

**SIEMENS**

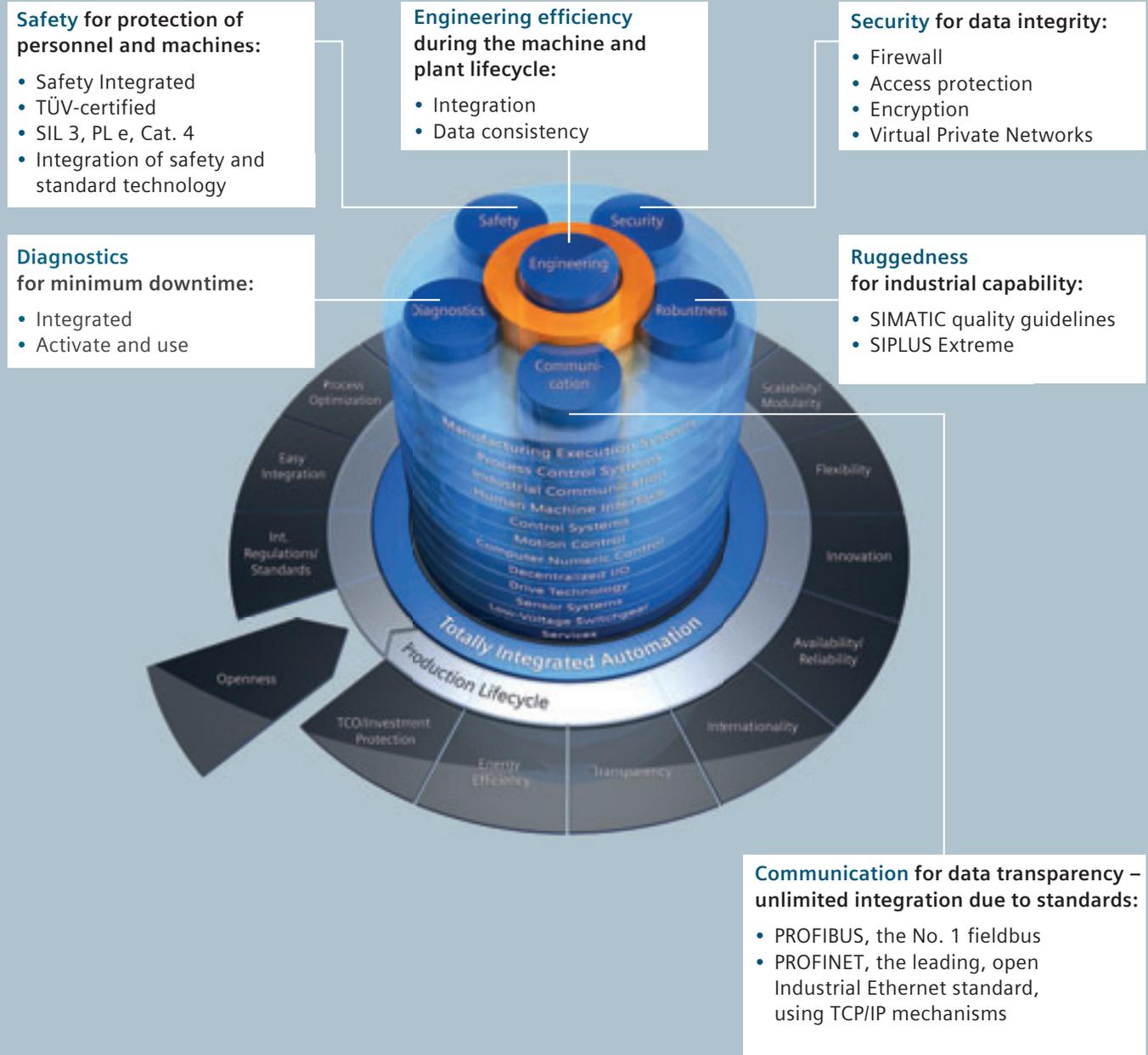


# SIMATIC S7-300

The modular controller for factory automation sets standards in performance and new features.

SIMATIC Controllers

# SIMATIC – the core component of Totally Integrated Automation



## SIMATIC S7-300 – the best-selling controller of the Totally Integrated Automation (TIA) product range for factory automation

Whether for machine or plant construction – the modular SIMATIC® Controllers include a variety of standardized, flexible, and scalable products for sector-independent automation solutions. To optimize productivity in central and distributed applications, OEMs, series and custom

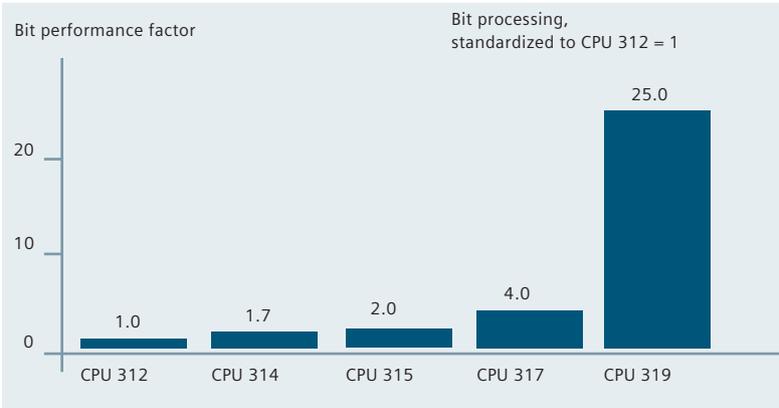
machine manufacturers, system integrators and plant constructors rely on the proven SIMATIC S7-300 and benefit from continuous further development and the latest technology.

# SIMATIC S7-300 – the suitable CPU for any application



SIMATIC S7-300 Controllers are available in Standard, Compact (C), Failsafe (F), and Technology (T) versions. A graded CPU range with a wide performance bandwidth is available for configuring an automation solution:

- **CPU 312 / CPU 312C** – cost-optimized solution for entry-level TIA users
- **CPU 313C / CPU 314 / CPU 314C** – the sophisticated solution for mid-range I/O needs, in part with integrated I/O
- **CPU 315-2 DP / CPU 315-2 PN/DP** – the standard controller for many applications in the medium performance range, with integrated interfaces for PROFINET/Ethernet or PROFIBUS DP
- **CPU 317-2 DP / CPU 317-2 PN/DP** – the standard controller in the S7-300 high-performance range, with integrated interfaces for PROFINET/Ethernet or PROFIBUS DP
- **CPU 319-3 PN/DP** – the high-performance CPU for applications in the top performance range and with high data throughput



The compact CPUs cover the lower performance range from the CPU 312 to the CPU 314. The CPU 315 and higher CPUs serve as a basis for failsafe controllers.

The system-tested Micro Memory Card for data and program memory makes a backup battery superfluous and saves maintenance costs. Simple program and firmware updates via project storage on the S7-MMC, along with the ability to exchange modules without the need for a programming device, reduce operating costs. In addition, an associated project, including symbols and comments, can be stored on this memory card, greatly simplifying service calls.

# SIMATIC S7-300 – the most important innovations in detail



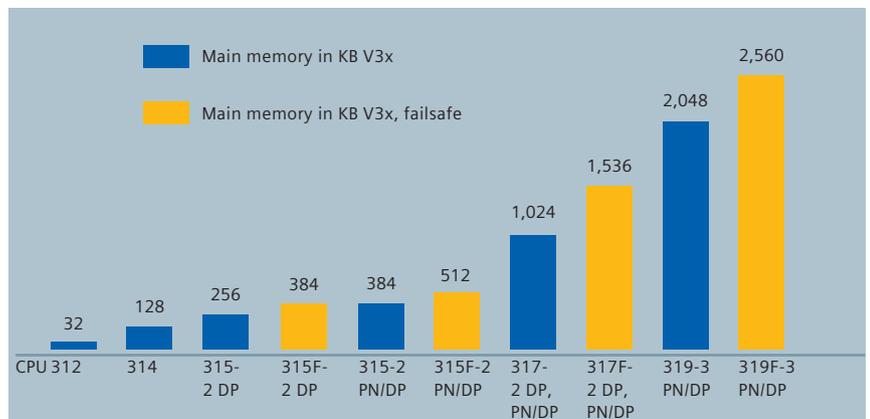
## Increased performance for programs and communication

The bit processing of all CPUs is on average twice as fast: A CPU 312 needs only 100 ns and a CPU 319 only 4 ns. The performance of word, fixed point, and floating point instructions has significantly increased. An additional highlight: optimized data block access that is just as fast as I/O and bit memory access. Initial experiences have shown that the result is shorter cycle times in real applications compared to the predecessor models; by a factor of between 4 and 14.

A further increase in operator control and monitoring performance is achieved by optimized communication mechanisms – the new (optional) prioritized HMI communication. A consistently short cycle time is ensured, even with increased data exchange.

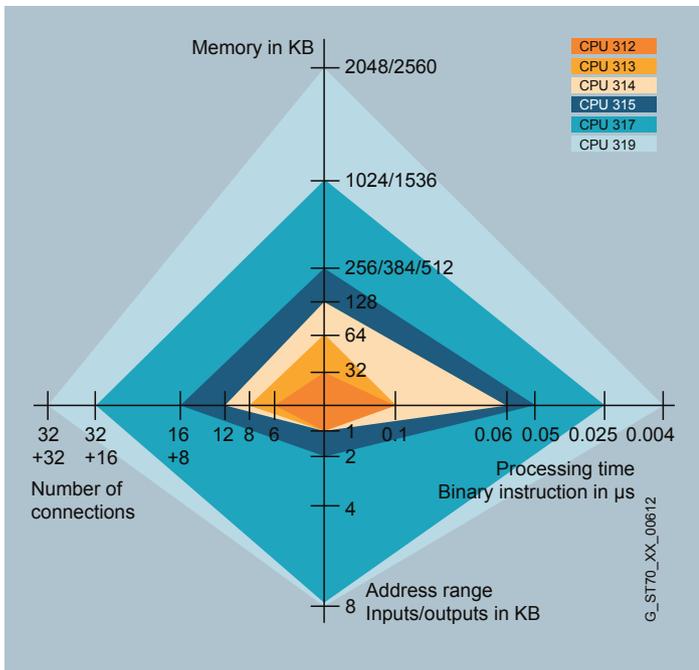
A larger main memory offers up to twice as much space for programs and data, depending on the CPU.

All this leads to significantly improved machine cycle times – and ultimately to higher productivity.



## Uniform slim design

The new hardware with overall width uniformly reduced to 40 mm – with no reduction in the number of available interfaces – saves control cabinet space and unifies the control cabinet layout while reducing rewiring effort. Our high-performance CPU 319 (F) remains the sole exception.



The six performance classes of the S7-300 CPUs

### Interchangeability through harmonization

The harmonization of the technical data for all S7-300 CPUs includes:

- Alignment of the block number ranges for function calls (FC), function blocks (FB) and data blocks (DB) with those of the S7-400
- Same local data amount of maximum 32 KB of data per process level and maximum 2 KB per block
- Adaptation of block size to 32 or 64 KB
- Uniform organization blocks (OB) for time delay and cyclic interrupts
- Uniform block nesting depth of 16

This facilitates the program exchange between S7-300 CPUs as well as porting to S7-400 CPUs. It also makes library creation independent of the hardware used, which in turn considerably reduces the cost of program development and maintenance.

Each CPU has a scalable I/O process image within the limits of the maximum usable address space. This ensures the optimum use of different CPUs in similar applications and machine types.

The encryption of function blocks and function calls with the "S7-Block Privacy" tool ensures cutting-edge know-how protection.

### PROFINET Controller

PROFIBUS International (PI) has defined PROFINET (according to IEC 61158/61784) as an open Industrial Ethernet standard based on TCP/IP for industrial automation which opens up new possibilities for the field level:

- IT integration
- Distributed automation
- Utilization of Industrial Wireless LAN
- Real time and isochronous mode
- Transfer of large volumes of data

Devices on PROFINET, i.e. I/O devices, can be replaced easily without a programming device or memory card thanks to centrally stored topology information.

### Expanded PROFINET functions

"Shared device" refers to the ability to flexibly assign the inputs and outputs of a PROFINET device module selectively to different controllers. Along with parallel access and processing of a shared input in two controllers, this architecture saves substantial wiring and communication overhead.

Another innovative option in a machine with multiple networked CPUs is the Intelligent Device (i-Device) concept. It allows a CPU's I/O communication to be seen as an I/O device to other higher-level or central controllers. With i-Device, the topology architecture becomes more compact and flexible and allows the setup of simple, proven communication – both project- and vendor-independent.

For better plant availability, PROFINET can be set up as a physical ring i.e. with redundant cabling. Using the Media Redundancy Protocol (MRP), reconfiguration times of about 200 ms can be implemented in the event of ring defects.

### Integrated switch

Both onboard PROFINET interfaces are physically designed as integrated switches. Linear topologies can be implemented easily and cost-effectively, as is already common practice with PROFIBUS DP. This can also include the distributed PROFINET I/O modules, which also feature this integrated switch technology.

By adding SCALANCE network components along with external switches, standard star or ring topologies, which are also common in Ethernet networks, can be created.

# Diagnosics minimizes downtimes and increases the plant availability

## Extended diagnostic functions

The following applies to all improved CPUs: As of firm-ware version 3, the simultaneous STEP® 7 online viewing of two blocks is possible. The status of both blocks can be viewed simultaneously on one programming device or separately on two different programming devices. As a result, two programmers can now work on the same machine online, which significantly reduces commissioning times.

A pending maintenance request on PROFINET is signaled by a yellow LED light. This maintenance LED indicates, for example, the synchronization loss of the current station or a lower-level PROFINET I/O device in Industrial Real Time (IRT) mode, or any other PROFINET I/O maintenance request. This simplifies finding a poor connection due to a disconnected plug, a cable-break or a worn fiber-optic connection.

## Integrated system diagnostics

The integrated plant-wide system diagnostics detects faults and automatically reports them immediately on activation to an HMI panel. Additional messages for monitoring the application or process can be configured easily and generated automatically. Furthermore, diagnostic displays with varying degrees of detail are automatically generated from configuration data – consistently through from the field to the management level.

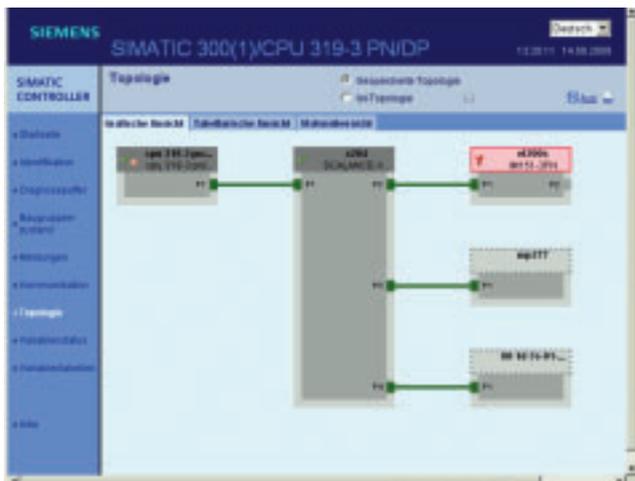
## Integrated web server

The web server integrated into the PN-CPU allows user-friendly, PG-independent access to module, program and diagnostic data from any location via any Internet browser. This is particularly advantageous during commissioning as well as during operation and is very convenient when combined with WLAN access or a web-enabled mobile phone. If this access to the CPU via Intranet/Internet is not desired, such as for security reasons, the built-in web server can also remain disabled.



In addition to the current visual CPU and status information, it is possible to examine, for example, the SIMATIC diagnostic buffer with up to 499 entries and messages. Furthermore, the module status of connected PROFINET nodes is displayed in table form with status and allows linking to web servers of other configured devices. The new graphical representation of the PROFINET I/O topology, with the comparison of actual value to configured and stored nominal view, allows malfunctioning devices to be easily monitored.

An additional extended feature is the automatic page update for all dynamic pages and pages created by the user. These pages, which can be developed in any HTML editor, are converted to data blocks using the STEP 7 accessory tool Web2PLC and are then imported to the STEP 7 project and activated with a system function call. Individual pages provide a much more user-friendly commissioning and maintenance view – even parameters can be changed via controlled login access.



# SIMATIC S7-300 – Overview of innovations



## Performance

- Faster command processing permits shorter machine cycle times and higher productivity.
- A larger main memory offers more space for programs and data.

## PROFINET

- Two PN interfaces as a switch, permit simple and low-cost linear topologies.
- Expanded PROFINET functions
  - Shared Device
  - i-Device and media redundancy (MRP) reduce hardware use and increase plant availability.
- Expansion of integrated web server with user-created pages allows user-friendly diagnostics and reading/writing of parameters without STEP 7.

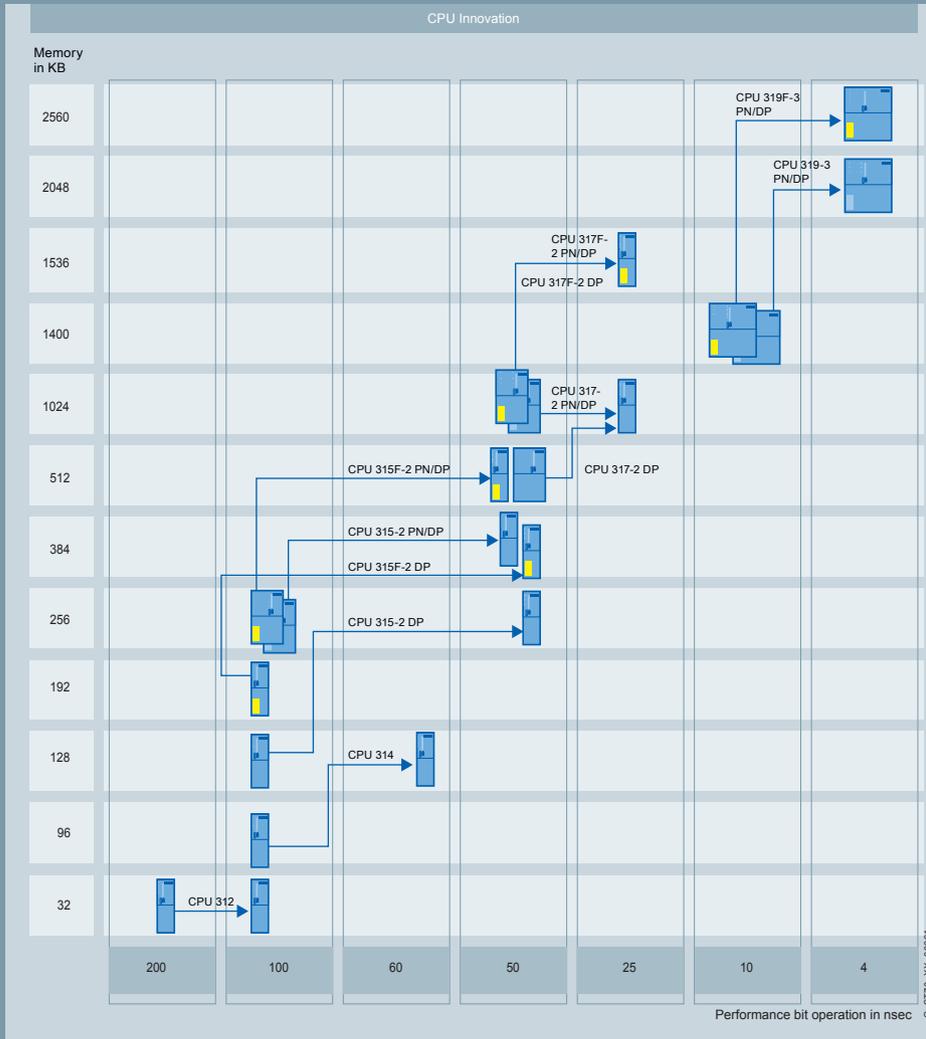
## Space requirements

- The width was reduced to 40 mm and therefore saves control cabinet space, standardizes the control cabinet layout, and reduces rewiring overhead.

## Interchangeability

- The harmonization of technical data simplifies program transfer.

# Memory and performance innovations of the S7-300 CPUs



Ordering information	
Standard CPUs	Order number
CPU 312, FW V3.0	6ES7312-1AE14-0AB0
CPU 314, FW V3.0	6ES7314-1AG14-0AB0
CPU 315-2 DP, FW V3.0	6ES7315-2AH14-0AB0
CPU 315-2 PN/DP, from FW V3.1	6ES7315-2EH14-0AB0
CPU 317-2 PN/DP, from FW V3.1	6ES7317-2EK14-0AB0
CPU 317-2 DP, FW V3.3	6ES7317-2AK14-0AB0
CPU 319-3 PN/DP, FW V3.2	6ES7318-3EL01-0AB0

Failsafe CPUs	Order number
CPU 315F-2DP, FW V3.0	6ES7315-6FF04-0AB0
CPU 315F-2 PN/DP, from FW V3.1	6ES7315-2FJ14-0AB0
CPU 317F-2 PN/DP, from FW V3.1	6ES7317-2FK14-0AB0
CPU 317F-2 DP, FW V3.3	6ES7317-6FF04-0AB0
CPU 319F-3 PN/DP, from FW V3.2	6ES7318-3FL01-0AB0

STEP 7 software	Order number
STEP 7 V5.5	6ES7810-4CC10-0YA5
STEP 7 Professional 2010	6ES7810-5CC11-0AA5
STEP 7 Professional V11	6ES7822-1AA01-0YA5
STEP 7 Professional Software Update Service	6ES7810-5CC04-0YE2
S7 F Distributed Safety V5.4	6ES7833-1FC02-0YA5

Accessories	Order number
SIMATIC Micro Memory Card 64 kB	6ES7953-8LF20-0AA0
SIMATIC Micro Memory Card 128 kB	6ES7953-8LG11-0AA0
SIMATIC Micro Memory Card 512 kB	6ES7953-8LJ30-0AA0
SIMATIC Micro Memory Card 2 MB	6ES7953-8LL20-0AA0
SIMATIC Micro Memory Card 4 MB	6ES7953-8LM20-0AA0
SIMATIC Micro Memory Card 8 MB	6ES7953-8LP20-0AA0

More information:  
[siemens.com/simatic-controller](http://siemens.com/simatic-controller)

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