

Integrated functions in all SIMATIC controllers

Apart from scalability, every controller offers integrated system functions such as efficient engineering, high performance, innovative design, reliable diagnostics, Safety Integrated, Technology Integrated and Security Integrated. This allows flexibility in the design or adaption of automation solutions, without repeatedly having to accumulate further know-how and expertise.



Efficient engineering

The seamless integration of SIMATIC controllers in the common TIA Portal engineering framework permits the consistent storage of data, the smart library concept, and a uniform operating philosophy. This makes the use of universal functions particularly easy.

Reliable diagnostics

The integrated system diagnostics with efficient fault analysis and fast troubleshooting cuts commissioning times and minimizes downtimes in production. Faults are uniformly indicated in the engineering on the HMI, in the web server and in the display of the SIMATIC S7-1500.

Innovative design

Each controller can be set up and wired differently. The SIMATIC controller portfolio offers modular, compact and PC-based CPUs.

Safety Integrated

Fail-safe SIMATIC controllers offer the greatest possible level of integration: one controller, one communication system and one engineering for both standard and fail-safe automation.

Technology Integrated

Technology functions for counting and measuring tasks, closed-loop control and motion control are integrated into all SIMATIC controllers. Technology CPUs are used for sophisticated motion control tasks.

Security Integrated

Intellectual property and the investment it represents are safeguarded by the integration of know-how protection, protection against copying and manipulation, and additional password protection for access to program contents.

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The information given in this document only contains general descriptions and/or performance features which may not always specifically reflect those described, or which may undergo modification in the course of further development of the products. The requested performance features are binding only when they are expressly agreed upon in the concluded contract.

Siemens offers automation and drives products with industrial security functions that support safe operation of the plant or machine. They are an important component in a holistic industrial security concept. With this in mind, our products undergo continuous development. We therefore recommend that you keep yourself informed with respect to our product updates, and that you only use the latest versions in each case.

You can find information on this at:

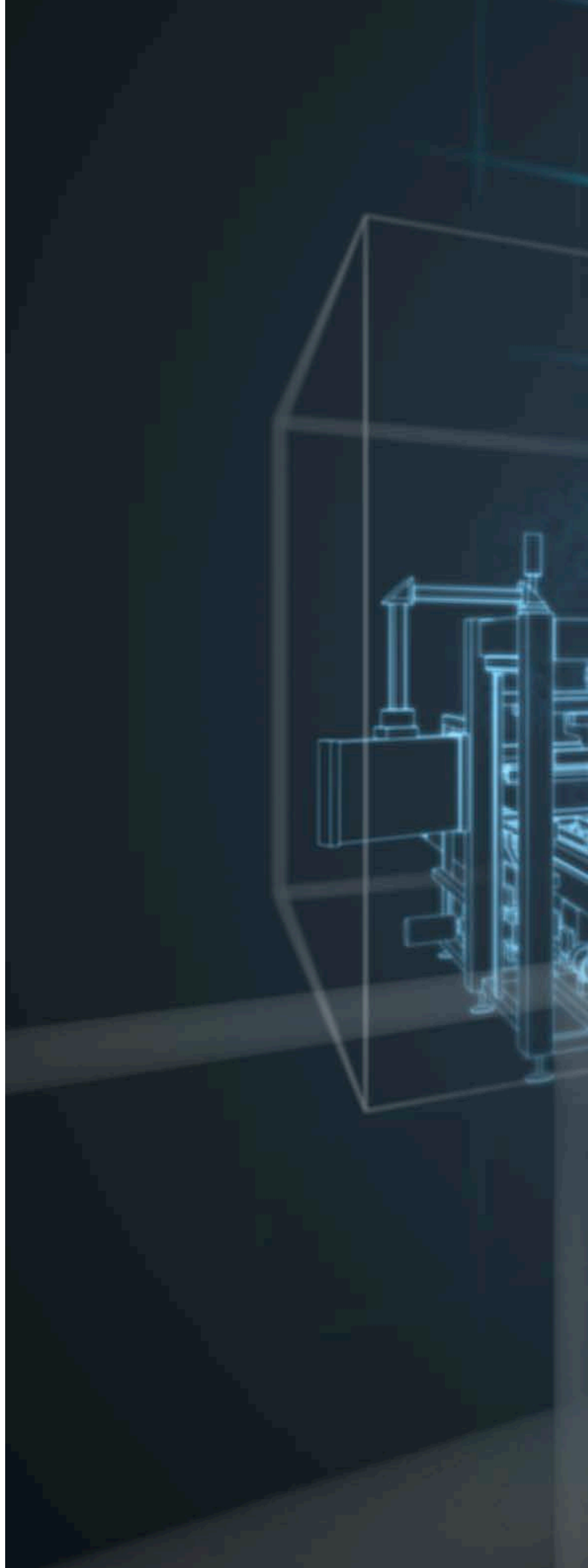
<http://support.automation.siemens.com>.

There you can also register for a newsletter specifically about these products.

To ensure the secure operation of a plant or machine, it is also necessary to take suitable preventive action (e.g. cell protection concept) and to integrate the automation and drive components into a state-of-the-art, holistic industrial security policy for the entire plant or machine. Products used from other manufacturers should also be taken into account here.

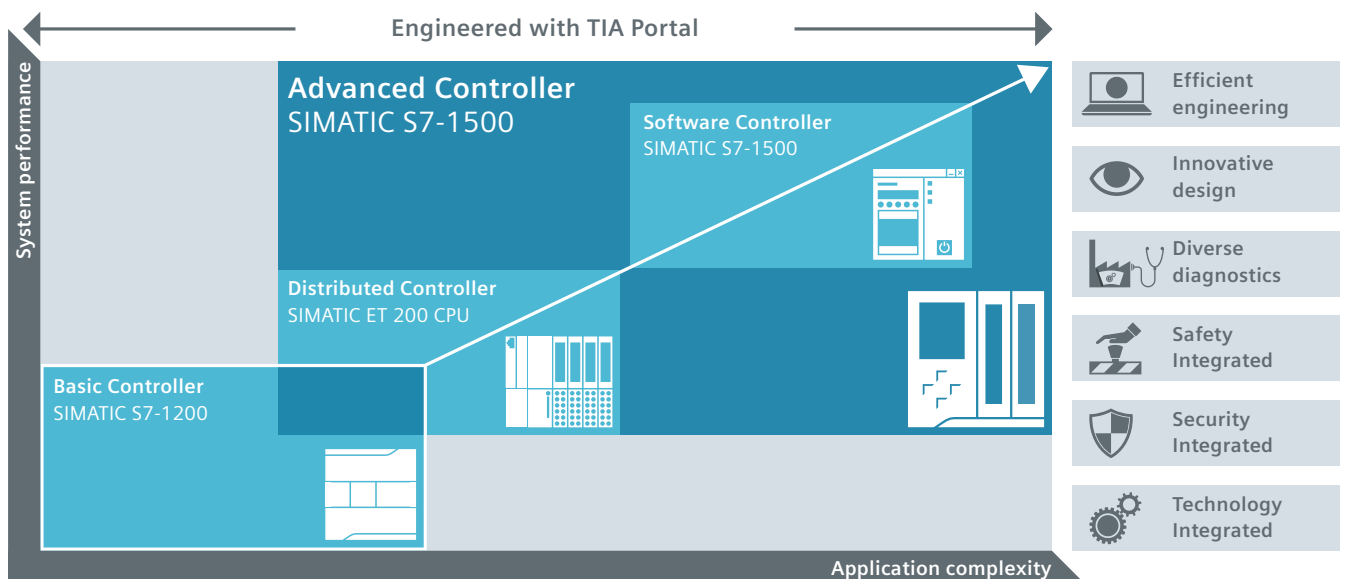
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Overview of the SIMATIC controller portfolio

Siemens offers the right controller for a wide range of automation requirements. The SIMATIC range of controllers comprises Basic, Advanced, Distributed and Software Controllers offering impressive scalability and integration of their functions. The engineering in the Totally Integrated Automation Portal (TIA Portal) enables optimum automation solutions to be found for every application.



Basic Controller

Basic Controllers are the intelligent choice for compact automation solutions with integrated communication and technology functions. They are available in both standard and safety versions.

Distributed Controller

Distributed Controllers are used for machines with a distributed architecture and for series machines with limited space available. They combine the advantages of a SIMATIC S7-1500 with the design of a SIMATIC ET 200SP. For an independent PC based solution the SIMATIC ET 200SP Open Controller is available.

Advanced Controller

Advanced Controllers automate not only complete production plants, but also applications which demand the greatest performance, flexibility and networking capability. Sophisticated motion control tasks are implemented with the technology CPU.

Software Controller

The Software Controllers are used wherever maximum precision and speed are required as well as PC-based automation. The PC-based controllers operate independently of the operating system. Like all SIMATIC controllers, the Software Controller is also available with Safety Integrated.

The intelligent choice for every requirement

Every machine or plant is different in terms of system performance needs and complexity. Requirements regarding technology and safety systems may be applied. With its comprehensive range of SIMATIC controllers, Siemens offers the perfect control solution for every application. The overview below simplifies the intelligent choice for every requirement!

Application

CPU types

Engineering efficiency

Programming software

Programming languages

Innovative design

Portfolio

Design of the IO modules

Wiring

Mounting

PROFINET interfaces/ports (max.)

High performance

Performance characteristics

Communication options*

Isochronous mode (IRT)

Reliable diagnostics

Integrated system diagnostics

User-defined messages

Display of the diagnostic message

Safety Integrated

Fail-safe

Technology Integrated

Motion Control

Counting and measuring

PID controller

Security Integrated

Know-how-protection

Copy protection

* onboard or with add-on module



**Basic Controllers –
Be flexible thanks to networking possibilities**

- Compact controllers with integrated IOs, technology and communication functions
- Networking options via various communication standards by means of integrated functions (PROFINET, Modbus, etc.) or add-on modules (IO-Link, AS-i, etc.)
- Flexible in design and with modular expansion options



**Advanced Controllers –
Increase productivity with the ultimate power**

- Controllers with extensive system functions and high performance
- Unique power thanks to high-performance backplane bus, extremely short terminal-to-terminal response times and high-speed signal processing
- Ensures maximum performance and user-friendliness

| | |
|--|---|
| Compact automation solution with requirements for integrated communication and technology functions – often combined with cost effectiveness | Complete production automation and applications for medium-sized and high-end machines with high demands in terms of performance, communication, flexibility and technology functions |
| CPU 1211C, 1212C (F), 1214C (F), 1215C (F), 1217C | CPU 1511C, 1512C, 1511 (F), 1513 (F), 1515 (F), 1516 (F), 1517 (F), 1518 (F), 1518 ODK (F), 1511T (F), 1515T (F), 1516T (F), 1517T (F), 1518 MFP (F) |
| STEP 7 Basic or Professional in the TIA Portal, STEP 7 Safety Basic | STEP 7 Professional in the TIA Portal, STEP 7 Safety Advanced |
| (F-)LAD, (F-)FBD, SCL | (F-)KOP, (F-)FUP, AWL, SCL, GRAPH, C++ (1518 ODK/MFP) |
| Compact-CPU | Compact and modular CPUs |
| Expandable centrally and on distributed basis | Expandable centrally and on distributed basis |
| Screw | Push-in and screw terminals |
| IP20 DIN rail | IP20 mounting bar |
| 1/2 (RJ45) | 3/4 (RJ45) |
| Small to medium | Large |
| PROFINET, PROFIBUS, PtP, AS-Interface, IO-Link, CANopen, Modbus RTU and TCP, Telecontrol | PROFINET (including PROFIsafe, PROFInergy and PROFIdrive), PROFIBUS, PtP, Modbus RTU and TCP |
| No | Yes, decentralized |
| Diagnostic functions | Diagnostic functions, process and system diagnosis (e.g. information in diagnostic buffer) |
| User diagnostics messages | User diagnostics messages, message status, program message with associated values |
| Engineering, HMI, web server | Display, engineering, HMI, web server |
| Yes | Yes |
| Control speed, positioning | Control speed, positioning, output cam, measuring input, gearing (relative), T-CPU with gearing (absolute) and camming |
| Integrated in CPU | Integrated into S7-1500 compact CPU or with technology modules |
| Yes | Yes |
| Yes | Yes |
| Yes | Yes |



**Distributed Controllers –
Save space with the smallest footprint**

- Controllers with distributed design
- ET 200SP controller: combines the advantages of the S7-1500 and the very compact design of the ET 200SP with a high channel density
- Space savings in the control cabinet and financial savings due to the use of distributed intelligence
- ET 200pro controller with IP65/67 protection for use outside the control cabinet

Machines with distributed architecture, series machines, with limited space requirements for the mid-performance range

CPU 1510SP-1PN (F), 1512SP-1PN (F), 1515SP PC2 (F), 1516pro-2PN (F)

STEP 7 Professional in the TIA Portal, STEP 7 Safety Advanced

(F-)LAD, (F-)FBD, STL, SCL, GRAPH,
High-level languages (C++/Windows-applications)

Modular CPUs

Expandable centrally and on distributed basis

Push-in

IP20 DIN rail and IP67

2/3 (RJ45, FC, FOC), flexible bus adapter

Average

PROFINET (including PROFI-safe, PROFI-energy and PROFI-drive), PROFIBUS, PtP, Modbus RTU and TCP, AS-Interface, IO-Link

Yes, decentralized

Diagnostic functions, process and system diagnosis (e.g. information in diagnostic buffer)

User diagnostics messages, message status, program message with associated values

Engineering, HMI, web server

Yes

Control speed, positioning, output cam, measuring input, gearing (relative)

With technology modules

Yes

Yes

Yes



**Software Controllers –
Be open and independent**

- C-based controller independent of the operating system
- Complete engineering in the TIA Portal: no Windows settings necessary
- Easy implementation of interfaces to PC applications, and integration of high-level language code with real-time capability
- Comprehensive hardware platforms with SIMATIC IPCs

Machines in the high-performance range which require maximum precision and speed, as well as a PC connection

CPU 1507S (F)

STEP 7 Professional in the TIA Portal, STEP 7 Safety Advanced

(F-)LAD, (F-)FBD, STL, SCL, GRAPH,
High-level languages (C++/Windows-applications)

Software-based CPU

Hardware dependent

Distributed I/O system

Hardware dependent

Hardware dependent

Large

Hardware dependent

No

Diagnostic functions, process and system diagnosis (e.g. information in diagnostic buffer)

User diagnostics messages, message status, program message with associated values

Engineering, HMI, web server

Yes

Control speed, positioning, output cam, measuring input, gearing (relative)

With technology modules

Yes

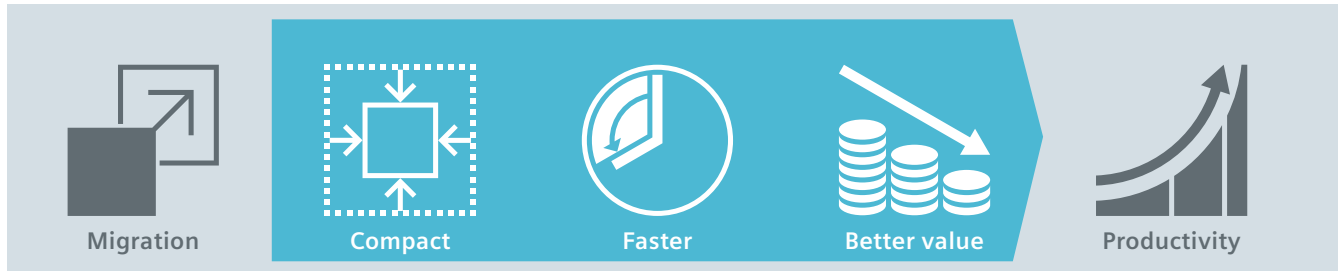
Yes

Yes

Now is the time to try something new

Modernization with SIMATIC controllers – Higher productivity, efficiency and availability by means of retrofit or modernization

To remain competitive in the long term, machines and plants must be continually adapted to the latest requirements. If your automation systems are no longer state-of-the-art, then a modernization will bring your company advantages in productivity, efficiency and availability. For this purpose, Siemens offers solutions using SIMATIC technologies tailored to your individual needs. Benefit from the time-saving simulation of automation while production is in progress, optimized control options by means of I/O adapters and integrated system diagnostics, as well as global support for retrofitting or modernization. Regardless of whether you want to completely modernize your plant or just replace parts of it.



Your advantages at a glance

- **Higher productivity, overall efficiency and usability:**
All-in-one solution, where SIMATIC controllers, SIMATIC HMI and SINAMICS drives work optimally together – engineered in the TIA Portal
- **The latest manufacturing standards, machine safety requirements, and industrial security requirements:**
Unrestricted participation in technological progress
- **Minimized downtimes:**
Integrated fault diagnostics and detailed display of faults
- **Increased profitability:**
Global long-term availability of all Siemens components
- **Improved competitiveness:**
Optimized availability and efficiency due to the latest generation of SIMATIC automation systems

Planning of modernization strategy

With a host of online tools from Siemens, individual migration strategies can be planned according to needs:

- **Documentation:**
Migration and conversion guides
- **Hardware:**
Module code conversion
- **Software:**
Integrated and external program converter
- **I/O conversion:**
I/O adapter table
- **Communication:**
Wide range of sample projects

Individual modernization support

On request, Siemens provides personal support for quite specific requirements. The analysis and testing of the core functionalities are performed by your Siemens contact:

[siemens.com/industry/contact](https://www.siemens.com/industry/contact)

For the complete service from consulting, through implementation, right up to full project completion, Siemens offers extensive modernization services:
[siemens.com/fa-migration](https://www.siemens.com/fa-migration)

For detailed information, visit:

[siemens.com/tia-migration](https://www.siemens.com/tia-migration)