SIEMENS

SIMATIC Controllers

The innovative solution for all automation tasks

SIMATIC

Overview

**Edition
April 2013**

Answers for industry.

SIMATIC Controllers
System-wide engineering, communications and diagnostics

SIMATIC Modular Controllers

Your benefits

- Ready to use
- Long-term compatibility and availability
- For use in harsh environments
- Modular expansion and scalability
- Vibration-resistant
- Maintenance-free

Fields of application

- Controlling with centralized and distributed I/O
- Technological tasks
- Fault-tolerant control
- Fail-safe control

You need optimal solutions for every application area to enable you to automate your machines and plants economically and flexibly.
Whether you want open-loop control, or you also want to cover other additional automation applications such as visualization, technology or data archiving – we always have the right solution for you! And with a unique level of integration in engineering, communications and diagnostics.
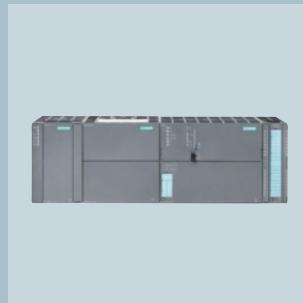
Our SIMATIC Controllers are based on different hardware and software architectures:

SIMATIC Modular Controllers

The Modular Controllers have been optimized for control tasks and specially designed for ruggedness and long-term availability. They can be flexibly expanded at any time using plug-in I/O modules, function modules, and communication modules. Depending on the size of the application, the right controller can be selected from a wide range according to performance, quantity frameworks, and communication interfaces. The modular controllers can also be used as fault-tolerant or fail-safe systems.

SIMATIC PC-based Controllers

Your benefits
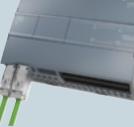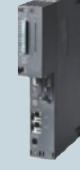
- Flexible in use
- Openness in hardware and software configuration
- Use of existing PC resources
- Participation in the continuous PC innovation process
- Multifunctional
- Customized PC variants
- Embedded bundles:
  - Ready to use
  - Rugged
  - Maintenance-free

Fields of application

- Control, operator control and monitoring
- Technological tasks
- Data acquisition and archiving
- Link to PC hardware and software
- Integration of C/C++/C# programs
- Data exchange via OPC
- Fail-safe control

SIMATIC PC-based Controllers

SIMATIC PC-based Controllers use the realtime-capable software controller WinAC RTX or its fail-safe variant WinAC RTX F on the basis of Windows operating systems. Any PC applications, operator control and monitoring tasks, as well as technological functions can simply be combined here to form an overall automation solution. The SIMATIC embedded bundles, with their highly rugged design and pre-installed, ready-to-use automation software, allow the advantages of PC-based Automation to be implemented at the machine.

SIMATIC Modulare Controllers

|	S7-1200	ET 200 with CPU	S7-300	S7-400	S7-1500
Control	S7-1200 www.siemens.com/s7-1200	ET 200 with CPU www.siemens.com/et200	S7-300 www.siemens.com/s7-300	S7-400 www.siemens.com/s7-400	S7-1500 www.siemens.com/s7-1500
Controlling with technology functions	S7-1200 www.siemens.com/s7-1200	ET 200 www.siemens.com/et200	S7-300 with Easy Motion Control or technology CPU (optionally with Safety) www.siemens.com/s7-300	S7-400 with FM 458 www.siemens.com/s7-400	S7-1500 www.siemens.com/s7-1500
Fail-safe control		ET 200 with F-CPU www.siemens.com/et200	S7-300 with F-CPU www.siemens.com/s7-300	S7-400 with F-CPU www.siemens.com/s7-400	S7-1500 with F-CPU www.siemens.com/s7-1500
Fault-tolerant control				S7-400 H-System optionally with Safety www.siemens.com/s7-400h	
Control, operator control and monitoring					

Totally Integrated Automation

Totally Integrated Automation stands for Industrial Auto-
mation from Siemens and encompasses the entire pro-
duction process. The open system structure incorporates
hardware and software sharing the same properties:
Consistent data management, world-wide standards, and
uniform interfaces. The resulting responsiveness increases
efficiency and productivity. SIMATIC Controllers are an
essential component of Totally Integrated Automation.
The extensive range of products makes it possible to find
the right solutions for the most diverse application areas
– in cost-sensitive standard production as well as in plant
building and special mechanical equipment manufacture,
where reduction of the engineering and startup costs plays
a crucial role.

SIMATIC PC-based Controllers			Software Controllers for Multi Panels

WinAC RTX

www.siemens.com/winac

WinAC RTX
with Easy Motion Control

Customized functions
with WinAC ODK

www.siemens.com/winac

www.siemens.com/winac-odk

WinAC RTX F

S7-mEC-RTX F

Embedded bundles
with WinAC RTX F

www.siemens.com/winac-rtx-f

www.siemens.com/s7-mec

www.siemens.com/embedded-automation

S7 Modular Embedded Controller

IPC227D/IPC427C bundles
with WinAC RTX (F) and HMI-Software

HMI IPC277D/IPC477C bundles
with WinAC RTX (F) and HMI-Software

WinAC MP 177/277

WinAC MP 377

www.siemens.com/s7-mec

www.siemens.com/ipc227d

www.siemens.com/ipc277d

Selection guide
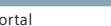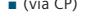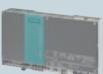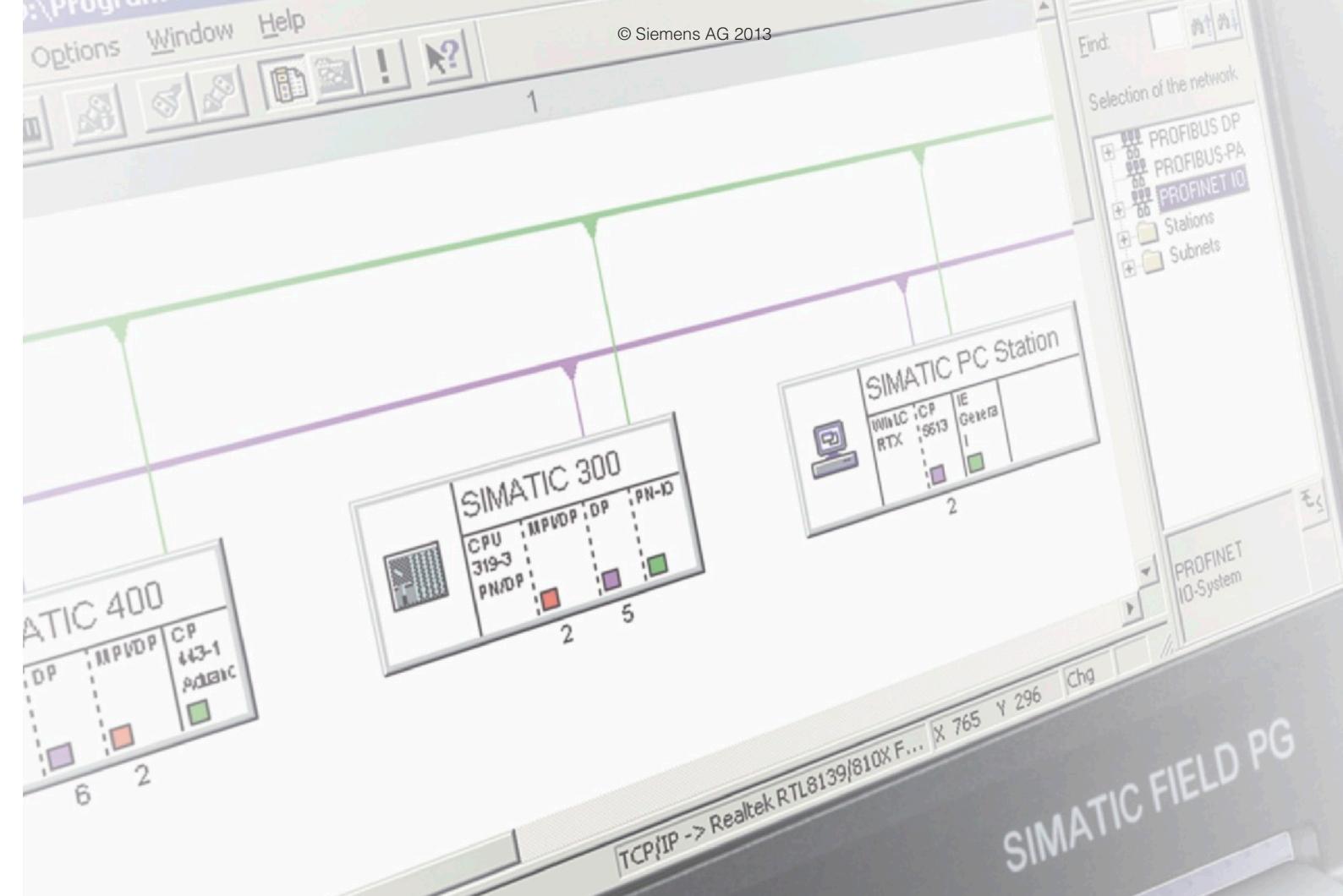
SIMATIC Modulare Controllers			
S7-1200	**ET 200 with CPU**		**S7-300**

SIMATIC product/family		ET 200S	ET 200pro	
Product Brief	Modular, compact controller for discrete and stand-alone automation solutions	Distributed, discretely-modular I/O system with local intelligence		Modular controllers for system solutions in production automation in the low to mid-performance ranges
		With degree of protection IP20	With degree of protection IP65/67	
Product range	• 5 compact CPUs	• 3 standard CPUs • 2 fail-safe CPUs	• 1 standard CPU • 2 fail-safe CPUs	• 7 standard CPUs • 7 compact CPUs • 5 fail-safe CPUs • 2 technology CPUs • 1 fail-safe technology CPU
Spare parts guaranteed for	10 years	10 years	10 years	10 years
Temperature range	-20 ... 60 °C [1]	0 ... 60 °C [2]	0 ... 55 °C	0 ... 60 °C [2]
Performance				
Execution time for bit operation, min.	0.085 µs	0.06 µs	0.025 µs (IM154-8FX)	0.004 µs (CPU 319)
Memory				
Main memory, max.	125 KB (CPU 1217C)	192 KB [5]	512 KB [6]	2 MB (CPU 319), 2.5 MB (CPU 319F)
Load memory/mass storage, max.	4 MB (CPU 1217C)	Micro Memory Card 8 MB	Micro Memory Card 8 MB	
Backup, max.	Program and data due to SIMATIC Memory Card (maintenance-free)	Program and data due to Micro Memory Card (maintenance-free)		Program and data due to Micro Memory Card (maintenance-free)
I/O devices				
I/O address area, max.	1024 / 1024 bytes	2048 / 2048 bytes	2048 / 2048 bytes	8192 / 8192 bytes
Centralized · I/O integrated in CPU	■			■ (compact CPU)
· I/O modules on CPU	■	■	■	■
Distributed · I/O modules on PROFIBUS	■	■	■	■
· I/O modules on PROFINET	■	■	■	■
Technology functions				
Loadable function blocks	■	■	■	■
Basic functions integrated in CPU	■			■ (compact CPU)
Special modules, plugged in centrally	■	■	■	■
Special technology controllers				■ (technology CPUs) [7]
Isochronous mode		■ (PN-CPUs)	■	■
Safety / availability				
Fail-safety	available soon	■ (F-CPUs)	■ (F-CPUs)	■ (F-CPUs) [7]
Fault tolerance				
Configuration changes during operation (CiR)				
Connection / disconnection of centralized I/O during operation (hot swapping)		■		
HMI functions				
Integrated				
PC functions				
C/C++/C#/Visual Basic link				
Data acquisition and archiving	■			
Expandable with PC standard hardware				
Integration of PC standard HW/SW				
Engineering				
Configuration / programming software	STEP 7 Basic V12 in the TIA Portal, STEP 7 Professional V12 in the TIA Portal		STEP 7 / STEP 7 Professional from V5.x, STEP 7 from V11 in the TIA	
Programming languages	KOP, FUP, SCL		KOP (LD), FUP (FBD), AWL (IL), S7-Graph (SFC), S7-SCL (ST), S7-HiGr	
Configuration of integral HMI functions				
Communications				
MPI		■	■	■
PtP	■ (character-based serial comm.)			■ (also via CP)
AS-Interface	■ (via CP with STEP 7 V11 SP2)			■ (via CP)
PROFIBUS	■	■	■	■ (also via CP) [4]
PROFINET IO	■	■ (PN CPUs)	■	■ (also via CP)
Others integrated				
Web server	■ (Smart Device Access, SIMATIC S7-1200 App)	■ (PN CPUs)		■ (PN CPUs)

1) as SIPLUS component also for extended temperature range
-40/-25 to +55/+70°C and corrosive atmosphere / condensation
(www.siemens.com/siplus)
2) as 1), but temperature range -25 to +60°C
3) as SIPLUS component also for corrosive atmosphere / condensation

(www.siemens.com/siplus-extreme)
4) with Technology CPU, additionally PROFIdrive
5) 256 KB with F version
6) 1.5 MB with F version
7) also TF-CPU with PROFINET

S7-400	S7-1500	SIMATIC PC-based Controllers		
		WinAC RTX (F)	S7 modular Embedded Controller	SIMATIC IPC227D bundles
	S7-1500			
Modular controllers for system solutions in production and process automation in the medium to upper performance ranges	The modular controller for applications in the medium to upper performance range for discrete automation	S7 controller as software controller for PC with Windows operating system (Windows XP, Windows Embedded Standard, Windows 7)	Embedded Controller in S7-300 design (fanless, diskless) with Windows Embedded Standard and software controller and HMI	Embedded rail-mounted PC (fanless, diskless) with Windows Embedded Standard, software controller and HMI
• 10 standard CPUs • 3 fail-safe CPUs • 4 fault-tolerant CPUs (also fail-safe)	• 3 standard CPUs with display (diagonal up to 6.1 cm) • others coming soon	• 1 software controller WinAC RTX • 1 fail-safe variant WinAC RTX F (the first safety-related real-time software controller worldwide for Windows-based automation solutions up to SIL3, PL e, Cat. 4)	• PC-based controller in the following variants: - Pre-installed operating system - Plus WinAC RTX (F) - Plus HMI WinCC flexible/WinAC RTX • 1 fail-safe variant	• 1 hardware platform • fail-safe variant • 3 device versions with different expansion capabilities • Customized / OEM product on request
10 years 0 ... 60 °C [3]	10 years 0 ... 60 °C	PC-dependent	5 years 0 ... 50 °C	5 years 0 ... 55 °C
0.018 µs (CPU 417)	0.01 µs (CPU 1516)	0.004 µs (Pentium IV, 2.4 GHz, PC-dependent)	0.004 µs (Intel CoreDuo 1.2 GHz)	
30 MB (CPU 417)	6 MB (program 1 MB, data 5 MB)	PC main memory [2]	1 GB RAM	512 KB ... 2 GB RAM
Memory Card	2 GB (via Memory Card)	PC mass storage	4 GB CompactFlash card	2 / 4 / 8 / 16 GB CF card or 50 GB SSD (High Endurance) or 80 GB SSD (Standard)
64 MB				
Program and data due to backup-battery or Program due to MC FEPROM	Program and data due to SIMATIC Memory Card (maintenance-free)	All data with UPS [3]	Control data (512 kB SRAM) without UPS, all data with UPS	Control data (128 KB MRAM) without UPS, all data with UPS
16384 / 16384 bytes	32 / 32 KB	16384 / 16384 bytes	16384 / 16384 bytes	16384 / 16384 bytes
	available soon			
■	■	■ [1]	■	■ (via PCIe, ODK)
■	■	■	■ (via CP 5603)	■
■	■	■	■	■
	■			
■	■			
■	■	■	■	
■ (F / FH CPUs) ■ (H / FH CPUs) ■ ■	available soon	■	■	■
		■ (can be installed on PC)	■ (S7-mEC-HMI/RTX)	■ (bundle with WinCC RT Advanced)
	■	■ (via ODK) ■ (very large volumes of data) ■ (PC-dependent) ■ (via ODK, OPC)	■ (via ODK) ■ (large volumes of data) ■ (4 PCI-104 cards max.) ■ (via ODK, OPC)	■ (via ODK) ■ (large volumes of data) ■ (1 PCI-104 card max.) ■ (via ODK, OPC)
Portal	STEP 7 Professional from V12 in the TIA Portal			STEP 7 / STEP 7 Professio
aph, CFC	LAD (LD), FDB, STL (IL), S7-Graph (SFC) available soon, S7-SCL (ST)			LAD
			WinCC flexible (optional)	WinCC RT Advanced
■	■ (via CMs)	■ (via CP distributed)	■ (via EM PC)	■ (via CP distributed)
■ (via CP)				
■ (also via CP)	■	■ (via CP in PC)	■ (via CP 5603)	■
■ (also via CP)		■ (via CP in PC)	■	■
	PROFINET (CPU 1516)	PC interfaces	Industrial Ethernet, USB	Industrial Ethernet, USB, RS232, DVI-D
■ (PN CPUs)	■	■ [5]	■ [5]	■ [5]

1) via PC cards and ODK
2) non-paged memory
3) 128 KB with specific SIMATIC PC without UPS
4) with F variant: S7 Distributed Safety, LAD, FBD for F program
5) with WinAC RTX 2010

SIMATIC IPC427C bundles	SIMATIC HMI IPC277D bundles	SIMATIC HMI IPC477C bundles	Software Controllers for Multi Panels WinAC MP 177/277/377		

SIMATIC IPC427C bundles	SIMATIC HMI IPC277D bundles	SIMATIC HMI IPC477C bundles	MP 177/277	MP 377	SIMATIC product/family
Embedded rail-mounted PC (fanless, diskless) with Windows Embedded Standard, software controller and HMI	Embedded Panel PC (fanless, diskless) with Windows Embedded Standard, software controller and HMI	Embedded Panel PC (fanless, diskless) with Windows Embedded Standard, software controller and HMI	Software controllers for Multi Panels		Product Brief
• 2 platforms (PROFINET, PROFIBUS), each with 3 software versions • 1 fail-safe variant • Customized / OEM product on request	• Panel PC with 7", 9", 12", 15" and 19" Touch • Customized design and OEM product on request • 1 fail-safe variant	• Panel PC, 12", 15" or 19" Touch or 12", 15" Key each with 3 software versions, bundle with IPC477C PRO all-round protection to IP 65 also available • Customized design and OEM product on request • 1 fail-safe variant	• 1 standard product for Multi Panels with 6" to 19" • Customized design and OEM product on request		Product range
5 years	5 years	5 years	10 years		Spare parts guaranteed for
0 ... 55 ℃	0 ... 50 ℃	0 ... 50 ℃	0 ... 50 ℃		Temperature range
					Performance
0.004 µs (Intel Core2Solo 1.2 GHz)		0.004 µs (Intel Core2Solo 1.2 GHz)			Execution time for bit operation, min.
					Memory
4 GB RAM	512 KB ... 2 GB RAM	4 GB RAM	128 KB / 256 KB	512 KB	Main memory, max.
4 / 8 / 16 GB CF card or 50 GB SSD (High Endurance) or 80 GB SSD (Standard)	4 / 8 / 16 GB CF card or 50 GB SSD (High Endurance) or 80 GB SSD (Standard)	4 / 8 / 16 GB CF card or 50 GB SSD (High Endurance) or 80 GB SSD (Standard)			Load memory/mass storage, max.
Control data (128 KB SRAM) without UPS, all data with UPS	Control data (128 KB MRAM) without UPS, all data with UPS	Control data (128 KB SRAM) without UPS, all data with UPS	Control data (64 KB / 128 KB MRAM)	Control data (256 KB MRAM)	Backup, max.
					I/O devices
16384 / 16384 bytes	16384 / 16384 bytes	16384 / 16384 bytes	2048 / 2048 bytes 4096 / 4096 bytes	8192 / 8192 bytes	I/O address area, max.
					Centralized · I/O integrated in CPU
■ (via PCI-104 cards and ODK)					· I/O modules on CPU
■	■	■	■		Distributed · I/O modules on PROFIBUS
■	■	■	■		· I/O modules on PROFINET
					Technology functions
■	■	■	■		Loadable function blocks
					Basic functions integrated in CPU
					Special modules, plugged in centrally
					Special technology controllers
■	■	■			Isochronous mode
					Safety / availability
■	■	■			Fail-safety
					Fault tolerance
					Configuration changes during operation (CiR)
					Connection / disconnection of centralized I/O during operation (hot swapping)
					HMI functions
■ (bundle with WinCC flexible or WinCC RT Advanced or WinCC single-user station or client or WinCC RT Professional)	■ (bundle with WinCC RT Advanced)	■ (bundle with WinCC flexible or WinCC RT Advanced or WinCC single-user station or client or WinCC RT Professional)	■ (Multi Panel)		Integrated
					PC functions
■ (via ODK)	■ (via ODK)	■ (via ODK)			C/C++/C#/Visual Basic link
■ (large volumes of data)	■ (large volumes of data)	■ (large volumes of data)	■		Data acquisition and archiving
■ (3 PCI-104 cards max.)					Expandable with PC standard hardware
■ (via ODK, OPC)	■ (via ODK, OPC)	■ (via ODK, OPC)			Integration of PC standard HW/SW
					Engineering
...onal from V5.x, STEP 7 from V11 in the TIA Portal					Configuration / programming software
...(LD), FDB (FBD), STL (IL), S7-Graph (SFC), S7-SCL (ST), S7-HiGraph, CFC 4)					Programming languages
WinCC flexible, WinCC RT Advanced (optional) WinCC, WinCC RT Professional	WinCC RT Advanced	WinCC flexible, WinCC RT Advanced (optional) WinCC, WinCC RT Professional	WinCC flexible Standard, Advanced		Configuration of integral HMI functions
					Communications
			■		MPI
■ (via CP distributed)	■ (via CP distributed)	■ (via CP distributed)			PtP
					AS-Interface
	■	■	■		PROFIBUS
■	■				PROFINET
Industrial Ethernet, USB, RS232, DVI/ VGA PROFINET (IRT)	Industrial Ethernet, USB	Industrial Ethernet, USB, RS232, DVI/ VGA PROFINET (IRT)	Industrial Ethernet, USB, RS232		Others integrated
■ 5)	■ 5)	■ 5)			Web server

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Options Window Help

1

Find:

Selection of the network

PROFIBUS DP
PROFIBUS-PA
PROFINET IO
Stations
Subnets

SIMATIC PC Station

WinLC CP   IE
RTX   5613 Genera
              l

2

SIMATIC 300

CPU   MP/DP DP   PN-IO
319-3
PN/DP

2   5

ATIC 400

DP   MP/DP CP
            443-1
            Advanc

6   2

PROFINET
IO-System

X 765   Y 296   Chg

TCP/IP -> Realtek RTL8139/810X F...

SIMATIC FIELD PG

Get more information

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SIPLUS extreme – hardening and finishing:
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