

Product Guide

Edition 2011



Totally Integrated Automation

SIEMENS

Introduction

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

As a response to the unrelenting competitive pressures, it is more important today than ever before to utilize all the available optimization potential – over the complete lifecycle of a machine or plant, starting from planning and engineering through operation and maintenance as far as expansion and modernization.



Siemens offers the perfect basis for this with the open system architecture Totally Integrated Automation – for every application area in all sectors.

The unique system uniformity of Totally Integrated Automation ensures perfect interaction of all components. This benefits machine and plant builders, system integrators and end customers alike: Optimized processes reduce the total cost of ownership, shorten the time to market and improve quality.

In this way, Totally Integrated Automation is key to constant gains in competitiveness.

Systematic benefits over the complete lifecycle

Totally Integrated Automation from Siemens is an automation architecture with clearly defined, characteristic system properties:

- Engineering
- Communication
- Diagnostics
- Safety
- Security
- Ruggedness

Engineering

Maximum engineering efficiency – in all phases of the lifecycle of the machine and plant

With the Totally Integrated Automation Portal (TIA Portal) Siemens has redefined engineering. The new engineering framework TIA Portal combines the automation software tools SIMATIC STEP 7, SIMATIC WinCC and SINAMICS StartDrive in a single development environment.



With its intuitive user interface, efficient navigation and well-proven technology, the TIA Portal offers innovative highlights in several fields. It is a milestone in future software development.

To supplement the Totally Integrated Automation Portal, you are offered software that will provide comprehensive support over the entire lifecycle of your machine or plant.

With COMOS and SIMATIC Automation Designer we provide software solutions that will assist you when planning, designing and operating your installations.

With SIMATIC IT, we offer a comprehensive software suite that supports you in the wide range of different tasks involved in optimizing your production.

With its high integration capability and well-matched interfaces, the software supports a data consistency which is unique – throughout the entire engineering process.

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.

Totally Integrated Automation relies on international, cross-vendor standards which can be combined flexibly: PROFIBUS, the global No. 1 fieldbus, and PROFINET, the open Industrial Ethernet standard.



Introduction

Diagnostics

Minimization of downtimes through efficient diagnostics concepts

Totally Integrated Automation offers powerful diagnostic functions which can be used to detect a fault quickly and rectify it. System-wide – without any additional engineering outlay.

In complex plants, the maintenance station provides you with a uniform view of the maintenance-relevant information of all automation components. This increases efficiency (Overall Equipment Efficiency, OEE) and saves costs.



Safety

Protection of humans and machines – within the framework of an integrated complete system

With integrated safety technology, you can satisfy today's flexibility, productivity and safety requirements.

With integrated safety functions, entirely new safety concepts can be cost-effectively implemented thanks to the short response times and the low wiring overhead. To this end, we offer a comprehensive range of products for economical overall concepts of safe machinery.

Integrated safety technology from Siemens is characterized by:

- A comprehensive range of certified products, know-how, services and tools all from a single source
- Scalable solutions for the functional safety of machines
- Integration of safety technology into standard automation and drive technology
- Uniform engineering and fast, effective diagnostics
- Secure communication via standard fieldbus systems



Security

Security:

Data security in the networked world – through harmonized, scalable security systems

With TIA you can use all the advantages that result as the worlds of automation and office grow together more and more: Seamless exchange of data across all levels, or access to production data via the Internet from any location.

In order to meet the resulting increased security requirements, SIMATIC offers you IT Security mechanisms for the protection of production and data through, for example, firewall functions, access protection, encryption and VPNs.



Ruggedness

Maximum industrial suitability – through increased ruggedness

With any standard product from the TIA range, you rely on maximum quality and ruggedness. They are ideally suited for use in industrial environments.

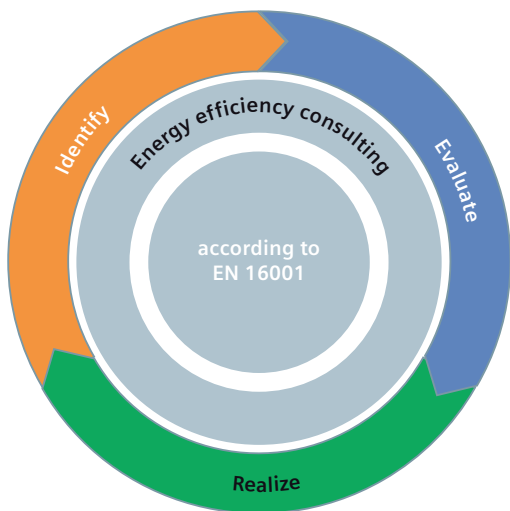
Specific system tests ensure the planned and required quality of each individual component.

The products from the TIA spectrum naturally comply with all the relevant international standards and have the corresponding certification.



Temperature and shock resistance are defined in the quality guidelines, as are vibration resistance or electromagnetic compatibility.

Energy management for industrial plants



Energy management is a continuous process, which constantly reduces the plant's energy needs, thus reducing operating costs and conserving the environment. The key to this is the perfect interaction of hardware and software (within the scope of Totally Integrated Automation) for detecting, visualizing, and analyzing energy currents.

The programs determine potential savings at all levels of factory and process automation, which can reduce energy needs in a lasting and documented way by means of improved configuration or the energy-optimized design of products and systems.

Energy management of Totally Integrated Automation consists of three phases: Identify, evaluate, and implement.

Identify

In the identify phase, a plant's energy flows are measured, visualized and analyzed using suitable hardware and software. This provides energy transparency in the plant, which allows heavy consumers of energy to be identified.

The measuring is done by measuring instruments such as the 7KM PAC or communication-capable switching and protective devices of the SENTRON family with integrated measuring technology such as the 3WL and 3VL circuit breakers.

The SIMATIC powerrate or powermanager energy management software takes over the visualization and analysis.

Using the cross-vendor PROFenergy profile of PROFIBUS & PROFINET International (PI), measured value data can also be recorded directly at the load and used for subsequent optimization.

Evaluate

As part of the evaluation process, software solutions show the exact potential for savings for the specific application scenario and they put the economic efficiency of possible implementation measures to the test. Drive systems at the field level can be tested using SinaSave, for example. The SIMATIC powerrate software program was designed for the control level and the b.data energy management system was designed for the cross-management level. In addition to automatic data acquisition and preparation, b.data also provides automatic data analysis, which is used as the basis for detailed statements on improving efficiency and possible savings in all of the relevant departments, from purchasing and planning to controlling.

Implement

In the third step (implementation), the desired economically viable potential savings are implemented. Special note should be taken of the drive technology, which is responsible for around two thirds of the industrial energy consumption. Up to 70 percent can be saved in this area by taking intelligent measures. This includes, for example,

- High-efficiency motors with a degree of efficiency that is up to 7% higher than that of conventional motors.
- Depending on the application, SINAMICS frequency converters can achieve energy savings of up to 70% by controlling the speed.
- Regenerative frequency converters with innovative infeed technology can feed accumulated braking energy back into the network and achieve energy savings of up to 50% during lifting applications.

SIRIUS motor starters and soft starters prevent current spikes and reduce the mechanical and electrical peak load of the application by up to 60%. Intelligent combinations, such as cascade connections for pump applications implemented by means of frequency converters and soft starters can reduce the power loss even further while simultaneously reducing acquisition costs and providing the utmost availability.

In addition, there are the energy management systems SIMATIC power-rate for WinCC and PCS 7, which optimizes energy currents and prevent peak loads, and b.data for optimized and economical energy management and dynamic energy management with PROFInergy for reducing the energy costs by means of a coordinated shutdown of temporarily unneeded loads during breaks in production. In connection with the PROFINET functionality I device, PROFInergy also allows the shutdown of entire parts of the plant.

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Automation systems

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Controllers

1

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.



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

The SIMATIC series comprises modular controllers such as the S7-300 and S7-400, 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.

These are just a few of the countless advantages that a SIMATIC controller can offer:

- 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 insure smooth operation
- Fail-safe SIMATIC controllers permit the integration of safety technology in standard automation
- Optimized engineering workflow due to comprehensive software

Modular controller – SIMATIC S7-1200

The mini controller for efficient and individual solutions in automation



- The new modular mini controller from the SIMATIC S7 controller series with PROFINET IO Controller functionality
- Large-scale integration, space-saving, powerful
- Suitable for small to medium-scale applications in automation engineering
- Communication modules support PROFIBUS communication as master and/or slave

Modular controller – SIMATIC S7-300

1

Optimized for the automation of machines and plants in manufacturing industry



- Integrated functions (e.g. high speed counters, closed-loop controls, motion control etc.), which saves additional modules
- Extensive selection of CPUs and modules for almost any application
- Compact design allows the use of smaller cabinets
- Integrated system diagnostics ensures high availability
- Innovative Micro Memory Card offers maintenance-free program backups and data storage without a backup battery in the event of a power failure, and the possibility of saving production and project data
- Project-wide engineering, allowing the implementation of highly integrated systems
- Fail-safe SIMATIC S7-300 CPUs permit the integration of safety technology in standard automation

Modular controller – SIMATIC S7-400

The powerful PLC for system solutions in the manufacturing and process industries



- Implementation of very complex and high-speed applications by the utilization of extremely high processing and communication performance
- Central coordination of the distributed slave controllers in plant-wide architectures
- Practically no restriction on the I/O capacities
- System expansions possible during operation and without interrupting the processes – thanks to "Configuration in RUN" and hot-swapping of modules
- Fail-safe SIMATIC S7-400 CPUs permit the integration of safety technology in standard automation
- Redundant layout for highly available processes, expandable by safety functions as needed
- Project-wide engineering, allowing the implementation of highly integrated systems

Modular controller –

Distributed controller based on ET 200S (IP20), ET 200pro (IP65/67)

Distributed intelligent automation as far as the field level

- Construction of complex system architectures from master/slave controllers for the distribution of automation tasks
- Controller can be arranged as part of the I/O subsystem in process or machine-level areas
- Can also be used as local master for the connection of drives and sensors
- Based on the modular S7-300 controller
- ET 200S and ET 200pro also available as fail-safe version

SIMATIC PC-based controllers**Complete hardware and software system for compact, open, and powerful automation**

- Maximum performance due to powerful industrial PCs with the new 2010 Intel Core processors and isochronous mode with PROFINET and IRT
- 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 or software into the S7 program.
- Integrated engineering with STEP 7, as with SIMATIC S7-300/400.

PC-based controller –

SIMATIC WinAC RTX (F)

The strength of a controller combined with the openness and performance of a PC – even for fail-safe applications

- For data-intensive applications and vertical integration
- Open interfaces for close integration of hardware and software technologies
- Optional developer kit simplifies the integration of new or existing C/C++ programs
- Deterministic response for hard real-time applications
- The TÜV-certified version SIMATIC WinAC RTX F is available for fail-safe applications

SIMATIC PC-based controllers

Ready-to-use embedded bundles

1

Open like a PC-based controller, rugged like a standard PLC

Embedded bundles utilize the openness of PC-based systems and offer an increased level of ruggedness. The controller (also as 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.

The operating system used is tailored and optimized to the hardware architecture in each case. Embedded bundles are ready to use and can be installed direct on DIN rails or at the machine on site.

SIMATIC PC-based controller –

SIMATIC S7 modular embedded controller



- Comprises the CPU EC31 as well as the expansion modules EM PC and EM PCI-104 available as options
- Interfacing to the I/O is possible decentralized as well as centralized with the SM modules of the S7-300 family
- Configuration and programming with STEP 7
- Available with the pre-installed WinAC RTX software controller, optionally also for fail-safe applications, and the SIMATIC WinCC flexible visualization runtime software

SIMATIC PC-based controller –

SIMATIC IPC227D bundles



- Open embedded PC platform in Nano format (approx. 1 liter volume) for simple control, HMI, communication, gateway and data concentrator tasks
- Available with WinAC RTX standard software controller or for fail-safe applications with WinAC RTX F
- Visualization with SIMATIC WinCC V11

SIMATIC PC-based controller – 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")
 - Available with WinAC RTX standard software controller or for fail-safe applications with WinAC RTX F
- Optionally also with WinCC flexible or WinCC visualization software

SIMATIC PC-based controller – 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
 - Available with WinAC RTX standard software controller or for fail-safe applications with WinAC RTX F
- Visualization with SIMATIC WinCC V11

SIMATIC PC-based controller – SIMATIC HMI IPC477C bundles



- Ultra-compact and fanless Panel PC (mounting depth starting at 60 mm) for use in the vicinity of machines
 - Brilliant displays from 12" to 19" with touch screen or keyboard operation, also as an IP65 version with all around protection for use without a control cabinet
- Available with WinAC RTX standard software controller or for fail-safe applications with WinAC RTX F
- Optionally also with WinCC flexible visualization software or with WinCC SCADA system (client or single-user station)

Fail-safe controller – SIMATIC S7

1

Integration of safety technology in standard automation



- For product environments, that make greater demands on the safety of personnel, machinery and environment
- Standard and fail-safe applications in only one controller
- Reduction of costs for development, installation and operation of machines that necessitate safety functions in addition to the automation
- Low maintenance costs due to extended diagnostics and shared components
- Meets the highest safety requirements and complies with the relevant standards: EN 954-1 up to Cat. 4, IEC 62061 up to SIL 3, and EN ISO 13849-1 up to PL e
- For further information, refer to the chapter *Safety Integrated*, page 95 et seq.

Safe, fault-tolerant, and redundant controller – SIMATIC S7-400H/FH

Continuous operation of plants and protection of production-critical processes



- High level of availability due to redundant system configuration, including I/O and communication
- All changes can be performed in online mode – both CPUs are automatically updated
- "Critical": with the S7-400FH as a redundant or non-redundant system for processes that are designed for safety and fault-tolerance
- Integrated safety functions on one or both CPUs meet the highest safety level requirements, up to SIL 3
- Programming with the same engineering tool for standard and safety technology
- Standard and secure communication using PROFIsafe via PROFIBUS
- For further information, refer to the chapter *Process control systems*, page 49 et seq.

For extreme ambient conditions – SIPLUS extreme

Refined standard modules, based on SIMATIC, for extreme environmental conditions



- Temperature range from -40/-25 °C to +60/70 °C
- 100% humidity, dewing, condensation, and ice formation permissible
- Modules with a special conformal coating for use in atmospheres containing corrosive gases according to EN60721-3-3 3C4 incl. salt fog and ISA S71.04 severity level G1; G2; G3; GX*) and EN60721-3-3 3S4 incl. electrically conductive sand, dust and EN60721-3-3 3B2 mold, fungus and fungal spores (excepting fauna)
- Use in accordance with railroad requirements (EN 50155)
- Increased mechanical strength
- Various voltage ranges

SIPLUS extreme product families:

SIPLUS LOGO!, SIPLUS S7-200, SIPLUS S7-1200, SIPLUS S7-300, SIPLUS S7-400, SIPLUS PCS 7, SIPLUS HMI, SIPLUS POSMO, SIPLUS MM4, SIPLUS SINAMICS, SIPLUS SIWAREX, SIPLUS Add-ons, SIPLUS NET, SIPLUS RIC extreme, SIPLUS ST 7, SIPLUS PS

*) ISA S71.04 severity level GX:

- Long-term load: SO₂ < 4.8 ppm; H₂S < 9.9 ppm; Cl < 0.2 ppm;
HCl < 0.66 ppm; HF < 0.12 ppm; NH < 49 ppm; O₃ < 0.1 ppm; NO_x < 5.2 ppm
- Limit value (max. 30 min/d): SO₂ < 14.8 ppm; H₂S < 49.7 ppm; Cl < 1.0 ppm;
HCl < 3.3 ppm; HF < 2.4 ppm; NH < 247 ppm; O₃ < 1.0 ppm; NO_x < 10.4 ppm

Technological tasks – Integrated functions

Integrated technology functions for compact machines with few axes, counter and control channels



- Counting, measuring, closed-loop control, and positioning integrated as tasks into the operating system
- For compact machines with few axes and counter/control channels
- No additional hardware or software components are required
- Parameter assignment in the engineering software

Technological tasks – Distributed ET 200S function modules

Intelligent, decentralized ET 200S modules for distributed applications



- Technological tasks are executed largely autonomously, i.e. independently of the CPU
- Parameterization in STEP 7
- Optimal performance with decentralized technology tasks
- Considerable savings in wiring costs
- Low space requirements and perfectly adapted hardware configurations thanks to compact, modular design

Technological tasks – SIMATIC technology controllers

- For more information about SIMATIC technology controllers, see "Motion Control" on page 36

Technological tasks – Loadable function blocks

- For further information about SIMATIC function blocks, see "Automation software" on page 86.

Technological tasks – Function modules

Coprocessor modules for high-performance applications



- Coprocessor modules with dedicated function for demanding counting, measuring, open-loop control, positioning, and CAM control tasks (S7-300, S7-400, and ET 200M)
 - Maximum precision and dynamic response
- Operation of the controller is not affected, because the functionalities are executed in the individual modules
 - Functions are programmed using the same tools as used in standard systems

Technological tasks – Freely configurable application modules

Configurable coprocessor modules offer ultimate flexibility and performance



- Overcomes even the most complex open-loop control, cam control, motion control, positioning, and high-speed counter applications
 - Processing within microseconds enables even the most demanding applications to be processed
 - Configurable functions can be customized for maximum processing speed and accuracy
- Functions are parameterized using the same tools as used in standard systems

Technological tasks – SIMATIC TDC

Unlimited open-loop control system



- Modular system structure with scalable hardware – also for the largest and most complex applications
 - Extremely fast sampling times of 100 μ s for dynamic control tasks
 - Maximum performance and computing power thanks to 64-bit architecture of the CPU
- Synchronized multi-processing with as many as 20 CPUs per rack and synchronous coupling of up to 44 racks
 - Graphical configuration using standard engineering tools

Automation systems

1

		Modular controller				SIMATIC PC-based controller				Distributed automation	
		LOGO!	S7-1200	S7-300	S7-400	Embedded Box PC bundles	Embedded Panel PC bundles	WinAC RTX (F)	S7-mEC	ET 200S with PLC functions	ET 200pro with PLC functions
Description		Logic module, intelligent relays, nano PLC	Compact controllers	Controllers in the mid-performance range	Controllers in the mid-performance and high performance range	IPC227D and IPC427C	HMI IPC277D and IPC477C	S7 software controller for Windows OS	Embedded controllers with Win Embedded OS	Distributed I/O system with local intelligence	
Max. main memory		200/400 Function blocks	50 KB	2560 KB	30 MB	(fanless, diskless) with Windows Embedded Standard, SW controller, HMI	Up to 4 GB SDRAM	PC main memory ¹⁾	1 GB RAM	96 KB	256 KB
Max. load memory			2 MB	Micro Memory Card 8 MB	Memory card 64 MB	Up to 8 GB CF card or up to 50 GB SSD	PC mass storage	2 GB CompactFlash Card	Micro Memory Card 8 MB		
Data backup		Maintenance-free, real-time clock, supercap 3/20 days	Program and data	Program and data (maintenance-free)	Program and data	Control data (128KB SRAM) without UPS, all data with UPS	All data with UPS ²⁾	Control data (512 KB SRAM) without UPS, all data with UPS	Program and data (maintenance-free)		

Max. I/O address area	24/16 digital, 8/2 analog	1024/1024 bytes	8192/8192 bytes	Sufficient for all applications	16384/16384 bytes	16384/16384 bytes	16384/16384 bytes	2048/2048 bytes
Local I/O	■	■	■	■	■ (via PC cards and ODK)	■	■	■
Distributed I/O					Up to 3 x PCI-104 cards (only for IPC427C) ■ 1 x PCIe or 4 digital I/O (opt., only for IPC227D)			
Motion Control								
Fail-safety								
High availability								
Programming	LOGO! Soft Comfort (FBD, LAD)	STEP 7 Basic V10.5	STEP 7 Lite, STEP 7 Professional	STEP 7 / STEP 7 Professional (LAD, FBD, STL, ST, SFC, state diagram)	STEP 7 C/C++ link (via ODK) ³⁾	STEP 7 / STEP 7 Professional (LAD, FBD, STL, ST, SFC, state diagram)	STEP 7 / STEP 7 Professional (LAD, FBD, STL, ST, SFC, state diagram)	STEP 7 / STEP 7 Professional (LAD, FBD, STL, ST, SFC, state diagram)
Networking	AS-interface, Konnex, <u>instabus</u> EIB/KNX, Ethernet	PtP, PROFINET	MPI, AS-Interface, PROFIBUS, PROFINET/Industrial Ethernet	MPI, PROFIBUS, PROFINET	PtP, PROFIBUS, PROFINET, TCP/IP, Open User Communication, OPC	PROFIBUS, IO-Link	PROFIBUS, PROFINET	PROFIBUS, PROFINET

1) non-paged memory

2) 128 KB with specific SIMATIC IPC without UPS

3) for F version: S7 Distributed Safety, LAD, FBD for F program

Distributed I/O

1

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

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

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

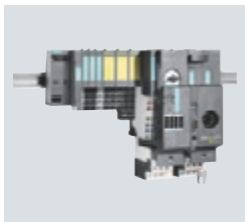
Another positive point: The devices offer communication options via PROFIBUS or PROFINET. In addition, special versions are available for fail-safe, redundant and intrinsically safe applications which are optimized for energy consumption.

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

Modular I/O system (IP20) – SIMATIC ET 200S

1

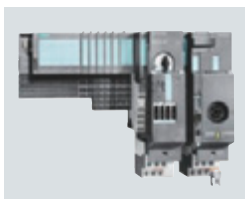
The flexibility of discretely modular I/O and the power of a high-performance module with a full range of functions



- Considerable savings in wiring costs (up to 80%)
- High availability thanks to hot swapping and permanent wiring
- Faster setup due to integrated backplane bus
- Minimal space requirement due to compact size with up to 8 digital channels on one module
- Expandable to up to 64 modules per station
- Broad module spectrum: Analog and digital I/O, fail-safe modules, motor starters, frequency converters, IO-Link Master, technology function modules, as well as CPU functionality
- Communication via PROFINET, PROFIBUS, PROFI-safe and PROFInergy profile

Discretely modular, expandable block I/O (IP20) – SIMATIC ET 200S COMPACT

Many channels in a small space – also expandable



- Compact design consisting of terminal and electronics module with 32 channels
- Further variants are available: 16 DI/16 DO or 32 DI
- Expandable with up to 12 modules (as required) from the ET 200S range of modules (except F modules) to a maximum of 128 channels
- Communication via PROFIBUS

Compact block I/O (IP20) – SIMATIC ET 200L

Low-cost digital block I/O for applications where space is at a premium



- Ideal for applications with a low number of channels
- Block design with terminal block (permanent field wiring) and replaceable electronics module
- Communication via PROFIBUS

I/O system with high channel density (IP20) – SIMATIC ET 200M

Perfectly suited for cabinet installation: Modules with high channel density, communication and function modules



- Large range of different electronics modules
- Special intrinsically safe analog modules (EEx, FM), suitable for use in process applications
- The safety-oriented modules meet the PROFIsafe specifications and allow fail-safe applications
- Module replacement during operation (hot swapping)
- High availability thanks to redundant design
- High channel density thanks to 64-channel I/O modules and up to 12 modules per station
- Simple, time-saving wiring thanks to FastConnect connectors
- Communication via PROFINET, PROFIBUS, and PROFIsafe profile

Intrinsically safe I/O system (IP30) – SIMATIC ET 200iSP

Reduction of installation costs in hazardous areas due to removal of external barriers

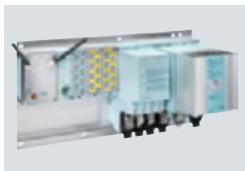


- Direct installation in areas where the danger of gas or dust explosion exists, i.e. installation in a cabinet in the hazardous areas of Zones 1, 2, 21 or 22
- Designed for operation in environments with severe vibration loads
- Module replacement during operation (hot swapping)
- Transparent HART support
- PROFIBUS and voltage supply fully redundant
- Configuration in RUN (CiR).
- Communication via PROFIBUS or PROFIsafe profile

Modular I/O system (IP65/67) – SIMATIC ET 200pro

1

The multi-functional I/O system for extreme ambient conditions for use directly on the machine



- Installation without control cabinet directly at the machine or in the process
- Broad module spectrum: Simple inputs/outputs, fail-safe modules, motor starters, frequency converters, RFID module, pneumatics, power modules for the creation of load groups
- Implementation of a wide variety of connection systems as a result of separation of the interface module and connection module
- High plant availability thanks to hot swapping and permanent wiring
- Comprehensive diagnostics concept: module-specific or channel-specific
- CPU functionality
- Communication via PROFINET, PROFIBUS, and PROFIsafe profile

Highly compact block I/O (IP65/67) – SIMATIC ET 200eco PN

Save space without losing flexibility



- Cost-efficient, extremely small digital block I/O that can be used directly on the machine
- Rugged, fully sealed zinc die-cast housing
- Flexible expansion with star and line topologies
- Multi-faceted range of modules: Digital, analog as well as user-parameterizable inputs/outputs, IO-Link Master, load voltage distributor
- Communication via PROFINET

Rugged block I/O (IP65/67) – SIMATIC ET 200eco

Easy to connect, easy to start up and inexpensive to buy and operate



- Cost-efficient digital block I/O that can be installed directly on the machine
 - Compact, rugged housing
 - Integrated T-functionality for hot swapping without interrupting the current feed or bus cable
 - Variable and flexible connection blocks available: ECOFAST and M12 7/8"
 - Also available as fail-safe I/O system
- Communication over PROFIBUS and PROFI-safe profile

Distributed I/O system for robot applications in automobile production (IP65) – SIMATIC ET 200R

Optimized for welding and handling applications in automobile production



- Housing of cast aluminum allows installation directly on the robot in environments with strong electromagnetic interference
- Resistant to welding sparks
- Communication via PROFIBUS

For extreme ambient conditions – SIPLUS extreme

1

Refined standard modules based on SIMATIC for extreme environmental conditions



- Temperature range from -40/-25 °C to +60/+70°C
- 100% humidity, dewing, condensation, and ice formation permissible
- Use in accordance with railroad requirements (EN 50155 and EN 50121-4)
- Modules with a special conformal coating for use in atmospheres containing corrosive gases according to EN 60721-3-3 3C4 incl. salt fog and ISA S71.04 severity level G1; G2; G3; GX*) and EN60721-3-3 3S4 incl. electrically conductive sand, dust and EN60721-3-3 3B2 mold, fungus and fungal spores (excepting fauna)

The products:

- SIPLUS ET200S
- SIPLUS ET200M
- SIPLUS ET200L

*) ISA S71.04 severity level GX:

- Long-term load: SO₂ < 4.8 ppm; H₂S < 9.9 ppm; Cl < 0.2 ppm;

HCl < 0.66 ppm; HF < 0.12 ppm; NH < 49 ppm; O₃ < 0.1 ppm; NO_x < 5.2 ppm

- Limit value (max. 30 min/d): SO₂ < 14.8 ppm; H₂S < 49.7 ppm; Cl < 1.0 ppm;

HCl < 3.3 ppm; HF < 2.4 ppm; NH < 247 ppm; O₃ < 1.0 ppm; NO_x < 10.4 ppm

Automation systems

1

	IP20 degree of protection					IP65/67 degree of protection				
	ET 200S	ET 200L	ET 200M	ET 200iSP	ET 200pro	ET 200eco	ET 200eco PN	ET 200R		
Description	Modular	Compact	High I/O density	Intrinsically-safe	Versatile	Low-cost	Compact	Robot specialist		
Design										
Block	■ ¹⁾	■				■	■	■		
Modular			■	■	■					
Discretely modular	■									
Installation	Standard sectional rail	DIN rail	Mounting rail	Mounting rail	Mounting rail	Direct installation				
Permanent wiring	■	■	■	■	■					
Hot swapping	■		■	■	■	■				
For use in hazardous areas	Zones 2, 22		Zones 2, 22	Zones 1, 21						
Functions										
Digital	■	■	■	■	■	■	■	■		
Analog	■	■	■	■	■					
Motor starters	■				■					
Frequency converter	■				■					
Pneumatic systems	■ ²⁾			■ ²⁾	■ ⁴⁾					
Technology functions	■		■	■						

CPU head	■	3)	Channel-specific	Channel-specific	Channel-specific	Module-specific	Channel-specific	Group-by-group
Fail-safe	■	■	Channel-specific	Channel-specific	Channel-specific	■	■	■
Diagnostics	■	■	Channel-specific	Channel-specific	Channel-specific	■	■	■
Redundancy	■	■	■	■	■	■	■	■
Communication								
PROFINET	■	5)	■	■	■	■	■	■
PROFIBUS	■	■	■	■	■	■	■	■
- Fiber-optic interface	■	■	■	■	■	■	■	■
- Copper: max. transmission rate	■	12 Mbit/s	1.5 Mbit/s	12 Mbit/s	1.5 Mbit/s (RS485-IS)	12 Mbit/s	12 Mbit/s	12 Mbit/s
IO-Link	■	■	Spring/screw-type terminal connections Fast Connect	Spring/screw-type terminal connections	Spring/screw-type terminal connections Fast Connect	Spring/screw-type terminal connections	■	M12, M23, 17-pin
Connections	■	Spring/screw-type terminal connections Fast Connect	Spring/screw-type terminal connections	Spring/screw-type terminal connections Fast Connect	Spring/screw-type terminal connections	Spring/screw-type terminal connections	Direct, ECOFAST, M12 7/8"	M12
<p>1) As ET 200S COMPACT 2) Available from Bürkert 3) Via S7-300-CPU5 4) Via FESTO 5) Now also available with fiber-optic connection</p>								

1 Intelligent logic module –

LOGO!

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

- Replace a host of conventional switching devices with several 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
 - Bars 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 OBA6 generation with two new LOGO! OBA7 basic units for:
 - Ethernet interface for programming and interconnecting LOGO! or connecting LOGO! to S7-CPU's and HMI communication
 - 400 blocks programming memory
 - Macro function
 - Data logging
 - Standard SD card for copying programs and for data logging



Motion Control

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SIMOTION Motion Control System

Products and solutions that enhance the productivity of machines

2



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
- Mechanical engineering

PC based Motion Control – SIMOTION P

Motion control, PLC and HMI on a single platform



- Ready-to-use motion control solution enables faster installation at lower cost
- Offers the openness of PCs
- Easy expansion of hardware and software thanks to standard interfaces
- Integrated isochronous PROFIBUS interfaces for connecting drives and distributed I/O
- Connection to PROFINET is implemented by means of the MCI-PN Option Module with integrated 4-port switch with IRT
- For data-intensive applications and vertical integration

Drive based Motion Control – SIMOTION D

Motion control and controller directly in the drive



- Compact design due to the integration of motion control, logic controller and drive control for the SINAMICS S120 drive system all in one unit
- Scalable and flexible due to different performance classes
- Short response times through integration of drives, motion control and controller on a single module
- Ideal for multi-axis machines with a distributed drive architecture
- Integrated Ethernet and PROFIBUS interfaces allow field devices, HMI, and higher-level control systems to be connected
- Connection to PROFINET is implemented by means of the CBE30 Option Module with integrated 4-port switch with IRT

Motion Control

Controller based Motion Control – Based on SIMOTION C

Modular, flexible motion control system

2



- Modular motion control system based on the field-proven design of the SIMATIC S7-300
 - Integral interfaces for the digital and analog connection of servo drives
 - Can be expanded to include S7-300 components
- Simple engineering of logic and motion control applications with full integration in the TIA architecture
 - Loadable software libraries covering everything from simple positioning tasks to complex axis couplings
 - Ideal for analog drives and retrofit applications thanks to on-board analog and sensor interfaces

Controller based Motion Control – SIMATIC technology controllers

The powerful controllers for technology and motion control functions, optionally with safety



- Scalability with SIMATIC CPU 315T-2DP/ CPU 317T-2DP
 - CPU 317TF-2DP: Safety and motion control in one controller
 - Lower hardware and software costs thanks to the integration of control logic and motion control in a single controller
- Only one application program has to be programmed with SIMATIC STEP 7 for the PLC and motion control
 - Shorter familiarization time and less training required since programming can be carried out in all SIMATIC languages
 - 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)
 - Powerful path interpolation functions that support innovative kinematics (SCARA, roll picker, articulated arm, 2D/3D delta picker).
 - Easy programming due to PLCopen-compatible motion control functions.
 - Isochronous PROFIBUS for controlling coordinated drives
 - Easy, system-wide engineering and maintenance of motion control functions through S7 technology

Controller based Motion Control – SIMATIC FM 357-2

Motion control coprocessor for the SIMATIC S7-300 for intelligent path and position control

- Continuous path and positioning control for intelligent motion control for up to 4 axes
- Wide range of applications – from simple position control to interpolated path control
- User-friendly startup thanks to easy-to-use parameterization tool
- For controlling stepper motors and axes with servo drive
- Interface for SIMODRIVE 611U and MASTERDRIVES MC via isochronous PROFIBUS

2

Controller based Motion Control – Easy Motion Control with SIMATIC

- For further information about Easy Motion Control with SIMATIC, see "Automation software" on page 86.

Controller based Motion Control – SIMATIC FM 458-1 DP

High-performance motion control coprocessor for the SIMATIC S7-400



- Integral open-loop, closed-loop and arithmetic operations in the SIMATIC S7-400
- Graphical configuration based on the engineering tools of the STEP7 range
- Library for technology functions and motion control with more than 300 function blocks
- Large selection of expansion modules for scaling the application
- Scalable number of controlled axes (more than 100 axes possible)
- Sampling times of 100 μ s and 1 μ s granularity for dynamic motion control and processing solutions
- Isochronous PROFIBUS – constant-time bus cycle with clock signal
- OEM know-how protection using hardware dongle

Motion Control Engineering Software – SIMOTION SCOUT

- For further information about SIMOTION SCOUT, see "Automation software" on Page 92.

Motion Control

2

		SIMATIC				SIMOTION		
		Easy motion control	Technology controllers	FM 357-2	FM 458-1 DP	C230 / C240 / C240 PN	P320 / P350	D410/D425/D435/D445
Platform	Software	Controller	Controller	Controller	Controller	Controller	PC-based controller	Drive-based controller
Features								
Number of axes, typ./max.	2...8/ limited by CPU memory	2...8/32	2...4/4	2...32/>200	2...8/32	8...32/64	1...4/16 (D410/D425) 2...8/32 (D435) 8...32/64 (D445)	
Cycle time (ms) min.	1; depends on CPU/I/O	1	6	0.1	1.5 (C230-2) 1 (C240)	0.25 with PROFINET	2 (D410/D425) 1 (D435) 0.5 (D445)	
Storage medium for user data	MMC (57-300) MC (57-400)	Micro Memory Card	PCMCIA	Micro Memory Card	Micro Memory Card	Hard disk	Compact Flash card	
Fieldbus interface	Optional	Optionally with IM 174	Integrated for 4 analog or stepper drives	Up to 16 analog drives with position encoder inputs (EXM 438-1)	Integrated for 4 drives, additional drives via interface on PROFIBUS	Via PROFIBUS interface with Profidrive profile Analog drive via analog interface ADI 4	SINAMICS integrated, 2 x isochronous PROFIBUS DP	
Analog drive interface	Optional	Optionally with IM 174	Integrated for 4 analog or stepper drives	Up to 16 analog drives with position encoder inputs (EXM 438-1)	Integrated for 4 drives, additional drives via interface on PROFIBUS	Via PROFIBUS interface with Profidrive profile Analog drive via analog interface ADI 4	SINAMICS integrated, 2 x isochronous PROFIBUS DP	
Other interfaces, fieldbus interfaces	Depends on CPU	PROFIBUS DP/IMPI; SIMATIC I/O	SIMATIC I/O	PROFIBUS DP; SIMOLINK (EXM 448-2)	Ethernet, PROFINET	Ethernet, PROFINET, other PC interfaces	Ethernet, PROFINET	

Engineering system	STEP 7 Easy Motion Control (PLCopen)	STEP 7 S7 Technology (PLCopen)	STEP 7 FM 357 Parameterization (DIN 66024)	STEP 7 CFC	SCOUT (integrated into STEP 7 or as stand-alone tool) Motion control via PLCopen
Functions					
Output cam			Path-path cams, path-time cams, dynamic cams		Trip cams, path-path cams, path-time cams
Axes	Speed-control, positioning, synchronous axes		Virtual, speed control, positioning, synchronous, cam disk axes		Virtual axes, speed-control axes, positioning axes, synchronous axes, cam disk axes, hydraulic axes
			Gantry axes	With Excel interface; on-the-fly switching	
Signal inputs			Print-mark control, flying shears, etc.		Print-mark control, flying shears, etc.
Cam disc			Can be calculated and scaled online, unlimited number		Can be calculated and scaled online, unlimited number
Interpolation		Using cam disks	Circular, linear and spline interpolation	Using cam disks	Using cam disks
Typical applications	PLC-based machines	PLC-based machines	Material handling; flying shears	High-performance PLC-based machines	Compact machines, modular machines and machines with high demands as to functionality and flexibility in motion control

Motion Control



Computerized Numerical Control

CNC of the smart class (SINUMERIK 802D sl)	42
CNC of the compact class (SINUMERIK 828D)	43
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Selection table for Computerized Numerical Control	46

Computerized Numerical Control

Computerized Numerical Control

Always the right CNC equipment

3



With SINUMERIK, Siemens offers an integrated system platform for the automation of machine tools for different sectors and technologies.

SINUMERIK is based on the following concept: One CNC system, many possibilities – from the computerized numerical control through drives and motors as far as the complete control cabinet.

SINUMERIK is easy to operate and it offers a number of innovative functions and technology cycles for even more economic production. The programming method also always meets your specific requirements, regardless of whether the production involves small or large series production, or simple or complex components.

Together with the SINAMICS S120 drive system, the SINUMERIK system platform encompasses different versions for a wide variety of requirements in the equipping of machine tools:

the SINUMERIK 802D sl for standard turning and milling machines, the compact SINUMERIK 828D and the innovative SINUMERIK 840D sl CNC for demanding solutions.

CNCs of the smart class – SINUMERIK 802D sl

SINUMERIK 802D sl – for standardized turning and milling machines



The SINUMERIK 802D sl is an operator panel control combining all the components of a CNC (NC, PLC, HMI) and drive control in a single unit. The motors can be easily connected to the digital drives via DRIVE-CLiQ. In combination with the modular structure of the SINAMICS S120 drive system, this design is conceived to ensure very simple and rugged installation with minimum wiring overhead.

The performance range of the control is ideally suited to applications on standardized machine tools - from one-off production runs to industrial scale manufacture.

SINUMERIK 802D sl – at a glance:

- Operator panel control for standardized machine tools
- Up to 4 axes + 1 spindle or 3 axes + 2 spindles plus 1 PLC auxiliary axis, 1 channel
- 80 bit NANO^{FP} accuracy
- 10.4" TFT operator panel fronts
- Programming support for cycles
- Machining step programming with Manual Machine plus for turning

CNCs of the compact class – SINUMERIK 828D

SINUMERIK 828D – compact, strong, simple – simply ingenious



This panel-based CNC is tailored for demanding turning and milling machines such as those typically used in the workshop. The range of applications ranges from vertical and simple horizontal machining centers to inclined-bed turning machines with a machining slide, equipped with a Y axis and counter spindle.

The operator panel and CNC electronics are combined in a rugged and maintenance-free unit. When dealing with small dimensions, the SINUMERIK 828D offers a number of powerful CNC functions and sets new standards in the compact class of CNCs. Equipped with a comprehensive CNC programming package, the SINUMERIK 828D is ideally prepared for all of the global CNC consumer markets. Technology-specific, pre-configured system software and intelligent service functions also allow the costs for commissioning and maintenance of the machines to be drastically reduced.

As an alternative to SINUMERIK 828D, a SINUMERIK 828D BASIC variant is available with an 8.4" TFT color display that is used in combination with the SINAMICS S120 Combi.

SINUMERIK 828D – at a glance:

- Compact operator panel CNC with horizontal and vertical operator panel layout
- Up to 6 axes/spindles (for milling) and 8 axes/spindles (for turning) in one machining channel
- 80 bit NANO^{FP} accuracy
- Operator panel with 10.4" TFT color display
- programGUIDE programming support
- ShopMill/ShopTurn machining step programming
- Operating and programming support with full video animated support graphics
- SINUMERIK MDynamics for 3 axes (milling version)
- Custom-tailored system software versions for turning and milling with pre-assigned parameters
- Process monitoring using text messaging (SMS)

CNCs of the premium class – SINUMERIK 840D sl

SINUMERIK 840D sl – open, flexible, strong – solid innovations



SINUMERIK 840D sl offers modularity, openness, flexibility and uniform structures for operation, programming, and visualization. It provides a system platform with trend-setting functions for almost all technologies.

Integrated into the SINAMICS S120 drive system and complemented by the SIMATIC S7-300 automation system, the SINUMERIK 840D sl forms a complete digital system.

The SINUMERIK 840D sl distinguishes itself through its high level of flexibility, maximum dynamics and precision, and optimum integration in networks.

SINUMERIK 840D sl – at a glance:

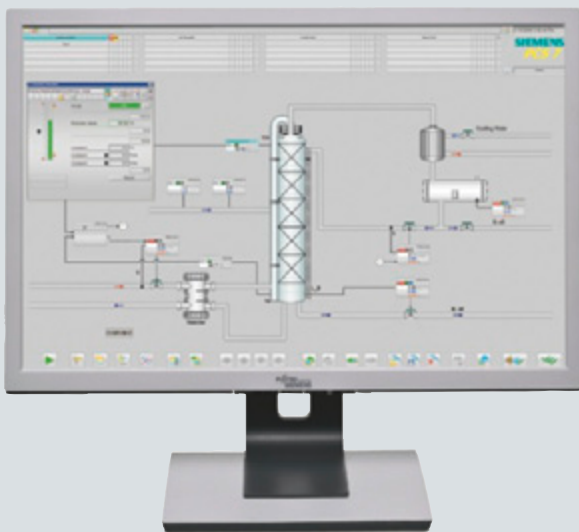
- Drive-based CNC for demanding solutions
- For up to 31 axes/spindles in 10 machining channels
- 80 bit NANO^{FP} accuracy
- 7.5"/10"/12"/15" TFT operator panel fronts
- programGUIDE programming support
- ShopMill/ShopTurn machining step programming
- Operating and programming with animated graphics
- SINUMERIK MDynamics 3-axis/5-axis technology packages
- Several operator panels possible on one CNC
- Tool management functions
- SINUMERIK Safety Integrated functions

Computerized Numerical Control

3

SINUMERIK	SINUMERIK 802D sI	SINUMERIK 828D	SINUMERIK 840D sI
Layout type	Panel	Panel	Drive
Axes/spindles	4+1	8	31
Channels/mode groups	1 / 1	1	10 / 10
CNC user memory	3 MB	5 MB	15 MB
User memory on hard disk of PCU 50.3	-	-	12 GB
Operator panel fronts TFT display	10"	10"	7.5"/10"/12"/15"
Operator panel fronts TFT display Touch	-	-	15"
Axis functions	■	■	■
Spindle functions	■	■	■
Interpolating axes	4	4	12
Advanced Surface	-	■	■
Measuring functions/measuring cycles	■	■	■
Motion-synchronous actions	■	■	■
Programming language (DIN 66025 and high-level language expansion)	■	■	■
Simulation for turning and milling in surface display	■	■	■
Tool management/tool monitoring	- / ■	■ / ■	■ / ■

Data storage CF card/USB device	■ / ■	■ / ■	■ / ■	■ / ■
Network drive management (Ethernet)	■	■	■	■
Data storage hard disk of PCU	-	-	-	■
Temperature compensation	-	■	■	■
Easy configuration of user screens (Easy Screen)	■	■	■	■
Integration of screens, software and technological know-how	-	-	-	■
Integrated SIMATIC PLCs	S7-200	S7-200	S7-200	S7-300
Maximum PLC memory in KB/statements	- / 6000	- / 24000	- / 24000	1536 / -
Machining time, typically in ms/KI	0.1	0.02	0.02	0.01
Distributed I/O via PROFIBUS DP/PROFINET	■ / -	- / ■	- / ■	■ / ■
Safety Integrated (Safe Torque Off, Safe Brake Control, Safe Stop 1)	■	■	■	■
SINUMERIK Safety Integrated	-	-	-	■
Alarms and messages	■	■	■	■
Remote diagnostics	■	■	■	■



Process control systems

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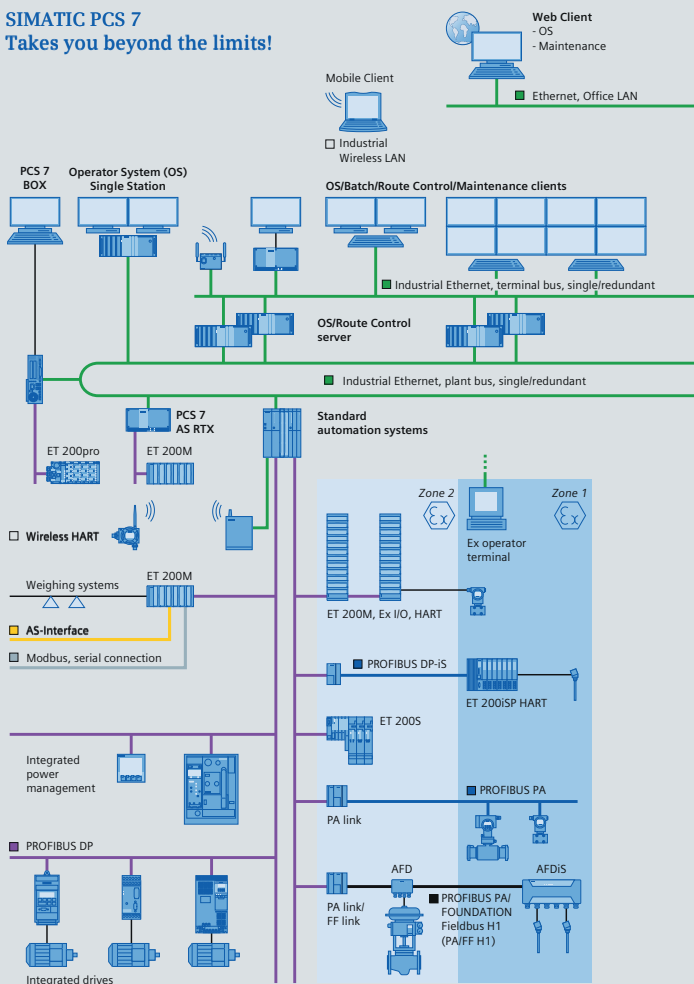
Process control systems

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 extension of process control functions through seamless integration of extensive supplemental functionality, e.g. for batch processes, material transport, asset management, security applications, process data analysis/management or MES tasks.

SIMATIC PCS 7 Takes you beyond the limits!

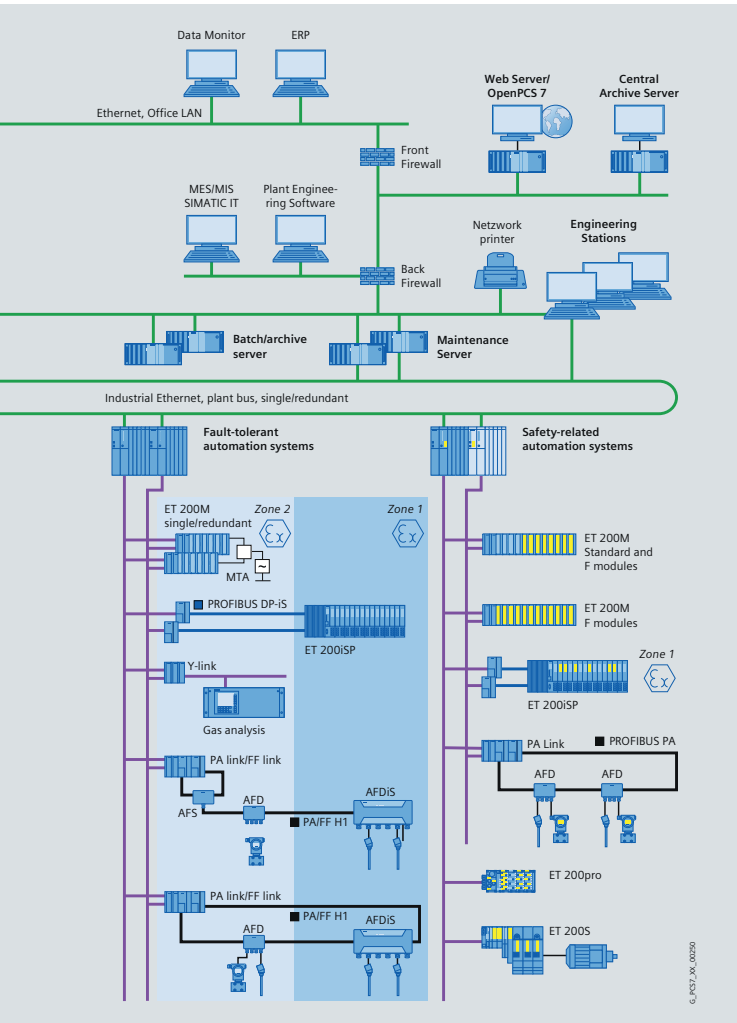


The SIMATIC PCS 7 process control system with the seven system properties offers you the following benefits:

I. Reduction of TCO (Total Cost of Ownership) through integration

The seamless integration of the SIMATIC PCS 7 process control system within Totally Integrated Automation (TIA) from Siemens provides the user with a complete range of matched products, systems and solutions for all sectors of the production, process and hybrid industries.

The integration strength of SIMATIC PCS 7 means that homogeneous automation can be realized throughout the production process from receiving to shipping. One excellent feature of SIMATIC PCS 7 is the seamless integration of Asset and Alarm Management, BATCH, Telecontrol, Route Control and Safety functions.



Process control systems

II. Higher performance due to increases in system reliability and availability

With SIMATIC PCS 7, you experience performance in the form of efficiency, for example, by configuring with a central, powerful engineering tool; or in the form of plant availability that we offer in both hardware and software at all levels to match your requirements.

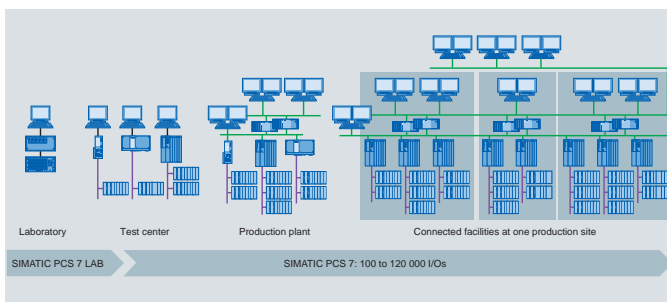
The high-performance components used, such as controllers with unique processing speed, also support demanding applications. Redundant system components on all levels (field bus, I/O, networks, controllers, OS/Batch/Historian server etc.) increase the availability of the system and therefore your plant.

4

III. Scalability of systems from hundreds up to 100,000 inputs/outputs

SIMATIC PCS 7 can be adapted flexibly for different plant sizes and customer requirements. A SIMATIC PCS 7 system can be subsequently expanded with no problem if there is an increase in capacities or a technological modification.

SIMATIC PCS 7 is scalable, from small single-station systems with around 160 process tags, e.g. for laboratory automation or use in a technical college, all the way to distributed multiple-station systems with client/server architecture and up to 60,000 process tags for automation of a very large production plant or a plant network at a single production location.



IV. Protection of the automation investment through modernization

A carefully tuned, step-by-step modernization strategy ensures that the value of the installed base in terms of hardware and application software is maintained.

Siemens has therefore offered numerous innovative products and solutions for the migration to SIMATIC PCS 7 for its own control systems (e.g. TELEPERM M, APACS) for years. The most important goal of the modernization strategy is to modernize the installed base without a system changeover and as far as possible without the need for plant stoppage.

The migration portfolio of Siemens already includes numerous innovative, well-proven products, tools and services. Migration solutions for control systems for other manufacturers is based on this, e.g. ABB, Bailey, Emerson, Honeywell and Invensys. These users can therefore also rely on the worldwide leading SIMATIC technology.

4

V. Risk avoidance thanks to integrated safety and security

Hacker attacks, viruses, worms and trojans are some of the negative by-products of global networking. With advancing standardization, opening and networking, the associated security risk in control system installations is also enormous. Unauthorized intervention in the process automation and intentional sabotage are conceivable. The potential consequences are not only material damage, but danger to humans and the environment as well.

SIMATIC PCS 7 offers a pioneering concept and comprehensive solutions for protecting a process engineering plant. What is special about this concept is its holistic approach. It is not just restricted to the use of individual security methods for the separate devices. Rather its strengths are the interaction of a host of security measures in the plant network.

VI. Continuous technological innovation

by one of the leading international suppliers of automation technology: Siemens.

VII. A worldwide network of experts and Solution Partners

Thanks to a network of experts spanning the globe, we can offer you classical service & support around the world in each process phase, with upgrades or replacement part deliveries. We can rely on our own system specialists or on authorized partners to provide our services. To this purpose, Siemens created the Solution Partner Program, which is unique in the market due to its scope.

Process control systems

SIMATIC PCS 7 system components – Automation systems

Controllers proven a million times over - optimally tailored to the demanding requirements of the process industry



- Innovative controllers with cycle times of up to 10 ms
- Redundancy for high availability
- Expansions/changes during operation
- Common hardware platform for process safety
- Easy integration of intelligent field devices/drives
- Maintenance-free PC based controllers for small-scale applications

4

SIMATIC PCS 7 system components – Process I/O

The right solution for any requirement

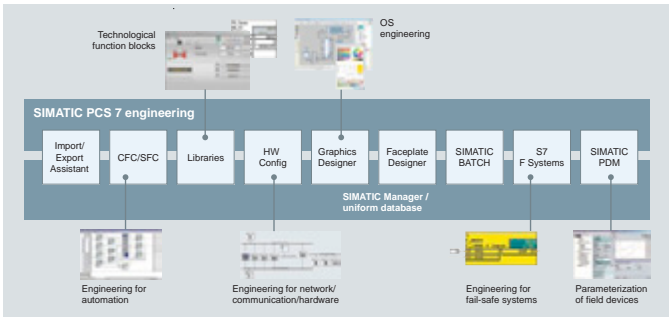


- Redundancy (I/O modules, fieldbus)
- Hot swapping (insertion and replacement of modules while the plant is operating)
- Expansions/changes during operation
- I/O modules for hazardous areas
- Time stamping at module level up to 1 ms

SIMATIC PCS 7 system components – Engineering System

Efficient and system-wide engineering over all phases of the production lifecycle

- Centralized, system-wide engineering
- Advanced ES - Interfacing of planning tools with bulk engineering / bulk editing and change management
- All the main configuring languages, specific user blocks
- Multi-user engineering capability
- Online expandability
- Advanced process control functionality is included in the standard
- Central parameterization of intelligent field devices with the integrated SIMATIC PDM engineering tool
- Version tracking, change log



SIMATIC PCS 7 system components – Operator System

User-friendly process control and a high degree of operational reliability to reduce production downtimes



- Scalable and flexible client-server system architectures
- High-performance archiving system with integral archive backup
- Redundancy for real-time data and archives
- Online changes and online language selection
- Intelligent alarm management
- User-friendly visualization of sequencers (SFC)
- MES interfacing to process data evaluation via OPC
- Efficient operator prompting via display hierarchy and group displays
- Operator control and monitoring via the World Wide Web

SIMATIC PCS 7 system components – Maintenance Station

Minimization of the total cost of ownership for the complete lifecycle of the plant



- Centralized, system-wide visualization, diagnosis and maintenance of all system components incl. mechanical assets
- Overview of the complete maintenance workflow
- Gap-free traceability and documentation of status changes and maintenance jobs
- Monitoring of the status and performance of the plant

Process control systems

For extreme ambient conditions – SIPLUS extreme

Refined standard modules based on SIMATIC PCS7 for extreme ambient conditions



- 100% humidity, dewing, condensation, and ice formation permissible
- Modules with a special conformal coating for use in atmospheres with corrosive gases according to ISA S71.04 severity level G1; G2; G3

4

SIMATIC PCS 7 system components –

Innovative and integrated fieldbus solutions for process automation

Fast and secure communication with PROFIBUS and FF in the field

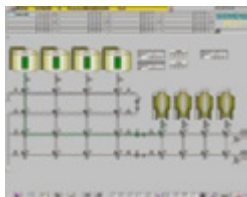


- Free choice of fieldbus: PROFIBUS PA and FOUNDATION Fieldbus
- Optimum availability due to ring redundancy for PA and FF
- Cost-effective alternative to conventional, high-availability and fail-safe architectures
- Repairs and bus expansion during operation
- Quick and easy fault rectification thanks to comprehensive diagnostics, and seamless integration in SIMATIC PCS 7

SIMATIC PCS 7 system components –

Routing with SIMATIC Route Control

Cost-effective and flexible solution for material transport – homogeneously integrated in SIMATIC PCS 7



- For configuring, controlling, monitoring and diagnosing material transport in pipe networks
- For simple transport paths through to complex pipe networks
- For plants with numerous pipe branches and large storage tanks
- Flexible, modular architecture with scalable hardware and software
- Fast response to plant changes during commissioning and operation
- Consideration of material compatibility (avoidance of undesirable material mixes)

SIMATIC PCS 7 system components – Telecontrol with SIMATIC PCS 7 TeleControl

Plant automation and telecontrol in one system



- 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
- Transmission media: Dedicated line, dial-up line (analog / ISDN), radio systems [GSM]), TCP/IP-based connections (DSL, GPRS)
- TeleControl function block library with PCS 7 compatible user interface - for expansion with user-defined function block types
- The same PCS 7 operator for the plant and telecontrol - reduces the risk of operator errors

4

SIMATIC PCS 7 system components – Comprehensive protective measures for IT security

Increases the plant availability and protects intellectual property by preventing hacker attacks

- Multi-tiered security architecture with segmentation of the plant into security cells
- Management of users and access rights in PCS 7 integrated into the Windows user management system
- Use of virus scanners and firewalls
- Management of Windows security patches
- Secure access to dial-up systems for support and remote access, e.g. using VPN and encryption
- Automatic configuration of the security settings

SIMATIC PCS 7 system components – Batch automation with SIMATIC BATCH

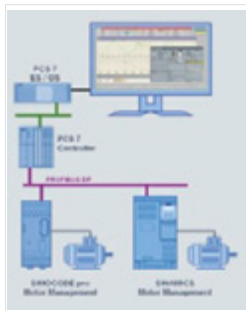
Comprehensive batch functionality – seamlessly integrated in SIMATIC PCS 7 – offers a high level of "ease-of-use"



- Seamless integration in the engineering system and operator station
- Recipes independent of the plant and apparatus
- Dynamic plant assignment
- Hierarchical recipes in accordance with ISA S 88.01
- Scalable from small to extremely large plants, single-user/client-server system
- Redundancy for increasing the availability
- 21 CFR Part 11, audit trail, access protection, electronic signature
- Highly flexible due to OS-based batch / AS-based batch
- Batch OS controls (OCX)

Motor management – SIMOCODE pro block library for SIMATIC PCS 7

Views into, through and beyond the process: for optimized management of processes



- Uniform, end-to-end integration of SIMOCODE pro in SIMATIC PCS 7
- Standardized motor blocks for easy integration and optimized operation
- Higher degree of process transparency due to greater information density in the process control system
- Preventative maintenance and reduced downtimes thanks to integration into the PCS 7 Maintenance Station
- Energy management in conjunction with SIMATIC powerrate for PCS 7

Energy management – SIMATIC powerrate for PCS 7

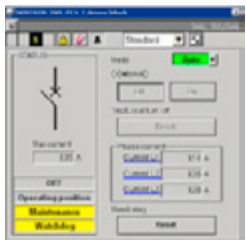
Efficient use of energy resources, reduction in operating costs



- Reduction of operating costs through increased transparency of energy flows
- Intensification of the energy cost awareness due to cost-by-cause allocation
- Avoidance of high penalty payments by monitoring the power limit agreed upon within the framework of the supply contract
- Security in the application through certified system components compliant with Totally Integrated Automation
- Avoidance of peak loads through automatic load management

Power Management – SENTRON 3WL/3VL block library for SIMATIC PCS 7

For seamless integration of SENTRON circuit breakers in the process environment



- Full integration of the SENTRON circuit breakers into the PCS 7 process control system via PROFIBUS DPV1 / MODBUS by means of certified PCS 7 add-on module
- Evaluation of the acyclic events relevant for 3WL/3VL (start-up, DP station failure, module fault)
- Generation of quality code and diagnostic information
- Remote triggering and maintenance information regarding the circuit breakers
- Setting of protection parameters/threshold values
- Product components: Driver block, diagnostic data block, faceplates

Power management – SIMATIC PCS 7 Library PAC3200

For seamless integration of the PAC3200 Power Monitoring Device into the process environment



- Total integration of the SENTRON PAC3200 into the PCS 7 process control system via PROFIBUS DPV1 by means of certified PCS 7 Add-On module
- Read-out and display of measured values and device data
- Input of limit values for monitoring by the driver module
- Resetting of values on the device (min./max. values)
- Product components: Driver block, diagnostic data block, faceplates

4

Compact process control system – SIMATIC PCS 7 BOX

Compact, low-cost process control system



- Complete process control system on an Industrial PC: controller, operator system and engineering system
- Ideal starter system for process control or for autonomous small plants, for package units with local operation and pilot plants
- Use of standard engineering tools of SIMATIC PCS 7
- Expandable and completely integratable into SIMATIC PCS 7

Automation for the laboratory – SIMATIC PCS 7 LAB

Efficient laboratory automation



4

- Specially for requirements in the laboratory
 - Modularly constructed with standard components: SIMATIC PCS 7 Box and ET 200M or ET 200pro I/O modules
 - Connection of laboratory equipment (dosing units, measuring instruments, pumps, agitators, etc.) via I/O
 - The same engineering tools, visualization and libraries as PCS 7
- Processes are directly transferrable from the laboratory to the production plant - without the need for any additional engineering
 - Processes can be developed and optimized more quickly, products can be moved more quickly from the development phase to the production phase

Fault-tolerant process control – SIMATIC S7-400FH

Safe, fault-tolerant controller for critical processes



- Minimization of risk for critical applications to prevent accidents with consequences for humans, equipment or the environment
 - If faults occur in the process or within the controller, the process will be placed in a safe state
- Fail-safe automation systems can be configured as single controllers or in a redundant configuration (FH)
 - The redundancy of FH systems is not relevant for safety, but it increases the availability of fail-safe and fault-tolerant automation systems
 - The maximum safety class of SIL 3 is already achieved with single controllers
 - Flexible Modular Redundancy (FMR) enables the implementation of multiple fault-tolerance levels precisely where the application requires them.

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

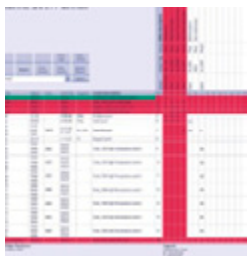


- SIMATIC ET 200M I/O modules with high channel density (NAMUR) and SIMATIC ET 200iSP bit-modular modules
 - Flexible type of construction allows fail-safe and standard modules to be operated simultaneously, reducing space requirements
 - Standard and Safety I/O on the same PROFIBUS cable
 - Fail-safe modules combine a diversified design with internal redundancy (with ET 200M)
- Comprehensive diagnostics functions for detecting internal and external faults

4

Safety Lifecycle Engineering – SIMATIC S7-F systems and SIMATIC Safety Matrix

Certified engineering of process safety applications



- Seamless integration of safety engineering into the SIMATIC PCS 7 series
 - Creation of the fail-safe safety program in accordance with the familiar cause and effect method - using the SIMATIC Safety Matrix
 - Automatic creation of the safety program (certified by the German Technical Inspectorate) - up to 50% lower engineering costs
 - Easy to configure - without special programming expertise
- Online viewer – integrated into the SIMATIC PCS 7 operator system – for easy operation and visualization of safety applications
 - SIMATIC Safety Matrix covers all phases of the safety lifecycle in accordance with IEC 61511: Engineering, commissioning, operation and maintenance

Migration of legacy process control systems

Investment security thanks to tailor-made migration products and services for those making the transition



4

- Siemens provides a host of products and solutions for the transition from legacy systems to SIMATIC PCS 7
- In addition to standard hardware and software components, the range of migration products also encompasses tools and services for the conversion of application software or on-site migration of an entire plant
- This offer applies for users of Siemens control systems and non-Siemens control systems alike



Automation software

Automation software for all tasks	64
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SIRIUS Industrial Controls	92

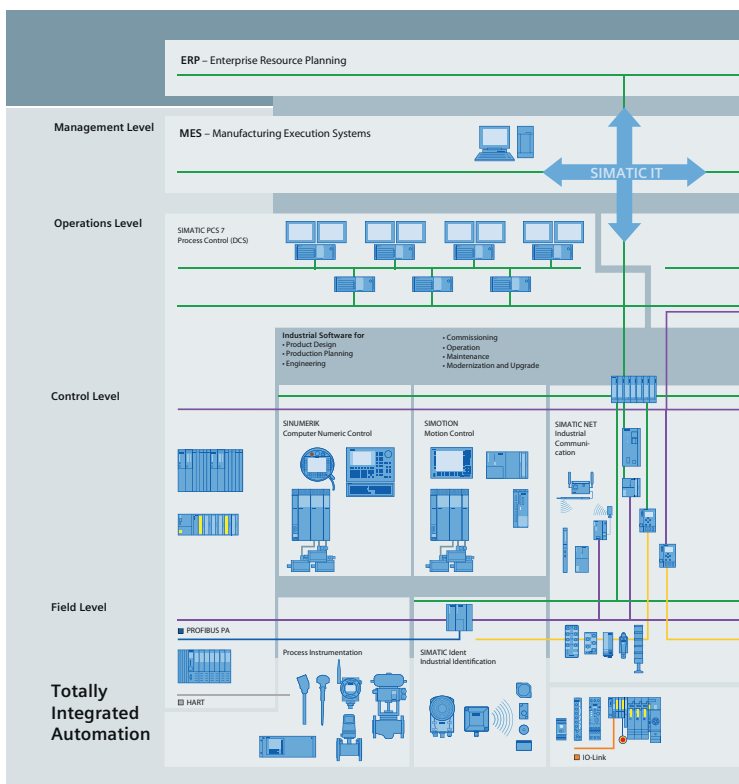
Automation software for all tasks.

The new engineering framework, the Totally Integrated Automation Portal (TIA Portal) combines all the automation software tools for controllers, HMI and drives in a single development environment. Seamless integration of these software products is unique in the sector and achieves efficiency gains regarded as impossible until now. With its intuitive user interface, efficient navigation and well-proven technology, the TIA Portal offers innovative highlights in several fields.

And what is more, Siemens offers perfectly matched software products for all automation tasks in all phases of the lifecycle of a machine or plant.

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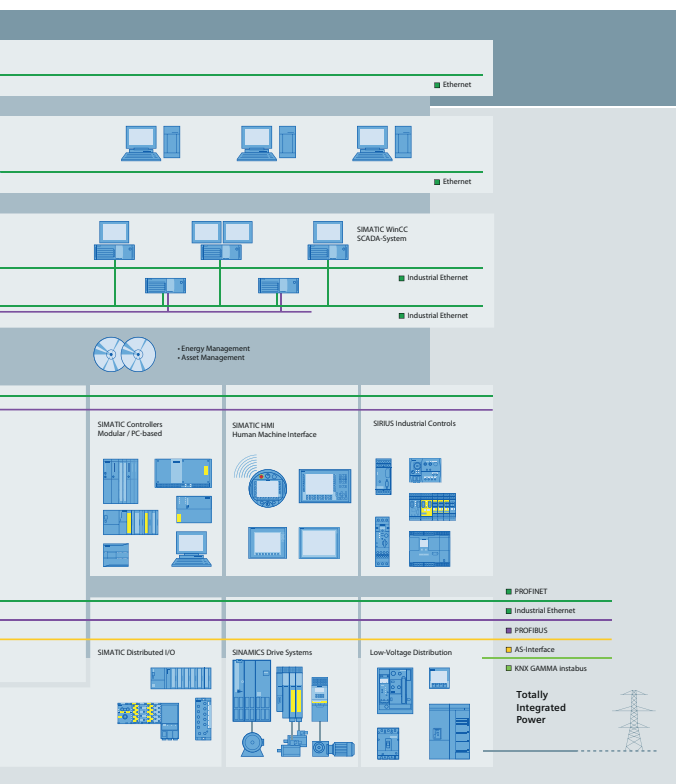
From the field level to company management level: With our comprehensive range of automation software, you can profit from mature solutions which are well-conceived, even down to the last detail. Scaled functionality and optional expansions ensure efficient working for a wide range of different tasks and ways of working.



We offer software solutions...

- ... for configuring and operating an MES in compliance with ISA-95 as well as company-wide data capture and evaluation
- ... for continuous plant planning and integrated plant management with COMOS.
- ... for plant engineering in an integral project view – digital engineering with SIMATIC Automation Designer
- ... for SIMATIC PCS 7, our leading control system (DCS) for the process industry
- ... for process visualization with our SIMATIC WinCC SCADA system
- ... for all tasks associated with operation and monitoring at the machine with SIMATIC WinCC flexible as far as SCADA solutions with SIMATIC WinCC in the TIA Portal
- ... for our extensive range of modular and PC-based controller solutions with SIMATIC STEP 7 and SIMATIC STEP 7 in the TIA Portal
- ... for all motion control tasks
- ... for all the requirements of industrial switchgear
- ... for access to secure industrial communication networks through clients

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Plant engineering software

COMOS –

From Integrated Engineering to Integrated Operations

Holistic plant management over the entire lifecycle



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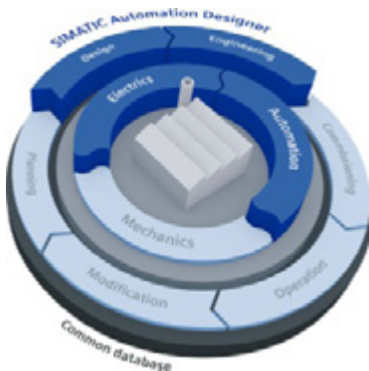
- Object-oriented and consistent data management ensure interdisciplinary cooperation across all levels of the corporation
- Uniform data platform and open system architecture support workflows that span company sites
- Process engineering solutions for concept design, as well as 2D/3D planning and the construction of plants
- Clear display of I&C and electrotechnical processes as well as graphical function planning that complies with the standards
- Professional plant management in the operating and maintenance phase, as well as shutdown planning
- Constantly up-to-date project and plant documentation

SIMATIC Automation Designer

Merging Worlds in Digital Engineering

Optimized engineering over the entire production lifecycle

- Interdisciplinary plant and machine planning based on shared, consistent data
- Uniform data management without the need for multiple entries
- Integration of different planning data from the mechanical and electrical systems and the automation in a single plant structure
- Efficient generation of circuit diagrams and automation software
- Graphical generation of process descriptions



SIMATIC IT

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. It 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.

SIMATIC IT offers a broad spectrum of specific solutions in the discrete, process and life sciences industries: Three SIMATIC IT suites, independent components and SIMATIC IT libraries and libraries for re-using previously created solutions.

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 it is via automatic management of software updates or the prediction of possible server problems.

SIMATIC IT Production Suite

Manufacturing Execution System (MES) in accordance with ISA-95

The SIMATIC IT Production Suite consists of predefined and easily configurable modules that close the gap between ERP systems, process automation and control systems:

- SIMATIC IT Framework and
- SIMATIC IT Components.

This modular approach allows maximum flexibility and efficiency.

The plant model as well as the production and plant operations are described in the SIMATIC IT Framework. The functions of the individual components can be synchronized and triggered by the Framework.

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Components from third parties are as easy to integrate into SIMATIC IT as the SIMATIC IT components.

SIMATIC IT R&D Suite –

A software platform for research and development

SIMATIC IT R&D Suite links R&D to manufacturing

SIMATIC IT R&D Suite is based on the same architecture as the SIMATIC IT Production Suite and offers a scalable and flexible platform to manage all of the research and development processes and shorten the time span from the development stage to the marketable product.

SIMATIC IT R&D Suite connects the R&D environment, including its data and its workflows, with the production environment in order to shorten the time to production. This is not only ensured by the integrated SIMATIC IT architecture, but also by specific functionalities such as LIMS, ELN, Specification Management and Formula Workbench.

SIMATIC IT Intelligence Suite –

Manufacturing Intelligence through Data acquisition and analysis

SIMATIC IT Intelligence Suite combines the real-time process data collected during production with data from business systems.

Intelligence Suite not only safely records all the relevant production data, it also evaluates them in real time and correlates them with information covering the entire production cycle and business data. Manufacturing Intelligence Tools can be the basis for immediate interventions, and can trigger actions in SIMATIC IT.

SIMATIC IT Intelligence Suite can be used at the production level and at the cross-plant level for analysis, benchmarking and the implementation of improvement measures.

SIMATIC IT Components

The SIMATIC IT portfolio is scalable – thanks to the component-based approach.

SIMATIC IT Components offer basic, reliable MES functionality, which corresponds to the international standard for MES, ISA-95. Each component addresses specific manufacturing tasks such as order management, material management, message management, personnel management, and report management:

- SIMATIC IT Product Definition Manager
- SIMATIC IT Production Order Manager
- SIMATIC IT Material Manager
- SIMATIC IT Personnel Manager
- SIMATIC IT Messaging Manager
- SIMATIC IT Data Integration Service
- SIMATIC IT Client Application Builder (CAB)
- SIMATIC IT Report Manager

SIMATIC IT components offer functionalities that can be used either individually or in combination with the MES functionality:

- SIMATIC IT Historian - PIMS (Plant Information Management System)
- SIMATIC IT Unilab - LIMS (Laboratory Information Management System)
- SIMATIC IT Interspec - Product specification management
- SIMATIC IT Unicam - The solution for manufacturers of electronic components

SIMATIC IT – Sector-specific solution packages

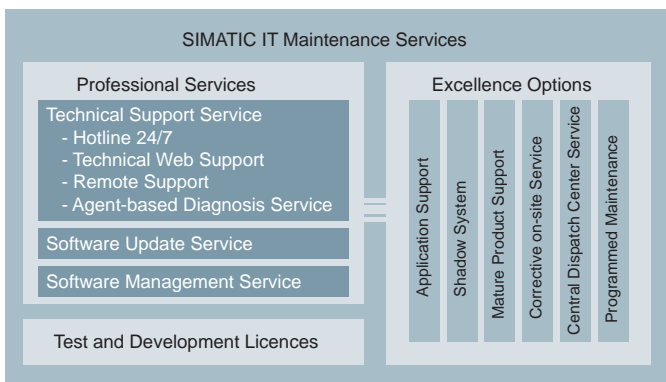
SIMATIC IT offers specific packages for process industries, for discrete industries and for life sciences industries.

These packages offer a best practice template, combining the right MES software and services to help companies in a specific industry achieve operational excellence. This helps lower TCO and maximize return on investment.

Full support for the MES installation – Added-value services for SIMATIC IT

Siemens supplements its wide range of functionality with a multifaceted range of value-added services. In this way, it can provide services over the entire product and project lifecycle, from the analysis of the investment requirements to the implementation phase and post-installation support. In order to get the maximum benefit from MES, manufacturers can combine these services with professional support from a team of technical support providers who work in synergy with the R&D and consulting departments. In cooperation with selected partners, Siemens offers a worldwide service and maintenance network with an outstanding skill level and expert know-how.

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SIMATIC PCS 7

SIMATIC PCS 7 system components – Engineering System

- For further information about the SIMATIC PCS 7 Engineering System, see "Process control systems" on page 54.

SIMATIC PCS 7 system components – Operator System

- For further information about the SIMATIC PCS 7 Operator System, see "Process control systems" on page 55.

SIMATIC PCS 7 system components – Maintenance Station

- For further information about the SIMATIC PCS 7 Maintenance System, see "Process control systems" on page 55.

SIMATIC PCS 7 system components – Batch automation with SIMATIC BATCH

- For further information about SIMATIC PCS 7 Batch automation, see "Process control systems" on page 57.

Motor management – SIMOCODE pro block library for SIMATIC PCS 7

- For further information about SIMOCODE pro for SIMATIC PCS 7, see "Process control systems" on page 58.

Safety Lifecycle Engineering – SIMATIC S7-F systems and SIMATIC Safety Matrix

- For further information about SIMATIC S7-F systems and the SIMATIC Safety Matrix, see "Process control systems" on page 61.

Energy management – SIMATIC powerrate for PCS 7

- For further information about SIMATIC powerrate for PCS 7, see "Process control systems" on page 58.

Power management – SIMATIC PCS 7 Library PAC3200

- For further information about SIMATIC PCS 7 Library PAC3200, see "Process control systems" on page 59.

SIMATIC HMI software at a glance

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

SIMATIC WinCC V11, the HMI software in the Totally Integrated Automation (TIA) Portal is part of a new, integrated engineering concept that offers a uniform engineering environment for the programming and configuration of controller, visualization and drive solutions.

With WinCC V11, HMI applications can be configured on PC-based multi-user systems from the simplest operating solutions with Basic Panels and Comfort Panels through to SCADA applications on PC-based multi-user systems. The range of possible solutions is therefore considerably larger than with the predecessor product SIMATIC WinCC flexible.

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SIMATIC WinCC V7 remains 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.

Note

More information on Totally Integrated Automation Portal is shown under "Totally Integrated Automation Portal – One integrated engineering framework for all automation tasks" on page 80.

SIMATIC WinCC in the TIA Portal

SIMATIC WinCC V11 engineering software

WinCC V11 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. They are based on each other and are optimally tailored to the individual classes of operator panel. The larger software package always includes the configuration options of the smaller package.

For WinCC Comfort upwards, an upgrade to larger packages is possible using PowerPacks. The following licenses are available:

- WinCC Basic for configuring SIMATIC HMI Basic Panels (not upgradeable)
- WinCC Comfort for configuring the new Comfort Panels as well as Mobile Panels, panels of the x70 series and Multi Panels
- WinCC Advanced for configuring PC-based HMI single-user solutions
- WinCC Professional for process visualization and SCADA applications are available in three versions with 512, 4096 or the maximum number of PowerTags (PowerTags are tags that have a process interface to the controller)

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SIMATIC WinCC V11 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.

There are stand-alone WinCC Runtime versions available for PC platforms.

WinCC V11 Runtime software is available as:

- WinCC Advanced Runtime for PC-based HMI single-user solutions with 128, 512, 2K, or 4K PowerTags
- WinCC Professional Runtime for multi-user SCADA applications with 128, 512, 2K, 4K, 8K, as well as 64K PowerTags

Tags without a process connection, constant limit values of tags as well as (up to 4 000) alarms are provided as an additional system feature.

SIMATIC WinCC (SCADA)

SCADA software for Plant Intelligence – SIMATIC WinCC

The powerful and scalable SCADA system for all sectors and technologies

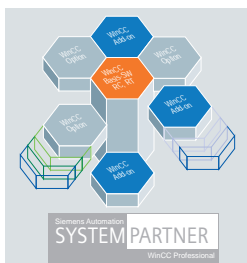


- Scalable system that can be adapted effortlessly to every requirement – from single-user systems to distributed SCADA systems with redundant servers
- Open system architecture, based on industry standards
- Direct connection of various different automation components thanks to a comprehensive driver library and via OPC
- SIMATIC IPC477C Panel PC as a WinCC single-user system, ready to use in Embedded Technology

- Cost-effective implementation of small, distributed applications with SIMATIC WinCC TeleControl
- Plant Intelligence for the utmost plant transparency
- Client virtualization for the production plant via Microsoft Hyper-V as well as VMware ESXi 4.0

Extension of the SCADA software functionality – SIMATIC WinCC options

Options and add-ons for extending the SCADA functionality



- High availability thanks to redundant servers and integrated process diagnostics
- Scalable client/server configurations, including intranet/Internet access
- IT integration and machine data management (KPI/OEE)
- FDA Compliance Tools (Audit Trails)
- Open programming interfaces and user-specific ActiveX controls

- Efficient planning of events with WinCC Calendar Scheduler and WinCC Event Notifier
- SIMATIC powerrate and B.Data for effective energy management

Energy management with SIMATIC WinCC

Energy management –

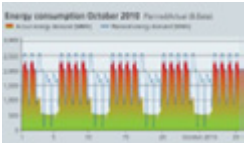
SIMATIC powerrate, B.Data system and SENTRON PAC3200 for WinCC

Powerrate



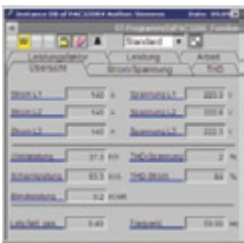
- Identification of energy-intensive loads and processes for the purpose of deriving measures for improving power efficiency
 - Comparison of consumption profiles for more efficient processes
 - Optimizing the company according to energy parameters based on an assessment of consumption and costs
- Reducing the energy costs by complying with agreed power limits
 - Production data and energy data can be correlated thanks to the integration of EM functionality based on the PCS 7 and WinCC standard systems

B.Data



- Combining the technical and commercial data processing systems creates company-wide transparency, thanks to continuous energy and materials balancing for the power generation systems and loads.
- Generation of characteristic values for well-informed statements on increasing the efficiency of power generation and distribution systems and loads supports costs-by-cause energy cost accounting and transfer to the billing system (e.g. SAP R/3)
 - Planning certainty through production-related load and demand forecasts supports energy purchasing decisions
 - Fulfilment of the legal obligations for monitoring and reporting on greenhouse gas emissions (CO₂ emissions)

PAC3200



- For seamless integration of the PAC3200 Power Monitoring Device into SIMATIC WinCC
 - Total integration of SENTRON PAC3200 in SIMATIC WinCC over PROFIBUS
 - DPV1 by means of certified WinCC add-on module
 - Read-out and display of measured values and device data
- Input of limit values for monitoring by the driver module
 - Resetting of values on the device (min./max. values)
 - Product components: Driver block, diagnostic data block, faceplates

SIMATIC Maintenance Station

User interface for efficient maintenance –
SIMATIC Maintenance Station

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



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- Visualization of the maintenance information of the entire automation engineering
 - Automatic derivation of the data from the hardware configurations
 - Cross-vendor display of identification and maintenance data
- Data, visualization and operation of the SCADA system and Maintenance Station are uniform and consistent
 - Automatic alarms ensure that events and operator actions are traceable. They form the basis of future evaluations for plant optimization

SIMATIC WinCC Open Architecture

SCADA software for special system requirements – SIMATIC WinCC Open Architecture

The flexible data point concept means that this scalable and expandable process visualisation and control system is especially suited to systems that are required to handle large quantities of data up to 10 million data points. Basis for the complete system is a high-performance and modular expandable system architecture, thereby ensuring maximum system availability. This concept also enables the system to operate at all levels.



- Object orientation facilitates efficiency in engineering and flexible system expansions
- Up to 2048 servers on distributed systems
- Scalable up to networked redundant high-end systems with more than 10 million tags
- Platform-independent and available for Windows, Linux and Solaris
- Hot-Standby Redundancy and Disaster Recovery System guarantee highest reliability and availability
- Platform for customized solutions
- Comprehensive range of drivers and connectivity: XML, OPC, TCP/IP, Modbus, IEC 60870-5-101/104, DNP3

Special functions & add-ons in SIMATIC WinCC Open Architecture – SIMATIC WinCC Open Architecture options

Options and add-ons for extending the SCADA functionality



- Video: Framework for the integration of video management systems
- Disaster Recovery System: 2x2 redundancy
- Web Client: A fully-functional client that operates via a web browser
- GIS Viewer: allows the visualisation of system objects on a map
- Advanced Maintenance Suite (AMS) for efficient maintenance management
- BACnet for centralised building control systems
- SQuick and easy engineering with ETool
- WinCC Open Architecture is SIL 3 certified to IEC 61508

SIMATIC WinCC flexible

HMI software for operation and monitoring at the machine – SIMATIC WinCC flexible

Flexibility for machine-oriented HMI application of all HMI operator panels



- Use in a broad range of HMI devices is possible – from Micro Panels to PCs
- Supports a host of languages for world-wide application
- Local operator control and monitoring stations offer plant-wide connection options
- Validation support in engineering and runtime: Supports the tracking of manufacturing processes while maintaining high quality requirements
- Options for the individual function enhancements

SIMATIC software for controllers

Introduction

SIMATIC software provides you with a development environment for the plant-wide engineering of your SIMATIC system. This enables you to create your SIMATIC controller programs extremely quickly, and they can then be transferred to other systems and reused at any time.



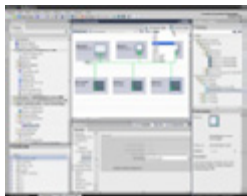
Fierce competition and technological advances have led to the expectation that systems for production and process automation should achieve greater performance at a lower cost. The demand for automation systems continues to rise – together with the demand for increasingly extensive user programs, integrated 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 life-cycle of your plant.

- Efficient development environment for all SIMATIC controllers for supporting the entire project life cycle
- 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.

Totally Integrated Automation Portal – One integrated engineering framework for all automation tasks

Intuitive. Efficient. Well-proven.



The TIA Portal is a new engineering concept that offers a uniform engineering environment for programming and configuring control, visualization and drive solutions. Absolute user-friendliness is ensured, regardless of whether you are just beginning in the engineering field or whether you have several years of experience. With the Portal view, beginners have an overview of

all the editors for the automation project and are supported with task-oriented user guidance. The Project view gives the advanced user quick and intuitive access to all editors, parameters and project data for object-oriented working.

5

With the aid of the intelligent Drag&Drop functionality, icons can be assigned to the hardware so that tags can also be easily assigned between the controller and the HMI - the link is automatically created.

Thanks to graphic editors, complex systems are easy to handle and large projects remain manageable. Devices and networks can be easily configured. Connections between the devices can be configured graphically by lines and diagnostic information is graphically displayed in the online mode.

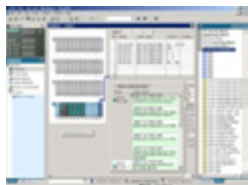
Uniform data management and symbols allow a high degree of project quality. In the event of changes and modifications, all of the data in the project is updated via the automatic data consistency feature. Symbols are automatically generated and assigned to corresponding I/Os. Data is only entered once, so additional address management is superfluous – which minimizes errors.

A wide variety of engineering elements, from simple graphical objects to completely configured HMI stations; from simple tags to a complete controller, incl. the configuration and user program, all can be saved in local and global libraries. With the global library, data that was generated in different projects can be exchanged quite easily.

Based on the proven SINAMICS tools, inverter applications using SINAMICS G120 will be configured with StartDrive, which will be integrated into the TIA Portal engineering framework to offer all the advantages.

SIMATIC STEP 7 in the TIA Portal

Intuitive and efficient engineering – from the microcontroller to the PC-based controller



STEP 7 V11 in the TIA Portal is available in two versions:

- **SIMATIC STEP 7 Basic V11** – Engineering for both SIMATIC S7-1200 and the SIMATIC HMI Basic Panels. With STEP 7 Basic, the SIMATIC S7-1200 microcontrollers can be configured and programmed. SIMATIC WinCC Basic is included in the scope of supply for simple visualization tasks with the SIMATIC Basic Panels.
- **STEP 7 Professional V11** – One engineering system for all SIMATIC Controllers - STEP 7 Professional is suitable for configuring and programming the SIMATIC Controllers S7-1200, S7-300, S7-400, and WinAC for PC-based control. SIMATIC WinCC Basic is also included here for simple visualization tasks with the SIMATIC Basic Panels.
- The following STEP 7 Professional V11 options are available:
 - STEP 7 Safety V11 for fail-safe SIMATIC Controllers
 - PID Professional V11, a package for controller configuring that combines the functionality of the previous Standard PID Control and Modular PID Control options.
 - Easy Motion Control supports position-controlled tasks

Find out here what highlights the TIA Portal has to offer and the benefits for you in your day-to-day work:

www.siemens.com/tia-portal-welcometour

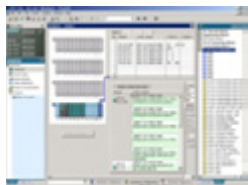
A number of short, easy-to-understand screencasts is available to help you discover how convenient and efficient engineering is with STEP 7 Basic:

<https://www.automation.siemens.com/mcms/simatic-controller-software/en/step7/step7-basic/podcasts/Seiten/Default.aspx>

Programming of modular standalone controllers

SIMATIC STEP 7 Lite

Intuitive programming tool for standard applications with individual controls and central I/O



- Extremely user-friendly design ensures short training times and optimum, user-friendly use
- You can download the software from the Internet free of charge: www.siemens.com/simatic-step7lite

Programming and configuration - SIMATIC STEP 7 Professional

All the software required for planning, implementing, and maintaining your automation solution



- Universal engineering that supports the entire project life cycle from the original planning to the periodic maintenance
- Plant-wide engineering from a central location reduces the integration time and the risk that data entry will result in errors

5

- Integrated development environment for logic, motion control, drives and process automation on a single controller
- High level of flexibility: Select the most suitable programming language for your application from the IEC 61131-3 languages
 - Ladder diagram (LAD)
 - Function block diagram (FBD)
 - Statement list (STL)
 - Sequential Function Chart (S7-GRAPH)
 - Structured text (S7-SCL) including a powerful offline simulation environment (S7-PLCSIM) for testing and optimizing the project before commissioning
 - Also available as version without S7-GRAPH, S7-SCL and PLCSIM as SIMATIC STEP 7 Basis
- Support for 64-bit operating systems
- Integrated interfacing to Matlab-Simulink

Programming of user-specific functions – SIMATIC S7-SCL

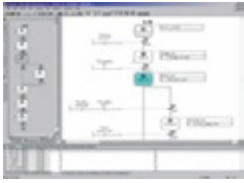
Text-based high-level language for the development of user-defined control algorithms (component of SIMATIC STEP 7 Professional)



- Ideally suited to programming complex algorithms and mathematical functions
 - Permits the creation of user-defined function blocks which can be used for creating user-defined block libraries
 - Simplified testing of programs at a high-level language level by means of debuggers
- In accordance with IEC 61131-3, Structured Text (ST)

Graphical sequential programming – SIMATIC S7-GRAPH

Intuitive sequence chart for the programming of sequential functions (component of SIMATIC STEP 7 Professional)

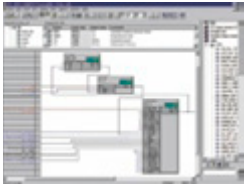


- Configuration of sequential functions without the need for a complex interlocking logic between the individual steps
- Integrated process diagnostics for faster troubleshooting in the event of process faults
- In accordance with IEC 61131-3, Sequential Function Chart (SFC)

Programming of function block diagrams – SIMATIC S7-CFC

5

Function block diagram programming for continuous processes, motion control, and PID control



- Graphical interconnection and parameterization of standardized or user-defined function blocks
- Extensive library with pre-defined, pre-tested functions
- Intuitive operation for users who are familiar with function block programming or circuit diagrams
- Extended implementation of the function block diagram (FBD) according to IEC 61131-3 by means of higher-level function blocks

Controller simulation – SIMATIC S7 PLCSIM

Checking and testing of applications before commissioning (component of SIMATIC STEP 7 Professional)



- Testing and correcting the program logic without hardware
- High program quality thanks to comprehensive test functions
- Short startup times
- Open interface (API) for integration of the dynamic simulation
- Easily integrated diagnostic functions which enable process faults to be detected and expensive downtimes to be avoided

Integrated process diagnostics – SIMATIC S7-PDIAG/SIMATIC ProAgent

Integrate the process diagnostics into your control strategy

- The process diagnostics are configured as an extension to the standard function blocks – this means additional programming is no longer required
- Monitoring of the operating process for the recording and reporting of process faults (e.g. limit switch failure, motor overload, etc.)
- Reduction of costly downtimes by means of fast and accurate localization of process faults and their causes
- Automatic linking with SIMATIC HMI
- S7-PDIAG to process diagnostics projects with LAD, FBD, STL
- ProAgent for integration of process data into HMI
- S7-GRAPH has integral process diagnostics

5

Access protection, data security and traceability SIMATIC LogOn, SIMATIC VersionTrial, SIMATIC Version Cross Manager

Expansion of the Windows user administration to include SIMATIC

- Access protection for projects and target systems
- User administration with assignment to user groups
- Change log for all relevant actions
- Versioning possible with additional SIMATIC VersionTrail software
- Comparison of projects with SIMATIC VXM additional software

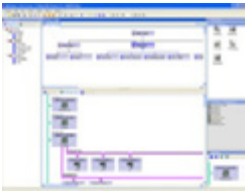
Safety Integrated Engineering – S7 Distributed Safety software for fail-safe SIMATIC systems

Certified approach for configuring safety applications

- Joint approach and uniform environment for configuring safety-related and standard automation applications (integrated into a standardized engineering environment)
- LAD and FBD standard editors familiar from STEP 7 (in accordance with IEC 61131-3) have been replaced by a library of safety function blocks approved by the German Technical Inspectorate (TÜV)
- Automatic safety checks, including integration of additional fail-safe blocks for fault detection and handling
- Software errors and hardware faults trigger the corresponding responses so that the fail-safe system always remains in a safe state
- Meets all requirements of IEC 61508 and EN 62061 up to SIL3 and EN 954-1 up to Category 4 and of the EN ISO 13849-1 up to PL e

Generation of components - SIMATIC iMap

Merging applications on a plant-wide basis using SIMATIC iMap, the engineering tool for Component Based Automation



- Graphical configuration of the relationships between individual machines in one plant-wide architecture
- Configuring of communication relationships instead of programming the communication
- Simple troubleshooting and debugging by means of intuitive online diagnostic functions
- Integration of systems from other manufacturers via PROFINET, PROFIBUS and other fieldbus systems (with proxy function)

5

Engineering software for the integration of drives – Drive ES

Engineering tools for the integration of drive technology into SIMATIC automation systems



- Integrated communication, configuration, and shared data storage for automation and drive systems
- Utilizes the user interface of the STEP 7 Manager, thereby ensuring a standardized configuration

Engineering for SINAMICS drives family integrated in TIA Portal – StartDrive

StartDrive is a tool that is integrated into the TIA Portal and can be used for configuration, commissioning and diagnostics of the SINAMICS drives family



- With the TIA Portal framework SINAMICS frequency converters can be integrated in your automation solution easily and without the need for any additional tool
- Configuration time is saved through simple and efficient parameterization with context-sensitive menus, quick commissioning wizard and graphical user interfaces
- Plant downtimes are reduced as a result of integrated diagnostic functions for the drives
- The commissioning times of the frequency converters are shortened thanks to an integral control panel that enables direct operation of the drive from the TIA Portal

PLC-based Motion Control – Easy Motion Control with SIMATIC

Positioning and synchronous operation made easy – with your PLC



- Flexible, software-based solution for positioning and gearing with the SIMATIC S7-300, S7-400, and WinAC
- Logic and motion control are programmed using SIMATIC STEP 7
- Function block library for absolute and relative motion, reference point approach, jogging, override, and simulation

5

- Standard I/O modules for connecting sensor signals and controlling the reference output
- Fulfills the requirements of the PLCopen motion control specification

Extended control options – Loadable function blocks

Function blocks for expansion of the control functions



- For positioning or control applications that have been implemented with SIMATIC controllers and corresponding software
- Software solutions for flexible use on almost all SIMATIC controllers
- Performance and dynamic response can be scaled by selecting the target system

Creating the project documentation – SIMATIC S7 DOCPRO

Creating and managing plant documentation

- Permits structuring of project data, preparation in the form of wiring manuals, and the printout in a specified print format
- Central generation, processing, and management of title block data
- The supplied standard layout templates are used as the basis for your own layouts and cover sheets

Technical product data for CAx applications

Library with supporting documentation for the creation of design drawings



- Product data for controllers and distributed I/O
- Device dimension drawings
- Description of device connections
- Interface for the export of data to CAD/CAE systems

Software Update Service

5

Always up-to-date



- Utilization of the latest technologies and functionalities for efficient engineering.
- Time savings as you need not download the latest releases
- Software update costs can be planned due to low annual fee

Industrial notebook – SIMATIC programming devices

SIMATIC Field PG M3 – the rugged industrial notebook optimized for configuring, commissioning, service and maintenance of your automation system.



- For configuring and programming automation systems in the SIMATIC environment
- For office applications and industrial use

SIMATIC SW pre-installed and ready to use:

- STEP 7 Basic
- STEP 7 Professional
- STEP 7 Micro/WIN
- WinCC flexible Advanced
- STEP 5 (optional)

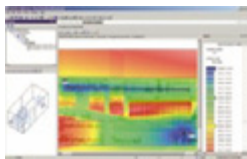
High-level languages	S7-SCL	S7-GRAPH (SFC)	S7-CFC
Description	Text-based high-level language programming of simple and complex calculations, CASE, loop, jump, and comparison functions	Graphical programming of sequential controllers and sequencers	Graphical creation, interconnection and parameterization of (preconfigured) blocks and functions
Advantages	<ul style="list-style-type: none"> ■ Clear and easy-to-read programs ■ Functional, module-oriented programming ■ CASE instruction replaces a large number of jump and comparison functions ■ Simple change for PLC programmers since the programming philosophy of LAD, FBD and STL is retained ■ Easy switchover to PLC programming for PC programmers ■ Exchangeability (porting) of subroutines in accordance with IEC 61131-3 ■ Less time required for engineering compared to LAD/FBD/STL: Up to 20% with programs; at least 50% with demanding program structures 	<ul style="list-style-type: none"> ■ Can be used to optimum effect even during the design phase ■ Less configuration effort thanks to graphical structuring and programming ■ Quick and easy familiarization ■ Precise fault localization thanks to integrated diagnostics in combination with ProAgent for ProTool/Pro and WinCC ■ Less time required for engineering compared to LAD/FBD/STL: Approx. 40% to 70% 	<ul style="list-style-type: none"> ■ Can be used to optimum effect even during the design phase ■ Reduced configuration effort thanks to graphical interconnection ■ High degree of reusability of diagrams that have already been created ■ Quick and easy familiarization ■ Quick and transparent interconnection of ready-made functions ■ Technological generation of the overall program ■ Clear representation of control loop structures ■ Short commissioning times ■ High plant availability ■ Less time required for engineering compared to LAD/FBD/STL: Up to 50%

Sectors	<ul style="list-style-type: none"> ■ Labeling machines ■ Chemical plants (e.g. oxygen recovery, evaluation of measured values) ■ Rubber and plastics machines ■ Woodworking machines ■ Warehouse systems and logistics ■ Paper and printing machinery ■ Punching and cutting machines ■ Water industry ■ Coilers 	<ul style="list-style-type: none"> ■ Automobile production (e.g. body-in-white, final assembly) ■ Electrical equipment manufacture ■ Rubber and plastics machines ■ Pick-and-place machines ■ Woodworking machines ■ Metalworking machines ■ Paper and printing machinery ■ Testing machines ■ Rolling mills ■ Coilers ■ Leisure and entertainment facilities 	<ul style="list-style-type: none"> ■ Automotive production (e.g. temperature controls, processes in tire production) ■ Chemicals ■ Power engineering and supply ■ Rubber and plastics machines ■ Metalworking machines ■ Food, beverages, and tobacco machines ■ Petrochemicals ■ Rolling mills ■ Water industry ■ Coilers
Process diagnostics	With S7-PDIAG	Integrated	With S7-PDIAG
Use in	SIMATIC controllers S7-300 S7-400 C7, WinAC	S7-300 S7-400 C7 WinAC	S7-300 S7-400 C7 WinAC Fail-safe systems High-availability systems

Industrial Networking Software

Network management

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



The term network management is used to describe functions and components for planning, monitoring and controlling networks.

5

- SINEMA E network management products and the SNMP OPC server support you with the main network management tasks in industrial environments.
- SINEMA Server has an Autodiscovery function for the automatic detection of all devices integrated into a network and their properties, such as their topological interconnection. The SINEMA Server diagnosis is accompanied by continuous logging and archiving. Standard protocols such as SNMP and PROFINET are used for this purpose. The diagnostic results can be presented as network statistics in either tabular or graphical form.
- The user interface and the functions that it provides are accessible via the integral browser from any computer on the network. These pages can be integrated into SCADA systems, such as SIMATIC WinCC, without any problems. There is no need for time-consuming configuring of special network views. Plant operators can monitor the plant communication that concerns them in their SCADA system.
- With the help of report functions, the network data from the SINEMA Server database can, for example, be conditioned and documented as verification of network uptime.
- SINEMA Server licenses are scalable in accordance with the number of stations to be monitored and are therefore cost-optimized for the network size. The scope of the information displayed can be adapted to the respective requirements and to suit user experience. This system is less complex than other network management systems - no special know-how is required for operation.

Safety for Industrial Ethernet – SOFTNET Security Client

The 'key' to accessing safe networks by means of clients



- Secure data transmission according to certified standards for protection against data espionage and manipulation
- Access to secure automation networks by means of programming devices or PCs
- User-friendly and simple to use, no special knowledge required for implementation
- Non-secure devices can be integrated into the secure data traffic

Communications driver for Ethernet – SOFTNET

5

Software driver for Ethernet



- Connection to Industrial Ethernet for your PC or PG
- Can be used in connection with an integrated network card or installed communications processor
- OPC server software is included in the scope of delivery

SIMOTION Motion Control System

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
- Creation and management of SIMOTION projects
- Extremely user-friendly thanks to integrated, function-oriented views and intuitive operation
- Function and technology-oriented project structure with filterable views (i.e. controllers, drives, axes, cams, etc.)
- Simple programming of the PLC tasks with LAD and FBD
- Project-based data and program management - even in distributed systems
- Graphical, sequence-oriented programming of motion control tasks

5

SIRIUS Industrial Controls

Parameterization and service software for the SIMOCODE pro motor management system – SIMOCODE ES

SIMOCODE ES is the centralized software for commissioning, operation and diagnostics of SIMOCODE pro



- Easy parameterization reduces engineering costs and shortens commissioning time
- Integrated graphical editor for device parameterization with Drag&Drop
- Clear plant documentation thanks to graphical presentation (DIN EN ISO 7200)
- Detailed information, also in the case of a fault, for supporting the maintenance personnel and shortening the plant standstill times
- Universal implementation due to stand-alone version and integration into SIMATIC STEP 7
- Parameter changes are also possible during normal operation
- Uniform data storage and easy project engineering thanks to integration in TIA (Totally Integrated Automation)

Selection and simulation program for soft starters – WinSoft Starter

Helping you select the right SIRIUS soft starter



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. Even with the most challenging of conditions (e.g. high moments of inertia or frequent switching cycles), the program simulates and displays the ramp-up and ramp-down characteristics of your motors, thereby allowing you to choose the right soft starter for your application.

- No need for complex, time-consuming manual calculations.
- Different sample loads are available: The ramp-up and ramp-down characteristics of your motors can be accurately simulated while taking into account the different operating modes.

You can download WinSoft Starter free of charge from:

www.siemens.com/industrial-controls/demosoftware

Parameterization and evaluation software for soft starters – Soft Starter ES

User-friendly parameterization and evaluation software for 3RW44



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. The device parameters can be set directly on the PC and transferred to the soft starter via a serial cable or PROFIBUS interface.

- User-friendly process of setting device functions and their parameters both online and offline
- Effective diagnostic functions on the soft starter with display of the most important measured values
- Oscilloscope function (trace) for recording measured values and events
- Time savings thanks to shorter commissioning
- Straightforward licensing
- Thanks to a range of templates, Soft Starter ES offers a user-friendly group function allowing you to parameterize a number of identical devices or applications
- Practical models, straightforward licensing: Three different Soft Starter ES versions that differ with respect to user friendliness, range of functions, and price are available

Parameterization and evaluation software for motor starters – Motor Starter ES

Motor Starter ES



The Motor Starter ES software allows you to parameterize, monitor, and perform diagnostics during servicing for SIRIUS motor starters quickly and easily. The device parameters can be set directly on the PC and transferred to the motor starter via a serial cable or PROFIBUS interface (ECOFAST, ET 200pro).

5

- User-friendly setting of device functions and their parameters both online and offline
- Effective diagnostic functions on the motor starter with display of the most important measured values
- Time savings thanks to shorter commissioning
- Straightforward licensing
- Practical models, straightforward licensing: Three different Motor Starter ES versions that differ with respect to user friendliness, the range of functions, and price are available.

SENTRON Low Voltage Distribution – Switch ES Power

Commissioning and diagnostic software completely integrated into the automation environment



- Parameterization, diagnostics and monitoring of the SENTRON circuit breakers via the PROFIBUS DP network
- Complete integration into the SIMATIC world and the STEP 7 engineering software
- Data management, configuration and parameterization are integrated into the automation project



Safety Integrated

Fail-safe communication	96
Detecting	98
Evaluation	98
Reaction	102
Selection table for Safety Integrated . . .	106

Safety Integrated

Safety technology from a single source



The following applies for mechanical equipment manufacturers and operators alike: There must be absolutely gap-free safety for personnel and machinery. The solution: our Safety Integrated safety 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 through the control 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.

- 6 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 further information refer to: www.siemens.com/safety-integrated

Fail-safe communication –

PROFIBUS and PROFINET with PROFIsafe profile

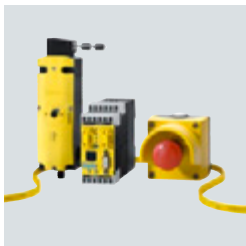
PROFIBUS or PROFINET – Standard and safety-related data on a single fieldbus



- PROFIsafe is a profile for PROFIBUS and PROFINET specified in accordance with IEC 61784-3-3. PROFIsafe complies with the following safety levels:
 - Safety Integrity Level SIL 3 (IEC 61508, EN 62061)
 - Category 4 (EN 954-1)
 - Performance Level e (EN ISO 13849 -1: 2006)
- The PROFIsafe profile is an open profile that allows cross-vendor integration of field devices
- PROFIsafe permits innovative approaches such as wireless fail-safe communication over IWLAN and PROFINET, e.g. using the SIMATIC Mobile Panel 277F IWLAN with integrated safety function (see page 135)

Fail-safe communication – ASIsafe

Connecting sensors easily and reliably



- Safety technology with AS-Interface: ASIsafe with standard and safety data on a single bus
- Certified to PL e acc. to ISO 13849-1, Cat. 4 acc. to EN 954-1 or up to SIL 3 acc. to IEC 61508
- All ASIsafe components are fully compatible with all standard components of AS-Interface in accordance with AS-Interface standard EN 50295
- Up to 31 safe slaves in one AS-i network
- Stand-alone solution using safety monitor (ASIsafe Solution local)
- Connection of ASIsafe to PROFIsafe thanks to DP/AS-i F-Link (ASIsafe Solution PROFIsafe) with programming via SIMATIC STEP 7 Distributed Safety

6

Fail-safe communication – ASIMON V3

ASIsafe Solution local with AS-i safety monitor



- The ASIMON PC software is used for configuring the AS-Interface safety monitor.
- Using the online function of the software, the current status of the configured logic blocks can be read on site and monitored in the pixel-graphics diagnostic view.
- The desired status information is provided in intuitive color changes of the blocks and connecting lines (green/yellow/red). This function is especially valuable during commissioning and troubleshooting.

Fail-safe communication – ASIsafe module S45F with fail-safe AS-i output

Greater flexibility - Safe switch-off with ASIsafe



- The fail-safe SlimLine module S45F allows fail-safe connection of actuators via AS-Interface in a distributed configuration.
- The fail-safe output can be installed anywhere on the AS-Interface and is activated via the safety monitor.
- The module is suitable for safety applications up to SIL 3 or PL e.
- The S45F is also equipped with standard inputs and outputs, for functional switching of an actuator, for example.

Detecting

Position switch with integral ASIsafe electronics – 3SF1

Quick and easy connection to the AS-Interface network



- Entire spectrum of 3SE5 position switches is available with integrated ASIsafe electronics
- Connection to the AS-Interface system is by means of an M12 connector
- Due to the direct integration of the safety position switches with retainers into the ASi network, the loading of the data cable is very low, i.e. the maximum current consumption of the magnets is 170 mA.

Evaluation

6

Fail-safe controllers – Modular, PC-based or embedded controllers

Automation and machine safety in one controller



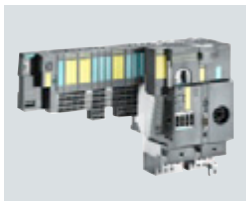
- Standard and safety controller combined, in a centralized or distributed configuration, PC or PLC-based – either over PROFIBUS or PROFINET with PROFIsafe profile
- Safety-related sensors are connected easily, directly with the controller
- Programming with shared software tool, and use of the same spare parts and the same networks as other standard controllers of the SIMATIC family
- Available in a fail-safe version for simple and complex safety applications
 - The controllers are certified by the German Technical Inspectorate according to IEC 61508, which facilitates compliance with the relevant standards: EN 954-1 up to Cat. 4, IEC 62061 up to SIL 3, and EN ISO 13849-1 up to PL e
 - Compliance with NFPA 79 2002
 - UL-NRFG-listed as "Programmable Safety Controllers"
- You can find more on the topic of safety engineering on the following pages:
 - Controllers: *Fail-safe controller*, page 17
 - Process automation: *Safe, fault-tolerant controller*, page 60

Safety Integrated Engineering – S7 Distributed Safety software for fail-safe SIMATIC systems

- For further information about S7 Distributed Safety software, see "Automation software" on page 84.

Modular fail-safe I/O system – SIMATIC ET 200S

Modular, safety-related I/O – Assembled according to your requirements



- Fail-safe modules for the family of bit-modular I/O devices
- You can combine fail-safe and standard I/O in one rack
- A safety-oriented range comprises digital inputs and outputs, relays, distributed F-CPU's, power modules, motor starters and frequency converters
- For applications with conventional wiring or over PROFIBUS or PROFINET
- Frequency converters provide integral encoder-less safety functions "Safe Torque Off", "Safe Stop 1" and "Safely Limited Speed"
- The components are certified by the German Technical Inspectorate (TÜV) according to IEC 61508, which facilitates compliance with the relevant standards: EN 954-1 up to Cat. 4, IEC 62061 up to SIL 3, and EN ISO 13849-1 up to PL e

6

Fail-safe I/O system with high packaging density – SIMATIC ET 200M

Installation of fail-safe and standard I/O in the same control cabinet



- Fail-safe digital and analog I/O modules supplement the wide range of standard modules – for all your requirements
- Active backplane bus enables module replacement during operation (hot swapping)
- Supports fault-tolerant configuration through redundant design
- For distributed I/O configuration via PROFIBUS with PROFIsafe profile
- The components are certified by the German Technical Inspectorate (TÜV) according to IEC 61508, which facilitates compliance with the relevant standards: EN 954-1 up to Cat. 4, IEC 62061 up to SIL 3, and EN ISO 13849-1 up to PL e

Modular, failsafe I/O system for hazardous areas – SIMATIC ET 200iSP

The intrinsically-safe version for hazardous areas



- With the fail-safe modules of ET200iSP automation tasks can be solved with safety requirements like IEC 61508 up to SIL 3 or PL e
- The fail-safe modules includes two digital modules (8- an 4 channel) and one analog HART-Modul
- Automation tasks like Emergency stop, or boiler protection without hazardous barriers (the additional SIL calculation for the hazardous barriers is obsolete)
- Communication via PROFIBUS with PROFIsafe

Fail-safe block I/O with high degree of protection – SIMATIC ET 200eco

**For installation direct at the machine –
enabling you to reduce the installation costs for fail-safe signals**

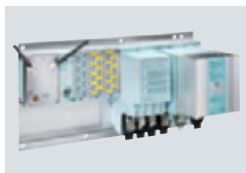


- Cost-effective block I/O that can be installed direct at the machine or in the process without a control cabinet
 - Compact, rugged enclosure with easy handling
 - Integrated functionality for hot swapping without interrupting the power supply or the bus cable
- The power supply module is an integral component of the modular concept – no additional wiring required
 - For distributed I/O configuration with PROFIBUS and PROFIsafe profile
 - The components are certified by the German Technical Inspectorate (TÜV) according to IEC 61508, which facilitates compliance with the relevant standards: EN 954-1 up to Cat. 4, IEC 62061 up to SIL 3, and EN ISO 13849-1 up to PL e

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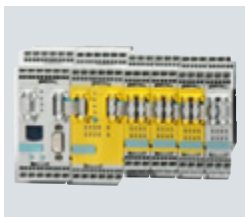
Modular, fail-safe I/O with high degree of protection – SIMATIC ET 200pro

The distributed fail-safe I/O system in IP65/67



- For distributed expansion of the safety-related S7 controller, optionally via PROFIBUS or PROFINET
 - The safety-related range encompasses a multi-channel digital input module and a hybrid module with digital inputs and outputs
- Cabinet-free distributed configurations thanks to high degree of protection IP65/67
 - Motor starters or frequency converters with high degree of protection can easily be integrated with the ET 200pro I/O. In PROFIsafe applications, the fail-safe response is performed via an F switch and a 400 V shutdown module for the motor starter.
 - The components are certified by the German Technical Inspectorate (TÜV) according to IEC 61508, which facilitates compliance with the relevant standards: EN 954-1 up to Cat. 4, IEC 62061 up to SIL 3, and EN ISO 13849-1 up to PL e
 - SIMATIC ET 200pro IWLAN: Wireless connection of distributed I/O systems to the IO Controller via an Access Point

SIRIUS modular safety system – 3RK3 Basic



The 3RK3 modular safety system is a modular, software-parameterized safety relay comprising:

- Central module, expansion modules, DP interface module, diagnostic display, and parameterization software.

The MSS 3RK is characterized by:

- High degree of flexibility and reliable planning thanks to modular design

- More space in the control cabinet and lower costs due to a bit-modular quantity structure
- Enhanced functionality and time savings thanks to a parameterizable system
- Comprehensive diagnostics locally with the MSS ES software
- Better plant diagnostics, higher plant availability thanks to data exchange over PROFIBUS

6

Flexible, fail-safe motor management – SIMOCODE pro 3UF7



- Integrated safety functions for safe shutdown of motors in automated processes
- Two fail-safe digital modules (DM-F Local, DM-F PROFIsafe) for optimized, error-free integration of the safety functions

- Processing of the safety shutdown signal from the fail-safe controller or direct sensor interfacing with the DM-F Local; processing of the safety shutdown signal from a fail-safe controller PROFIBUS / PROFIsafe with the DM-F PROFIsafe
- Transmission of comprehensive diagnostics information via SIMOCODE to the controller
- Compliance with the requirements of the IEC 61508/62061 and ISO 13849-1 standards for functional safety up to SIL 3 or PL e
- For further information, visit: www.siemens.com/simocode

Reaction

Frequency inverter for single drives up to 250 kW – SINAMICS G120C, G120, G120D

Standard drive with integrated safety functions for variable-speed operation of asynchronous motors in conveyor systems, pumps, fans, compressors and other equipment units (saws, extruders, etc.)



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- G120C: Compact unit to IP20 for outputs from 0.55 to 18.5 kW
- G120: Modular design to IP20 for outputs from 0.37 to 250 kW
- G120D: Distributed inverter with high degree of protection (IP65) for outputs from 0.75 to 7.5 kW
- Regenerative feedback capability with G120 and G120D
- Fully integrated safety functions according to IEC 61800-5-2 and EN 60204: Safe Torque Off (STO), with G120 and G120D: Safe Stop 1 (SS1), Safely Limited Speed (SLS); only with G120: Safe Brake Control (SBC), Safe Direction (SDI), Safe Speed Monitor (SSM)
- Certified for Category 3 acc. to EN 954-1, PL d acc. to EN ISO 13849-1, and SIL 2 acc. to IEC 61508 or PL d (EN ISO 13849-1)
- Further information about SINAMICS converters can be found in the section *Low-voltage converters* page 187 et seq.

Fail-safe positioning drive – SINAMICS S110

AC/AC device for positioning a drive axis with synchronous or asynchronous motors



- Integral safety electronics with extremely high-speed response to safety problems
- Integral self-test routines for detecting errors and faults
- Available safety functions: Safe Torque Off (STO), Safe Operating Stop (SOS), Safe Stop 1 and 2 (SS1, SS2), Safe Direction (SDI), Safely Limited Speed (SLS), Safe Speed Monitor (SSM), Safe Brake Control (SBC)
- Transmission of all safety-relevant signals via hardwiring or PROFIBUS/PROFINET with PROFIsafe protocol
- All safety functions are supported by a setup tool
- Certified for Category 3 (EN 954-1), SIL 2 (IEC 61508) or PL d (EN ISO 13849-1)

Fail-safe drive system – SINAMICS S120

Drive system for high-performance single/multiple-axis applications



- Integral safety electronics with extremely high-speed response to safety problems
- Integral self-test routines for detecting errors and faults
- Available safety functions:
Safe Torque Off (STO), Safe Operating Stop (SOS), Safe Stop 1 and 2 (SS1, SS2), Safe Direction (SDI), Safely Limited Speed (SLS), Safe Speed Monitor (SSM), Safe Brake Control (SBC)
- Transmission of all safety-relevant signals via hardwiring or PROFIBUS/PROFINET with PROFIsafe
- All safety functions are supported by a setup tool
- Certified for Category 3 acc. to EN 954-1, PL d acc. to EN ISO 13849-1, and SIL 2 acc. to IEC 61508 or PL d (EN ISO 13849-1)
Booksize format: NFPA 79, NRTL-listed

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Fail-safe drive – SINAMICS G130/150

Frequency converters for single drives in the mid to upper performance range



- Integral safety electronics with extremely high-speed response to safety problems
- Integral self-test routines for detecting errors and faults
- Available safety functions:
Safe Torque Off (STO), Safe Stop 1 (SS1)
- Transmission of the safety-relevant signals via PROFIBUS DP/PROFIsafe protocol
- The STO and SS1 functions (24V-230 V) can be optionally controlled via the standard option K82
- All safety functions are supported by the commissioning tool
- Certified for Category 3 acc. to EN 954-1, PL d acc. to EN ISO 13849-1, and SIL 2 acc. to IEC61508

Fail-safe drive – SINAMICS S150

The converter cabinet for demanding, variable-speed single drives.



- Integral safety electronics with extremely high-speed response to safety problems
 - Integral self-test routines for detecting errors and faults
 - Available safety functions: Safe Torque Off (STO), Safe Operating Stop (SOS), Safe Stop 1 and 2 (SS1, SS2), Safely Limited Speed (SLS), Safe Speed Monitor (SSM)
 - Transmission of the safety-relevant signals via PROFIBUS DP/PROFIsafe protocol
 - All safety functions are supported by the commissioning tool
- 6
- Certified for Category 3 acc. to EN 954-1, PL d acc. to EN ISO 13849-1, and SIL 2 acc. to IEC 61508

Safety numeric control – SINUMERIK

Integral safety functions for protecting personnel and machinery in machine tools



- Functions for safe monitoring of velocity and standstill
 - Functions for establishing safe boundaries around working areas and protection zones, and for range recognition
 - Direct connection of all safety-related signals and their internal logical linkage
- Distributed I/Os for process and safety signals are connected via PROFIBUS using the PROFIsafe protocol.
 - Safe brake management comprising dual-channel braking signal and cyclic brake test
 - Partially automated acceptance test for all safety-related functions
 - Certified for Cat. 3 (EN 954-1), SIL2 (EN61508), PL d (EN ISO 13849-1), NFPA, NRTL-listed

For extreme ambient conditions – SIPLUS extreme

Refined standard modules based on SIMATIC for extreme environmental conditions



- Temperature range from -25 °C to +60 °C
- 100% humidity, dewing, condensation, and ice formation permissible
- Modules with a special conformal coating for use in atmospheres containing corrosive gases according to EN 60721-3-3, Class 3C4 incl. salt fog and ISA S71.04 severity level G1; G2; G3; GX*) and EN 60721-3-3, Class 3S4 incl. electrically conductive sand, dust and EN 60721-3-3, Class 3B2 mold, fungus and fungal spores (excepting fauna)

The products:

- SIPLUS S7-300F
- SIPLUS ET200S F

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*) ISA S71.04 severity level GX:

- Long-term load: SO₂ < 4.8 ppm; H₂S < 9.9 ppm; Cl < 0.2 ppm; HCl < 0.66 ppm; HF < 0.12 ppm; NH < 49 ppm; O₃ < 0.1 ppm; NO_x < 5.2 ppm
- Limit value (max. 30 min/d): SO₂ < 14.8 ppm; H₂S < 49.7 ppm; Cl < 1.0 ppm; HCl < 3.3 ppm; HF < 2.4 ppm; NH < 247 ppm; O₃ < 1.0 ppm; NO_x < 10.4 ppm

Safety Integrated

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		Evaluation				Detecting		
		Controller for the manufacturing industry	Controller for the process industry	Fail-safe I/O for process and manufacturing	SIMOCODE pro motor management system	Modular safety system SIRIUS 3RK3		
Description	Position switch with integrated connection to AS-Interface	Scalable fail-safe controller	The safe and/or fault-tolerant controller	The limitless I/O systems	Reliable safe shutdown of motors in automated processes	Modular, parameterizable safety system		
Application areas	For mechanical monitoring of protective devices, protective doors or flaps	All applications in the manufacturing industry	All applications for the process industry	All applications in the manufacturing and process industries	Motor management in the process industry.	All safety applications in factory automation		
Certificate for safety category	up to SIL 3 up to PL e up to Cat. 4	up to SIL 3 up to PL e up to Cat. 4	up to SIL 3 up to PL e up to Cat. 4	up to SIL 3 up to PL e up to Cat. 4	up to SIL 3 up to PL e up to Cat. 4	up to SIL 3 up to PL e up to Cat. 4		

Fail-safe communication	AS-Interface (ASIsafe)	AS-Interface (ASIsafe) and PROFIBUS with PROFIsafe profile	PROFIBUS/PROFINET with PROFIsafe profile	PROFIBUS with PROFIsafe profile	PROFIBUS DP for diagnostics data (without PROFIsafe profile)
Standards	IEC 61508, IEC 62061, EN ISO 13849-1, EN 954-1	IEC 61508, IEC 62061, EN ISO 13849-1, EN 954-1, NFPA 79, NRTL-listed	IEC 61508, IEC 62061, IEC 61511, EN ISO 13849-1, EN 954-1, NFPA 79, NFPA 85, CSA 142/432/434	IEC 61508, IEC 62061, EN ISO 13849-1, NFPA 79, Approvals: TÜV, NRTL	IEC 61508, IEC 62061, EN ISO 13849-1, NFPA 79, Approvals: TÜV, NRTL
Fail-safe functions	Locking the safety door Safe detection of potentially hazardous movements	Secure gateway for the transfer of ASIsafe signals to the PROFIsafe message frame	Integral diagnostic functions and self-test routines In the event of a fault, the application can be flexibly brought to a fail-safe state or maintained in a fail-safe state.	Safe shutdown of motors via hardware signal or PROFIBUS/PROFIsafe	Safe evaluation of protective devices. Easy implementation of safety functions thanks to ready-to-use safety function blocks.
Degree of protection	IP65/IP7	IP65	IP20	IP20	IP20
			IP20 to IP67		

Safety Integrated

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Reaction		SINAMICS ET200S/pro motor starters	SIMATIC ET200S/pro FC	SINAMICS G120C/G120/G120D	SINAMICS G130/G150	SINAMICS S110/S120	SINAMICS S150	SINUMERIK
Description	Motor starters with integral safety shutdown	Frequency converter embedded in distributed I/Os with integrated, autonomous safety functions; without encoder	Frequency inverter with integral, autonomous safety functions; without encoder	Frequency converter for variable-speed single drives	Modular drive system for complex single-axis/multi-axis applications (S120) or basic positioning drives (S110)	Frequency converter for complex variable-speed single drives	NC system with integrated safety functions	
Application areas	All factory automation applications, e.g. conveyor systems or automobile manufacture	Applications for factory automation, e.g. conveyors	Machine building, conveyor systems, equipment units such as saws, extruders	Machines and plants for industrial applications, wherever solid, liquid, or gas substances must be moved, transported, pumped, or compressed	Continuous motion control, motion control tasks (including highly dynamic and coordinated positioning tasks) in multi-axis drives with a common, central power supply and intermediate DC circuit	Machines and plants for industrial applications with the most stringent requirements for processes with dynamic and reproducible procedures	Machine tools	
Certificate for safety category	up to SIL 3 up to PL e up to Cat. 4	up to SIL 2 up to PL d up to Cat. 3					up to SIL 2 up to PL d up to Cat. 3	



Industrial communication

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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 company management level
- use the advantages of industrial wireless communication
- integrate IT systems

7

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)
- Worldwide communication thanks to telecontrol technologies (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 sector:

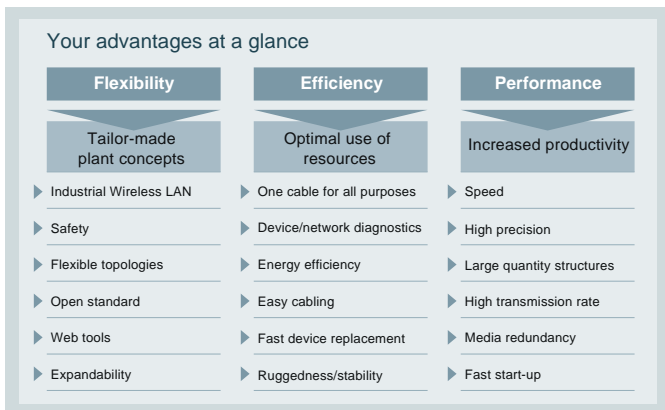
- Network components for use in extreme industrial environments
- Fail-safe networks through high-speed redundancy
- Continuous monitoring and diagnosis of the network components
- Fail-safe and simple connection method on site

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 – standardized and specified in the largest fieldbus organization in the world: PROFIBUS & PROFINET International (PI), with more than 3 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.



Discover more about your advantages with PROFINET under:

www.siemens.com/profinet

Connection options for controllers to Industrial Ethernet – Communications processors

Make your controller fit and ready for connection to Industrial Ethernet



- Use Industrial Ethernet for programming, monitoring, peer-to-peer communication, connection to your IT and e-mail/web integration
- Lighten the load on your CPU of your controller by using an independent communications coprocessor
- Communication processors with additional functionalities (e.g. BACnet) are offered for special application scenarios.
- Can be used for forwarding production data as a web and FTP server or client
- Plug-in module for connection to the backplane bus of the controller
- Modules for S7-200, S7-300, S7-400 and SINUMERIK 840D powerline
- Connection to Industrial Ethernet at 10/100/1000 Mbit/s via RJ45 interface

7 CPs 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

- Designed for use in harsh industrial environments
- Certified for use on ships and offshore units
- Additional, integrated 2-port switch for setting up small, local networks for CP 343-1 Lean, CP 343-1 and CP 443-1
- Can be used via RJ45 interface for the industry-standard SIMATIC NET FastConnect cabling system
- High-speed transfer even with large volumes of data (10/100 Mbit/s)

CPs with function expansions

- Can be used as a PROFINET IO Controller with real-time characteristics
- With Gigabit connection, incl. routing functionality (10/100/1000 Mbit/s)
- Network separation with IP routing functionality
- Access protection via IP access list
- Extensive diagnostics options
- With integrated safety functions: Firewall and VPN for „cell protection concept inside“

CP 343-1 Advanced for SIMATIC S7-300 - with IT functionality

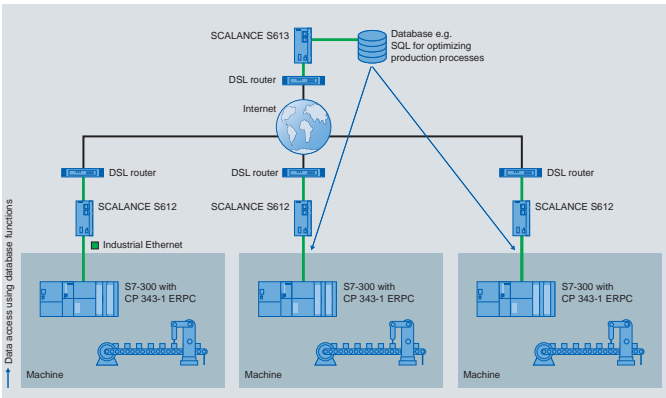
- Can be used as a PROFINET IO Controller and IO Device with real-time characteristics
- Integrated 2-port switch for setting up small local networks

CP 443-1 Advanced for SIMATIC S7-400 - with IT functionality

- Additional integrated 4-port switch for setting up small local networks
- Operation in SIMATIC H system for redundant S7 communication
- Operation in fail-safe applications (PROFIsafe) together with SIMATIC S7-400 CPU 416F

Access to databases – without time-consuming programming of the controller

- Connections to databases are directly configured, without intermediate gateways or PCs.
- The communication processor CP 343-1 ERPC 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.
- The CP 343-1 ERPC can be used together with the software from the partner company ILS for directly connecting SIMATIC S7-300 controllers to databases over Industrial Ethernet.
- In addition to the familiar communication possibilities with programming devices, operator control and monitoring devices and SIMATIC S5/S7/C7 systems, direct interfacing to database applications such as ORACLE, MySQL, MS-SQL and DB2 can be easily implemented.
- Simply configured controllers can therefore be directly supplied with data or orders from the databases of the Manufacturing Execution Systems (MES) or the Enterprise Resource Planning (ERP) level.



Industrial communication

Connection options for PC to Industrial Ethernet – Communications processors

PC-based products for industrial applications offer:

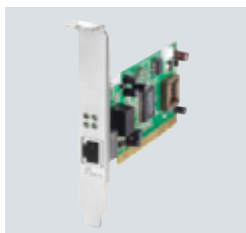
- a long product life cycle
- a standardized, successful system
- scalable system performance and an expandable platform,
- easy combination of control and HMI functionality,
- consistency in the plant thanks to uniform network topologies,
- a standardized application interface,
- simple engineering,
- utilization of known IT technologies in industrial applications
- simple and integrated remote access to the plant,
- expanded quantity structures, increased performance and new applications.

Intelligent cards: HARDNET cards with internal microcontroller



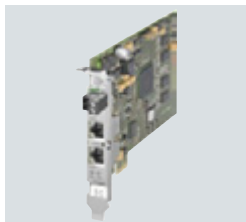
- High computing performance available in the PC since there is less workload on the host CPU
- Constant data throughput through protocol processing on the CP
- Use for large network configurations
- The products:
 - CP 1604 (PCI-104)
 - CP 1613 A2 (PCI 32 bit)
 - CP 1616 (PCI 32 bit)
 - CP 1623 (PCIe x1)

Simple cards: SOFTNET cards without internal processor



- Easy installation and startup
- For diagnostics and commissioning
- Use in small network configurations
- CP 1612 A2 (PCI 32 bit)

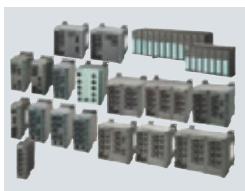
Communication module with security for PCs – CP 1628



- Comprehensive, reliable protection (firewall, VPN) for PCs without specialist knowledge of the operating system
- Cost savings due to the added-value of the security function

SCALANCE X Industrial Ethernet switches –

In a class of its own in every category



Switches are active network components that specifically distribute data to the relevant addressees, i.e. network stations.

The SCALANCE X product family comprises product lines that complement each other and are tuned to the specific 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.

Compact Switch Modules CSM –

More connections to SIMATIC



Interface expansion directly at the SIMATIC and for integrating machines into existing plant networks.

The devices in SIMATIC design allow the cost-effective setting up of small, electrical Industrial Ethernet star, tree and linear topologies with SIMATIC S7-300, or ET 200M or S7-1200.

SCALANCE X-000 –

Simple – Space-saving – Industry-standard

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 degrees of protection. They are suitable for use in less harsh industrial environments and for setting up small line, tree or star topologies in machine and plant islands.

The low-cost, space-saving switches, that are also available as Gigabit variants, can be mounted on DIN rails in control cabinets or control boxes thanks to their industry-standard plastic enclosure in a compact box design.

SCALANCE X-100 –

Basic version fully suitable for industrial use

For a reliable network solution with all of the equipment details

These switches are unmanaged Industrial Ethernet switches with various port characteristics. These products are the ideal and cost-optimized solution for setting up star, tree or linear topologies with switching functionality in machine or plant units.

The unmanaged Industrial Ethernet media converters of the SCALANCE X-100 product line are ideally suited to the conversion of different transmission media in Industrial

Ethernet networks at 10/100 Mbit/s in linear, star and ring topologies.

The SCALANCE X-100 switches are available with various port configurations and densities, or as PoE variants.

SCALANCE X-200 managed –

Convenient and universal

7

For all network structures, from machine-level applications to networked subsystems

Universally usable SCALANCE X-200 managed switches. For an industry-standard, reliable network solution and for applications in the vicinity of machinery and for networked sub-systems.

They increase plant availability because the configuring and diagnostics are integrated into STEP 7. The various construction types make them suitable for use outside the control cabinet (IP65), for example, or in flat control cabinets or control boxes (ET 200 design). The SCALANCE X-200 switches are available with different port configurations and densities.

SCALANCE X-200IRT – Operating in hard real time

Compact switch for connection to the enterprise network



To cover all automation requirements, we also offer SCALANCE X-200IRT switches, which are Industrial Ethernet real-time switches with integrated real-time ASIC ERTEC (Enhanced Real-Time Ethernet Controller) for applications with demanding performance requirements. Response times can be achieved using standard components which correspond to the

performance of current fieldbus systems. High-performance, isochronous motion control applications can be implemented with IRT (Isochronous Real-Time).

The various construction types make them suitable for use outside the control cabinet (IP65), for example, or in flat control cabinets or control boxes (ET 200 design).

SCALANCE X-300 managed – Convincing performance – compact or modular

7

Flexible solutions for high-performance network structures - even under extreme conditions



SCALANCE X-300 is the low-cost version for use in high-performance plant networks. Thanks to the support of IT standards and Gigabit Ethernet, automation networks can be seamlessly integrated into existing office networks.

Different construction types permit mounting on classical DIN rails or S7 mounting rails, as well as in the 19" rack. PoE variants, for example, help to save power supply costs for the terminals, and EEC variants can even be used at extreme temperatures.

The use of different media modules gives the modular SCALANCE XR-300 switches flexibility, e.g. when configuring Gigabit topologies, and helps to save costs due to lower stocking levels.

SCALANCE X-400 managed / Layer 3 – Segmentation at all levels

Seamless integration of automation networks in existing office networks



SCALANCE X-400 offers everything you expect from switches designed for use in high-performance industrial networks, which need to be ready already today for the high demands of the future. This includes, for example, Gigabit data rates and a large number of ports. The modular structure

means that the switches can be precisely adapted to the specific task. Support of IT standards makes the smooth integration of automation networks into existing office networks possible.

With the integrated Layer 3 switching functionality (routing) of the SCALANCE X414-3E switch, it is possible to divide large Ethernet networks into smaller Ethernet networks with their own IP address space (subnet) or to connect subnets to each other.

7

Security modules and SOFTNET Security – SCALANCE S (V3) and SOFTNET Security Client



- Expansion of the SCALANCE S product spectrum
 - Additional security function for cell protection
 - DMZ port for secure connection of a DSL modem or as a service interface
- SOFTNET Security Client (64 bit version)

Industrial Wireless LAN – SCALANCE W

Installation of a plant-wide wireless network



- The flexibility of a wireless network and the reliability of a wired network
- Deterministic data transmission allows the implementation of demanding applications with real-time and redundancy requirements such as PROFINET, PROFI-safe or video
- Support with planning, simulation, configuration, site survey and documentation with the SINEMA E engineering tool, wizards and online help; easy management with Web server and SNMP
- Reliable thanks to rugged, impact-resistant enclosure, protected from water and dust (IP65), resistant to shock, vibration and electromagnetic fields

Connection of PROFIBUS to IWLAN – IWLAN/PB Link PN IO

Investment protection with wireless solutions



- 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, i.e. all S7 stations can be remotely programmed from the PG on Industrial Ethernet, IWLAN, or PROFIBUS

SIMATIC NET engineering/network management/ diagnostics – SINEMA E

- For further information about SINEMA E, see "Automation software" on page 90.

Communications driver for Ethernet – SOFTNET

- For further information about SOFTNET, see "Automation software" on page 91.

For extreme ambient conditions – SIPLUS extreme

Refined standard modules, based on SIMATIC NET for extreme environmental conditions



- 100% humidity, dewing, condensation, and ice formation permissible
- Modules with a special conformal coating for use in atmospheres containing corrosive gases according to EN60721-3-3 3C4 incl. salt fog and ISA 571.04 severity level G1; G2; G3; GX*) and EN60721-3-3 3S4 incl. electrically conductive sand, dust and EN60721-3-3 3B2 mold, fungus and fungal spores (excepting fauna)
- Extended temperature range from -25 to +60/+70 °C

The products:

- SIPLUS CP 342-5 communications processor
- SIPLUS CP 343-1 / CP 343-1 LEAN / CP 343-1 ADVANCED communications processor
- SIPLUS CP 443-1 / CP 443-1 ADVANCED / CP 443-5 communications processor
- SIPLUS SCALANCE X 101-1 / X 104-2 media converter
- SIPLUS SCALANCE X 202 2PIRT / X 204-2 / X 204-2LD / X 212-2 switches
- SIPLUS SCALANCE X 308-2 switch

*) ISA 571.04 severity level GX:

- Long-term load: SO₂ < 4.8 ppm; H₂S < 9.9 ppm; Cl < 0.2 ppm;
HCl < 0.66 ppm; HF < 0.12 ppm; NH < 49 ppm; O₃ < 0.1 ppm; NO_x < 5.2 ppm
- Limit value (max. 30 min/d): SO₂ < 14.8 ppm; H₂S < 49.7 ppm; Cl < 1.0 ppm;
HCl < 3.3 ppm; HF < 2.4 ppm; NH < 247 ppm; O₃ < 1.0 ppm; NO_x < 10.4 ppm

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 sector:

- 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.

All devices can be connected via one and the same cable, for example:

- Distributed I/O
- Drives
- Controllers
- Identification systems
- Motor starters
- Weighing and dosing systems
- User interfaces (HMI)

Connection of controllers to PROFIBUS – Communications processors

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
 - An independent communication processor ensures the continuous sampling of the distributed devices – separate from the sampling by the controller
 - A number of communications processors can be used for segmenting the distributed devices
 - Plug-in module for easy connection to the backplane bus of the controller
- Support of redundant I/O in connection with redundant controller
- The products:

7

- for SIMATIC S7-1200
 - CM 1242-5
 - CM 1243-5
- 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

Options for connecting a PC to PROFIBUS – Communications processors

PC-based products for industrial applications offer:



- 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

- A standardized application interface
- Simple engineering
- Utilization of known IT technologies in industrial applications
- Simple and integrated remote access to the plant
- Expanded quantity structures, increased performance and new applications

Intelligent cards: HARDNET cards with internal microcontroller

- High computing performance available in the PC since there is less workload on the host CPU
- Constant data throughput through protocol processing on the CP
- Use in large network configurations

The products:

- CP 5603 (PCI-104)
- CP 5613 A2 (PCI 32 bit)
- CP 5614 A2 (PCI 32 bit)
- CP 5623 (PCIe x1)
- CP 5624 (PCIe x1)

Simple cards: SOFTNET cards without internal processor

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

The products:

- CP 5512 (Cardbus 32 bit)
- CP 5711 (USB V2.0)
- CP 5611 A2 (PCI 32 bit)
- CP 5621 (PCIe x1)

AS-Interface



AS-Interface is the simple, low-cost, effective networking system for the field level. Data and energy are transferred over a single cable. As an open manufacturer-independent bus system, it transfers digital and analog signals that are closely related to the process and machine. On the other hand it also functions as a universal interface

between simple binary actuators and sensors as well as to the higher control levels – for standard and safety engineering. (for ASIsafe, also refer to the Safety Integrated section)

Thanks to the AS-i master for interfacing to SIMATIC or the routers to PROFIBUS or PROFINET, AS-Interface can be completely integrated in TIA. All the diagnostic information of the AS-Interface network is then available in the controller plant wide and can be read out, for example, using Operator Panels or in the control room.

7 Fail-safe communication –

ASIsafe

For further information about ASIsafe, refer to the chapter *Safety Integrated* on page 97.

Connecting AS-Interface to the controller - CPs for SIMATIC

Make your controller fit and ready for connection to AS-Interface



- Plug-in modules to AS-i Spec. 3.0 for connection to the backplane bus of the controller
- The controller becomes an AS-Interface master and offers support for as many as 62 AS-Interface slaves (A/B system)
- Fast display of the slave states by means of LEDs on the front panel
- Integrated analog value transmission
- No configuration necessary; optional for S7-300: Upload the AS-i configuration into STEP 7

Routers – ASIsafe

Further information about routers for AS-Interface can be found in this chapter on page 132 et seq.

Slaves – For connecting actuators and sensors in the field and in the control cabinet up to degree of protection IP69K



- Connection of up to 62 slaves to an AS-i network.
- Standard and safe slaves that exchange their data with the higher-level AS-i master.
- The spectrum ranges from simple I/O modules to motor starters and frequency converters:
 - I/O modules for applications in the field, high degree of protection
 - I/O modules for applications in the control cabinet
 - SIRIUS 3RA6 compact starters
 - Motor starters for applications in the field, high degree of protection
 - SIRIUS 3SF5 pushbuttons and indicator lights
 - 8WD4 signaling columns

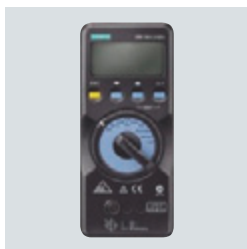
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AS-Interface power supply units, IP20 – More space in the control cabinet and more participants in the AS-i network



- The power supply units are available in different versions (for 3 A, 5 A, and 8 A)
 - Flexible response to the requirements of the plant
 - Safe applications thanks to functions such as integrated diagnostic memory for overload and ground fault detection
 - Fewer components and reduced maintenance and downtimes
- The power supply unit can be replaced very quickly thanks to removable terminal blocks

System components and accessories –
For setup and installation of AS-i networks



- The spectrum of our system components includes products for the analysis of AS-i networks, for addressing AS-i slaves, for increasing the range, and much more:
 - Repeater
 - Extension plug
 - Addressing device
 - Analyzer

Diagnostics – SW tools and function blocks for the easy integration of AS-i in STEP 7 and WinCC



Diagnostics in SIMATIC S7

An comprehensive diagnostics function block is available for SIMATIC S7-300/S7-400 that automatically reads the diagnostic data from the AS-Interface safety monitor or even the system status from the AS-Interface master – completely independent of the safety monitor and therefore also in all standard AS-Interface networks without safety components.

HW Config SIMATIC S7

7

With SIMATIC STEP7 V5.4 or higher, you can configure AS-Interface modules from Siemens in your system even easier. The HW Config SIMATIC S7 software package offers a slave selection dialog via which the modules can be integrated in the respective S7 project at a click of the mouse.

WinCC flexible/Pro Tool

AS-Interface provides comprehensive diagnostic data which can be immediately and easily read by the SIMATIC STEP7 system. Thanks to WinCC flexible/Pro Tool, this data can be linked in the STEP7 program to trigger a response to plant statuses and/or be displayed on an operator panel to permit quick troubleshooting.

Transline HMI PRO

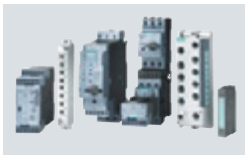
Specifically for the use of AS-Interface in machine tools, the Transline HMI PRO operating software package supports the comprehensive and yet easy diagnostics of the AS-Interface network.

ASIMON V3

Further information about the ASIMON PC software for configuring the AS-Interface safety monitor in safety-oriented applications can be found in the chapter 'Safety Integrated' on page 97.

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.

Improvements in the intelligence of field devices and their integration in the overall automation supports data access down to the lowest field level.

The result: Greater plant availability and reduced engineering expenditure.

As an open interface, the IO-Link can be integrated into all common fieldbus and automation systems. Consistent interoperability ensures maximum protection of investment. This also applies in the context of existing machine concepts for continued use of sensors without an IO-Link interface.

Interfacing is implemented in the well-proven, flexible configuration using ET 200S or ET 200eco PN master modules. I/O modules and switching devices are also available. The user-friendly parameterization tool (Port Configurator Tool, PCT), an engineering tool integrated into STEP 7, offers direct access to the configuring, parameterizing and testing of IO-Link masters and devices. All available IO-Link components from Siemens are already contained in the selection catalog, and further IO-Link devices can be integrated through a description file (IODD). A user block FB IOL_Call makes it easy to use device data in the runtime program of SIMATIC S7.

IO-Link integrated into Totally Integrated Automation – The advantages at a glance:

Innovative control cabinet design

- Access to energy data for integration in energy management systems
- Transparent diagnostics for integration in maintenance systems
- Less wiring and less space required in the control cabinet

Open engineering

- Pre-integration of Siemens devices in SIMATIC HMI
- Freely available function blocks for SIMATIC for user-friendly parameterization and diagnostics
- Open system for connecting IO-Link-compatible devices

Industrial communication

IO-Link products from Siemens:

Master modules

- SIMATIC ET 200S 4SI
- SIMATIC ET 200eco PN

Switchgear

- SIRIUS 3RA6 compact load feeders
- SIRIUS 3RA27 function modules
- SIRIUS 3RB24 overload relays

IO modules

- IO-Link module K20 4DI
- IO-Link module K20 8DI

Software

- SIMATIC S7-PCT (Port Configurator Tool)

Routers

Routers: Bridge to PROFIBUS –

IE/PB Link PN IO

Vertical integration of PROFIBUS-based devices into Industrial Ethernet and PROFINET



- Transfer the data from the PROFIBUS field devices to Industrial Ethernet/PROFINET
- Integrate the PROFIBUS devices into a PROFINET-based automation solution
- Configure the PROFIBUS devices on an Ethernet-based engineering workstation

Routers: Bridge to WirelessHART –

IE/WSN-PA LINK

Vertical integration of WirelessHART field devices in Industrial Ethernet



- Connection of up to 100 WirelessHART devices
- Approved for operation in hazardous areas in Zone 2
- Open TCP/IP communication and Modbus TCP via the Ethernet interface
- Can be used with HART OPC servers from the HART Communication Foundation

7

Routers: Bridge to PROFIBUS PA –

DP/PA coupler and link

Integration of the process instrumentation into the plant-wide architecture



- Electrical interface for the implementation of PROFIBUS DP on PROFIBUS PA for the connection of the process instrumentation
- Connection to 2- and 4-wire devices in normal or intrinsically safe environments
- In the case of critical applications, it can be installed as a redundant interface capable of hot swapping
- "Configuration in Run" supports the addition and removal of devices during operation

Routers: Bridge to FOUNDATION Fieldbus – FF link and coupler

Integration of the process instrumentation into the plant-wide architecture



- SIMATIC PCS 7 seamlessly integrates the two fieldbuses PROFIBUS PA and FOUNDATION Fieldbus.
 - Electrical interface for conversion to FOUNDATION Fieldbus for connecting the process instrumentation
 - The scalable redundancy model with the unique ring redundancy concept offers a maximum degree of ruggedness and availability.
- In the case of critical applications, it can be installed as a redundant interface capable of hot swapping

Routers: Bridge to AS-Interface – DP/AS-i LINK 20E

7

Connection of AS-Interface to PROFIBUS



- AS-Interface single master acc. to Spec. 3.0
 - Support for as many as 62 AS-Interface slaves
 - Simplified, integrated analog value transmission
 - Supports all AS-Interface master functions in accordance with the extended AS-Interface specification V3, i.e. Master Class M4.
- Supplied from the AS-Interface cable, so no additional power supply is necessary

Routers: Bridge to AS-Interface – DP/AS-i LINK Advanced

Connection of AS-Interface to PROFIBUS



- Single and double master to Spec. 3.0 (incl. Master Profile M4)
- Integration of as many as 124 AS-i slaves into a PROFINET-based automation solution
- Integrated web interface or graphical display and control keys locally for easy commissioning and diagnostics
- Simplified, integrated analog value transmission
- One integrated Ethernet port
- Simple installation by means of an alternative power supply via the AS-i cable or 24 V DC direct supply

Routers: Bridge to AS-Interface – IE/AS-i LINK PN IO

Vertical integration of AS-i into Industrial Ethernet and PROFINET



- Single and double master to Spec. 3.0 (incl. Master Profile M4)
- Integration of as many as 124 AS-i slaves into a PROFINET-based automation solution
- Integrated web interface or graphical display and control keys locally for easy commissioning and diagnostics
- Simplified, integrated analog value transmission
- Integral Ethernet 2-port switch (RJ45, ERTEC inside)
- Simple installation by means of an alternative power supply via the AS-i cable or 24V DC direct supply

Remote access - 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 center over a telecommunications network (Wide Area Network WAN) - regardless of the size of the application or plant.

An extensive selection of perfectly interacting system components and solutions for the control centers, substations and the network permit an individual configuration that matches customer requirements.

Telecontrol – Telecontrol Basic

Cost-effective solution for monitoring and controlling simple telecontrol tasks over GPRS/Internet

7



- Always stay up to date via the wireless "online" connection, wherever your control station is located
- GPRS technology with cost-effective volume tariffs (= low operating costs)
- Create a connection without any special "radio expertise"
- Pre-created and pre-tested program blocks for fast commissioning
- It is possible to manage small applications as well as up to 5000 substations.
- International approvals permit worldwide use

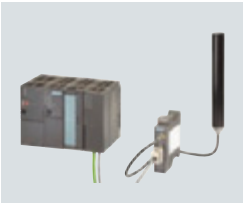
Products:

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

The server allows S7-200 and S7-300 stations to be connected to the MD 720-3 modem.

Telecontrol

Automatic monitoring and control of distributed stations via a Wide Area Network



- Automation and telemetry in one module
- Flexible selection of the transmission networks over classical WANs (e.g. dedicated lines (copper/fiber-optic), private wireless networks, analog telephone networks) and/or IP-based networks such as wireless (e.g. Ethernet wireless, IWLAN), fiber-optic cables, public networks and the Internet by means of DSL, GPRS, EGPRS or UMTS.
- Local data storage on the module for reducing the costs in dial-up networks or in the case of an interruption of communication
- Time synchronization and messages with time stamp
- Optional: Redundant transmission paths

The products:

- Communication modules
 - TIM 3V-IE, TIM 3V-IE DNP3
 - TIM 3V-IE Advanced
 - TIM 4R/TIM 4RD
 - TIM 4R-IE, TIM 4R-IE DNP3
- Modems
 - MD2 dedicated-line modem
 - MD3 telephone modem
- GSM modems/routers
 - MD720-3 GSM/GPRS modem
 - MD741-1 EGPRS router
 - UMTS router SCALANCE M873
- Telecontrol protocols
 - ST7, DNP3, IEC-870-5

For extreme ambient conditions –
SIPLUS extreme

Refined standard modules based on SINAUT for extreme ambient conditions



- Temperature range -25 ... +60°C / +70°C
- 100% humidity, dewing, condensation, and ice formation permissible
- Modules with a special conformal coating for use in atmospheres with corrosive gases according to ISA S71.04 severity level G1; G2; G3

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

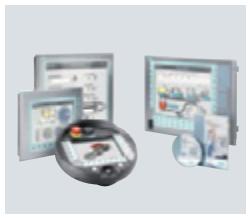


Human Machine Interface

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Operator control and monitoring with SIMATIC HMI

Gain transparency and lower 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.

With SIMATIC powerrate and B.Data options for WinCC and PCS 7, we offer you an intelligent and efficient energy management solution which is seamlessly integrated in the operating and monitoring level as well as in 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 front for use in the food and beverages industry. Of course, 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.

HMI Key Panels – SIMATIC HMI KP8/KP8F

Innovative operator panels for use in PROFINET networks



- No time-consuming individual mounting or wiring, thanks to ready-to-install, pre-assembled design
- Large, freely-configurable keys with tactile feedback for reliable, easy operation
- LED backlighting with five colors - with individual selection for displaying the machine status
- Integrated Ethernet switch for configuring linear and ring topologies
- Fail-safe variant (KP8F) for use in safety-critical applications up to SIL3
- Optimized for fitting perfectly in the expansion units of the fully-enclosed HMI devices (Page 155)

HMI Basic Panels – SIMATIC KP300 Basic, KTP400 Basic, KTP600 Basic, KTP1000 Basic, TP1500 Basic

Low-cost entry-level series for compact applications



- Devices with displays in sizes from 3" to 15" in monochrome or color, for operating with keys and/or touch screen
- Freely-configurable keys, with tactile feedback on pressing a key in 4" version upwards
- Variants for connection to PROFINET/ Ethernet or PROFIBUS DP
- Flexible scalability within the HMI family thanks to configuring with SIMATIC WinCC flexible
- Ideally in interaction with the SIMATIC S7-1200 controller

HMI Comfort Panels – SIMATIC KTP400/KP400 Comfort, TP700/ KP700 Comfort, TP900/KP900 Comfort, TP1200/KP1200 Comfort

High-end functionality for demanding HMI tasks



- Brilliant widescreen displays for excellent readability and enhanced display options (up to 40% more visualization area)
- Efficient energy management due to 100% dimmable displays with LED backlighting and the use of PROFlenergy for coordinated switch-off during idle times
- Variants from 4" to 12" with uniform functionality across all display sizes, with choice of touch operation or keys.
- Easy project transfer using a system card
- 100% data security in the event of a power failure
- Numerous approvals for worldwide implementation, e.g. ATEX, shipbuilding

HMI Mobile Panels –

SIMATIC Mobile Panel 177 / 277 / 277F IWLAN

Portable operator panels for flexible operator control and monitoring

- Allows a direct view of the process or workpiece. Also allows operator control from any point in a plant
- Ergonomic, compact and light-weight
- Extremely shock-resistant (fall height of more than 1 meter) and rugged with IP65 degree of protection
- Insertion and removal without interrupting the emergency stop circuit (with connection box Plus)
- Unambiguous recognition of the respective connecting point on the machine for machine-specific HMI authorizations or actions
- Cable-free version, also for fail-safe plant operation using PROFI-safe and Rapid Roaming

HMI Micro Panels –

SIMATIC TD 100 / TD 200 / TD 400C / OP 73micro / TP 177micro

Easy and cost-effective, special for the SIMATIC S7-200

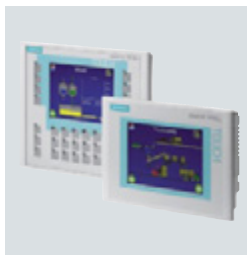
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- For simple automation tasks, adjusted to the performance capability and application areas of the SIMATIC S7-200
- As low-cost text displays (TDs) and operator panel (OP) with keys or as touch panel (TP) for operating via a touch screen, also suited for upright configuration
- For TD 400C, free configuration of the interface and individual layout are possible via a special overlay

HMI Panels –

SIMATIC Operator Panels / Touch Panels 77 / 177 / 277

The all-rounder with comprehensive basic functionality

- Various power ranges for machine-level operator control and monitoring
- As touch panels with touch display, operator panels with a membrane keyboard, or as a combination of both.
- Fully-graphical displays (monochrome, color, or blue mode)
- Version with 4 inch widescreen display in 16:9 format and additional, tactile keys
- Version with stainless steel front for applications with increased safety and hygiene requirements, e.g. in the food and beverage industry

HMI Multi Panels –

SIMATIC Multi Panels 177 | 277 | 377

As rugged as an Operator Panel, as flexible as a PC



- Devices with touch displays or keys in sizes ranging from 6 to 19 inches
- Diskless and fanless, therefore ideal for increased requirements in terms of vibration resistance and dust exposure
- Optional use of the WinAC MP software controller
- Version with stainless steel front for applications with increased safety and hygiene requirements, e.g. in the food and beverage industry
- Also as version with all-round IP65 protection with 15" touch display, for use outside of the control cabinet, mounted on a support bracket or stand

HMI Multi Panel option –

SIMATIC WinAC MP



- Software controller with Windows CE, one optimized variant each for SIMATIC Multi Panels
- Combined visualization and control on a single device, especially for small to medium-scale applications
- Ideal for tasks on the machine level, saves space and costs

Panels for extreme ambient conditions –

SIPLUS extreme

Refined standard modules based on SIMATIC HMI for extreme ambient conditions



- 100% humidity, dewing, condensation, and ice formation permissible
- Modules with a special conformal coating for use in atmospheres containing corrosive gases according to EN60721-3-3 3C4 incl. salt fog and ISA S71.04 severity level G1; G2; G3; GX*) and EN60721-3-3 3S4 incl. electrically conductive sand, dust and EN60721-3-3 3B2 mold, fungus and fungal spores (excepting fauna)

The products:

- SIPLUS Push Button Panels
- SIPLUS Micro Panels
- SIPLUS Mobile Panels
- SIPLUS Basic Panels
- SIPLUS Touch Panels
- SIPLUS Operator Panels
- SIPLUS Multi Panels
- SIPLUS Text Displays
- SIPLUS KTP

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*) ISA S71.04 severity level GX:

- Long-term load: SO₂ < 4.8 ppm; H₂S < 9.9 ppm; Cl < 0.2 ppm; HCl < 0.66 ppm; HF < 0.12 ppm; NH < 49 ppm; O₃ < 0.1 ppm; NO_x < 5.2 ppm
- Limit value (max. 30 min/d): SO₂ < 14.8 ppm; H₂S < 49.7 ppm; Cl < 1.0 ppm; HCl < 3.3 ppm; HF < 2.4 ppm; NH < 247 ppm; O₃ < 1.0 ppm; NO_x < 10.4 ppm

SIMATIC STEP 7 Basic – shared engineering for SIMATIC S7-1200 and SIMATIC HMI Basic Panels

For further information, see "Automation software" on page 81.

SIMATIC HMI software

Information about SIMATIC HMI Software can be found in the chapter "Automation software":

SIMATIC HMI software (page 72)

- SIMATIC WinCC in the TIA Portal (page 73)
- SIMATIC WinCC (SCADA) (page 74)
- Energy management with SIMATIC WinCC (page 75)
- SIMATIC Maintenance Station (page 76)
- SIMATIC WinCC Open Architecture (page 77)
- SIMATIC WinCC flexible (page 78)

Human Machine Interface

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	Basic Panels	Comfort Panels	Micro Panels
	KP300 Basic KTP400 Basic KTP600 Basic KTP1000 Basic TP1500 Basic	KTP400 / KP400 Comfort TP700 / KP700 Comfort TP900 / KP900 Comfort TP1200 / KP1200 Comfort	TD 100C TD 200 / TD 200C / TD 400C OP 73micro TP 177micro
Description	Low-cost entry-level series for compact applications	HMI devices with high-end functionality for demanding applications	Easy and cost-effective, special for the SIMATIC 57-200
Display	3.6" STN / 3.8" STN / 5.7" STN, 10.4" TFT / 15.1" TFT	4.3", 7", 9", 12.1" TFT widescreen, 100% dimmable	Text display / 3"/5.7" STN
Colors	Monochrome with 4 gray levels or 256 colors	16 million colors	Monochrome/4 shades of blue
Control elements	Tactile keys and/or touch screen	Tactile keys or touch screen	Membrane keyboard/touch screen
Max. user memory	1024 KB	12 MB	256 KB
Memory for options/recipes	- / 40 KB	12 MB/12 MB	- / -
Interfaces			
Serial / MPI / PROFIBUS DP	- / - ⁹⁾ / - ⁹⁾		PPI
PROFINET (Ethernet)	■ ¹⁰⁾		-
USB	-		-
CF/MM and SD MM Card	- / - / -		- / - / -
Functionality			
Alarm logging	■		■
Alarm Buffer	■ ¹⁾		■ ¹⁾
Process images	■		■

Tags	■			■	■
Graphics Objects	■			■	■ ¹⁾
Recipes	■			■	-
archiving	-			■	-
Visual Basic scripts	-			■	-
PG functions (STATUS/CONTROL)	-			■	-
Connection to PLC					
S7 / WinAC / S5 / S 505	■ / ■ / - / -			■ / ■ / - / -	S7-200 / - / - / -
SINUMERIK / SIMOTION	- / -			■ / -	- / -
non-Siemens	-			■	-
Engineering software	WinCC Basic V11 or higher, WinCC flexible Compact or higher		WinCC Comfort V11 or higher		TD 100/TD 200: Micro/WIN; OP 73/micro/ TP 177/micro; WinCC flexible Micro/Compact/Standard/Advanced
Sm@rt Service/ Sm@rt Access/ProAgent/ Audit	- / - / - / -			■ / ■ / - / ■	- / - / - / -
OPC server / Pocket Internet Explorer	- / -			■ / ■	- / -
WinAC MP	-			-	-

Human Machine Interface

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	Mobile Panel	Operator Panels / Touch Panels	Multi Panels
	Mobile Panel 177 Mobile Panel 277 Mobile Panel 277(F) IWLAN	OP 73 TP 177A OP 177B OP 77B	TP 277 OP 277
Description	Portable operator panels for flexible operator control and monitoring	Cost-effective operation with rugged keys	The universal devices with high-contrast TFT displays
Display	5.7" STN / 7.5" TFT / 10.4"	3" / 4.5" STN	5.7" TFT
Colors	256/64 K colors	Monochrome	256 colors
Control elements	Membrane keyboard and touch screen	Membrane keyboard	Membrane keyboard/touch screen
Max. user memory	6 MB	1024 KB	4 MB
Memory for options/recipes	1024 KB ⁴⁾ / 64 KB	- / 32 KB ²⁾	- / 64 KB
Interfaces			
Serial / MPI / PROFIBUS DP	■ / ■ / ■	■ ²⁾ / ■ / ■	■ / ■ / ■
PROFINET (Ethernet)	■	-	■
USB	■ ⁴⁾	■ ²⁾	■
CF/MM and SD MM Card	- / ■ / ■ ⁴⁾	- / ■ ²⁾ / -	- / ■ / -
Functionality			
Alarm logging	■	■	■
			2000 / 32 ⁶⁾ 4000 / 32 ^{7) 8)}

Alarm buffer	■						■
Process images	■						■
Tags	■						■
Graphics objects	■						■
Recipes	■						■
Archiving	■ ⁴⁾						■ ^{7) 8)}
Visual Basic scripts	■ ⁴⁾						■ ^{7) 8)}
PG functions (STATUS/CONTROL)	With SIMATIC S5/S7						With SIMATIC S5/S7
Connection to PLC							
S7 / WinAC / S5 / S 505	■ / ■ / ■ / ■			■ / ■ / ■ ²⁾ / ■ ²⁾		■ / ■ / ■ ³⁾ / ■ ³⁾	■ / ■ / ■ / ■
SINUMERIK / SIMOTION	■ ⁵⁾ / ■ ⁵⁾			- / -		■ ³⁾ / ■ ³⁾	■ / ■
Non-Siemens	■ ⁵⁾			■ ²⁾		■ ³⁾	■
Engineering software	WinCC Comfort V11, WinCC flexible Compact, Standard, Advanced or higher			WinCC Comfort V11, WinCC flexible Compact, Standard, Advanced or higher		WinCC Comfort V11, WinCC flexible Compact, Standard, Advanced or higher	WinCC Comfort V11, WinCC flexible Compact, Standard, Advanced or higher
Sm@rt Service/Sm@rt Access/ProAgent/Audit	■ / ■ / - / ■ ⁴⁾			- / - / - / -		■ ³⁾ / ■ ³⁾ / - / -	■ / ■ / ■ ^{7) 8)} / ■ ^{7) 8)}
OPC server / Pocket Internet Explorer	■ ⁴⁾ / ■ ⁴⁾			- / -		- / -	- / -
WinAC MP	-			-		-	■

¹⁾ for OP 73micro, TP 177micro ²⁾ for OP 77B ³⁾ for TPIOP 177B ⁴⁾ for Mobile Panel 277 ⁵⁾ except Mobile Panel 277F WLAN ⁶⁾ for MP177 ⁷⁾ for MP277 ⁸⁾ for MP377 ⁹⁾ for DP versions ¹⁰⁾ for PN versions



Industrial PC

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Industrial PC

Industrial PC

Rugged and powerful industrial computers for compact and open automation applications



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 (customer-specific 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.

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

- Use of new Intel processors (Atom up to Core i7) and DDR3 memory technology, optional 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.

This means that the SIMATIC IPCs are the ideal industrial PC systems for your industrial automation architecture. 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 greater networking possibilities with the PROFINET interface integrated on the mainboard, which also saves a slot for expansions with other PC cards. The integrated 3-port switch facilitates the flexible and easy assembly of line, tree or ring topologies. Real-time, IT communication as well as TCP/IP are thus possible on a single line.

SIMATIC IPC – more industrial PC.

Embedded industrial PC – SIMATIC IPC227D and IPC427C

Ultra-compact, flexible, and maintenance-free for the DIN rail



- For embedded applications under very cramped installation conditions
- All interfaces are accessible from one side for user-friendliness, and are easy to cable up. The devices can be flexibly installed due to standard rail, wall, portrait and side assembly, and valuable installation space is saved.
- Rugged version for use in the machine subject to loading from electromagnetic interference, temperature, vibrations, and shocks
- Maintenance-free due to use of CF cards up to 8 GB and Solid-State Drive up to 50 GB for diskless systems and fanless continuous 24-hour operation at up to 55 °C (customer-specific 60/65 °C on request) IPC227D can also be operated without batteries.
- High degree of flexibility for interfaces and expansions:
 - IPC227D: 1 x RS232 (opt. as RS485, CAN); 1 x PCIe; 3 x serial or 4 x digital inputs/outputs
 - IPC427C: 3 x PCI-104; PC IO modules for up to 120 analog IO, 320 digital IO, and 12 encoder/counter interfaces.
- Excellent adaptability and flexibility due to 4 USB V2.0 and 2 teaming-capable Gigabit Ethernet interfaces, for IPC227D one can be optionally used as PROFINET with real-time function; IPC427C optionally with PROFIBUS or PROFINET interface
- Front LED display for efficient self-diagnostics
- Also available with pre-installed software as ready-to-use bundles:
 - with SIMATIC WinCC flexible RT visualization software
 - with SIMATIC WinCC SCADA system (client or single-user station)
 - with SIMATIC WinAC RTX software controller
 - with fail-safe SIMATIC WinAC RTX F software controller

Compact for universal application – SIMATIC Box PC

Compact and rugged for universal application



- High resistance to vibration/shock during operation
 - Compact Flash drive and Solid-State Drive for diskless systems at ambient temperatures up to 55 °C
 - High electromagnetic compatibility
 - CE marking for industrial, as well as domestic and commercial applications
- Easy-to-service, modular equipment for rapid replacement of defective components during servicing
 - Flexibility due to manifold installation options:
 - Front/book mounting kit means that the user interfaces are arranged on the front for improved user-friendliness.
 - Further options are portrait assembly with interfaces arranged on the bottom/top, as well as wall mounting with bracket
 - Integrated diagnostic and signaling functions for temperature, fans and watchdog as well as self-diagnostics, locally or via LAN (SIMATIC IPC DiagMonitor)
 - Can also be ordered as economical packages with:
 - SIMATIC WinCC flexible visualization software
 - with SIMATIC WinCC SCADA system (client or single-user station)
- 9 Two different versions for individual requirements are available:
- SIMATIC IPC627C – maximum performance in a minimum of space with Intel Core processors i7/i3
 - SIMATIC IPC827C – maximum performance and high expansion capability with Intel Core processors i7/i3

Can be mounted in control cabinets, consoles,
and switchboards – SIMATIC Panel PC

Powerful industrial PCs with brilliant displays for on-site operator control and monitoring



- Rugged, compact design to the high degree of protection IP65/NEMA 4, ideal for visualization and operation directly at the machine or in the process
- Variants with touch or key operation enable operation in practically any industrial environment
- High level of flexibility due to different display sizes:
 - IPC477C/577C/677C with 12" and 15" Touch/Key or 19" Touch
 - IPC277D with 7", 9" or 12" widescreen, Touch
- In the distributed configuration the front panel can up to 30 m away from the computer unit (HMI IPC677C)

Four different versions for individual requirements:

- SIMATIC HMI IPC277D – Nanopanel PC in embedded technology, absolutely maintenance-free, optimized performance with Intel Atom processor.
- SIMATIC HMI IPC477C – compact, rugged, and maintenance-free in embedded technology, with Intel Core2 Duo processors. Also as IP65 device with all-round protection for cabinet-free installation.
- SIMATIC HMI IPC577C – Industrial functionality at an attractive price with Intel Core 2 Duo processors
- SIMATIC HMI IPC677C – maximum performance and flexibility, with Intel Core processors i7/i3

SIMATIC HMI IPC227D / IPC477C are also available as embedded bundles with ready-to-use, preconfigured software:

- with SIMATIC WinCC flexible RT visualization software
- with SIMATIC WinCC SCADA system (client or single-user station)
- with SIMATIC WinAC RTX software controller
- with fail-safe SIMATIC WinAC RTX F software controller

SIMATIC HMI IPC577C / IPC677C Panel PCs can also be ordered as cost-effective packages with:

- SIMATIC WinCC flexible visualization software
- with SIMATIC WinCC SCADA system (client or single-user station)

For applications with a risk of splash water (e.g. food and beverages industry), devices with stainless steel front or customer-specific versions can be supplied as HMI stations complete with an enclosure.

Industrial PC

Mounting in 19" racks – SIMATIC Rack PC

Flexible, high-performance industrial PCs for installation in 19" racks



- High-quality components with a high MTBF (mean time between failure) as well as over-pressure ventilation with temperature-controlled fans and replaceable dust-filters increase the life of all internal components
- An active heat dissipation concept and an optimal arrangement of the components ensures continuous operation 24 hours a day in a maximum configuration at full processing performance –

without power loss (throttling) – up to the maximum specified temperature in operation

- High system availability due to monitoring and diagnostic functions as well as rugged SSD and RAID1/5 configuration, optionally in the hot-swap frame and with redundant power supply (hot-swap capability)
- Service-friendly device construction and the option of telescopic rails mounted on the sides for quick replacement of components during servicing
- The minimal housing depth supports space-saving installation in 19" control cabinets of 500 mm depth and above
- Can also be ordered as economical packages with:
 - SIMATIC WinCC flexible visualization software
 - with SIMATIC WinCC SCADA system (client or single-user station)

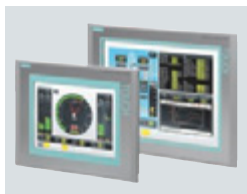
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In order to perform your tasks and meet your special requirements as effectively as possible, we offer you different device classes with Intel Core processors:

- SIMATIC IPC547D – maximum performance at an attractive price with the latest Intel Core processors (up to **i7** with **4C/8T**)
- SIMATIC IPC647C – maximum compactness and industrial functionality with Intel Core i processors i7/i5/i3
- SIMATIC IPC847C – maximum expansion capability and industrial functionality with Intel Core i processors i7/i5/i3

Thin Client – SIMATIC Thin Client

Ideal for applications with more than one operator station



- Low-cost, remote operator terminal with 10" and 15" TFT touch displays
- Simple "Plug & Play" commissioning
- Self-contained, safe system, as it is independent of user software; central data storage and administration
- Includes Sm@rt Access, RDP Client and VNC
- USB and Ethernet interface onboard.

Also as PRO version with all-round IP65 protection with 15" touch display, for mounting on a support bracket or stand

HMI devices with all-round protection

Flexible mounting and installation concepts with IP65 degree of protection



- All devices with touch displays, in the designs SIMATIC Multi Panel PRO, SIMATIC Thin Client PRO, Flat Panel Monitor PRO, SIMATIC HMI IPC477C
- Adaptation possible above or below for mounting on wall bracket or stand
- Retrofitting of modular expansions for additional command devices, e.g. emergency stop pushbutton, illuminated pushbutton
- Easy mounting due to low weight, service-friendly due to removable rear panel, for example, for retrofitting cables or swapping memory cards

Brilliant monitors for industrial use – SIMATIC Flat Panel monitors

LCD monitors in a rugged industrial design



- With 12", 15", or 19" display
- Optionally available as pure display unit or with Touch functionality and as a keyboard version (12" and 15")
- Ideal for use directly on the machine
- Can be up to 30 m away from the computer unit
- Fully suitable for industrial use with degree of protection IP65/NEMA 4, also in case of vibration loads of 1g and shock loads of up to 5g
- Mineral glass pane provides high mechanical protection against scratches and impacts
- PRO versions with all-round IP65 protection with 15" or 19" touch displays allow mounting on a support bracket or stand

Brilliant monitors for industrial use – SIMATIC HMI SCD1900

SCD monitor in widescreen format



- Low-cost SCD monitor in 19" widescreen format
- High resolution with 1440 x 900 pixels and user-friendly operation thanks to touch functionality
- Extremely rugged thanks to degree of protection IP65 (on the front) for use on machines

Description	Rack PC			Box PC		
	IPC547D	IPC647C	IPC847C	IPC227D	IPC427C	IPC627C / IPC827C
Description	Flexible industrial PC for installation in 19" cabinets					
Processor	Intel Core i7-2600 (4C8T, 3.40 GHz, 8 MB L2 cache, TB 2.0, EM64T, VT-x/d) Intel Core i5-2400 (4C4T, 3.10 GHz, 6 MB L2 cache, TB 2.0, EM64T, VT-x/d) Intel Pentium Dual Core (available soon)	Intel Core i7-610E (2C14T, 2.53 GHz, 4 MB cache, turbo boost, VT-d, EM64T) Intel Core i5-520E (2C14T, 2.4 GHz, 3 MB cache, turbo boost, VT-d, EM64T) Intel Core i3-330E (2C14T, 2.13 GHz, 3 MB cache, EM64T)	Intel Core i7-610E (2C14T, 2.53 GHz, 4 MB L2 cache, turbo boost, VT-d, EM64T) Intel Core i3-330E (2C14T, 2.13 GHz, 3 MB L2 cache, EM64T) Intel Celeron P-4502 (2C12T, 1.86 GHz, 2 MB L2 cache)	Embedded industrial PC	Embedded industrial PC	Compact, rugged industrial PC for installation at the machine
RAM *) optional	From 1 GB DDR3 1333 SDRAM (dual-channel support); expandable to 32 GB	from 1 GB DDR3 1066 SDRAM expandable to 8 GB; ECC optional	from 1 GB DDR3 1066 SDRAM expandable to 8 GB; ECC optional	> 500 MB, retentivity memory; MRAM 512 KB (optional)	512 MB DDR3 SDRAM; 1, 2 or 4 GB *) 1 MB battery-backed SRAM	from 1 GB DDR3 1066 SDRAM; expandable to 8 GB; ECC optional; 2 MB battery-backed SRAM
Graphics processor, display *) optional	1 x DP and 1 x DVI-I onboard, 2 x VGA or 2 x DVI-I over PCIe graphics card, optional	1 x DVI-I / 1 x VGA through adapter, optional, 2 x VGA or 2 x DVI-D via PCIe graphics card	1 x DVI-I (VGA through adapter), Dual Head (VGA/DVI-D) via Y cable	1 x DVI-D	1 x DVI-I (VGA through adapter), Dual Head (VGA/DVI-D) via Y cable *)	1 x DVI-I (VGA through adapter), Dual Head (VGA/DVI-D) via Y cable *)
Drives *) optional	Internal: 500 GB / 1 TB, RAID1 2 x 500 GB (RAID controller onboard), SSD 50 GB; In swap frame at the front: 500 GB, 2 x 500 GB, RAID1 2 x 500 GB, RAID1 2 x 500 GB (SAS-RAID controller onboard), RAID1 2x 300 GB (SAS-RAID controller PCIe x8) SSD 50 GB DVD-ROM or DVD +/- RW	Internal installation or in swap frame at the front: 250 or 500 GB; 2 x 500 GB; SSD 32 GB; CF card on the front, RAID1, 2 x 500 GB (RAID controller onboard) RAID1, 2 x 500 GB (RAID controller onboard) RAID1, 2x 300 GB (SAS-RAID controller PCIe x8) DVD +/- RW	Internal installation or in swap frame: 250 or 500 GB; 2 x 500 GB; SSD 32 GB; RAID1, 2 x 500 GB, RAID5 3 x 500 GB (RAID controller onboard) RAID1, 2x 300 GB, RAID5 3x 300GB (SAS RAID controller PCIe x8) DVD-ROM or DVD +/- RW	without; ± 250 GB, SSD 50 GB, CF card up to 8 GB	80 GB, SSD 32 GB, CF Card 256 MB / 2 / 4 / 8 GB (externally accessible), internal CF card 256 MB / 2 / 4 / 8 GB *)	250 GB; 500 GB; 2 x 250 GB; SSD 32 GB; RAID1, 2 x 250 GB (controller onboard) 1 x CF card (externally accessible) 1 x internal CF card (instead of DVD, HDD) DVD +/- RW

Slots optional	Slot codes: L = long (265 mm) K = short (175 mm)	4 x PCI, 1 x PCIe x8 (1 lane), 1 x PCIe x16 (4 lanes), 1 x PCIe x16 (all L)	2 x PCI, 1 x PCIe x16 (all L) or 1 x PCI, 1 x PCIe x4, 1 x PCIe x16 (all L)	7 x PCI, 1 x PCIe x16 or 7 x PCI, 1 x PCIe x16 3 x PCIe x4 (all L)	1 x PCIe (optional); 4 digital inputs and outputs 24 V (optional)	Up to 3x PCI-104 (with expansion frame)	1 x PCI (L) and 1 x PCI (K) or 1 x PCI (L) and 1 x PCI x16 (K)	2 x PCI (L), 1 x PCI (L), 1 x PCIe x4 (K), 1 x PCIe x16 (L)
	USB 2.0	2 x at front, 8 x at back, 1 x internal (mech. locked)	2 x at front, 4 x at back, 1 x internal (mech. locked)		4x	4x	4x	
	I/O, networking	COM1	COM1	COM1 (RS232 or RS485 or CAN)	COM1 (RS232 or RS485 or CAN)	COM1		
		COM2 and LPT1 via PCI card	COM2 and LPT1	COM2-4 (RS232, optional)	COM2 *	COM2 and LPT1 via PCI card *		
	2 x PS/2	2 x PS/2						
	1 x Line In; 1 x Line Out; 1 x Micro	1 x Line In; 1 x Line Out; 1 x Micro						
		PROFIBUS/IMPI 1 x 12 Mbit/s (isolated, compatible with CP 5611), optionally instead of PROFIBUS *						
	2 x 10/100/1000 Mbit/s (RJ45), teaming-capable							
Operating system	None, Win Xp Pro (32 bit), Windows 7 Ultimate (32 and 64 bit), Windows Server 2008 (32 bit) / 2008 R2 (64 bit), LINUX and others on request	None, Win Xp Pro, Windows 7 Ultimate, Server 2008 / Server 2008 R2 64 bit* (* available soon), Linux and others on request	None, Win Xp Pro, Windows 7 Ultimate, Server 2008 / Server 2008 R2 64 bit* (* available soon), Linux and others on request	None, Win Xp Pro, Windows 7 Ultimate, Server 2008 / Server 2008 R2 64 bit* (* available soon), Linux and others on request	None, Windows Embedded Standard 2009, Win XP Pro; RMOSS3, Linux and others on request	None, Windows Embedded Standard 2009, Win XP Pro; RMOSS3, Linux and others on request	None, Windows Embedded Standard 2009, Win XP Pro; Windows 7 Ultimate; RMOSS3, Linux and others on request	Windows Embedded Standard 2009, Win XP Pro, Windows 7 Ultimate; RMOSS3, Linux and others on request
		PROFINET 1 x 10/100 Mbit/s (with integrated 3-port switch, compatible with CP 1616)	PROFINET 1 x 10/100 Mbit/s (with integrated 3-port switch, compatible with CP 1616)	PROFINET with RT (Real_Time) over Ethernet	PROFINET 1 x 10/100 Mbit/s (with integrated 3-port switch, compatible with CP 1616) ¹⁾			

¹⁾ 128 KB usable by WinAC as retentive memory (with 24 V DC power supply)

Panel PC			
	HMI IPC277D	HMI IPC477C	HMI IPC577C
Description	Compact industrial PC with brilliant displays for on-site operator control and monitoring		
Processor	Intel Atom E640 (1.0 GHz)	Intel Core2 Duo SU9300 (2 x 1.2 GHz, 800 MHz FSB, 3 MB L2 cache) Intel Core2 Solo ULV SU3300 (1 x 1.2 GHz, 800 MHz FSB, 3 MB L2 cache) Intel Celeron M ULV 722 (1.2 GHz, 800 MHz FSB, 1 MB L2 cache)	Intel Core2 Duo SU9300 (2 x 1.2 GHz, 800 MHz FSB, 3 MB L2 cache) Intel Core2 Solo ULV SU3300 (1 x 1.2 GHz, 800 MHz FSB, 3 MB L2 cache) Intel Celeron M ULV 722 (1.2 GHz, 800 MHz FSB, 1 MB L2 cache)
RAM *) optional	1 GB, retentivity memory: MRAM 512 KB (optional)	1 GB DDR3 SDRAM; 2 or 4 GB *); 2 MB battery-backed SRAM	from 1 GB DDR3 1066 SDRAM; expandable to 8 GB; ECC optional; 2 MB battery-backed SRAM
Graphics processor, display *) optional	1 x DVI-I (VGA through adapter), *) Dual Head (VGA/DVI-D) via Y cable		
Drives *) optional	without; SSD 50 GB, CF card up to 8 GB	2 x CompactFlash drives with 2, 4, 8 GB or SSD 32 GB (hard disk only available as customized product)	250 GB; 500 GB; 2 x 320 GB; SSD 32 GB; RAID1, 2 x 320 GB (controller onboard) 1 x CF card (externally accessible) 1 x internal CF card (instead of DVD, HDD)
Slots *) optional	3 x	4 x at back 1 x at front	2x PCI (1K, 1L) or 1 x PCI (L) and 1x PCI x16 (K)
USB 2.0		COM1	
I/O, networking	COM1 (RS232 or RS485 or CAN)		
			LPT via PCI card *)
			PROFIBUS/IMPI 1 x 12 Mbit/s (isolated, compatible with CP 5611), optionally instead of PROFIBUS *)
	2 x 10/100/1000 Mbit/s (RJ45), teaming-capable		
	PROFINET with RT (Real_Time) over Ethernet *)	PROFINET 1 x 10/100 Mbit/s (with integrated 3-port switch, compatible with CP 1616)	as IPC627C
Operating system	Without, Windows Embedded Standard 2009, Win XP Pro; RMO53, Linux and others on request	None, Windows Embedded Standard 2009; Others on request	None, Win XP Pro, XP Embedded Standard 2009, Server 2008, Windows 7 Ultimate; Others on request



Sensor systems

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Sensor 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 together with the vision sensors to create a complete product range for all sectors.

As the leading innovator 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
- Vision sensors

Process sensors

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

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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 sectors.

Level transmitters - SITRANS L

The reliable solution for level measurement



- For use in process industries worldwide, including water and wastewater treatment, cement production, mining, dry bulk storage, the chemical and petrochemical industries, oil and gas, and other sectors
- Point level detection based on ultrasonic, capacitance and electromechanical methods
- Continuous level measurement based on radar, ultrasonic, capacitance and hydrostatic methods
- Level measuring instruments for liquids, solids, slurries and interfaces

Positioners – SIPART PS2

Accurate positioning of control valves



- Intelligent electropneumatic positioner for linear or part-turn actuators
- Fast set-up thanks to automatic commissioning function with self-adjusting zero and span
- Integrated diagnostics functions provide information about the status of the valve and actuator
- Low air consumption ensures a quick return on your investment
- For applications in hazardous and non-hazardous areas
- Available in plastic or metal housing

10

Flow meter – SITRANS F

The first choice in flow measurement



- Comprehensive range of flow meters 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
- Multi-purpose instruments for standard and extremely complex applications
- For temperatures from -150 °C to +250 °C
- Accurate measurement of corrosive or high-viscosity media in normal environments or areas subject to explosion hazard

Process controllers – SIPART DR

The field-proven, high-performance controller family for all tasks in process engineering



- Closed-loop control with and without feedback possible
- Scalable: from the standard controller with only one control loop right up to complex multi-loop controllers
- Simple configuration thanks to extensive library of functions
- Can work with a continuous output signal or as a step controller
- Standard dimensions for rail mounting: 96 mm x 96 mm and 72 mm x 144 mm
- Also available: Software packages for integration with PROFIBUS and HMI software

Pressure gauge – SITRANS P

Wide range of instruments – the right pressure gauge for every application



- One measuring cell and housing fits all applications
- Handles extreme chemical and mechanical loads as well as electromagnetic interference
- From 1 mbar to 400 bar
- Explosion-proof versions are also available
- Certified in accordance with CENELEC, FM, CSA, NAMUR, etc.
- Available in digital and analog versions with support for PROFIBUS PA and HART
- Safe pressure measurement with PROFIBUS PA and PROFIsafe connection in single (SIL 2) and redundant design (SIL 3)
- in single (SIL 2) and redundant design (SIL 3)

For extreme ambient conditions – SIPLUS extreme

Refined standard modules based on SIWAREX for extreme ambient conditions



- 100% humidity, dewing, condensation, and ice formation permissible
- Modules with a special conformal coating for use in atmospheres with corrosive gases according to EN 60721-3-3 3C4 incl. salt fog and ISA S71.04 severity level G1; G2; G3; GX*) and EN60721-3-3 3S4 incl. electrically conductive sand, dust and EN 60721-3-3 3B2 mold, fungus and fungal spores (excepting fauna)
- Increased mechanical strength

*) ISA S71.04 severity level GX:

- Long-term load: SO₂ < 4.8 ppm; H₂S < 9.9 ppm; Cl < 0.2 ppm;
HCl < 0.66 ppm; HF < 0.12 ppm; NH < 49 ppm; O₃ < 0.1 ppm; NO_x < 5.2 ppm
- Limit value (max. 30 min/d): SO₂ < 14.8 ppm; H₂S < 49.7 ppm; Cl < 1.0 ppm;
HCl < 3.3 ppm; HF < 2.4 ppm; NH < 247 ppm; O₃ < 1.0 ppm; NO_x < 10.4 ppm

Temperature transmitters – SITRANS T

Wide range of instruments – the right temperature transmitter for every application



- For use as control room, field or head-mounted transmitter
- Cost-effective, high-precision measurement even in demanding applications
- Simple connection to thermocouples and resistance thermometers
- Parameterization with intelligent software without input errors in just minutes

10

Weighing technology – SIWAREX

Precision weighing and batching for integration into your automation system



- High precision and comprehensive functionality for complex batching and filling applications
- Simple customization of weighing systems with the help of standard automation components
- PROFIBUS connection results in tight integration into SIMATIC PCS 7 and S7 controllers
- Five load cell families for different applications
- Large measuring range from 6 kg to 280 t

Process analysis

Gas analyzers

Stand-alone and system solutions for industrial process analysis



- Highly accurate and reliable gas analyzers (extractive or in-situ) for emission monitoring in waste incinerators, power plants, chemical processing, rotary kilns, automotive, and many more applications
- Measurement and analysis of O₂, CO, CO₂, NO, SO₂, NH₃, H₂O, CH₄, R₂₂ (Freon, CHClF₂) and total hydrocarbon content in air
- Menu-driven operation in accordance with NAMUR recommendations
- Integration into higher-level automation systems via PROFIBUS and Ethernet TCP/IP

Gas chromatographs

Process gas chromatographs with expanded functionality



- State-of-the-art technology enables drastically reduced cycle times providing better information about the process
- The smallest explosion-proof online process gas chromatograph from Siemens: MicroSAM
- Based on the latest microsystem technology on the scale of chip technology, a high-performance calorific value analyzer: The micro process chromatograph SITRANS CV
- MAXUM Edition II for virtually all applications under the extreme industrial conditions of the chemical, petrochemical and refining industries

Vision sensors

Vision sensors

Application-specific industrial image processing



- The intelligent vision sensors are specially designed for application-specific image processing. Their task is to inspect objects with reference to their shape, type, position, color or height profile. The product family impresses customers with a simple operating concept and easy teaching of the inspection task.

- Optimizes the material flow and reduces machine downtimes
- Easy commissioning: Training instead of programming and intuitive menu-based operation for fast results
- Easy system integration: PROFIBUS, Ethernet and digital I/O onboard; PROFINET I/O and RS232 functionality

Portfolio:

- SIMATIC MV220 for high-speed inspection of colored objects
- SIMATIC MV230 for high-speed inspection of contours and profiles
- SIMATIC VS120 for inspecting the shape, type or position of small components

Rotary encoders

Rotary encoders – SIMODRIVE sensors

Giving you tight control of the position of machine axes at all times



- Optoelectronic 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
- Can be used in conjunction with products of the SIMATIC, SINUMERIK, SIMOTION, SIMODRIVE, and SINAMICS series
- Wide selection of couplings, installation material, and off-the-shelf cables available as accessories



Industrial identification systems

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Industrial identification 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 sector-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.

RFID systems – SIMATIC RF

Optimization of material flow and logistics

The clever electronic RFID systems read and write data reliably, quickly and economically. They are unaffected by harsh environments, store data directly on a tag attached to the product, and thus control and optimize production and the flow of material, and provide for efficient logistics processes.

Users of RFID systems have very specific technology needs based on the desired application. One might be looking for economical Smart Labels for logistics, and another for rugged data memories for assembly lines. In transport logistics, however, transponders with a long range are an essential component.

The RFID systems SIMATIC RF300, RF600, D and U can be used in a wide range of different applications. Identification is performed either directly on the object or indirectly via the workpiece holder, skid, container, box, pallet or outer packaging. Depending on the application, the transponders are either re-used (closed loop) or they remain permanently attached to the object (open loop). Other important selection criteria for RFID systems are frequency range, data throughput, memory size, working range, standards, type of construction, transponder costs or bulk capability.



- Fully automatic, high-speed, and reliable identification
- Production and quality data can be saved direct on the product
- Insensitive to temperature fluctuations and contamination
- Wide range of repeatedly reusable data memories – from SmartLabels to heat-resistant transponders
- Flexible communication with the automation system: serial, via PROFIBUS or Industrial Ethernet and PROFINET
- Seamless integration into SIMATIC reduces engineering costs
- Support for ISO 14443, ISO 15693, ISO 18000-2, ISO 189000-4 standards as well as EPCglobal and ISO/IEC 18000-6B / -6C

Code reading systems

Flexible reading and verification of 1D/2D codes, as well as OCR text recognition

Data Matrix Code is an optical code recognition technique which is ideal for high-speed, secure and unambiguous acquisition. It offers easy recognition thanks to its pattern limitations and security through special data encryption with data redundancy. It even allows partially fouled or damaged information to be automatically reconstructed.

For problem-free reading and verification of 1D/2D codes as well as text recognition (OCR), we offer stationary reading systems of the SIMATIC MV420, MV440 and VS130-2 product series as well as handheld readers of the SIMATIC HawkEye series.



- Unambiguous identification of products and product parts
- Maximum decoding speed for complex codes
- Traceability of products by means of Direct Part Marking (DPM)
- Verification in product liability cases (e.g. recall actions)
- Easy system integration: PROFIBUS, Ethernet and digital I/O onboard; PROFINET I/O and RS232 functionality

Identification systems		Code reading systems
SIMATIC RF RFID systems		
Portfolio	SIMATIC RF200, RF300, RF600, MOBY D, MOBY U	Stationary code reading systems SIMATIC MV420/MV440/MV5130-2, handheld readers SIMATIC HawkEye 40I40T/45I45T
Physical principle	Radio frequency	Photoelectric
Range/measuring range	0 m...300 m	–
Communication	Industrial Ethernet/PROFINET, PROFIBUS, serial interface	Industrial Ethernet/PROFINET, PROFIBUS, serial interface
Special functions	Write/read units with IQ-Sense; completely integrated into SIMATIC, heat resistant; file handling; memory capacity up to 64 KB	Completely integrated in SIMATIC; extremely high clock rates are possible
Applications	Product recognition and tracking, identification, reading and writing data	Identification, reading 1D/2D codes, OCR recognition



Power supplies

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Power supplies

SITOP stabilized power supply

Reliable supply for efficient plant operation



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 und 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.

The modular power supply - SITOP modular

Technology power supply for demanding solutions



- 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
- Rugged and compact metal enclosure
- Wide input range for various line voltages
- High degree of efficiency up to 93%
- Power Boost with 3 times the rated current for tripping protective devices
- Extra power with 1.5 times the rated current for up to 5 seconds for brief, operations-related overloads
- Selectable short-circuit behavior: Automatic restart or saving and shutdown
- Operating status via 3 LEDs and signaling contact
- Expandable with SITOP add-on modules and DC-UPS

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
 - Compact size for small mounting spaces
 - Extra power with 1.5 times the rated current for up to 5 seconds for brief, operations-related overloads
 - Continuously 120% of the rated output up to 45 °C ambient temperature
 - Large setting range for output voltage
 - Extensive certification, also for marine applications and hazardous areas
- Expandable with DC-UPS, redundancy module, and selectivity/diagnostic module

The slim power supply – SITOP compact

For control boxes



- 24 V / 0.6 A, 1.3 A, 2.5 A, 4 A
 - 12 V / 2 A, 6.5 A
 - Small mounting surface thanks to its slim design
 - Wide-range input for 85 V to 264 V AC or 110 V to 300 V DC
 - High efficiency across the entire load range
 - Low energy consumption during no-load operation (stand-by)
 - Plug-in terminals
- Temperature range from -20 °C to +70 °C
 - Comprehensive certifications, such as ATEX

The flat power supply – LOGO! Power

For distribution boards



- 24 V / 1.3 A, 2.5 A, 4 A;
 - 5 V / 3 A, 6.3 A; 12 V / 1.9 A, 4.5 A;
15 V / 1.9 A, 4 A
 - Flat LOGO! design with an installation depth of only 55 mm
 - Wide-range input 85 V...264 V for almost all 1-phase grids, also on DC systems from 110 to 300 V DC
 - Constant current under overload conditions for reliable connection of difficult loads
- Large temperature range from -20 °C to +70 °C
 - For industrial and public networks
 - Extensive certification, including FM and GL shipbuilding

In SIMATIC design –

Power supplies for SIMATIC S7-200, S7-1200, S7-300, ET200pro

The optimum supply for SIMATIC S7 and more

- S7-200 design with 24 V/3.5 A. The flat power supply is especially suitable for applications with restricted headroom and depth in the control cabinet.
- PM1207 power module: The compact power supply with 24 V/2.5 A for the SIMATIC S7-1200. The automatic range switchover ensures problem-free connection to 1-phase 120 V and 230 V grids.
- S7-300 design: 24 V/2 A, 5 A and 10 A, PS307 compact system and load power supplies. The automatic range switchover to 1-phase 120 and 230 V AC grids prevents operator errors. The delivery kit includes the connecting comb to the CPU, an optional adapter allows mounting on a DIN rail. The 5 A power supply is also available as an outdoor version for temperatures ranging from -25 °C to +70 °C and increased vibration and shock loads.



- The SIMATIC ET200pro power supply unit with degree of protection IP67 is used as electronics/encoder supply and load voltage supply of the I/O device. It has a signaling contact for "24 V o.k." and "overtemperature" and a second plug-in connector for looping through of the input voltage.

DC-UPS and add-on modules –

For functional expansion of the SITOP power supplies

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

- Protection against power failure:
 - 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
- For maximum availability, the redundancy module decouples SITOP power supplies of the same type
- The selectivity/diagnostics module offers selective protection of individual 24 V paths against overload and short-circuit. Downtimes can be minimized thanks to rapid localization of errors.

For extreme ambient conditions – SIPLUS extreme

Refined standard modules based on SITOP for extreme ambient conditions



- Temperature range from $-40^{\circ}\text{C}/-25^{\circ}\text{C} \dots +60^{\circ}\text{C}/+70^{\circ}\text{C}$
- 100% humidity, dewing, condensation, and ice formation permissible
- Modules with a special conformal coating for use in atmospheres containing corrosive gases according to EN 60721-3-3 3C4 incl. salt fog and ISA S71.04 severity level G1; G2; G3; GX*) and EN 60721-3-3 3S4 incl. electrically conductive sand, dust and EN60721-3-3 3B2 mold, fungus and fungal spores (excepting fauna)

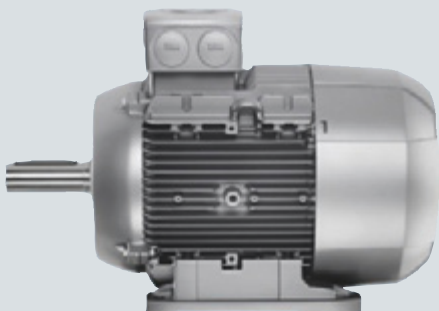
- Increased mechanical strength

Products:

- 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

*) ISA S71.04 severity level GX:

- Long-term load: $\text{SO}_2 < 4.8 \text{ ppm}$; $\text{H}_2\text{S} < 9.9 \text{ ppm}$; $\text{Cl} < 0.2 \text{ ppm}$; $\text{HCl} < 0.66 \text{ ppm}$; $\text{HF} < 0.12 \text{ ppm}$; $\text{NH} < 49 \text{ ppm}$; $\text{O}_3 < 0.1 \text{ ppm}$; $\text{NOX} < 5.2 \text{ ppm}$
- Limit value (max. 30 min/d): $\text{SO}_2 < 14.8 \text{ ppm}$; $\text{H}_2\text{S} < 49.7 \text{ ppm}$; $\text{Cl} < 1.0 \text{ ppm}$; $\text{HCl} < 3.3 \text{ ppm}$; $\text{HF} < 2.4 \text{ ppm}$; $\text{NH} < 247 \text{ ppm}$; $\text{O}_3 < 1.0 \text{ ppm}$; $\text{NOX} < 10.4 \text{ ppm}$



Drive technology

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Drive technology

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.

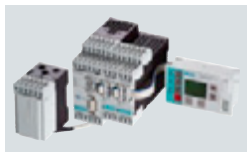
Integration into the overall automation architecture is implemented via standard fieldbuses, such as PROFIBUS and PROFINET. The Siemens tools, drive products, and solutions described on the following pages can help you achieve the goals of your automation strategy.

www.siemens.com/drives

Motor management and control devices

Motor management system – SIMOCODE pro

Flexible motor protection and control



- 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
- Reduction in installation, operating, and maintenance costs
- Safety-related shutdown of drives, through integrated safety functions

Parameterization and service software for SIMOCODE pro – SIMOCODE ES

For further information about SIMOCODE ES, see "Automation software" on page 92.

Motor and soft starters

For applications in the control cabinet –
SIRIUS 3RW44 soft starter for High Feature applications



With its high-end functionality, the SIRIUS 3RW44 all-rounder handles even complex ramp-up and ramp-down operations easily and, above all, smoothly. Thanks to innovative torque control, the device can be used for drives up to 710 kW (at 400 V) with in-line circuits or up to 1200 kW (at 400 V) with inside-delta circuits. The functions have been specially designed to offer maximum user friendliness.

- Its compact design means that it saves space and is easy to operate in the control cabinet
- SIRIUS 3RW44 is a cost-effective alternative to a frequency converter when it comes to starting/stopping motors without speed control
- Torque control and variable current limitation for challenging starting conditions
- The prevention of torque surges and current peaks when motors are started/stopped helps minimize the cost of dimensioning the switchgear and maintaining the machines
- Whether you are using an in-line or inside-delta circuit, SIRIUS 3RW44 can help you save space and cut costs
- Commissioning is quick and effortless thanks to ergonomic, state-of-the-art user prompting and a menu-assisted, multi-row graphical display *)
- An integrated jumper contact system minimizes the thermal power loss of the soft starter during operation, thereby ensuring that the area around the switchgear is not subject to excessive warming
- SIRIUS 3RW44 is equipped with integrated device overload protection, which ensures that the thyristors in the power unit are not subject to thermal overload (e.g. due to an excessive number of closing operations)
- No wiring needs to be carried out to install an additional motor overload relay – SIRIUS 3RW44 takes care of this too
- Variable current limitation reliably prevents inrush peaks
- The 3RW44 can be integrated into the overlying control level using the optional PROFIBUS DP communication module - this means that parameterization, processing of measured values and operating values as well as control of the soft starter are all possible over PROFIBUS

*) The optional Soft Starter ES parameterization and evaluation software is available for easy commissioning with the PC (see Chapter 5)

Drive technology

For applications in the control cabinet – WinSoft Starter

- For further information about the WinSoft Starter, see "Automation software" on page 93.

For applications in the control cabinet – Soft Starter ES

- For further information about Soft Starter ES, see "Automation software" on page 93.

For applications in the control cabinet – SIRIUS 3RA2 load feeders and SIRIUS 3RA6 compact starters

SIRIUS Innovations: One click and you're done!

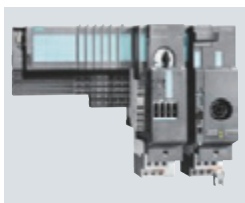


The SIRIUS range offers simple and practical load feeder solutions in the control cabinet: Switching devices that are optimally harmonized with each other for a very compact layout and are extremely easy and fast to install and wire for an optimal motor start in any application! The flexible and modular load feeders (up to 40 A) can easily and quickly be expanded to communication-

capable feeders by adding function modules that are plugged into the contactor.

With the SIRIUS compact starter, you have the functions of a circuit breaker, contactor and electronic overload relay in one compact device at your disposal. For both solutions, the connection to the controller can be made optionally via AS-Interface or IO-Link. Thus you will always benefit from maximum plant transparency.

For applications in the control cabinet – ET 200S motor starters



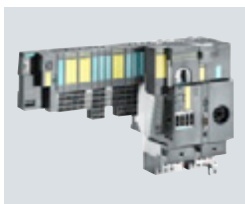
Standard and High Feature:

The fully prewired SIMATIC ET 200S motor starters can protect and switch any three-phase load.

- Flexible direct-on-line starters, reversing starters, or soft starters; High Feature motor starters with starter protection switches, electronic overload protection, and contactors, or soft starters up to 7.5 kW
- Communication via PROFINET, PROFIBUS, and PROFIsafe profile
- Equipped with a self-assembling 40/50 A power bus (i.e. single load voltage supply for a group of motor starters)
- Hot swapping is permissible
- Integrated inputs and outputs for control and status signaling
- Full diagnostics capability for active monitoring of the switching and protection functions
- More possibilities – can be combined with various expansion modules and safety engineering (Safety Motor Starter Solution local and Solution PROFIsafe)
- Support of the PROFIenergy profile for energy-efficient operation

For applications in the control cabinet – ET 200S safety motor starters (PROFIsafe)

Modular, safety-related I/O – Assembled according to your requirements



- Fail-safe modules for the family of bit-modular I/O devices
 - You can combine fail-safe and standard I/O in one rack
 - A safety-oriented range comprises digital inputs and outputs, relays, distributed F-CPU's, power modules, motor starters and frequency converters
- For applications with conventional wiring or over PROFIBUS or PROFINET
 - Frequency converters provide integral encoder-less safety functions "Safe Torque Off", "Safe Stop 1" and "Safely Limited Speed"
 - The components are certified by the German Technical Inspectorate (TÜV) according to IEC 61508, which facilitates compliance with the relevant standards: EN 954-1 up to Cat. 4, IEC 62061 up to SIL 3, and EN ISO 13849-1 up to PL e

For applications in the field –

ET 200pro motor starters



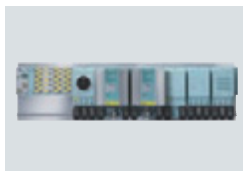
The intelligent ET 200pro motor starters are used for starting and protecting motors and loads of up to 5.5 kW. They are available as standard and High Feature electromechanical motor starters (direct-on-line and reversing starters) as well as electronic High Feature motor starters:

- Repair switch for isolating the series-connected starters from the supply voltage (load group formation)
- Disconnecting module for creating safety-related applications (safety motor starter solution (local) and PROFIsafe solution)
- Multifunctionality thanks to a wide range of integrated functions
- User-friendly installation and high plant availability thanks to plug-in connection systems
- Parameterization fully integrated in TIA via STEP 7 (OM) or GSD
- Comprehensive diagnostics concept (logbook function, statistics data memory, etc.)
- Integrated standard and safety-related communication via PROFIBUS and PROFINET

For applications in the field –

ET 200pro safety motor starters (PROFIsafe)

The distributed fail-safe I/O system in IP65/67



- For distributed expansion of the safety-related S7 controller, optionally via PROFIBUS or PROFINET
- The safety-related range encompasses a multi-channel digital input module and a hybrid module with digital inputs and outputs

- Cabinet-free distributed configurations thanks to high degree of protection IP65/67
- Motor starters or frequency converters with high degree of protection can easily be integrated with the ET 200pro I/O. In PROFIsafe applications, the fail-safe response is performed via an F switch and a 400 V shutdown module for the motor starter.
- The components are certified by the German Technical Inspectorate (TÜV) according to IEC 61508, which facilitates compliance with the relevant standards: EN 954-1 up to Cat. 4, IEC 62061 up to SIL 3, and EN ISO 13849-1 up to PL e
- SIMATIC ET 200pro IWLAN: Wireless connection of distributed I/O systems to the IO Controller via an Access Point

For applications in the field – SIRIUS M200D motor starters

Versatile functionality and highly flexible



The rugged and compact M200D motor starters are the ideal solution for all automated decentralized tasks. They are available in the following versions: Standard for AS-Interface M200D and M200D for PROFIBUS or PROFINET as direct or reversing starters, both mechanically and electronically switching (up to 5.5 kW), optionally available with brake control or local operator terminal.

- Faster device replacement thanks to fail-safe wiring of the power supply and motor cable or modular design consisting of a motor starter and communication module with a running bus (PROFINET/PROFIBUS)
- Comprehensive diagnostics concept via data sets and bus protocol
- User-friendly parameterization via PROFIBUS/PROFINET from STEP 7 and with data sets from the user program - automatic re-parameterization when devices are replaced thanks to adjacency detection (only for M200D PROFINET)
- End-to-end wiring to SINAMICS G120D, to the SIMATIC ET 200pro distributed I/O, and to the ET 200pro motor starters
- Integrated conveying functions such as Quick Stop and Quick Stop Block
- Fully integrated in TIA. Parameterization via STEP 7 or using the Motor Starter ES commissioning software
- Support of the PROFIenergy profile for energy-efficient operation

For applications in the field – ECOFAST motor starters

Distributed switching and protection



ECOFAST motor starters are distributed devices used for switching and protecting three-phase current loads (400 V AC). The starters with a high degree of protection (IP65/67) are installed on the motor. They are available as reversing starters (electromechanical switching up to 5.5 kW) or soft starters (electronic switching up to 4 kW) and are equipped with a fieldbus interface for PROFIBUS DP or AS-Interface.

- Quick and easy commissioning thanks to a highly efficient connection system for both power and data cables
- Ideal for distributed protection, switching, and open/closed-loop control tasks
- ECOFAST offers a high level of user-friendliness and long-term security (e.g. for motor protection with thermistor evaluation, whether full motor protection or soft starting/run down)
- Fully integrated in TIA and STEP 7 HW Config

Drive technology

For applications in the field –

Motor Starter ES

You will find further details on Motor Starter ES (the engineering software for ET 200S and ET 200pro motor starters, the SIRIUS motor starters M200D and the ECOFAST motor starters) under "Automation software" on page 94.

For applications in the field –

SIRIUS MCU motor starters

Multi-faceted and economical - in various versions for a distributed layout



The family of SIRIUS motor starter MCUs (Motor Control Units) rounds out the lower performance range of the SIRIUS motor starter family. The application area of this motor starter series with high degree of protection is a system solution for cabinet-free controlling of three-phase current loads for use in the field.

- Communication via AS-Interface, plastic enclosure: 2I/2O (standard slaves), metal enclosure: 4I/3O (slaves in A/B technology, addressable)
- Comprehensive motor protection thanks to integrated overload and short-circuit protection with SIRIUS 3RV motor starter protectors (for metal enclosure, full motor protection with temperature sensor (TH) or thermoclick analysis (TC) is also an option)
- Wide-range setting for the motor current with an electronic overload relay (optional)
- Cost-effective cable connection via M screw gland (also available for metal enclosure with M12 connector technology)

Converters

Low-voltage converters – SINAMICS G110

The versatile single drive for low outputs



- Externally compact – just three frame sizes cover the output range 0.12 to 3 kW
- Internally flexible – user-assignable digital inputs offer maximum flexibility for a wide range of applications
- Simple installation and mounting – just like a contactor
- Quick, uncomplicated commissioning by means of an optional operator panel or a software engineering tool
- For variable-speed drives (U/f) on single-phase 200 V to 240 V networks
- Ideal for use with LOGO! and SIMATIC S7-200 controllers

Low-voltage converters – SINAMICS G110D

The solution for simple drive tasks, especially in the field of conveyor systems



SINAMICS G110D is a compact inverter with degree of protection IP65, which combines the Control Unit (CU) and Power Module (PM) functional units in one device.

- Stepless speed control for three-phase asynchronous motors
- Meets all of the requirements of conveying applications with frequency control
- Distributed layout - ideal for applications which cover large areas
- Compact and slim design with degree of protection IP65
- Integration in the automation world of TIA via AS-Interface
- Wide performance range: 0.75 kW to 7.5 kW

Frequency inverter for single drives up to 250 kW – SINAMICS G120C, G120, G120D

Standard drive for variable-speed operation of asynchronous motors



- Applications: Conveyor technology, pumps, fans, compressors and other equipment units (saws, extruders, ...)
- Regenerative feedback capability with G120 and G120D
- Fully integrated safety functions in accordance with IEC 61800-5-2 and EN 60204. Certified for Category 3 according to EN 954-1, PI d according to EN ISO 13849-1 and SIL 2 according to IEC 61508 or PL d (EN ISO 13849-1)
- Increased ruggedness for extreme environments thanks to a sophisticated cooling concept
- With IP20 for central installation (G120C, G120) and IP65 for distributed installation (G120D)
- 0.55-18.5 kW (G120C), 0.37-250 kW (G120), 0.75-7.5 kW (G120D)

Communication possibilities

- G120C: PROFIBUS
- G120: PROFIBUS, PROFINET, RS485
- G120D: PROFIBUS, PROFINET

Low-voltage converters – SINAMICS G120P

Standard drive for pumps, fans, and compressors



- Ideal for building management systems, the water industry, and the process industry. Specially developed for industrial environments and for heating, ventilation and air-conditioning applications.
- SINAMICS G120P is very operator-friendly. For example, integrated application-specific wizards and macros for easy commissioning
- USB interface and IOP (= Intelligent Operator Panel) with plain text display
- SINAMICS G120P offers functions for utilizing energy efficiency along the entire process chain: Minimal apparent power loss, automatic adjustment of the motor current to the current load conditions with ECO mode
- Automatic switchover to mains-fed operation with rated speed hibernation (sleep mode) depending on the setpoint value, auto-ramping function for current limiting
- Communication possibilities: USS, Modbus RTU, BacNet MS/TP, PROFIBUS DP, CANopen

Low-voltage converters – SINAMICS G130/G150

The universal drive solution for high-performance single drives



- U/f control and vector control with or without encoder
 - Easy commissioning and operation
 - Exceptionally quiet and compact converters thanks to state-of-the-art IGBT power semiconductors and an innovative cooling concept
 - Available as a complete, preassembled unit in a standardized control cabinet or in individual modules for application-specific assembly
- All the unit modules are easily accessible, offering maximum service friendliness
 - Flexibility with standard cabinet-based solutions thanks to the comprehensive range of options
 - Easy integration in automation solutions thanks to a PROFIBUS and PROFINET interface as well as a range of analog and digital interfaces
 - With a Line Harmonics Filter, as needed, for mains-friendly operation and dV/dt filter
 - Covers the output range from 75 kW to 2700 kW

Low-voltage converters – SINAMICS S110

The single-axis drive for positioning tasks



- AC/AC device for positioning single axes with synchronous or asynchronous motors
- Servo control
- Integrated positioning functions (EPOS)
- Outputs of between 0.12 and 90 kW
- Integrated safety functions (see "Safety Integrated")
- Straightforward system interface to higher-level controllers (e.g. PLC) with PROFIBUS, PROFINET, CANopen, (USS) serial interface, analog or impulse/direction interface.

Low-voltage converters – SINAMICS S120

The modular drive system for demanding drive tasks in single-axis and multi-axis applications



- High-performance and motion control tasks with servo control or vector control
- In single-axis and multi-axis applications
- Output range: 0.12 kW... 4500 kW
- Extremely flexible, modular system with a high degree of scalability
- Integrated safety functions (see "Safety Integrated")
- Integrated positioning functions (EPOS); user-configurable logic and closed-loop control functions (DCC - Drive Control Chart)
- Available in different designs for single-axis and multi-axis applications:
 - SINAMICS S120 AC Drives for single-axis applications (0.12...250 kW)
 - SINAMICS S120 multi-axis devices in booksize and chassis format for multi-axis applications (1.6...1200 kW)
 - SINAMICS S120 Cabinet Modules for implementing multi-axis applications, applications in plant construction up to 4500 kW output with modular drive cabinets
- Comprehensive set of Motion Control functions (integrated or in combination with SIMOTION or SINUMERIK)
- Different infeed concepts:
 - Active Line Module (regulated infeed and feedback)
 - Smart Line Module (regenerative feedback)
 - Basic Line Module
- Simple configuring, installation and wiring (with DRIVE-CliQ interface)
- Flexibility with standard cabinet-based solutions thanks to the comprehensive range of options
- Communication via PROFIBUS and PROFINET
- Liquid-cooled devices

Low-voltage converters – SINAMICS S150

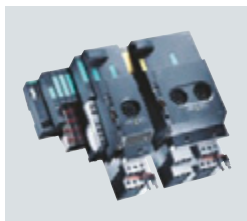
The drive solution for sophisticated, high-performance single drives



- Ideal for applications such as test bay drives, elevators and cranes, cross-cutters and shears, conveyor belts, presses, cable winches, and centrifuges
 - Standard regenerative feedback, 4Q operation
 - Innovative AFE technology
 - Prewired converter cabinet
- Major energy savings, particularly with frequent braking cycles
 - U/f control and vector control with or without encoder
 - Resistant to line voltage fluctuations, reactive power can be compensated
 - Flexibility with standard cabinet-based solutions thanks to the comprehensive range of options
 - Covers the output range from 75 kW to 1200 kW
 - Easy integration in automation solutions by means of a PROFIBUS and PROFINET interface

Low-voltage converters – ET 200S FC

Modular drive system for distributed I/O



- The self-assembling power bus offers high power density and requires minimal time/effort to install
- Minimal downtimes:
All components can be disconnected/connected during operation; the parameters can be archived on an optional memory card (Micro Memory Card)
- Can handle dynamic control methods, such as encoderless vector or torque control
- Integrated safety functions facilitate fail-safe drive solutions
- Output range from 0.75 kW to 4 kW
- Regenerative energy conversion using innovative power modules with energy regeneration capability
- For use with PROFIBUS and PROFINET ET200 systems

Low-voltage converters – ET 200pro FC

Standard drive with integrated safety functions



- Standard and fail-safe distributed frequency converter, operated in an ET 200pro station
- No additional wiring required for fail-safe functions
- Integrated functions "Safe Torque Off", "Safe Stop 1", and "Safely Limited Speed"; in accordance with IEC 61800-5-2.
- All advantages of the ET 200pro system
- Significantly reduced assembly and wiring costs
- Fulfills requirements up to SIL2 to IEC 61508 and up to category 3 to EN 954-1; in accordance with IEC 61800-5-2
- Regenerative energy conversion using innovative power modules with energy regeneration capability
- For use with PROFIBUS and PROFINET ET200 systems

Low-voltage converters – DYNAVERT T

The drive solution for customer-specific and sector-specific requirements



- Sector-specific features, e.g. for the chemical industry, are integrated as standard
 - PTC shutdown for Ex motors in Zone 1 and 2
 - ATEX certification with the types of protection Ex n, Ex e, Ex d, and Ex p in the system with Chemstar low-voltage motors
 - Self-teaching software for parameterization and error diagnosis
 - Oscilloscope function and remote maintenance modem
 - Start-up support with subsequent synchronization of the motor in the network
- Various special closed-loop control modes
 - Output range of between 2.2 and 6600 kW

Low-voltage converters – MICROMASTER

AC inverters for a wide range of applications – from simple speed control to complex torque control



- Compact, self-cooling design enables quick installation
 - Quick commissioning – you only need to enter a few easy parameters
 - Output range of between 0.12 and 250 kW
 - U/f characteristic and vector control with/without actual value sensor
 - High starting torque and smooth motor operation
- Low total cost of ownership thanks to a simplified design and user-friendly operation

Low-voltage converters – SIPLUS extreme For extreme ambient conditions

Refined standard modules based on MICROMASTER for extreme ambient conditions



- 100% humidity, dewing, condensation, and ice formation permissible
- Modules with a special conformal coating for use in atmospheres with corrosive gases according to ISA S71.04 severity level G1; G2; G3

Drive technology

Low-voltage converters – SIMODRIVE POSMO A

Intelligent, distributed positioning motor for PROFIBUS DP



- Servomotor and integral drive for direct installation at the machine
 - User-friendly tool enabling quick and easy commissioning and maintenance
 - Greater flexibility in machine and plant planning
 - Minimal cabling
- Quick assembly and commissioning
 - Complete solutions without control cabinets

Low-voltage converters – SIMODRIVE POSMO SI

Single-axis servo drive system for PROFIBUS DP



- Compact design – the entire functional unit is integrated into the motor
 - Motion control sequences stored as a program directly in the device
 - Interpolating sequence of motions with other nodes by means of a higher-level motion control system with PROFIBUS DP
 - Integrated absolute measuring system
- Minimal time/effort involved in installation with connection via a communications and power bus
 - Minimized control cabinet costs by locating the drives direct "on site" at the machine

Low-voltage converters – SIMODRIVE POSMO CD/CA

Distributed drive for installation direct at the machine



- Motion control sequences stored as a program directly in the device
 - Flexible – supports a wide range of different motor types
 - High-resolution feedback system interfaces
- Degree of protection IP65 for extreme environmental conditions
 - POSMO CA: Power bus connected direct to the three-phase power supply of the motor
 - POSMO CD: Power supply via the power unit

Low-voltage converters – SIPLUS extreme

For extreme ambient conditions

Refined standard modules based on MICROMASTER and SIMODRIVE POSMO A for extreme ambient conditions



- 100% humidity, dewing, condensation, and ice formation permissible
- Increased degree of protection IP65

Product for SIMODRIVE POSMO A: SIPLUS POSMO A 75W

Medium-voltage converters –

ROBICON Perfect Harmony

The Number 1 medium-voltage converter



- Output range from 150 kW to 13.5 MW
- Most compact medium-voltage converter
- Plug and play
- Maximum availability thanks to redundancy and ProToPS
- Easy on the power supply and motor, minimum harmonics

Medium-voltage converters –

SINAMICS GM150

The universal drive solution for single drives in the medium-voltage range



- U/f control and vector control with or without encoder
- Output range 820 kW to 17 MW
- Simple integration and installation
- Simple operation
- Intelligent maintenance functions

Drive technology

Medium-voltage converters – SINAMICS SM150

A sophisticated drive solution for single and multi-motor drives in the medium-voltage range



- Regenerative feedback
- Output range 2.8 MW to 31.5 MW
- High drive quality and availability for demanding processes
- Simple integration and installation
- Simple operation
- Intelligent maintenance functions

Medium-voltage converters – SINAMICS GL150

Rugged single drive for synchronous machines with maximum performance



- Specially for synchronous machines up to 120 MW
- Compact design and high power density
- Extremely reliable and almost maintenance-free
- Simple installation, integration, and operation

Medium-voltage converters – SINAMICS SL150

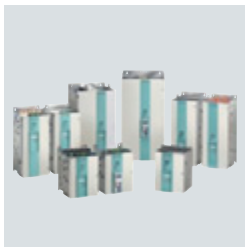
The cycloconverter for high-performance, high-torque asynchronous and synchronous motors



- High efficiency
- Reliable and almost maintenance-free
- High degree of brief overload capability: typically 200% in 60 seconds
- Circuit alternatively open or in star connection
- Output up to 36 MW

DC converters – SIMOREG DC Master

The standard when it comes to cost effectiveness



- Fully integrated into any automation environment
- Modular expansion capability from standard applications to high-performance solutions
- Redundant drive systems offering maximum availability
- Quick and easy commissioning thanks to fully-electronic parameterization of all settings
- Uniform operating philosophy
- Fulfills all the relevant international standards
- Extended output range: up to 18,000 A
- Permissible supply voltages: from 400 V to 950 V

DC converters – SINAMICS DC Master

The scalable, reliable and future-ready solution for DC drives in all performance classes



- Maximum scalability thanks to the ability to select between a Standard Control Unit and an Advanced Control Unit or a combination of the two
- Maximum flexibility due to optimal technical and economical adaptation to the plant-specific requirements
- Compatible with the predecessor product while simultaneously expanding the functionality by means of SINAMICS components
- A high degree of plant availability owing to the maximum reliability of the device, maintenance-friendly design, and redundancy concepts
- Rated direct current from 15 to 3000 A, expandable by means of a parallel connection
- Extremely easy commissioning and operation
- Free function blocks and Drive Control Chart
- Available for armature and field infeed and two or four-quadrant drive
- PROFIBUS and PROFINET interface

Drive technology

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.

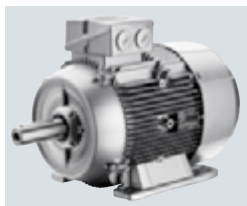
Choose from the wide range of motors:

- Low-voltage motors
 - Mains-fed and converter-fed operation
 - Standard and motion control tasks
- Explosion-proof motors, DC motors, and high-voltage motors
- Special versions for customized applications.

www.siemens.com/motors

Low-voltage motors – Asynchronous motors with aluminum housing

Unbeatable reliability, performance power, and cost effectiveness



- Output range from 0.09 kW to 45 MW
- Light aluminum housing, facilitates droop in machines
- Efficiency classes IE1, IE2 and IE3 from 0.75 kW acc. to IEC 60034-30:2008
- Innovative technology allows for highly compact IE2 and IE3 motors
- User-friendly connection method with easily accessible terminal box
- Motors suitable for mains-fed and converter-fed operation
- Extensive range with pole-changing motors and compact motors with increased power rating
- Up to 10% energy savings by using motors with premium efficiency instead of motors with standard efficiency.
- For applications in the manufacturing industry and for pumps, fans and compressors
- Export lines for the NAFTA market, certified to EISA, in the Premium Efficiency and Energy Efficient classes

Low-voltage motors –

Asynchronous motors with cast iron housing

Unbeatable reliability, ruggedness, and cost effectiveness

- Output range from 0.75 kW to 1250 MW
- Rugged cast iron housing for corrosive ambient conditions
- Efficiency classes IE1, IE2 and IE3 from 0.75 kW to 375 kW acc. to IEC 60034-30:2008
- Up to 10% energy savings by using motors with premium efficiency instead of motors with standard efficiency.

- Motors suitable for mains-fed and converter-fed operation
- For use in the process industry and in applications with mixers, mills, extruders, pumps, or fans
- Export lines for the NAFTA market, certified to EISA, in the Premium Efficiency and Energy Efficient classes

Servomotors and main spindle motors –

Asynchronous servomotors for converter-fed operation 1PH8, 1PL6

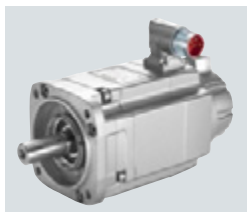
For motion control applications

- Used in main drives, winding drives, spindles, extruders, etc.
- High degree of variation: Forced ventilation, open-circuit air cooled, liquid cooled, solid/hollow shaft
- Compact design, highly dynamic
- Outputs from 2.8 to 1340 kW
- Rated torques from 13 to 12415 Nm
- Rated speeds of up to 5000 rpm

- Maximum speeds of up to 20000 rpm
- Converter-fed operation, e.g. with the SINAMICS S120 drive system

Servomotors and main spindle motors –

Synchronous servomotors for converter-fed operation 1FK7, 1FT7, 1PH8

For motion control applications

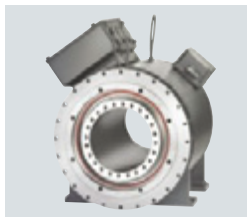
- Positioning and synchronous axes, feed axes in machine tools, etc.
- High degree of variation: self-cooled, forced cooled, liquid cooled
- Permanent-magnet synchronous motors
- Compact design, highly dynamic, high overload capability
- Outputs from 0.05 to 118 kW

- Rated torques from 0.08 to 690 Nm
- Rated speeds of up to 6000 rpm
- Maximum speeds of up to 12000 rpm
- Converter-fed operation, e.g. with SINAMICS S110 or SINAMICS S120

Drive technology

Direct drives – 1FW3, 1FW4, 1FW6 torque motors

Direct drive for rotary axes



- With high torque for a wide range of applications up to and including motion control applications
- Permanently excited synchronous motors as built-in or complete motors
- High torque, high acceleration capability, very high radial eccentricity, high availability, high efficiency

- Rated outputs from 1.7 to 2150 kW
- Rated torques from 100 to 42000 Nm
- Rated speeds of up to 1200 rpm
- Converter-fed operation, e.g. with the SINAMICS S120 drive system

Direct drives – 1FN3, 1FN6 linear motors

Direct drive for highly dynamic linear axes

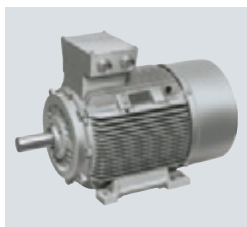


- Permanent-magnet synchronous motors
- Extremely dynamic, maximum traversing speeds, extremely precise, free from wear, high electrical efficiency
- Rated force from 150 to 10375 N

- Max. speed from 57.5 to 1280 m/min
- Converter-fed operation, e.g. with the SINAMICS S120 drive system

EX asynchronous motors – For potentially explosive atmospheres

Rugged and powerful for sensitive environments



- Explosion-proof versions for Ex Zone 1, 2, 21, 22 and firedamp protection
- Motors with increased safety level "e", explosion-proof enclosure "d", non-sparking "n", pressurized enclosure "p" and dust explosion protection Dual protection to Ex e and Ex d as well as gas and dust is also possible
- Output range from 0.12 to 30,000 kW

- Suitable for areas with increased safety requirements (e.g. in the process industry)
- Also available in the high efficiency class IE2
- Certification in accordance with ATEX, IEC EX, NEPSI, CCOE, GOST/Rostekhnadzor

DC motors

Outstanding variable-speed performance



- Modular design, suitable for use in dry indoor or outdoor environments
- Low-noise version
- Extremely low levels of vibration and torque ripple
- Ideal for use with SINAMICS DCM converters
- Low shaft heights at high torque

High-voltage motors – AC asynchronous and synchronous motors

Maximum performance in even the smallest spaces



- Compact design with high power density
- Rugged and reliable for a long service life
- Low operating costs
- Easy to install and maintain
- Low noise and vibration
- Harmonized system solution with SINAMICS and ROBICON Perfect Harmony medium-voltage frequency converters

Motors to NEMA standard – High performance, rugged, reliable



Type spectrum

- General purpose, severe duty, explosion-proof motors
- IEEE 841 versions, IEEE standard for petrochemical industry
- General purpose in aluminum and cast iron version (GP A & GP)

Efficiency versions

- EPEX efficiency (GP10A, GP10, SD10)
- NEMA Premium® Efficiency (GP100A, GP100, SD100, SD100IEEE841)

Degree of protection/cooling

- Surface cooled (TEFC)

Explosion-proof versions

- Multilabel (class 1 group D, class 2 group F&G)
- Singlelabel (class 1 group C&D)

Frequency converter operation

- Acc. to NEMA MG1-2003, Part 31

Drive technology

Sector-specific motors - Tailor-made for any requirement

We offer:

- Roller conveyor motors
- Smoke extraction motors
- Crane motors
- Ship motors for operation below deck and for the offshore industry

Also:

Customized motors and special solutions

www.siemens.com/low-voltage-motors

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

MOTOX –

MOTOX geared motors for mains-fed and converter-fed operation

Geared motors with more power for any drive task



- Complete range of geared motors: helical, parallel shaft, bevel helical, helical worm, and worm geared motors including industry-specific solutions
- Output torques of up to 34,000 Nm; output range from 0.12 to 200 kW
- Low noise and vibration
- Maximum rated gear torque for high operational reliability, plant availability, and a long product service life
- Maximum flexibility thanks to the intelligent, modular gear system and highly-flexible modular MODULOG® motor system
- High gear ratios thanks to the plug-in pinion principle
- User-friendly selection and configuration tool (incl. 2D and 3D CAD data)

Versions:

- Asynchronous geared motors for mains-fed and converter-fed operation with numerous gear variants

MOTOX –

Selection and configuration of geared motors – Motox configurator

Selection and configuring tool

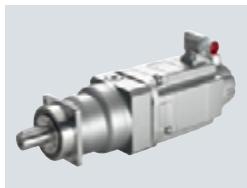
The Motox configurator guides the user step-by-step making it easy to select the specific geared motor. The individual steps are checked logically and the subsequent optional functions are filtered accordingly. This prevents ordering errors.

Dimension drawings are also offered in DXF format and 3D CAD data is offered in the most common file formats.

www.siemens.com/motox-configurator

Servo geared motors –

1FK7, 1FT7 geared servomotors

For motion control applications

- Positioning axes, feed axes in machine tools, etc.
 - Permanently excited synchronous motors with helical, parallel shaft, bevel helical, worm, planetary gears
 - Compact design, low torsional backlash, high efficiency
- Outputs from 0.19 to 57 kW
 - Output torques from 3.6 to 2500 Nm
 - Gear ratios from 3.8 to 76
 - Rated output torques from 34 to 825 rpm
 - Converter-fed operation, e.g. with the SINAMICS S120 drive system

Tools

Calculates potential for energy savings and amortization time – SinaSave

Selection for motors and frequency converters



- SinaSave is designed for selecting a motor for mains-fed operation or a frequency converter for variable-speed operation
- In the case of mains-fed operation, cost savings can be calculated as well as the amortization time for our energy-saving motors of classes IE2 or NEMA Premium on the basis of three comparison cases. IE2 motors in comparison to
 - IE1 or EPAct motors
 - Individually selected and known motors
 - Known motors within an overall plant analysis
- In the case of converter-fed operation, SinaSave takes into account all the necessary plant-specific parameters as well as the values required for the process. From the plant-specific data, SinaSave calculates the matching drive system, the price of the appropriate frequency converter and the energy requirement of the variable-speed system in comparison to all alternative concepts

www.siemens.com/sinasave

Configuration of motors and converters – DT configurator



- The configurator for drives is an online tool for product selection and the creation of documentation
- A complete range of motors and converters is available
- No knowledge of order numbers is required
- Customers can create their own documentation
- 2D and 3D models for motors
- Start-up calculation for motors
- Available on the Internet: 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-axe drives. The workflow wizard intuitively and conveniently leads the user through the individual phases of the configuration, step by step. SIZER is available in English, French, German, and Italian.

SIZER supports the following:

- Calculation the load
- Layout of the motor and power components
- Configuration of further system components
- Load-dependent calculation of energy consumption for drive configurations

This is provided by SIZER

- Configuration results: Characteristics, technical data, layout drawings, and dimension drawings
- Parts list with the associated ordering data

SIZER also has an interface to the DT configurator and supports the electronic ordering of the components, including to SAP systems, via an integrated DP interface.

www.siemens.com/sizer

Commissioning software – STARTER



STARTER is available for the commissioning of all drives in the SINAMICS family. This intelligent tool allows easy the configuration and commissioning of the drive components - menu-assisted and graphically supported.

The following is especially helpful: STARTER allows the importation of all of the relevant data from the electronic type plates of the drive components. For the user, this means

considerable time savings, which, in turn, accelerates parameterization and prevents any incorrect entries.

Entries can be checked and parameters can be optimized using integrated test functions. Velocity plots and setpoint/actual value curves can be logged chronologically. Graphics allow clear diagnostics and facilitate orientation.

STARTER is available in English, French, German, Italian, and Spanish.

www.siemens.com/starter

Gearboxes

Always the right solution: FLENDER gearboxes

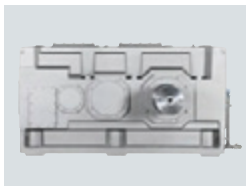
As the world's largest supplier of industrial gearboxes, we have the ideal solutions for your applications. Thanks to our many decades of experience, we have extensive expertise in nearly all of the sectors of material acquisition, industry, and further processing. The FLENDER portfolio of gearboxes 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 gears*. 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.

FLENDER – Gear drives



With FLENDER gear drives, Siemens offers the most comprehensive industrial gearbox portfolio in the world. Horizontal or vertical mounting position, various versions in the form of helical, bevel and bevel helical gearboxes, and the compact design of our gearboxes give you maximum flexibility when constructing your plant.

Application examples

- Belt conveyor drives
- Bucket elevator drives
- Agitator drives
- Hoisting gear drives
- Traversing gear drives
- Papermaking machine drives
- Dry drives
- Water worm gear drives

Product advantages

- Short delivery times
- Fast availability worldwide
- Convincing price/performance ratio

FLENDER – Planetary gearboxes



With the FLENDER planetary gear drives, Siemens also offers gearbox solutions for higher performance ranges in the quality expected from FLENDER. In 27 sizes and seven basic designs, torque ranges of up to 2,600,000 Nm and transmission ratios of 4,000:1 are possible with PLANUREX.

In our standardized products, we have already implemented the specific requirements that must be taken into consideration for bucket wheel, pinion and traversing gear drives in the field of conveying systems. You can also benefit from the advantages of a standard product in your sector.

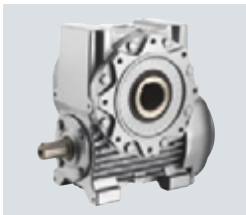
Application examples

- Roller presses
- Slewing gear drives
- Bucket wheel drives
- Slat conveyor drives
- Agitator drives
- Traversing gear drives
- Rotary furnace drives
- Central drives for tube mills

Product advantages

- Low weight and compact, space-saving design thanks to power splitting
- Save operating costs thanks to high degree of efficiency and optimized service intervals
- Easily combined with other gearboxes, e.g. upstream helical, worm, bevel or bevel helical gearboxes
- Low-noise running thanks to low rolling and sliding speeds on the flanks of the teeth

CAVEX worm gearbox



With the CAVEX worm gearbox/motor, Siemens offers you a complete range of industrial worm gearboxes/motors in 18 sizes, each with 7 designs. Thanks to its unique tothing geometry (CAVEX tothing), torques of up to 360,000 Nm and an efficiency of up to 95% can be achieved. We offer transmission ratios of even one i out of 30,000.

Product advantages

- Especially high torques, high degree of efficiency and long life span thanks to unique tothing geometry
- High transmission rates in a minimum of space
- Rugged design
- Low-noise
- Individual and sector-specific solutions
- ATEX-compliant
- Complete range of the MODULOG MOTORS principle

FLENDER –

Application-specific gearboxes



Each sector has its own requirements, needs specific solutions and competent consulting. As a partner to the sectors, Siemens knows the customer and their markets. Many application-specific, reliable and long-lasting drive solutions can be implemented from the standard portfolio thanks to the FLENDER modular gear system. The added value that results from this opens up more market opportunities for the customer. Because: The proven standard and special solutions result in cost-savings and increased competitiveness. References from all around the world prove our multi-faceted sector competence.

Sectors

- Chemical plants and environment
- Conveyor systems
- Cranes
- Plastic and rubber
- Paper industry
- Railway vehicles
- Marine applications
- Roller systems
- Cement, coal and ore
- Sugar industry

FLENDER –

Customer-specific gearboxes

Siemens has special departments for highly professional consulting and product development. In close cooperation with our customers, we implement individual solutions that are ideally attuned to their specific needs.

Couplings

As the world's largest manufacturer of mechanical couplings and with more than 80 years of experience, Siemens ensures reliable connections of machine shafts in nearly all sectors of industry - worldwide.

FLENDER – Couplings

Proven connections – quality and flexibility in a range of products that is unique worldwide



The high-quality industrial couplings are ideally suited for use in many applications and many of them are suited for hazardous environments as well. The portfolio includes couplings in the torque range of 10 to 10,000,000 Nm.

Product portfolio

- Torsionally stiff couplings
- Flexible couplings
- Highly flexible couplings
- Hydrodynamic couplings

Advantages

- Especially reliable
- Low-maintenance
- Low investment and operating costs
- The highest product quality
- Exceptionally long service life
- Individually adapted solutions are possible

Selection guide for FLENDER gearboxes and couplings – FLENDER X.CAT product configurator



- Comprehensive configuration of gearboxes and couplings is possible
- The consistency of the configuration is automatically checked
- Drawings and 3D models can be created
- Multi-lingual (more than 10 languages)
- Available as online and offline version

Condition Monitoring System

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



Security of investment

- Constant monitoring for the protection of machines and processes
- Early detection of damage
- Optimum utilization of the service life of the units
- Avoidance of total failure

Reduced lifecycle costs

- Better maintenance planning
- Minimized downtimes
- Reduced status-specific maintenance
- Service costs in comparison to cyclic maintenance
- Increase in plant availability

Use of innovative Siemens standard products

- Easy integration in higher-level maintenance and SCADA systems
- Effective process traceability through traceable monitoring of complex processes and plants

Condition Monitoring System – SIPLUS CMS4000

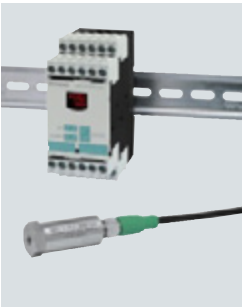
Scalable condition monitoring: Highly dynamic monitoring and analysis



- Scalable and configurable system for monitoring individual machine components through to the complex plant
 - Quality assurance of production processes through "flight recorder" functions for highly dynamic process signals
 - X-Tools software for detailed analysis, diagnostics, visualization, and archiving
- Constant, detailed monitoring of roller bearings, gearboxes, fans, pumps and machines – as far as low-frequency tower vibrations
 - Easy integration in higher-level maintenance and SCADA systems
 - Satisfies the requirements for Germanischer Lloyd and Allianz for wind power plants

Condition Monitoring System – SIPLUS CMS1000

Easy and compact condition monitoring: Switch on, teach, monitor



- Easy roller bearing monitoring for fixed and variable speed, based on VDI 3832, K(t) procedure
 - Monitoring for imbalance, alignment errors, setup problems with RMA according to DIN ISO 10816-3
 - Traffic light system for signaling the diagnostic status: Warning and alarm
 - Complete diagnostics at a glance
 - Constant monitoring of roller bearings, gearboxes, fans, pumps and machines
- No expert know-how is required: Switch on, teach, monitor

Starting with SIRIUS industrial controls, soft starters and motor starters

SIRIUS controls				
	3RV1/3RV2 motor starter protector	3RA1/3RA2 load feeder	3RA6 compact starter	3RW soft starter
Degree of protection	IP20			
Supply voltage	up to 3 AC 690 V			
Power	100 A/45 kW	3RA1 : 500 A/250 kW 3RA2: 32 A/15 kW	32 A/15 kW	3RW44: up to 2103 A/1200 kW 3RW40: up to 432 A/250 kW
Output voltage	Supply voltage			
Output frequency	50/60 Hz			
Switching/control principle	Direct starter	Direct, reversing, star-delta starter	Direct, reversing starter	Soft starter
Infeed system	3RV19/29	3RV19/29	3RA68	–
Connectable motors	Asynchronous motors			
Communication	–	AS-Interface/IO-Link	AS-Interface/IO-Link	PROFIBUS DP (only 3RW44)

Motor starters				
	SIRIUS MCU motor starter	SIRIUS M200D motor starter	SIMATIC ET 200S motor starters	SIMATIC ET 200pro motor starter
Degree of protection	IP54	IP65	IP20	IP65
Supply voltage	up to 3 AC 690 V	up to 3 AC 500 V		
Power	0.12...5.5 kW	0.06...5.5 kW	0.06...7.5 kW	0.2...5.5 kW
Output voltage	Supply voltage			
Output frequency	50/60 Hz			
Switching/control principle	Direct, reversing starter	Direct, reversing starter	Direct, reversing, soft starter	Electromechanical direct/reversing starter, electronic direct/reversing starter
Connectable motors	Asynchronous motors			
Communication	I/O controlled, AS-Interface	AS-Interface	PROFIBUS, PROFIBUS with PROFIsafe, PROFINET, PROFINET with PROFIsafe	PROFIBUS, PROFIBUS with PROFIsafe, PROFINET, PROFINET with PROFIsafe

Drive technology

13

Low-voltage converters												
SINAMICS											SIMATIC	
	G110	G110D/ G120D	G120/ G120C	G120P	G130/G150	S110	S120 AC/AC	S120 DC/AC	S150	ET 2005 FC	ET 200pro FC	MICRO- MASTER
Supply voltage	200...240 V	380...480 V	380...690 V	380 ... 480 V	380...690 V	200 ... 480 V	200...480 V	380...690 V	380...690 V	380...480 V	380...480 V	100...600 V
Rated output (in kW)	0.12...3	0.75 - 7.5	0.37...250	0.37 ... 18.5	75...2700	0.12 ... 90	0.12...250	0.9...4500	75...1200	0.75...4	1.1...1.5	0.12...250
Control												
V/f	■	■	■	■	■		■	■	■	■	■	■
Vector		■	■	■	■		■	■	■	■	■	■
Servo						■	■	■	■			
Motors												
Asynchronous	■	■	■	■	■	■	■	■	■	■	■	■
Synchronous					■	■	■	■	■			■
Torque					■ on request		■	■	■			
Linear							■	■	■			
Functions												
Speed	■	■	■	■		■	■	■	■	■	■	■
Torque		■	■			■	■	■	■	■	■	■
Positioning						■	■	■	■	■	■	
Special features		Distributed, IP65 degree of protection	Optimally with Safety integrated functions	Specially for pumps, fans and compressors		Safety integrated functions	DCC (Drive Control Chart) Safety integrated functions	DCC (Drive Control Chart), regenerative feedback, Safety integrated functions	Regenerative feedback Safety integrated functions	Distrib. I/O, w. optional safety function, regenerative feedback	Distrib. I/O, w. optional safety function, regenerative feedback	

	Low-voltage converters				DC drives			Medium-voltage converters			
	SIMODRIVE				Dynavert			SINAMICS			
	Posmo A	Posmo SI	Posmo CD/CA	Dynavert T	SIMOREG	SINAMICS DCM	GM150	GL150	SM150	SL150	ROBICON
Supply voltage	24 V; 48 V	600 V DC	600 V DC; 400...480 V AC	230...690 V	400...950 V	1 AC 85 V... 3 AC 950 V	2.3...4.16 kV	2.3...13.4 kV	3.3 kV	1.5...4 kV	Perfect Harmony 2.3...7.2 kV
Rated output	75 W; 300 W	5/10 kW; 5 kW	5/10 kW; 5 kW	2.2...6600 kW	6.3...2508 kW	6.3...2508 kW (max. 30 MW)	0.8...17 MW	2.8...120 MW	2.8...31.5 MW	3...36 MW	0.15...13.5 MW
Control											
V/f				■			■		■		■
Vector				■			■	■	■		■
Servo	■	■	■								
Motors											
Asynchronous				■			■		■		■
Synchronous	■ (integrated)	■ (integrated)	■		DC motors	DC motors	■	■	■		■
Torque											
Linear											
Functions											
Speed	■	■	■	■	■	■	■	■	■	■	■
Torque	■	■	■	■	■	■	■	■	■	■	■
Positioning	■	■	■								
Special features	Fieldbus interface PROFIBUS DP integrated			Sector-spec. versions		Regenerative feedback		Regenerative feedback	Regenerative feedback	Regen. feedback, extreme over-load capability	

Drive technology

	Low-voltage motors					Ex motors	
	Low-voltage asynchronous motors		Asynchronous servo-motors for converter-fed operation	Permanent-magnet synchronous servo-motors	Permanent-magnet torque motor for rotary axes	Permanent-magnet linear motor for linear axes	Explosion-protected and fire-damp-proofed asynchronous motors
	Alu	Gray cast					
Rated voltage	IEC: 230...690 V NEMA: 220...575 V		400...480 V, 690 V	230 V, 400...480 V	400...480 V, 690 V	400...480 V	IEC: 230 V...13.2 kV NEMA: 230...460 V
Rated speed rpm	IEC: Mains operation at 50 Hz: 750 ... 3000 NEMA: Mains operation at 60 Hz: 900 ... 3600 For converter operation: up to 6000		400...6000	up to 6000	up to 1200	up to 1280 m/min	IEC: 750...3600 NEMA: 900...3600 (for converter operation: up to 12000)
Power	IEC: 0.09 ... 45 kW NEMA: 1 ... 20 HP		2.8...1340 kW	0.05...118 kW	1.7...2150 kW	3.1...81.9 kW (calculated output)	IEC: 0.12...30000 kW NEMA: 1...400 HP
Torque	IEC: 0.61 ... 292 Nm NEMA: 1.5...60 lb-ft		13...12415 Nm	0.08 ... 690 Nm	100...42,000 Nm	150...10,375 N	IEC: 0.61...450,000 Nm NEMA: 3.0...1772 lb-ft
Shaft height	IEC: 63M...225 NEMA FS: 140...250		80...355	20...160	150...500		IEC: 63M...1250 NEMA: 140...440
Encoders	HTL pulse encoder, TTL pulse encoder		Resolver (type dependent), Incremental encoder (sin/cos, 1V _{pp}), EnDat absolute encoder (type dependent), HTL pulse encoder (type dependent)	Resolver, Incremental encoder (sin/cos, 1V _{pp}), EnDat absolute encoder	Resolver (type dependent), Incremental encoder (sin/cos, 1V _{pp}), EnDat absolute encoder (type dependent), external encoder sometimes required	External encoder required	On request: HTL/TTL pulse encoder

Options									
Brake	■		■		■		■		On request
DRIVE-CLiQ interface			■		■		■		
External fan	■				■ (type dependent)		■ (type dependent)		■ (type dependent)
ECOFAST	■								
2. shaft end	■				■ (type dependent)		■ (type dependent)		■
Tools	SIZER, DT configurator		SIZER, DT configurator		SIZER		SIZER		SIZER DT configurator
Application examples	Pumps, fans, compressors, conveyor systems with especially low weight and high efficiency requirements	Pumps, fans, compressors, marine applications, mixers with different degrees of efficiency, with special demands on ruggedness, for example in the chem. and petrochem. industries	Higher performance applications demanding high dynamic response and compact design, e.g. printing machinery, extruders, main spindle drives in machine tools	High to extra-high dynamic applications, e.g. robots and handling systems, woodworking, glass, ceramics and stone-working, packaging, plastics and textile machines and in the machine tool area	Extruders, swivel axes, rotary tables and circular tables, tool magazines, turret and cylinder indexing, main spindles, roller drives and in the machine tool area	Demanding high dynamic response and precision in linear movements, e.g. machining centers, turning, grinding, laser machining, handling, and in machine tool areas	For general industrial applications with special requirements regarding explosion protection (Zones 1, 2, 21, 22 and fire/explosion protection), e.g. in the process industry		

Drive technology

	Geared motors			DC motors			High-voltage motors	
	Geared motors for mains-fed operation and converter-fed operation	Industrial gears/ Worm gearbox	Permanently excited synchronous geared motors with helical/bevel gearboxes	Permanent-magnet excited synchronous servomotors with coaxial planetary gearbox	DC motors for speed-controlled operation	High-voltage asynchronous motors for mains-fed operation and converter-fed operation	High-voltage asynchronous motors for mains-fed operation and converter-fed operation	
Rated voltage	230...690 V	230...690 V	400...480 V	400...480 V	Up to 810 V DC	2...13.2 kV	6 kV...13.2 kV	
Rated speed rpm	0.05...1088	0.08...580	34...780	40...825	Up to 3600	Mains operation up to 3600, converter operation up to 15000	Mains operation up to 3600, converter operation up to 6300	
Power	0.09...200 kW	0.12...200 kW	0.3...8 kW	19...57 kW	Up to 1610 kW	200 kW...30 MW	5 MW...100 MW	
Torque	0.12...20,000 Nm	100...360,000 Nm	3.6...1730 Nm	4...2500 Nm	Up to 44,500 Nm	Up to 200,000 Nm	Up to 600,000 Nm	
Shaft height	Depending on motor and transmission	63...630	Depending on motor and transmission	28...132	100...630	315...1250	710...1250	
Encoders	Incremental encoder (TTL, HTL), absolute encoder (EnDat, SSI) Resolver, magnetic encoder	Incremental encoder (TTL, HTL), absolute encoder (EnDat, SSI), resolver, magnetic encoder	Resolver, incremental encoder (sin/cos, 1Vpp), EnDat absolute encoder	Resolver, incremental encoder (sin/cos, 1Vpp), EnDat absolute encoder	Resolver (on request), incremental encoder (sin/cos, 1Vpp) (on request), EnDat absolute encoder (on request), HTL pulse encoder, TTL pulse encoder	Resolver, incremental encoder (sin/cos, 1Vpp), EnDat absolute encoder, HTL pulse encoder, TTL pulse encoder	Resolver, incremental encoder (sin/cos, 1Vpp), EnDat absolute encoder, pulse encoder TTL	

Options									
Brake	■	■	■	■	■				
DRIVE-CLIQ interface		■							
External fan						■			■
ECOFAS ^T	■								
2. shaft end	■								■
Tools	Electronic catalog 'MOTOX Configurator'	Electronic catalog 'MOTOX Configurator'	SIZER	SIZER	SIZER, SIDIM, PFAD Plus, CAD CREATOR (1st exp. lev.)	SIZER, SIDIM, PFAD Plus, CAD CREATOR (1st exp. lev.)	SIZER, SIDIM, PFAD Plus, CAD CREATOR (1st exp. lev.)	SIZER, SIDIM, PFAD Plus, CAD CREATOR (1st exp. lev.)	
Application examples	Conveyor systems, cranes, food and beverages industry, cooling tower drives, agitators and mixers, car washes, pumps	Elevators, escalators, solar technology, theater drives, presses, heavy-load applications, e.g. in the area of steelworks and power plants	Simple positioning tasks and continuous auxiliary drives of servo quality (production machines, stacking and retrieval cranes, bottling plants, conveyor belts)	Positioning tasks in machine tools, production machines, robots, handling systems, auxiliary axes	Motors for standard drive applications in all industrial areas and in infrastructure	Medium-voltage drive applications, especially pumps, compressors, mixers, mills, conveyor belts, marine propulsion	Medium-voltage drive applications, especially pumps, compressors, blowers, refiners, mixers, extruders	Medium-voltage drive applications, including compressors, furnace blowers, refiners, pumps, extruders	



Low-voltage power distribution

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Low-voltage power distribution

Intelligent energy management

Innovative automation contributes considerably to cost savings in production

Energy resources are becoming more scarce and more expensive all the time and this is forcing operators of industrial plants to make their production more energy efficient. TIA provides intelligent and efficient energy management, which pursues the goal of reducing operating costs and increasing the plant's availability through efficient energy use.

Various products for power distribution can be integrated in the energy management system. These include hardware and software components such as the energy management add-on SIMATIC powerrate for PCS 7 and WinCC, 7KM PAC measuring devices, communication-capable 3WL/3VL circuit breakers, the SIMOCODE pro motor management system, and protective 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
- Securing of quality of electrical energy through continuous monitoring and analysis
- Optimization of maintenance requirements through analysis of the usage of your power distribution components

Energy distribution for efficient energy use - Energy management system

For optimized energy use and reduced energy costs



- The 7KM PAC measuring devices record consumption data reliably and accurately and are therefore the ideal basis for optimization measures.
- With the add-on SIMATIC powerrate for PCS 7 and WinCC, you can easily display and evaluate energy values. It also allows costs to be assigned to the cost generator and supports automatic load management.
- 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.
- Integrated industrial technology as well as integration in Totally Integrated Automation and Totally Integrated Power.

Accurate overview of electrical parameters and energy - 7KM PAC measuring devices

Comprehensive energy measurement and flexible communication



- Three-phase meters for control panel mounting (96 x 96 mm) for recording of electrical variables in all energy distribution plants
- Three devices for each measuring task:
 - 7KM PAC3100 measuring device, for low-cost entry in digital measurement
 - 7KM PAC3200 measuring device, the specialist for accurate energy acquisition and
 - 7KM PAC4200 measuring device, the professional for communication and monitoring
- Measurement of up to 200 measured variables, such as UL-N / UL-L / I / S / $\pm P$ / $\pm Q$ / LF / f / THD with min., max., and average values
- Can be used for single-phase and multi-phase measurements in 3 and 4-conductor networks as well as for direct connection in IT networks
- Uncomplicated system connection thanks to integrated and optional communication interfaces (RS485, Ethernet, PROFIBUS-DP, PROFINET, PROFinergy)
- Large, graphical LCD display with intuitive operation using function keys
- Seamless integration in PCS 7 and WinCC via pre-configured blocks in SIMATIC powerrate for PCS 7 and WinCC or via the SIMATIC PCS 7 Library PAC3200 and the block library 7KM PAC3200 for SIMATIC WinCC

Low-voltage power distribution

3WL/3VL circuit breakers

Modular circuit breaker 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.

3WL air circuit breaker and 3VL molded-case circuit breaker

Communication-enabled circuit breakers

The 3VL molded-case circuit breakers fulfill your requirements with regard to space requirements, plant availability and security:

- Integrated communication via PROFIBUS DP and Modbus RTU
- Wide range of measured values
- Extensive diagnostics, maintenance and servicing functions
- Increased plant availability



3WL air circuit breakers

from 630 A up to 6,300 A



3VL molded-case circuit breakers

from 16 A up to 1,600 A

Enhanced communication capability -

3VL molded-case circuit breakers with COM20/COM21

New functions and uniform communication capability

- In 3VL2 and 3VL3 molded-case circuit breakers, tripping magnet integrated directly into the ETU
- Uniform communication capability for all ETU versions
- Neutral conductor protection can be set to 50/100%
- Adjustable ground fault protection

**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

**Configuration software –
Switch ES Power**

- For further information about Switch ES Power, see "Automation software" on page 94.

**Energy management –
3WL/3VL block library for SIMATIC PCS 7**

- For further information about the block library, see "Process control systems" on page 58.

Low-voltage power distribution

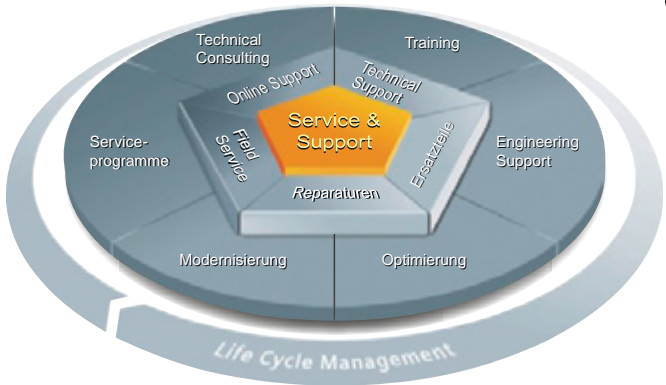


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Comprehensive range of services for all your company's needs



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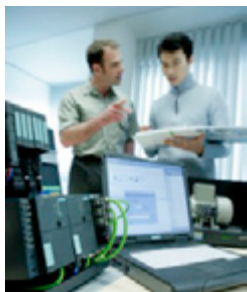
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