Each component addresses specific manufacturing tasks such as order management, material management, message management, personnel management, and report management.

- **SIMATIC IT – Industry-specific packages**
  These packages offer the companies in various industries ‘best practice’ examples of how to link the appropriate MES software and services to achieve optimized operational processes.

- **Full support during MES installation**
  In cooperation with selected partners, Siemens offers a worldwide service and maintenance network with outstanding levels of skill and expert knowledge.
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As a partner to industry worldwide, Siemens offers a comprehensive range of tailor-made services relating to products, systems and applications over the entire lifecycle. The extensive product knowledge and industrial competence of our global network of experts form the basis for minimizing downtimes and optimizing the use of resources.

This soon pays for itself: machines and systems become more productive, flexible and efficient. That is why you should opt for technology-based service from Siemens and secure a decisive advantage over the competition:

More information is available under: www.siemens.com/industry-services
Appendix

Online Support

Online Support is a comprehensive information system for all queries concerning products, systems and solutions that Siemens has developed for industry over the course of time. With more than 300,000 documents, examples and tools, it offers users of automation and drive technology the opportunity to obtain the latest information quickly. The 24-hour service allows direct, centralized access, not only to in-depth product information, but also to numerous solution examples for programming, configuration and application.

The content is available in 6 languages on an increasingly multimedia basis and now also available via mobile app. The "Technical Forum" of the Online Support offers users the opportunity to exchange information and ideas with one another. "Support Request" enables contact to be established with the Siemens Technical Support experts. The latest contents, software updates and notifications by newsletters and Twitter ensure that users from industry are kept up to date at all times.

www.siemens.com/industry/onlinesupport

Industry Training

Up-to-date knowledge is increasingly becoming a critical factor for success. One of the key resources of any company: qualified personnel who are able to make the right decisions at the right moments and exploit any available potential.

With SITRAIN – Training for Industry, Siemens offers comprehensive training courses. The technical training courses impart expertise and practical knowledge direct from the manufacturer. SITRAIN covers the entire range of Siemens products and systems in the field of automation and drives technology. Together with the customer the individual need for training for the company is determined and then a training program is drawn up tailored to the customer’s requirements. Further services ensure that all partners of Siemens and their employees are kept up to speed in terms of the latest knowledge.

More information is available under: www.siemens.com/sitrain
Appendix

Ordering electronically – Online/Offline Mall

Comprehensive library of product information

- More than 100,000 products that can help you solve almost every automation task
- Quick access to overviews, technical data, and ordering information
- Easy setup of your automation system using the selection and configuration tools
- User-friendly operator interface to product information on the Internet, including product support, FAQs, manuals, certification, etc.
- Available over the Internet (Mall) or as an interactive catalog on DVD (CA 01) – the Offline Mall of the Siemens Industry Sector.

The Siemens Mall is available under:
www.siemens.com/automation/mall
Appendix

**TIA Selection Tool**

All automation products can easily be configured and ordered using the TIA Selection Tool (downloadable without a license from the Industry Mall). Just a few configuration steps are required, making it easy and convenient to select and compile lists of parts.

All automation products in a single Selection Tool:
- Controllers (SIMATIC S7)
- Distributed I/O (SIMATIC ET 200)
- PC systems (SIMATIC IPC)
- Human Machine Interface Systems (SIMATIC HMI)
- SIMATIC NET (switches, WLAN, routers, cables/connectors)
- SIMATIC HMI software

Standardized operation and usability – as in the TIA Portal:
- Portal view (guided selection)
- Project view (specialists)

Select different user levels:
- Beginner – guided selection
- Expert – allows all options (network, export HW-Config,...)

Customer benefits
- All TIA automation products in one tool
- Simple operation, look and feel based on TIA Portal
- Fast and direct creation of system and plant configurations, no matter how complex
- Mode for new users with support / wizard
- Mode for experts with extensive functions
- Simple transfer of the ordering data to the Industry Mall
- Exchange of the configuration data with the TIA Portal is planned

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