Siemens S7-1500 Advanced Controller

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Siemens Industry - Digital Factory
SIMATIC New Controller Generation
Challenges need innovative answers

<table>
<thead>
<tr>
<th>Individualization</th>
<th>Globalization</th>
<th>Time to Market</th>
<th>Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>Production Logistics</td>
<td>New Technology</td>
<td>Energy Consumption</td>
</tr>
<tr>
<td>• Customized mass production</td>
<td>• Global alliance of production and suppliers</td>
<td>• Critical to success in highly competitive industries</td>
<td>• The efficient use of energy and environmentally safe materials</td>
</tr>
<tr>
<td>• Top quality at a competitive price</td>
<td>• New business models</td>
<td>• Pressure on productivity increases, shortening time for new development</td>
<td></td>
</tr>
</tbody>
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SIMATIC New Controller Generation
Challenges sets new automation scale

Trends
- Ethernet-based field bus
- IT functionality
- Increased functionality and design flexibility
- Increased Integrated functionality
- Optimized usability
- Easy to manage, reduced complexity

Solutions...
- PROFINET I/O as a standard at all PLCs
- For the same price
- More interfaces, higher performance, memory …
- e.g. web server on-board all PLCs
- e.g. motion control functions / PID controller / Trace / high speed counters
- e.g. integrated system diagnostics, project upload
- Reduced, optimized portfolio
- Simplified commissioning (serial machine building)
- Increase of system functionality

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Totally Integrated Automation – “See the bigger picture”

**Feature / Function**

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

**Engineering**
- TIA stands for efficiency and productivity, in particular in Engineering
- TIA Application with 3rd Party Integration incl. Engineering

**Benefit**

- Efficient interoperability of all automation components
- Efficiency in Engineering
- Perfect Interoperability with 3rd Party Application
New SIMATIC controller generation
Always the appropriate controller with comprehensive functionalities!

Engineered with TIA Portal

System performance

Application complexity

Advanced Controller
SIMATIC S7-1500

Distributed Controller
SIMATIC ET 200SP CPU

Basic Controller
SIMATIC S7-1200

Software Controller
SIMATIC S7-1500
SIMATIC S7-1500
Overview of Highlights

Hardware
- Max. 32 modules / line
- Identical modules for U-connector and backplane assembly
- Sufficient memory for any application
- Load memory via SIMATIC memory card

Communication
- PN IO RT/IRT in every CPU
- 2 additional interfaces for network separation
- All I/O data (PLC, CM) in the process image
- Easy communication programming for PLC & CMs
- Integrated web server

Display
- For commissioning
- For rapid diagnostics
- All error messages in plain text
- Access to MLFB, serial number, ...

Technology
- Standard motion (via PN IRT V2.2)
- Trace for all tags
- New PID control functions

Performance
- Extremely fast backplane bus
- Extremely fast bit instructions
- Extremely short response time (terminal <-> terminal)

Portfolio
- One system for machine and plant engineering
- Reduction of modules by >50% with CPU
- Reduction of modules by >30% with I/O

STEP7 language innovations
- Fully symbolic programming
- High-performance LAD/FBD/SCL compiler
- Innovations LAD/FBD/SCL
- Max. DB: 10MB, FBs/FCs: 512k

System diagnostics, alarms
- Fully integrated system diagnostics
- One ALARM FB
- Uniform representation PLC&HMI

Plug & play
- Read-out of actual configuration
- Complete project upload to empty programming device

Data log (archives) and recipes
- On the SIMATIC memory card in csv format
- Access via web server

compatibility
- Within the complete product range
- Easy migration 300/400->1500

Security integrated
- Know-how protection / copy protection
- Authentication
- Manipulation protection
SIMATIC S7-1500
Engineering in the TIA Portal

Efficient engineering
- Fully symbolic programming
- Optimized LAD/FBD/SCL compiler for increased performance
- Identical command scope in all programming languages
- Compute box in LAD/FBD for complex computing algorithms
- Support of 64-bit data types (LREAL, LINT, LWORD...) in all IEC languages
- No restriction of block sizes to 64 kByte – FBs/FCs with maximally 512 kByte, DBs with maximally 10 Mbyte (system limit 16 Mbyte)
- Free assignment of OB types to OB numbers
- Implicit type conversion
- Programming guideline for SIMATIC S7-1500: http://support.automation.siemens.com/WW/view/de/81318674

Efficient, flexible and free programming
Enhanced know-how protection in STEP 7

- Password protection against unauthorized opening of program blocks with STEP 7, resulting in protection against unauthorized copying, e.g. of developed algorithms
- Password protection against unauthorized evaluation of program blocks with external programs
  - from the STEP 7 project
  - from data on the memory card
  - from program libraries

Protection of intellectual property and investment
SIMATIC S7-1500
Integrated Technology

Motion Control functionality
- Flexible connection of drives via PROFINET, PROFIBUS or analog interfaces
- Easy programming of motion sequences with PLCopen motion blocks
- Uniform configuration for CPU / HMI / drives
- Comfortable diagnostics and commissioning tools (control panel, trace)
- Easy troubleshooting through automatic alarming of the engineering system and the HMI
- Functional scope V13
  Speed axis, positioning axis, encoder

Easy scalability through integration of identical motion control functions in all CPUs

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Option handling in central assembly

- Various hardware configurations can be saved in the control:
  - Configuration modification in the user program
  - Option retrofitting upon configuration completion

Maximum configuration:
Options: A, B, C, D

Configuration upon delivery:
Options: A, D

Machine update:
Options: A, D, C
Modular Controller with integrated safety functionality for Advanced Control applications

**S7-1500 with Safety Integrated**

<table>
<thead>
<tr>
<th>Feature / Function</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ All standard controllers also available as fail-safe controllers</td>
<td>▪ Simplified CPU selection thanks optimized portfolio</td>
</tr>
<tr>
<td>▪ One controller for standard and fail-safe automation</td>
<td>▪ Minimization of types and parts</td>
</tr>
<tr>
<td>▪ F-runtime group for autonomous prioritization and timing settings</td>
<td>▪ Efficient engineering in the TIA Portal</td>
</tr>
<tr>
<td>▪ All controllers with Onboard Status-Display</td>
<td>▪ Diagnostics messages without programming device</td>
</tr>
<tr>
<td>▪ Additional password for access to F configuration &amp; F program</td>
<td>▪ Maximum protection against manipulation</td>
</tr>
</tbody>
</table>

- CPU 1518F
- CPU 1517F
- CPU 1516F
- CPU 1515F
- CPU 1511F
- CPU 1513F

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## Fail-safe modules for SIMATIC ET 200MP

...high channel modules for optimum utilization of control cabinet volume

### ET 200MP

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<tr>
<th>Feature / Function</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Fail-safe, digital input and output modul for S7-1500 and ET 200MP</td>
<td>- Minimization of types and parts via simply add of failsafe modules to the standard I/O</td>
</tr>
<tr>
<td>- Reduction in module width of 60% or more</td>
<td>- Optimum utilization of control cabinet volume</td>
</tr>
<tr>
<td>- Signal-test (Short-circuit, wire breakage, …) onboard</td>
<td>- High availability via easy and rapid localization of faults</td>
</tr>
<tr>
<td>- Fault messages in plain text</td>
<td>- Simple commissioning and module replacement</td>
</tr>
<tr>
<td>- PROFIsafe address configured via software and saved in the coding module</td>
<td></td>
</tr>
</tbody>
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1. 16 F-DI 24V *)
2. 8 F-DQ 2A PPM *)

*) planned release for delivery QII/2015
Advanced Controller: SIMATIC S7-1500
SIMATIC S7-1500: Easy PLC selection thanks to an optimized Portfolio

<table>
<thead>
<tr>
<th>CPUs</th>
<th>Interface-module</th>
<th>Power-module/supply</th>
<th>Communication-module</th>
<th>Signal-module</th>
<th>Technology-module</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU 1511-1PN</td>
<td>2x IM PN</td>
<td>2x PM</td>
<td>4x CM PtP</td>
<td>13xI/Q(35mm)</td>
<td>3xTM</td>
</tr>
<tr>
<td>CPU 1513-1PN</td>
<td>1x IM DP</td>
<td>3x PS</td>
<td>2x CM/CP DP</td>
<td>8x I/Q (25 mm)</td>
<td>TM Count</td>
</tr>
<tr>
<td>CPU-1515/F-2PN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TM PosInput2</td>
</tr>
<tr>
<td>CPU-1516/F-3PN/DP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TM Timer DIDO</td>
</tr>
<tr>
<td>CPU-1517/F-3PN/DP</td>
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The new Advanced Controller in compact construction form

SIMATIC S7-1500C / Advanced Controller

<table>
<thead>
<tr>
<th>Feature / Function</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two compact CPUs with integrated analogous and digital inputs and outputs</td>
<td>Part reduction and type variety</td>
</tr>
<tr>
<td>▪ CPU 1511C-1PN</td>
<td></td>
</tr>
<tr>
<td>▪ CPU 1512C-1PN</td>
<td></td>
</tr>
<tr>
<td>Integrated counting measurement or frequency measurement with 100 kHz fast inputs</td>
<td>For higher performance with technological functionality.</td>
</tr>
<tr>
<td>Less width with integrated inputs and outputs</td>
<td>Special space-saving construction form by retention of the S7-1500</td>
</tr>
<tr>
<td></td>
<td>characteristics</td>
</tr>
</tbody>
</table>
Advanced Controller: SIMATIC S7-1500

Get more Information…

Reference center

From customer to customer!
- Customers give account to their experiences using our Products for their applications.

Internet

Detailed product information and related subjects!
- Product Websites
- Twitter, Youtube..

Getting Started

Easy Introduction to the new SIMATIC controller Generation!
- Learn about the new possibilities and get to know the new Hardware even better.

Starter kits

Why wait…when getting started is so easy?
- Customers give account to their experiences using our Products for their applications.

https://webservices.siemens.com/referenzen/#language=en

http://www.siemens.com/S7-1500

www.siemens.com/getting-started/s7-1500

6ES7511-1AK01-4YB5
Thank you for your attention!

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www.usa.siemens.com/s7-1500