Distributed Controllers

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Distributed Controllers
based on ET 200SP
Standard CPUs

CPU 1510SP-1 PN

■ Overview

- CPU 1510SP-1 PN for SIMATIC ET 200SP based on S7-1500 CPU 1511-1 PN
- For high-performance control solutions using ET 200SP
- Increase in availability of systems and machines
- PROFINET IO controller for up to 64 IO devices
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device with a SIMATIC or non-Siemens PROFINET IO controller
- PROFINET shared I-Device for 4 controllers
- PROFINET IO IRT interface with integrated 3-port switch
- Isochronous mode on PROFINET
- With multiple communication options: PG/OP communication, PROFINET IO, open IE communication (TCP, ISO-on-TCP and UDP), web server and S7 communication (with loadable FBs)
- OPC UA server and client (data access) as runtime option for easy connection of the SIMATIC ET 200SP to third-party devices/systems
- Optional PROFIBUS DP master for 125 PROFIBUS DP slaves (with CM DP module 6ES7545-5DA00-0AB0)
- Optional PROFIBUS DP slave (with CM DP module 6ES7545-5DA00-0AB0)
- Configuration control (option handling)
- Integrated motion control functionalities for controlling speed-controlled and positioning axes, support for external encoders, output cams/cam tracks and probes

Note:

SIMATIC memory card required for operation of the CPU. The BusAdapter is not included in scope of supply and is to be ordered separately.

■ Technical specifications

Article number	6ES7510-1DJ01-0AB0
	CPU 1510SP-1 PN, 100KB Prog./750KB Data
General information	
Product type designation	CPU 1510SP-1 PN
Engineering with	
• STEP 7 TIA Portal configurable/ integrated as of version	V15.1 (FW V2.6)/V13 SP1 Update 4 (FW V1.8) or higher
Supply voltage	
Type of supply voltage	24 V DC
Memory	
Work memory	
• integrated (for program)	100 kbyte
• integrated (for data)	750 kbyte
Load memory	
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte
CPU processing times	
for bit operations, typ.	72 ns
for word operations, typ.	86 ns
for fixed point arithmetic, typ.	115 ns
for floating point arithmetic, typ.	461 ns
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
IEC counter	
• Number	Any (only limited by the main memory)
S7 times	
• Number	2 048
IEC timer	
• Number	Any (only limited by the main memory)
Data areas and their retentivity	
Flag	
• Number, max.	16 kbyte
Address area	
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image
Address space per module	
• Address space per module, max.	288 byte; For input and output data respectively
Address space per station	
• Address space per station, max.	2 560 byte; for central inputs and outputs; depending on configuration; 2 048 bytes for ET 200SP modules + 512 bytes for ET 200AL modules
Time of day	
Clock	
• Type	Hardware clock

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■ **Technical specifications** (continued)

Article number	**6ES7510-1DJ01-0AB0**
	CPU 1510SP-1 PN, 100KB Prog./750KB Data
1. Interface	
Interface types	
• Number of ports	3; 1. integr. + 2. via BusAdapter
• integrated switch	Yes
• RJ 45 (Ethernet)	Yes; X1 P3; opt. X1 P1 and X1 P2 via BusAdapter BA 2x RJ45
• BusAdapter (PROFINET)	Yes; Applicable BusAdapter: BA 2x RJ45, BA 2x FC
Protocols	
• IP protocol	Yes; IPv4
• PROFINET IO controller	Yes
• PROFINET IO Device	Yes
• SIMATIC communication	Yes
• Open IE communication	Yes
• Web server	Yes
• Media redundancy	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0
PROFINET IO controller	
Services	
- PG/OP communication	Yes
- S7 routing	Yes
- Isochronous mode	Yes
- Open IE communication	Yes
- IRT	Yes
- MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
- MRPD	Yes; Requirement: IRT
- PROFIenergy	Yes
- Prioritized startup	Yes; Max. 32 PROFINET devices
- Number of connectable IO Devices, max.	64; In total, up to 256 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
- Of which IO devices with IRT, max.	64
- Number of connectable IO Devices for RT, max.	64
- of which in line, max.	64
- Number of IO Devices that can be simultaneously activated/ deactivated, max.	8; in total across all interfaces
- Number of IO Devices per tool, max.	8
- Updating times	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data
Update time for IRT	
- for send cycle of 250 µs	250 µs to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 625 µs of the isochronous OB is decisive
- for send cycle of 500 µs	500 µs to 8 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 625 µs of the isochronous OB is decisive
- for send cycle of 1 ms	1 ms to 16 ms
- for send cycle of 2 ms	2 ms to 32 ms
- for send cycle of 4 ms	4 ms to 64 ms
- With IRT and parameterization of "odd" send cycles	Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)

Article number	**6ES7510-1DJ01-0AB0**
	CPU 1510SP-1 PN, 100KB Prog./750KB Data
Update time for RT	
- for send cycle of 250 µs	250 µs to 128 ms
- for send cycle of 500 µs	500 µs to 256 ms
- for send cycle of 1 ms	1 ms to 512 ms
- for send cycle of 2 ms	2 ms to 512 ms
- for send cycle of 4 ms	4 ms to 512 ms
PROFINET IO Device	
Services	
- PG/OP communication	Yes
- S7 routing	Yes
- Isochronous mode	No
- Open IE communication	Yes
- IRT	Yes
- MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
- MRPD	Yes; Requirement: IRT
- PROFIenergy	Yes
- Shared device	Yes
- Number of IO Controllers with shared device, max.	4
- Asset management record	Yes; Per user program
2. Interface	
Interface types	
• Number of ports	1
• RS 485	Yes; Via CM DP module
Protocols	
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes
• SIMATIC communication	Yes
Protocols	
Number of connections	
• Number of connections, max.	96; via integrated interfaces of the CPU and connected CPs / CMs
PROFIBUS DP master	
Services	
- Number of DP slaves	125; In total, up to 256 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
OPC UA	
• OPC UA client	Yes
• OPC UA server	Yes; Data access (read, write, subscribe), method call, custom address space
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes; Only with PROFINET; with minimum OB 6x cycle of 625 µs

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Distributed Controllers
based on ET 200SP
Standard CPUs

CPU 1510SP-1 PN

■ Technical specifications (continued)

Article number	**6ES7510-1DJ01-0AB0**
	CPU 1510SP-1 PN, 100KB Prog./750KB Data
Supported technology objects	
Motion Control	Yes; Note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool or SIZER
• Number of available Motion Control resources for technology objects (except cam disks)	800
• Required Motion Control resources	
- per speed-controlled axis	40
- per positioning axis	80
- per synchronous axis	160
- per external encoder	80
- per output cam	20
- per cam track	160
- per probe	40
Controller	
• PID_Compact	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves
• PID-Temp	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
• High-speed counter	Yes
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-25 °C; No condensation
• horizontal installation, max.	60 °C
• vertical installation, min.	-25 °C; No condensation
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Configuration	
Programming	
Programming language	
- LAD	Yes
- FBD	Yes
- STL	Yes
- SCL	Yes
- GRAPH	Yes
Know-how protection	
• User program protection/password protection	Yes
• Copy protection	Yes
• Block protection	Yes
Access protection	
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Complete protection	Yes
Dimensions	
Width	100 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	310 g

■ Ordering data

	Article No.
CPU 1510SP-1 PN	**6ES7510-1DJ01-0AB0**
Work memory 100 KB for program, 750 KB for data, PROFINET IO IRT interface; SIMATIC memory card required	
Accessories	
CM DP for ET 200SP CPU	**6ES7545-5DA00-0AB0**
PROFIBUS DP master/slave with electrical interface for connecting the ET 200SP CPUs to PROFIBUS at up to 12 Mbps	
SIMATIC memory card	
4 MB	**6ES7954-8LC03-0AA0**
12 MB	**6ES7954-8LE03-0AA0**
24 MB	**6ES7954-8LF03-0AA0**
256 MB	**6ES7954-8LL03-0AA0**
2 GB	**6ES7954-8LP02-0AA0**
32 GB	**6ES7954-8LT03-0AA0**
DIN rail 35 mm	
• Length: 483 mm for 19" cabinets	**6ES5710-8MA11**
• Length: 530 mm for 600 mm cabinets	**6ES5710-8MA21**
• Length: 830 mm for 900 mm cabinets	**6ES5710-8MA31**
• Length: 2 m	**6ES5710-8MA41**
PE connection element for DIN rail 2 000 mm	**6ES7590-5AA00-0AA0**
BusAdapter BA 2xRJ45	**6ES7193-6AR00-0AA0**
BusAdapter BA 2xFC for increased vibration and EMC loads	**6ES7193-6AF00-0AA0**
BusAdapter BA 2xSCRJ	**6ES7193-6AP00-0AA0**
BusAdapter BA SCRJ/RJ45	**6ES7193-6AP20-0AA0**
BusAdapter BA SCRJ/FC	**6ES7193-6AP40-0AA0**
Equipment labeling plates	**6ES7193-6LF30-0AW0**
10 sheets of 16 plates	
Labeling strips	
500 labeling strips on roll, light gray, for inscription with thermal transfer roll printer	**6ES7193-6LR10-0AA0**
500 labeling strips on roll, yellow, for inscription with thermal transfer roll printer	**6ES7193-6LR10-0AG0**
1 000 labeling strips DIN A4, light gray, card, for inscription with laser printer	**6ES7193-6LA10-0AA0**
1 000 labeling strips DIN A4, yellow, card, for inscription with laser printer	**6ES7193-6LA10-0AG0**

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■ **Ordering data**

	Article No.
IE FC RJ45 plugs	
RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables	
IE FC RJ45 plug 90	
90° cable outlet	
1 unit	6GK1901-1BB20-2AA0
10 units	6GK1901-1BB20-2AB0
50 units	6GK1901-1BB20-2AE0
IE FC RJ45 plug 180	
180° cable outlet	
1 unit	6GK1901-1BB10-2AA0
10 units	6GK1901-1BB10-2AB0
50 units	6GK1901-1BB10-2AE0
IE FC TP standard cable GP 2x2	6XV1840-2AH10
4-wire, shielded TP installation cable for connection to IE FC RJ45 outlet/ IE FC RJ45 plug; PROFINET-compatible; with UL approval; sold by the meter; max. delivery unit 1 000 m, minimum order quantity 20 m	
IE FC TP trailing cable 2 x 2 (Type C)	6XV1840-3AH10
4-wire, shielded TP installation cable for connection to IE FC RJ45 outlet/ IE FC RJ45 plug 180/90 for use as trailing cable; PROFINET-compatible; with UL approval; sold by the meter; max. delivery unit 1 000 m, minimum order quantity 20 m	
IE FC TP marine cable 2 x 2 (Type B)	6XV1840-4AH10
4-wire, shielded TP installation cable for connection to IE FC RJ45 outlet/IE FC RJ45 plug 180/90 with marine approval, sold by the meter; max. delivery unit 1 000 m, minimum order quantity 20 m	
IE FC stripping tool	6GK1901-1GA00
Preadjusted stripping tool for fast stripping of Industrial Ethernet FC cables	
Manuals for ET 200SP distributed I/O system	
ET 200SP library: ET 200SP Manual Collection, comprising system manual, product information, and device manuals	
Manuals can be downloaded from the Internet as PDF files:	
http://www.siemens.com/ simatic-docu	

	Article No.
SIMATIC Manual Collection	6ES7998-8XC01-8YE0
Electronic manuals on DVD, multi-language: LOGO!, SIMADYN, SIMATIC bus components, SIMATIC C7, SIMATIC Distributed I/O, SIMATIC HMI, SIMATIC sensors, SIMATIC NET, SIMATIC PC-based Automation, SIMATIC PCS 7, SIMATIC PG/PC, SIMATIC S7, SIMATIC Software, SIMATIC TDC	
SIMATIC Manual Collection update service for 1 year	6ES7998-8XC01-8YE2
Current "Manual Collection" DVD and the three subsequent updates	
STEP 7 Professional V15.1	
Target system: SIMATIC S7-1200, S7-1500, S7-300, S7-400, WinAC Requirement: Windows 7 Home Premium SP1 (64-bit) Windows 7 Professional SP1 (64-bit) Windows 7 Enterprise SP1 (64-bit) Windows 7 Ultimate SP1 (64-bit) Windows 10 Home Version 1709, 1803 Windows 10 Professional Version 1709, 1803 Windows 10 Enterprise Version 1709, 1803 Windows 10 Enterprise 2016 LTSB Windows 10 IoT Enterprise 2015 LTSB Windows 10 IoT Enterprise 2016 LTSB Windows Server 2012 R2 StdE (full installation) Windows Server 2016 Standard (full installation) Type of delivery: en, de, fr, it, es, zh	
STEP 7 Professional V15.1, floating license	6ES7822-1AA05-0YA5
STEP 7 Professional V15.1, floating license software download incl. license key [1]	6ES7822-1AE05-0YA5
Email address required for delivery	
Spare parts	
Power supply connector	6ES7193-4JB00-0AA0
Spare part; for connecting the 24 V DC supply voltage • With push-in terminals; 10 units	
Cover for bus adapter interface	6ES7591-3AA00-0AA0
5 units	
Server module	6ES7193-6PA00-0AA0

[1] For up-to-date information and download availability, see: http://www.siemens.com/tia-online-software-delivery

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Distributed Controllers
based on ET 200SP
Standard CPUs

CPU 1512SP-1 PN

■ Overview

- CPU 1512SP-1 PN for SIMATIC ET 200SP based on S7-1500 CPU 1513-1 PN

- For applications with medium requirements in terms of program scope and processing speed, for distributed configurations via PROFINET IO or PROFIBUS DP.

- Increase in availability of systems and machines

- PROFINET IO controller for up to 128 IO devices

- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device with a SIMATIC or non-Siemens PROFINET IO controller

- PROFINET shared I-Device for 4 controllers

- PROFINET IO IRT interface with integrated 3-port switch

- Isochronous mode on PROFINET

- With multiple communication options:
  PG/OP communication, PROFINET IO, open IE communication (TCP, ISO-on-TCP and UDP), web server and S7 communication (with loadable FBs)

- OPC UA server and client (data access) as runtime option for easy connection of the SIMATIC ET 200SP to third-party devices/systems

- Optional PROFIBUS DP master for 125 PROFIBUS DP slaves (with CM DP module 6ES7545-5DA00-0AB0)

- Optional PROFIBUS DP slave (with CM DP module 6ES7545-5DA00-0AB0)

- Configuration control (option handling)

- Integrated motion control functionalities for controlling speed-controlled and positioning axes, support for external encoders, output cams/cam tracks and probes

Note:

SIMATIC memory card required for operation of the CPU. BusAdapter is not included in scope of supply and is to be ordered separately.

■ Technical specifications

Article number	**6ES7512-1DK01-0AB0**
	CPU 1512SP-1 PN, 200KB Prog./1MB Data
General information	
Product type designation	CPU 1512SP-1 PN
Engineering with	
• STEP 7 TIA Portal configurable/ integrated as of version	V15.1 (FW V2.6)/V13 SP1 Update 4 (FW V1.8) or higher
Supply voltage	
Type of supply voltage	24 V DC
Memory	
Work memory	
• integrated (for program)	200 kbyte
• integrated (for data)	1 Mbyte
Load memory	
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte
CPU processing times	
for bit operations, typ.	48 ns
for word operations, typ.	58 ns
for fixed point arithmetic, typ.	77 ns
for floating point arithmetic, typ.	307 ns
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
IEC counter	
• Number	Any (only limited by the main memory)
S7 times	
• Number	2 048
IEC timer	
• Number	Any (only limited by the main memory)
Data areas and their retentivity	
Flag	
• Number, max.	16 kbyte
Address area	
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image
Address space per module	
• Address space per module, max.	288 byte; For input and output data respectively
Address space per station	
• Address space per station, max.	2 560 byte; for central inputs and outputs; depending on configuration; 2 048 bytes for ET 200SP modules + 512 bytes for ET 200AL modules
Time of day	
Clock	
• Type	Hardware clock

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■ **Technical specifications** (continued)

Article number	**6ES7512-1DK01-0AB0**
	CPU 1512SP-1 PN, 200KB Prog./1MB Data
1. Interface	
Interface types	
• Number of ports	3; 1. integr. + 2. via BusAdapter
• integrated switch	Yes
• RJ 45 (Ethernet)	Yes; X1 P3; opt. X1 P1 and X1 P2 via BusAdapter BA 2x RJ45
• BusAdapter (PROFINET)	Yes; Compatible BusAdapter: BA 2x RJ45, BA 2x FC, BA 2x SCRJ, BA SCRJ / RJ45, BA SCRJ / FC, BA 2x LC, BA LC / RJ45, BA LC / FC
Protocols	
• IP protocol	Yes; IPv4
• PROFINET IO controller	Yes
• PROFINET IO Device	Yes
• SIMATIC communication	Yes
• Open IE communication	Yes
• Web server	Yes
• Media redundancy	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0
PROFINET IO controller	
Services	
- PG/OP communication	Yes
- S7 routing	Yes
- Isochronous mode	Yes
- Open IE communication	Yes
- IRT	Yes
- MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
- MRPD	Yes; Requirement: IRT
- PROFIenergy	Yes
- Prioritized startup	Yes; Max. 32 PROFINET devices
- Number of connectable IO Devices, max.	128; In total, up to 512 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
- Of which IO devices with IRT, max.	64
- Number of connectable IO Devices for RT, max.	128
- of which in line, max.	128
- Number of IO Devices that can be simultaneously activated/ deactivated, max.	8; in total across all interfaces
- Number of IO Devices per tool, max.	8
- Updating times	The minimum value of the update time also depends on communi-cation share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data
Update time for IRT	
- for send cycle of 250 µs	250 µs to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 500 µs of the isochronous OB is decisive
- for send cycle of 500 µs	500 µs to 8 ms
- for send cycle of 1 ms	1 ms to 16 ms
- for send cycle of 2 ms	2 ms to 32 ms
- for send cycle of 4 ms	4 ms to 64 ms
- With IRT and parameterization of "odd" send cycles	Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)

Article number	**6ES7512-1DK01-0AB0**
	CPU 1512SP-1 PN, 200KB Prog./1MB Data
Update time for RT	
- for send cycle of 250 µs	250 µs to 128 ms
- for send cycle of 500 µs	500 µs to 256 ms
- for send cycle of 1 ms	1 ms to 512 ms
- for send cycle of 2 ms	2 ms to 512 ms
- for send cycle of 4 ms	4 ms to 512 ms
PROFINET IO Device	
Services	
- PG/OP communication	Yes
- S7 routing	Yes
- Isochronous mode	No
- Open IE communication	Yes
- IRT	Yes
- MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
- MRPD	Yes; Requirement: IRT
- PROFIenergy	Yes
- Shared device	Yes
- Number of IO Controllers with shared device, max.	4
- Asset management record	Yes; Per user program
2. Interface	
Interface types	
• Number of ports	1
• RS 485	Yes; Via CM DP module
Protocols	
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes
• SIMATIC communication	Yes
Protocols	
Number of connections	
• Number of connections, max.	128; via integrated interfaces of the CPU and connected CPs / CMs
PROFIBUS DP master	
Services	
- Number of DP slaves	125; In total, up to 512 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
OPC UA	
• OPC UA client	Yes
• OPC UA server	Yes; Data access (read, write, subscribe), method call, custom address space
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes; Only with PROFINET; with minimum OB 6x cycle of 625 µs

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Distributed Controllers
based on ET 200SP
Standard CPUs

CPU 1512SP-1 PN

Technical specifications (continued)

Article number	**6ES7512-1DK01-0AB0**
	CPU 1512SP-1 PN, 200KB Prog./1MB Data
Supported technology objects	
Motion Control	Yes; Note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool or SIZER
• Number of available Motion Control resources for technology objects (except cam disks)	800
• Required Motion Control resources	
- per speed-controlled axis	40
- per positioning axis	80
- per synchronous axis	160
- per external encoder	80
- per output cam	20
- per cam track	160
- per probe	40
Controller	
• PID_Compact	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves
• PID-Temp	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
• High-speed counter	Yes
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-25 °C; No condensation
• horizontal installation, max.	60 °C
• vertical installation, min.	-25 °C; No condensation
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Configuration	
Programming	
Programming language	
- LAD	Yes
- FBD	Yes
- STL	Yes
- SCL	Yes
- GRAPH	Yes
Know-how protection	
• User program protection/password protection	Yes
• Copy protection	Yes
• Block protection	Yes
Access protection	
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Complete protection	Yes
Dimensions	
Width	100 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	310 g

Ordering data

	Article No.
CPU 1512SP-1 PN	**6ES7512-1DK01-0AB0**
Work memory 200 KB for program, 1 MB for data, PROFINET IO IRT interface; SIMATIC memory card required	
Accessories	
CM DP for ET 200SP CPU	**6ES7545-5DA00-0AB0**
PROFIBUS DP master/slave with electrical interface for connecting the ET 200SP CPUs to PROFIBUS at up to 12 Mbps	
SIMATIC memory card	
4 MB	**6ES7954-8LC03-0AA0**
12 MB	**6ES7954-8LE03-0AA0**
24 MB	**6ES7954-8LF03-0AA0**
256 MB	**6ES7954-8LL03-0AA0**
2 GB	**6ES7954-8LP02-0AA0**
32 GB	**6ES7954-8LT03-0AA0**
DIN rail 35 mm	
• Length: 483 mm for 19" cabinets	**6ES5710-8MA11**
• Length: 530 mm for 600 mm cabinets	**6ES5710-8MA21**
• Length: 830 mm for 900 mm cabinets	**6ES5710-8MA31**
• Length: 2 m	**6ES5710-8MA41**
PE connection element for DIN rail 2 000 mm	**6ES7590-5AA00-0AA0**
BusAdapter BA 2xRJ45	**6ES7193-6AR00-0AA0**
BusAdapter BA 2xFC for increased vibration and EMC loads	**6ES7193-6AF00-0AA0**
BusAdapter BA 2xSCRJ	**6ES7193-6AP00-0AA0**
BusAdapter BA SCRJ/RJ45	**6ES7193-6AP20-0AA0**
BusAdapter BA SCRJ/FC	**6ES7193-6AP40-0AA0**
BusAdapter BA 2xLC	**6ES7193-6AG00-0AA0**
BusAdapter BA LC/RJ45	**6ES7193-6AG20-0AA0**
BusAdapter BA LC/FC	**6ES7193-6AG40-0AA0**
Equipment labeling plates	**6ES7193-6LF30-0AW0**
10 sheets of 16 plates	
Labeling strips	
500 labeling strips on roll, light gray, for inscription with thermal transfer roll printer	**6ES7193-6LR10-0AA0**
500 labeling strips on roll, yellow, for inscription with thermal transfer roll printer	**6ES7193-6LR10-0AG0**
1 000 labeling strips DIN A4, light gray, card, for inscription with laser printer	**6ES7193-6LA10-0AA0**
1 000 labeling strips DIN A4, yellow, card, for inscription with laser printer	**6ES7193-6LA10-0AG0**

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■ **Ordering data**

	Article No.		Article No.
IE FC RJ45 plugs		**SIMATIC Manual Collection**	6ES7998-8XC01-8YE0
RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables		Electronic manuals on DVD, multi-language: LOGO!, SIMADYN, SIMATIC bus components, SIMATIC C7, SIMATIC Distributed I/O, SIMATIC HMI, SIMATIC sensors, SIMATIC NET, SIMATIC PC-based Automation, SIMATIC PCS 7, SIMATIC PG/PC, SIMATIC S7, SIMATIC Software, SIMATIC TDC	
IE FC RJ45 plug 90			
90° cable outlet			
1 unit	6GK1901-1BB20-2AA0		
10 units	6GK1901-1BB20-2AB0	**SIMATIC Manual Collection update service for 1 year**	6ES7998-8XC01-8YE2
50 units	6GK1901-1BB20-2AE0	Current "Manual Collection" DVD and the three subsequent updates	
IE FC RJ45 plug 180		**STEP 7 Professional V15.1**	
180° cable outlet		Target system: SIMATIC S7-1200, S7-1500, S7-300, S7-400, WinAC	
1 unit	6GK1901-1BB10-2AA0	Requirement: Windows 7 Home Premium SP1 (64-bit)	
10 units	6GK1901-1BB10-2AB0	Windows 7 Professional SP1 (64-bit)	
50 units	6GK1901-1BB10-2AE0	Windows 7 Enterprise SP1 (64-bit) Windows 7 Ultimate SP1 (64-bit)	
IE FC TP standard cable GP 2x2	6XV1840-2AH10	Windows 10 Home Version 1709, 1803	
4-wire, shielded TP installation cable for connection to IE FC RJ45 outlet/ IE FC RJ45 plug; PROFINET-compatible; with UL approval; sold by the meter; max. delivery unit 1 000 m, minimum order quantity 20 m		Windows 10 Professional Version 1709, 1803 Windows 10 Enterprise Version 1709, 1803 Windows 10 Enterprise 2016 LTSB Windows 10 IoT Enterprise 2015 LTSB Windows 10 IoT Enterprise 2016 LTSB Windows Server 2012 R2 StdE (full installation) Windows Server 2016 Standard (full installation)	
IE FC TP trailing cable 2 x 2 (Type C)	6XV1840-3AH10	Type of delivery: en, de, fr, it, es, zh	
4-wire, shielded TP installation cable for connection to IE FC RJ45 outlet/ IE FC RJ45 plug 180/90 for use as trailing cable; PROFINET-compatible; with UL approval; sold by the meter; max. delivery unit 1 000 m, minimum order quantity 20 m		STEP 7 Professional V15.1, floating license	6ES7822-1AA05-0YA5
		STEP 7 Professional V15.1, floating license software download incl. license key [1]	6ES7822-1AE05-0YA5
IE FC TP marine cable 2 x 2 (Type B)	6XV1840-4AH10	Email address required for delivery	
4-wire, shielded TP installation cable for connection to IE FC RJ45 outlet/IE FC RJ45 plug 180/90 with marine approval, sold by the meter; max. delivery unit 1 000 m, minimum order quantity 20 m		**Spare parts**	
		Power supply connector	6ES7193-4JB00-0AA0
IE FC stripping tool	6GK1901-1GA00	Spare part; for connecting the 24 V DC supply voltage • With push-in terminals; 10 units	
Preadjusted stripping tool for fast stripping of Industrial Ethernet FC cables		**Cover for bus adapter interface**	6ES7591-3AA00-0AA0
Manuals for ET 200SP distributed I/O system		5 units	
ET 200SP library: ET 200SP Manual Collection, comprising system manual, product information, and device manuals		**Server module**	6ES7193-6PA00-0AA0
Manuals can be downloaded from the Internet as PDF files:			
http://www.siemens.com/ simatic-docu			

[1] For up-to-date information and download availability, see: http://www.siemens.com/tia-online-software-delivery

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Distributed Controllers
based on ET 200SP
SIPLUS standard CPUs

SIPLUS CPU 1510SP-1 PN

Overview

- SIPLUS CPU 1510SP-1 PN for SIPLUS ET 200SP based on SIPLUS-S7-1500 CPU 1511-1 PN
- For high-performance control solutions using ET 200SP
- Increase in availability of systems and machines
- PROFINET IO controller for up to 64 IO devices
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device with a SIMATIC or non-Siemens PROFINET IO controller
- PROFINET shared I-Device for 4 controllers
- PROFINET IO IRT interface with integrated 3-port switch
- Isochronous mode on PROFINET
- With multiple communication options: PG/OP communication, PROFINET IO, open IE communication (TCP, ISO-on-TCP and UDP), web server and S7 communication (with loadable FBs)
- Optional PROFIBUS DP master for 125 PROFIBUS DP slaves (with CM DP module 6ES7545-5DA00-0AB0)
- Optional PROFIBUS DP slave (with CM DP module 6ES7545-5DA00-0AB0)
- Configuration control (option handling)
- Integrated motion control functionalities for controlling speed-controlled and positioning axes, support for external encoders

Note:

SIMATIC memory card required for operation of the CPU. The bus adapter is not included in scope of supply and is to be ordered separately.

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme specific information was added.

Technical specifications

Article number	**6AG1510-1DJ01-2AB0**
Based on	**6ES7510-1DJ01-0AB0**
	SIPLUS ET 200SP CPU 1510SP-1 PN
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-40 °C; = Tmin (incl. condensation/frost)
• horizontal installation, max.	60 °C; = Tmax
• vertical installation, min.	-40 °C; = Tmin
• vertical installation, max.	50 °C; = Tmax
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	5 000 m
• Ambient air temperature-barometric pressure-altitude	Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m) // Tmin ... (Tmax - 10 K) at 795 hPa ... 658 hPa (+2 000 m ... +3 500 m) // Tmin ... (Tmax -20 K) at 658 hPa ... 540 hPa (+3 500 m ... +5 000 m)
Relative humidity	
• With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation / frost (no commissioning in bedewed state), horizontal installation
Resistance	
Coolants and lubricants	
- Resistant to commercially available coolants and lubricants	Yes; Incl. diesel and oil droplets in the air
Use in stationary industrial systems	
- to biologically active substances according to EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request
- to chemically active substances according to EN 60721-3-3	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
- to mechanically active substances according to EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!
Use on ships/at sea	
- to biologically active substances according to EN 60721-3-6	Yes; Class 6B2 mold and fungal spores (excluding fauna); Class 6B3 on request
- to chemically active substances according to EN 60721-3-6	Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
- to mechanically active substances according to EN 60721-3-6	Yes; Class 6S3 incl. sand, dust; *
Remark	
- Note regarding classification of environmental conditions acc. to EN 60721	* The supplied plug covers must remain in place over the unused interfaces during operation!
Conformal coating	
• Coatings for printed circuit board assemblies acc. to EN 61086	Yes; Class 2 for high availability
• Protection against fouling acc. to EN 60664-3	Yes; Type 1 protection
• Military testing according to MIL-I-46058C, Amendment 7	Yes; Discoloration of coating possible during service life
• Qualification and Performance of Electrical Insulating Compound for Printed Board Assemblies according to IPC-CC-830A	Yes; Conformal coating, Class A

■ **Ordering data**

SIPLUS CPU 1510SP-1 PN	Article No.
SIPLUS CPU 1510SP-1 PN (Extended temperature range and exposure to environmental substances) Work memory 100 KB for program, 750 KB for data, PROFINET IO IRT interface; SIMATIC memory card required	6AG1510-1DJ01-2AB0

Accessories	Article No.
BA 2xRJ45 BusAdapter (Extended temperature range and exposure to environmental substances)	6AG1193-6AR00-7AA0
BA 2xFC BusAdapter for increased vibration and EMC loads (Extended temperature range and exposure to environmental substances)	6AG1193-6AF00-7AA0
IE FC RJ45 plugs RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables	
IE FC RJ45 plug 180 (Extended temperature range and exposure to environmental substances) 180° cable outlet	
1 unit	6AG1901-1BB10-7AA0
Additional accessories	See SIMATIC ET 200SP CPU 1510SP-1 PN, page 7/4

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Distributed Controllers
based on ET 200SP
SIPLUS standard CPUs

SIPLUS CPU 1512SP-1 PN

■ Overview
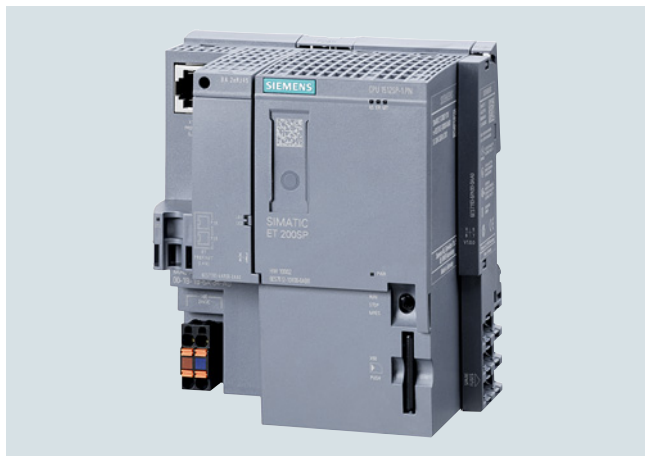
- SIPLUS CPU 1512SP-1 PN for SIPLUS ET 200SP based on SIPLUS S7-1500 CPU 1513-1 PN
- For applications with medium requirements regarding the program scope and processing speed, for distributed setup via PROFINET IO or PROFIBUS DP.
- Increase in availability of systems and machines
- PROFINET IO controller for up to 128 IO devices
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device with a SIMATIC or non-Siemens PROFINET IO controller
- PROFINET shared I-Device for 4 controllers
- PROFINET IO IRT interface with integrated 3-port switch
- Isochronous mode on PROFINET
- With multiple communication options: PG/OP communication, PROFINET IO, open IE communication (TCP, ISO-on-TCP and UDP), web server and S7 communication (with loadable FBs)
- Optional PROFIBUS DP master for 125 PROFIBUS DP slaves (with CM DP module 6ES7545-5DA00-0AB0)
- Optional PROFIBUS DP slave (with CM DP module 6ES7545-5DA00-0AB0)
- Configuration control (option handling)
- Integrated motion control functionalities for controlling speed-controlled and positioning axes, support for external encoders

Note:

SIMATIC memory card required for operation of the CPU. BusAdapter is not included in scope of supply and is to be ordered separately.

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme specific information was added.

■ Technical specifications

| Article number	6AG1512-1DK01-2AB0
Based on	6ES7512-1DK01-0AB0
	SIPLUS ET 200SP CPU 1512SP-1 PN
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-40 °C; = Tmin (incl. condensation/frost)
• horizontal installation, max.	60 °C; = Tmax
• vertical installation, min.	-40 °C; = Tmin
• vertical installation, max.	50 °C; = Tmax
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	5 000 m
• Ambient air temperature-barometric pressure-altitude	Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m) // Tmin ... (Tmax - 10 K) at 795 hPa ... 658 hPa (+2 000 m ... +3 500 m) // Tmin ... (Tmax -20 K) at 658 hPa ... 540 hPa (+3 500 m ... +5 000 m)
Relative humidity	
• With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation / frost (no commissioning in bedewed state), horizontal installation
Resistance	
Coolants and lubricants	
- Resistant to commercially available coolants and lubricants	Yes; Incl. diesel and oil droplets in the air
Use in stationary industrial systems	
- to biologically active substances according to EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request
- to chemically active substances according to EN 60721-3-3	Yes; Class 3C4 (RH < 75%) incl. salt spray according to EN 60068-2-52 (degree of severity 3). The supplied connector covers must remain on the unused interfaces during operation!
- to mechanically active substances according to EN 60721-3-3	Yes; Class 3S4 incl. sand, dust. The supplied connector covers must remain on the unused interfaces during operation!
Use on ships/at sea	
- to biologically active substances according to EN 60721-3-6	Yes; Class 6B2 mold and fungal spores (excluding fauna); Class 6B3 on request
- to chemically active substances according to EN 60721-3-6	Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
- to mechanically active substances according to EN 60721-3-6	Yes; Class 6S3 incl. sand, dust; *
Remark	
- Note regarding classification of environmental conditions acc. to EN 60721	* The supplied plug covers must remain in place over the unused interfaces during operation!
Conformal coating	
• Coatings for printed circuit board assemblies acc. to EN 61086	Yes; Class 2 for high availability
• Protection against fouling acc. to EN 60664-3	Yes; Type 1 protection
• Military testing according to MIL-I-46058C, Amendment 7	Yes; Discoloration of coating possible during service life
• Qualification and Performance of Electrical Insulating Compound for Printed Board Assemblies according to IPC-CC-830A	Yes; Conformal coating, Class A

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■ **Ordering data**

	Article No.		Article No.
SIPLUS CPU 1512SP-1 PN	**6AG1512-1DK01-2AB0**	**Accessories**	
(Extended temperature range and exposure to environmental substances)		**BusAdapter BA 2xRJ45**	**6AG1193-6AR00-7AA0**
Work memory 200 KB for program, 1 MB for data, PROFINET IO IRT interface; SIMATIC memory card required		(Extended temperature range and exposure to environmental substances)	
		BusAdapter BA 2xFC for increased vibration and EMC loads	**6AG1193-6AF00-7AA0**
		(Extended temperature range and exposure to environmental substances)	
		IE FC RJ45 plugs	
		RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables	
		IE FC RJ45 plug 180	
		180° cable outlet	
		1 unit	**6AG1901-1BB10-7AA0**
		Additional accessories	see SIMATIC ET 200SP, CPU 1512SP-1 PN, page 7/8

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Distributed Controllers

based on ET 200SP
Fail-safe CPUs

CPU 1510SP F-1 PN

Overview

- CPU 1510SP F-1 PN for SIMATIC ET 200SP based on S7-1500 CPU 1511F-1 PN
- For high-performance control solutions using ET 200SP
- Increase in availability of systems and machines
- Supports PROFIsafe in centralized and distributed configurations
- PROFINET IO controller for up to 64 IO devices
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device with a SIMATIC or non-Siemens PROFINET IO controller
- PROFINET shared I-Device for 4 controllers
- PROFINET IO IRT interface with integrated 3-port switch
- Isochronous mode on PROFINET
- With multiple communication options:
  PG/OP communication, PROFINET IO, open IE communication (TCP, ISO-on-TCP and UDP), web server and S7 communication (with loadable FBs)
- OPC UA server and client (data access) as runtime option for easy connection of the SIMATIC ET 200SP to third-party devices/systems
- Optional PROFIBUS master for 125 PROFIBUS DP slaves (with CM DP module 6ES7545-5DA00-0AB0)
- Configuration control (option handling)
- Integrated motion control functionalities for controlling speed-controlled and positioning axes, support for external encoders

Note:

SIMATIC memory card required for operation of the CPU.

The BusAdapter is not included in the scope of supply and must be ordered separately.

Technical specifications

Article number	6ES7510-1SJ01-0AB0
	CPU1510SP F-1 PN, 150KB Prog./750KB Data
General information	
Product type designation	CPU 1510SP F-1 PN
Engineering with	
• STEP 7 TIA Portal configurable/ integrated as of version	V15.1 (FW V2.6)/V13 SP1 Update 4 (FW V1.8) or higher
Supply voltage	
Type of supply voltage	24 V DC
Memory	
Work memory	
• integrated (for program)	150 kbyte
• integrated (for data)	750 kbyte
Load memory	
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte
CPU processing times	
for bit operations, typ.	72 ns
for word operations, typ.	86 ns
for fixed point arithmetic, typ.	115 ns
for floating point arithmetic, typ.	461 ns
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
IEC counter	
• Number	Any (only limited by the main memory)
S7 times	
• Number	2 048
IEC timer	
• Number	Any (only limited by the main memory)
Data areas and their retentivity	
Flag	
• Number, max.	16 kbyte
Address area	
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image
Address space per module	
• Address space per module, max.	288 byte; For input and output data respectively
Address space per station	
• Address space per station, max.	2 560 byte; for central inputs and outputs; depending on configuration; 2 048 bytes for ET 200SP modules + 512 bytes for ET 200AL modules
Time of day	
Clock	
• Type	Hardware clock

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■ Technical specifications (continued)

Article number	**6ES7510-1SJ01-0AB0**
	CPU1510SP F-1 PN, 150KB Prog./750KB Data
1. Interface	
Interface types	
• Number of ports	3; 1. integr. + 2. via BusAdapter
• integrated switch	Yes
• RJ 45 (Ethernet)	Yes; X1 P3; opt. X1 P1 and X1 P2 via BusAdapter BA 2x RJ45
• BusAdapter (PROFINET)	Yes; Applicable BusAdapter: BA 2x RJ45, BA 2x FC
Protocols	
• IP protocol	Yes; IPv4
• PROFINET IO controller	Yes
• PROFINET IO Device	Yes
• SIMATIC communication	Yes
• Open IE communication	Yes
• Web server	Yes
• Media redundancy	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0
PROFINET IO controller	
Services	
- PG/OP communication	Yes
- S7 routing	Yes
- Isochronous mode	Yes
- Open IE communication	Yes
- IRT	Yes
- MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
- MRPD	Yes; Requirement: IRT
- PROFIenergy	Yes
- Prioritized startup	Yes; Max. 32 PROFINET devices
- Number of connectable IO Devices, max.	64; In total, up to 256 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
- Of which IO devices with IRT, max.	64
- Number of connectable IO Devices for RT, max.	64
- of which in line, max.	64
- Number of IO Devices that can be simultaneously activated/deactivated, max.	8; in total across all interfaces
- Number of IO Devices per tool, max.	8
- Updating times	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data
Update time for IRT	
- for send cycle of 250 µs	250 µs to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 625 µs of the isochronous OB is decisive
- for send cycle of 500 µs	500 µs to 8 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 625 µs of the isochronous OB is decisive
- for send cycle of 1 ms	1 ms to 16 ms
- for send cycle of 2 ms	2 ms to 32 ms
- for send cycle of 4 ms	4 ms to 64 ms
- With IRT and parameterization of "odd" send cycles	Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)

Article number	**6ES7510-1SJ01-0AB0**
	CPU1510SP F-1 PN, 150KB Prog./750KB Data
Update time for RT	
- for send cycle of 250 µs	250 µs to 128 ms
- for send cycle of 500 µs	500 µs to 256 ms
- for send cycle of 1 ms	1 ms to 512 ms
- for send cycle of 2 ms	2 ms to 512 ms
- for send cycle of 4 ms	4 ms to 512 ms
PROFINET IO Device	
Services	
- PG/OP communication	Yes
- S7 routing	Yes
- Isochronous mode	No
- Open IE communication	Yes
- IRT	Yes
- MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
- MRPD	Yes; Requirement: IRT
- PROFIenergy	Yes
- Shared device	Yes
- Number of IO Controllers with shared device, max.	4
- Asset management record	Yes; Per user program
2. Interface	
Interface types	
• Number of ports	1
• RS 485	Yes; Via CM DP module
Protocols	
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes
• SIMATIC communication	Yes
Protocols	
Number of connections	
• Number of connections, max.	96; via integrated interfaces of the CPU and connected CPs / CMs
PROFIBUS DP master	
Services	
- Number of DP slaves	125; In total, up to 256 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
OPC UA	
• OPC UA client	Yes
• OPC UA server	Yes; Data access (read, write, subscribe), method call, custom address space
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes; Only with PROFINET; with minimum OB 6x cycle of 625 µs

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Distributed Controllers

based on ET 200SP
Fail-safe CPUs

CPU 1510SP F-1 PN

Technical specifications (continued)

Article number	6ES7510-1SJ01-0AB0
	CPU1510SP F-1 PN, 150KB Prog./750KB Data
Supported technology objects	
Motion Control	Yes; Note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool or SIZER
• Number of available Motion Control resources for technology objects (except cam disks)	800
• Required Motion Control resources	
- per speed-controlled axis	40
- per positioning axis	80
- per synchronous axis	160
- per external encoder	80
- per output cam	20
- per cam track	160
- per probe	40
Controller	
• PID_Compact	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves
• PID-Temp	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
• High-speed counter	Yes
Standards, approvals, certificates	
Highest safety class achievable in safety mode	
Probability of failure (for service life of 20 years and repair time of 10047,131 mmhours)	
- Low demand mode: PFDavg in accordance with SIL3	< 2.00E-05
- High demand/continuous mode: PFH in accordance with SIL3	< 1.00E-09

Article number	6ES7510-1SJ01-0AB0
	CPU1510SP F-1 PN, 150KB Prog./750KB Data
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-25 °C; No condensation
• horizontal installation, max.	60 °C
• vertical installation, min.	-25 °C; No condensation
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Configuration	
Programming	
Programming language	
- LAD	Yes; incl. failsafe
- FBD	Yes; incl. failsafe
- STL	Yes
- SCL	Yes
- GRAPH	Yes
Know-how protection	
• User program protection/password protection	Yes
• Copy protection	Yes
• Block protection	Yes
Access protection	
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Complete protection	Yes
Dimensions	
Width	100 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	310 g

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■ **Ordering data**

	Article No.		Article No.
CPU 1510SP F-1 PN	6ES7510-1SJ01-0AB0	**IE FC RJ45 plugs**	
Work memory 150 KB for program, 750 KB for data, PROFINET IO IRT interface; SIMATIC memory card required		RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables	
Accessories		**IE FC RJ45 plug 90**	
CM DP for ET 200SP CPU	6ES7545-5DA00-0AB0	90° cable outlet	
PROFIBUS DP master/slave with electrical interface for connecting the ET 200SP CPUs to PROFIBUS at up to 12 Mbps		1 unit	6GK1901-1BB20-2AA0
		10 units	6GK1901-1BB20-2AB0
		50 units	6GK1901-1BB20-2AE0
SIMATIC memory card		**IE FC RJ45 plug 180**	
4 MB	6ES7954-8LC03-0AA0	180° cable outlet	
12 MB	6ES7954-8LE03-0AA0		
24 MB	6ES7954-8LF03-0AA0	1 unit	6GK1901-1BB10-2AA0
256 MB	6ES7954-8LL03-0AA0	10 units	6GK1901-1BB10-2AB0
2 GB	6ES7954-8LP02-0AA0	50 units	6GK1901-1BB10-2AE0
32 GB	6ES7954-8LT03-0AA0	**IE FC TP standard cable GP 2x2**	6XV1840-2AH10
DIN rail 35 mm		4-wire, shielded TP installation cable for connection to IE FC RJ45 outlet/ IE FC RJ45 plug; PROFINET-compatible; with UL approval; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m	
• Length: 483 mm for 19" cabinets	6ES5710-8MA11		
• Length: 530 mm for 600 mm cabinets	6ES5710-8MA21		
• Length: 830 mm for 900 mm cabinets	6ES5710-8MA31		
• Length: 2 m	6ES5710-8MA41	**IE FC TP trailing cable 2 x 2 (Type C)**	6XV1840-3AH10
PE connection element for DIN rail 2 000 mm	6ES7590-5AA00-0AA0	4-wire, shielded TP installation cable for connection to IE FC RJ45 outlet/ IE FC RJ45 plug 180/90 for use as trailing cable; PROFINET-compatible; with UL approval; sold by the meter; max. delivery unit 1 000 m, minimum order quantity 20 m	
BusAdapter BA 2xRJ45	6ES7193-6AR00-0AA0		
BusAdapter BA 2xFC for increased vibration and EMC loads	6ES7193-6AF00-0AA0		
BusAdapter BA 2xSCRJ	6ES7193-6AP00-0AA0		
BusAdapter BA SCRJ/RJ45	6ES7193-6AP20-0AA0		
BusAdapter BA SCRJ/FC	6ES7193-6AP40-0AA0	**IE FC TP marine cable 2 x 2 (Type B)**	6XV1840-4AH10
Equipment labeling plates	6ES7193-6LF30-0AW0	4-wire, shielded TP installation cable for connection to IE FC RJ45 outlet/IE FC RJ45 plug 180/90 with marine approval, sold by the meter; max. delivery unit 1 000 m, minimum order quantity 20 m	
10 sheets of 16 plates			
Labeling strips			
500 labeling strips on roll, light gray, for inscription with thermal transfer roll printer	6ES7193-6LR10-0AA0		
500 labeling strips on roll, yellow, for inscription with thermal transfer roll printer	6ES7193-6LR10-0AG0	**IE FC stripping tool**	6GK1901-1GA00
1 000 labeling strips DIN A4, light gray, card, for inscription with laser printer	6ES7193-6LA10-0AA0	Preadjusted stripping tool for fast stripping of Industrial Ethernet FC cables	
1000 labeling strips DIN A4, yellow, card, for inscription with laser printer	6ES7193-6LA10-0AG0		

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Distributed Controllers
based on ET 200SP
Fail-safe CPUs

CPU 1510SP F-1 PN

Ordering data	Article No.
Manuals for ET 200SP distributed I/O system	
ET 200SP library: ET 200SP Manual Collection, comprising system manual, product information, and device manuals	
Manuals can be downloaded from the Internet as PDF files: http://www.siemens.com/simatic-docu	
SIMATIC Manual Collection	**6ES7998-8XC01-8YE0**
Electronic manuals on DVD, multi-language: LOGO!, SIMADYN, SIMATIC bus components, SIMATIC C7, SIMATIC Distributed I/O, SIMATIC HMI, SIMATIC sensors, SIMATIC NET, SIMATIC PC-based Automation, SIMATIC PCS 7, SIMATIC PG/PC, SIMATIC S7, SIMATIC Software, SIMATIC TDC	
SIMATIC Manual Collection update service for 1 year	**6ES7998-8XC01-8YE2**
Current "Manual Collection" DVD and the three subsequent updates	
STEP 7 Professional V15.1	
Target system: SIMATIC S7-1200, S7-1500, S7-300, S7-400, WinAC	
Requirement: Windows 7 Home Premium SP1 (64-bit), Windows 7 Professional SP1 (64-bit), Windows 7 Enterprise SP1 (64-bit), Windows 7 Ultimate SP1 (64-bit), Windows 10 Home Version 1709, 1803, Windows 10 Professional Version 1709, 1803, Windows 10 Enterprise Version 1709, 1803, Windows 10 Enterprise 2016 LTSB, Windows 10 IoT Enterprise 2015 LTSB, Windows 10 IoT Enterprise 2016 LTSB, Windows Server 2012 R2 StdE (full installation), Windows Server 2016 Standard (full installation)	
Type of delivery: en, de, fr, it, es, zh	
STEP 7 Professional V15.1, floating license	**6ES7822-1AA05-0YA5**
STEP 7 Professional V15.1, floating license software download incl. license key [1]	**6ES7822-1AE05-0YA5**
Email address required for delivery	

Ordering data	Article No.
STEP 7 Safety Advanced V15.1	
Task: Engineering tool for configuring and programming fail-safe user programs for SIMATIC S7-1200 FC, S7-1500F, S7-1500F Software Controller, S7-300F, S7-400F, WinAC RTX F, ET 200SP F Controller and the fail-safe ET 200SP, ET 200MP, ET 200S, ET 200M, ET 200iSP, ET 200pro and ET 200eco I/O	
Requirement: STEP 7 Professional V15.1	
Floating license for 1 user, software and documentation on DVD, license key on USB flash drive	**6ES7833-1FA15-0YA5**
Floating license for 1 user, software, documentation and license key for download[2]; email address required for delivery	**6ES7833-1FA15-0YH5**
Spare parts	
Power supply connector	**6ES7193-4JB00-0AA0**
Spare part; for connecting the 24 V DC supply voltage • With push-in terminals; 10 units	
Cover for bus adapter interface	**6ES7591-3AA00-0AA0**
5 units	
Server module	**6ES7193-6PA00-0AA0**

[1] For up-to-date information and download availability, see: http://www.siemens.com/tia-online-software-delivery

Overview

- CPU 1512SP F-1 PN for SIMATIC ET 200SP based on S7-1500 CPU 1513F-1 PN

- For applications with medium requirements in terms of program scope and processing speed, for distributed configurations via PROFINET IO or PROFIBUS DP.

- Increase in availability of systems and machines

- Supports PROFIsafe in centralized and distributed configurations

- PROFINET IO controller for up to 128 IO devices

- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device with a SIMATIC or non-Siemens PROFINET IO controller

- PROFINET shared I-Device for 4 controllers

- PROFINET IO IRT interface with integrated 3-port switch

- Isochronous mode on PROFINET

- With multiple communication options: PG/OP communication, PROFINET IO, open IE communication (TCP, ISO-on-TCP and UDP), web server and S7 communication (with loadable FBs)

- OPC UA server and client (data access) as runtime option for easy connection of the SIMATIC ET 200SP to third-party devices/systems

- Optional PROFIBUS master for 125 PROFIBUS DP slaves (with CM DP module 6ES7545-5DA00-0AB0)

- Configuration control (option handling)

- Integrated motion control functionalities for controlling speed-controlled and positioning axes, support for external encoders

Note:

SIMATIC memory card required for operation of the CPU.

The BusAdapter is not included in the scope of supply and must be ordered separately.

Technical specifications

Article number	**6ES7512-1SK01-0AB0**
	CPU 1512SP F-1 PN, 300KB Prog./1MB Data
General information	
Product type designation	CPU 1512SP F-1 PN
Engineering with	
• STEP 7 TIA Portal configurable/ integrated as of version	V15.1 (FW V2.6)/V13 SP1 Update 4 (FW V1.8) or higher
Supply voltage	
Type of supply voltage	24 V DC
Memory	
Work memory	
• integrated (for program)	300 kbyte
• integrated (for data)	1 Mbyte
Load memory	
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte
CPU processing times	
for bit operations, typ.	48 ns
for word operations, typ.	58 ns
for fixed point arithmetic, typ.	77 ns
for floating point arithmetic, typ.	307 ns
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
IEC counter	
• Number	Any (only limited by the main memory)
S7 times	
• Number	2 048
IEC timer	
• Number	Any (only limited by the main memory)
Data areas and their retentivity	
Flag	
• Number, max.	16 kbyte
Address area	
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image
Address space per module	
• Address space per module, max.	288 byte; For input and output data respectively
Address space per station	
• Address space per station, max.	2 560 byte; for central inputs and outputs; depending on configuration; 2 048 bytes for ET 200SP modules + 512 bytes for ET 200AL modules
Time of day	
Clock	
• Type	Hardware clock

Distributed Controllers
based on ET 200SP
Fail-safe CPUs

CPU 1512SP F-1 PN

■ **Technical specifications** (continued)

Article number	**6ES7512-1SK01-0AB0**
	CPU 1512SP F-1 PN, 300KB Prog./1MB Data
1. Interface	
Interface types	
• Number of ports	3; 1. integr. + 2. via BusAdapter
• integrated switch	Yes
• RJ 45 (Ethernet)	Yes; X1 P3; opt. X1 P1 and X1 P2 via BusAdapter BA 2x RJ45
• BusAdapter (PROFINET)	Yes; Compatible BusAdapter: BA 2x RJ45, BA 2x FC, BA 2x SCRJ, BA SCRJ / RJ45, BA SCRJ / FC, BA 2x LC, BA LC / RJ45, BA LC / FC
Protocols	
• IP protocol	Yes; IPv4
• PROFINET IO controller	Yes
• PROFINET IO Device	Yes
• SIMATIC communication	Yes
• Open IE communication	Yes
• Web server	Yes
• Media redundancy	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0
PROFINET IO controller	
Services	
- PG/OP communication	Yes
- S7 routing	Yes
- Isochronous mode	Yes
- Open IE communication	Yes
- IRT	Yes
- MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
- MRPD	Yes; Requirement: IRT
- PROFIenergy	Yes
- Prioritized startup	Yes; Max. 32 PROFINET devices
- Number of connectable IO Devices, max.	128; In total, up to 512 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
- Of which IO devices with IRT, max.	64
- Number of connectable IO Devices for RT, max.	128
- of which in line, max.	128
- Number of IO Devices that can be simultaneously activated/ deactivated, max.	8; in total across all interfaces
- Number of IO Devices per tool, max.	8
- Updating times	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data
Update time for IRT	
- for send cycle of 250 µs	250 µs to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 500 µs of the isochronous OB is decisive
- for send cycle of 500 µs	500 µs to 8 ms
- for send cycle of 1 ms	1 ms to 16 ms
- for send cycle of 2 ms	2 ms to 32 ms
- for send cycle of 4 ms	4 ms to 64 ms
- With IRT and parameterization of "odd" send cycles	Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)

Article number	**6ES7512-1SK01-0AB0**
	CPU 1512SP F-1 PN, 300KB Prog./1MB Data
Update time for RT	
- for send cycle of 250 µs	250 µs to 128 ms
- for send cycle of 500 µs	500 µs to 256 ms
- for send cycle of 1 ms	1 ms to 512 ms
- for send cycle of 2 ms	2 ms to 512 ms
- for send cycle of 4 ms	4 ms to 512 ms
PROFINET IO Device	
Services	
- PG/OP communication	Yes
- S7 routing	Yes
- Isochronous mode	No
- Open IE communication	Yes
- IRT	Yes
- MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
- MRPD	Yes; Requirement: IRT
- PROFIenergy	Yes
- Shared device	Yes
- Number of IO Controllers with shared device, max.	4
- Asset management record	Yes; Per user program
2. Interface	
Interface types	
• Number of ports	1
• RS 485	Yes; Via CM DP module
Protocols	
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes
• SIMATIC communication	Yes
Protocols	
Number of connections	
• Number of connections, max.	128; via integrated interfaces of the CPU and connected CPs / CMs
PROFIBUS DP master	
Services	
- Number of DP slaves	125; In total, up to 512 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
OPC UA	
• OPC UA client	Yes
• OPC UA server	Yes; Data access (read, write, subscribe), method call, custom address space
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes; Only with PROFINET; with minimum OB 6x cycle of 625 µs

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■ **Technical specifications** (continued)

Article number	**6ES7512-1SK01-0AB0**
	CPU 1512SP F-1 PN, 300KB Prog./1MB Data
Supported technology objects	
Motion Control	Yes; Note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool or SIZER
• Number of available Motion Control resources for technology objects (except cam disks)	800
• Required Motion Control resources	
- per speed-controlled axis	40
- per positioning axis	80
- per synchronous axis	160
- per external encoder	80
- per output cam	20
- per cam track	160
- per probe	40
Controller	
• PID_Compact	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves
• PID-Temp	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
• High-speed counter	Yes
Standards, approvals, certificates	
Highest safety class achievable in safety mode	
Probability of failure (for service life of 20 years and repair time of 100 hours)	
- Low demand mode: PFDavg in accordance with SIL3	< 2.00E-05
- High demand/continuous mode: PFH in accordance with SIL3	< 1.00E-09

Article number	**6ES7512-1SK01-0AB0**
	CPU 1512SP F-1 PN, 300KB Prog./1MB Data
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-25 °C; No condensation
• horizontal installation, max.	60 °C
• vertical installation, min.	-25 °C; No condensation
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Configuration	
Programming	
Programming language	
- LAD	Yes; incl. failsafe
- FBD	Yes; incl. failsafe
- STL	Yes
- SCL	Yes
- GRAPH	Yes
Know-how protection	
• User program protection/password protection	Yes
• Copy protection	Yes
• Block protection	Yes
Access protection	
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Complete protection	Yes
Dimensions	
Width	100 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	310 g

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Distributed Controllers
based on ET 200SP
Fail-safe CPUs

CPU 1512SP F-1 PN

Ordering data	Article No.		Article No.
CPU 1512SP F-1 PN	6ES7512-1SK01-0AB0	**IE FC RJ45 plugs**	
Work memory 300 KB for program, 1 MB for data, PROFINET IO IRT interface, SIMATIC memory card required		RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables	
Accessories		**IE FC RJ45 plug 90**	
CM DP for ET 200SP CPU	6ES7545-5DA00-0AB0	90° cable outlet	
PROFIBUS DP master/slave with electrical interface for connecting the ET 200SP CPUs to PROFIBUS at up to 12 Mbps		1 unit	6GK1901-1BB20-2AA0
		10 units	6GK1901-1BB20-2AB0
SIMATIC memory card		50 units	6GK1901-1BB20-2AE0
4 MB	6ES7954-8LC03-0AA0	**IE FC RJ45 plug 180**	
12 MB	6ES7954-8LE03-0AA0	180° cable outlet	
24 MB	6ES7954-8LF03-0AA0	1 unit	6GK1901-1BB10-2AA0
256 MB	6ES7954-8LL03-0AA0	10 units	6GK1901-1BB10-2AB0
2 GB	6ES7954-8LP02-0AA0	50 units	6GK1901-1BB10-2AE0
32 GB	6ES7954-8LT03-0AA0	**IE FC TP standard cable GP 2x2**	6XV1840-2AH10
DIN rail 35 mm • Length: 483 mm for 19" cabinets • Length: 530 mm for 600 mm cabinets • Length: 830 mm for 900 mm cabinets • Length: 2 m	6ES5710-8MA11 6ES5710-8MA21 6ES5710-8MA31 6ES5710-8MA41	4-wire, shielded TP installation cable for connection to IE FC RJ45 outlet/ IE FC RJ45 plug; PROFINET-compatible; with UL approval; sold by the meter; max. delivery unit 1000 m, minimum order quantity 20 m	
PE connection element for DIN rail 2 000 mm	6ES7590-5AA00-0AA0	**IE FC TP trailing cable 2 x 2 (Type C)**	6XV1840-3AH10
BusAdapter BA 2xRJ45	6ES7193-6AR00-0AA0	4-wire, shielded TP installation cable for connection to IE FC RJ45 outlet/ IE FC RJ45 plug 180/90 for use as trailing cable; PROFINET-compatible; with UL approval; sold by the meter; max. delivery unit 1 000 m, minimum order quantity 20 m	
BusAdapter BA 2xFC for increased vibration and EMC loads	6ES7193-6AF00-0AA0		
BusAdapter BA 2xSCRJ	6ES7193-6AP00-0AA0		
BusAdapter BA SCRJ/RJ45	6ES7193-6AP20-0AA0		
BusAdapter BA SCRJ/FC	6ES7193-6AP40-0AA0		
Equipment labeling plates	6ES7193-6LF30-0AW0	**IE FC TP marine cable 2 x 2 (Type B)**	6XV1840-4AH10
10 sheets of 16 plates		4-wire, shielded TP installation cable for connection to IE FC RJ45 outlet/IE FC RJ45 plug 180/90 with marine approval, sold by the meter; max. delivery unit 1 000 m, minimum order quantity 20 m	
Labeling strips			
500 labeling strips on roll, light gray, for inscription with thermal transfer roll printer	6ES7193-6LR10-0AA0		
500 labeling strips on roll, yellow, for inscription with thermal transfer roll printer	6ES7193-6LR10-0AG0	**IE FC stripping tool**	6GK1901-1GA00
1 000 labeling strips DIN A4, light gray, card, for inscription with laser printer	6ES7193-6LA10-0AA0	Preadjusted stripping tool for fast stripping of Industrial Ethernet FC cables	
1000 labeling strips DIN A4, yellow, card, for inscription with laser printer	6ES7193-6LA10-0AG0		

■ Ordering data

	Article No.
Manuals for ET 200SP distributed I/O system	
ET 200SP library: ET 200SP Manual Collection, comprising system manual, product information, and device manuals	
Manuals can be downloaded from the Internet as PDF files: http://www.siemens.com/simatic-docu	
SIMATIC Manual Collection	6ES7998-8XC01-8YE0
Electronic manuals on DVD, multi-language: LOGO!, SIMADYN, SIMATIC bus components, SIMATIC C7, SIMATIC Distributed I/O, SIMATIC HMI, SIMATIC sensors, SIMATIC NET, SIMATIC PC-based Automation, SIMATIC PCS 7, SIMATIC PG/PC, SIMATIC S7, SIMATIC Software, SIMATIC TDC	
SIMATIC Manual Collection update service for 1 year	6ES7998-8XC01-8YE2
Current "Manual Collection" DVD and the three subsequent updates	
STEP 7 Professional V15.1	
Target system: SIMATIC S7-1200, S7-1500, S7-300, S7-400, WinAC	
Requirement: Windows 7 Home Premium SP1 (64-bit) Windows 7 Professional SP1 (64-bit) Windows 7 Enterprise SP1 (64-bit) Windows 7 Ultimate SP1 (64-bit) Windows 10 Home Version 1709, 1803 Windows 10 Professional Version 1709, 1803 Windows 10 Enterprise Version 1709, 1803 Windows 10 Enterprise 2016 LTSB Windows 10 IoT Enterprise 2015 LTSB Windows 10 IoT Enterprise 2016 LTSB Windows Server 2012 R2 StdE (full installation) Windows Server 2016 Standard (full installation)	
Type of delivery: en, de, fr, it, es, zh	
STEP 7 Professional V15.1, floating license	6ES7822-1AA05-0YA5
STEP 7 Professional V15.1, floating license software download incl. license key [1]	6ES7822-1AE05-0YA5
Email address required for delivery	

	Article No.
STEP 7 Safety Advanced V15.1	
Task: Engineering tool for configuring and programming fail-safe user programs for SIMATIC S7-1200 FC, S7-1500F, S7-1500F Software Controller, S7-300F, S7-400F, WinAC RTX F, ET 200SP F Controller and the fail-safe ET 200SP, ET 200MP, ET 200S, ET 200M, ET 200iSP, ET 200pro and ET 200eco I/O	
Requirement: STEP 7 Professional V15.1	
Floating license for 1 user, software and documentation on DVD, license key on USB flash drive	6ES7833-1FA15-0YA5
Floating license for 1 user, software, documentation and license key for download [1]; email address required for delivery	6ES7833-1FA15-0YH5
Spare parts	
Power supply connector	6ES7193-4JB00-0AA0
Spare part; for connecting the 24 V DC supply voltage • With push-in terminals; 10 units	
Cover for bus adapter interface	6ES7591-3AA00-0AA0
5 units	
Server module	6ES7193-6PA00-0AA0

[1] For up-to-date information and download availability, see: http://www.siemens.com/tia-online-software-delivery

Distributed Controllers
based on ET 200SP
SIPLUS fail-safe CPUs

SIPLUS CPU 1510SP F-1 PN

Overview

- SIPLUS CPU 1510SP F-1 PN for SIPLUS ET 200SP based on S7-1500 CPU 1511F-1 PN
- For high-performance control solutions using ET 200SP
- Increase in availability of systems and machines
- Supports PROFIsafe in centralized and distributed configurations
- PROFINET IO controller for up to 64 IO devices
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device with a SIMATIC or non-Siemens PROFINET IO controller
- PROFINET shared I-Device for 4 controllers
- PROFINET IO IRT interface with integrated 3-port switch
- Isochronous mode on PROFINET
- With multiple communication options:
  PG/OP communication, PROFINET IO, open IE communication (TCP, ISO-on-TCP and UDP), web server and S7 communication (with loadable FBs)
- Optional PROFIBUS master for 125 PROFIBUS DP slaves (with CM DP module 6ES7545-5DA00-0AB0)
- Configuration control (option handling)
- Integrated motion control functionalities for controlling speed-controlled and positioning axes, support for external encoders

Note:

SIMATIC memory card required for operation of the CPU.

The bus adapter is not included in the scope of supply and must be ordered separately.

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the corresponding standard products. SIPLUS extreme specific information was added.

Technical specifications

Article number	**6AG1510-1SJ01-2AB0**
Based on	**6ES7510-1SJ01-0AB0**
	SIPLUS ET 200SP CPU 1510SP F-1PN
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-25 °C; = Tmin
• horizontal installation, max.	60 °C; = Tmax
• vertical installation, min.	-25 °C; = Tmin
• vertical installation, max.	50 °C; = Tmax
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	2 000 m
• Ambient air temperature-barometric pressure-altitude	Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m)
Relative humidity	
• With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation / frost (no commissioning in bedewed state), horizontal installation
Resistance	
Coolants and lubricants	
- Resistant to commercially available coolants and lubricants	Yes; Incl. diesel and oil droplets in the air
Use in stationary industrial systems	
- to biologically active substances according to EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request
- to chemically active substances according to EN 60721-3-3	Yes; Class 3C4 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
- to mechanically active substances according to EN 60721-3-3	Yes; Class 3S4 incl. sand, dust, *
Use on ships/at sea	
- to biologically active substances according to EN 60721-3-6	Yes; Class 6B2 mold and fungal spores (excluding fauna); Class 6B3 on request
- to chemically active substances according to EN 60721-3-6	Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
- to mechanically active substances according to EN 60721-3-6	Yes; Class 6S3 incl. sand, dust; *
Remark	
- Note regarding classification of environmental conditions acc. to EN 60721	* The supplied plug covers must remain in place over the unused interfaces during operation!
Conformal coating	
• Coatings for printed circuit board assemblies acc. to EN 61086	Yes; Class 2 for high availability
• Military testing according to MIL-I-46058C, Amendment 7	Yes; Discoloration of coating possible during service life
• Qualification and Performance of Electrical Insulating Compound for Printed Board Assemblies according to IPC-CC-830A	Yes; Conformal coating, Class A

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Distributed Controllers
based on ET 200SP
SIPLUS fail-safe CPUs

SIPLUS CPU 1510SP F-1 PN

Ordering data

	Article No.		Article No.
SIPLUS CPU 1510SP F-1 PN	6AG1510-1SJ01-2AB0	**Accessories**	
(Extended temperature range and exposure to environmental substances)		**SIPLUS BusAdapter BA 2xRJ45**	6AG1193-6AR00-7AA0
		IE FC RJ45 plugs	
Work memory 150 KB for program, 750 KB for data, PROFINET IO IRT interface; SIMATIC memory card required		RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables	
		IE FC RJ45 plug 180	
		(Extended temperature range and exposure to environmental substances)	
		180° cable outlet	
		1 unit	6AG1901-1BB10-7AA0
		Other accessories	See SIMATIC ET 200SP, CPU 1510 F-1 PN, page 7/17

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Distributed Controllers
based on ET 200SP
SIPLUS fail-safe CPUs

SIPLUS CPU 1512SP F-1 PN

■ Overview

- SIPLUS CPU 1512SP F-1 PN for SIPLUS ET 200SP based on S7-1500 CPU 1513F-1 PN
- For applications with medium requirements in terms of program scope and processing speed, for distributed configurations via PROFINET IO or PROFIBUS DP.
- Increase in availability of systems and machines
- Supports PROFIsafe in centralized and distributed configurations
- PROFINET IO controller for up to 128 IO devices
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device with a SIMATIC or non-Siemens PROFINET IO controller
- PROFINET shared I-Device for 4 controllers
- PROFINET IO IRT interface with integrated 3-port switch
- Isochronous mode on PROFINET
- With multiple communication options:
  PG/OP communication, PROFINET IO, open IE communication (TCP, ISO-on-TCP and UDP), web server and S7 communication (with loadable FBs)
- Optional PROFIBUS master for 125 PROFIBUS DP slaves (with CM DP module 6ES7545-5DA00-0AB0)
- Configuration control (option handling)
- Integrated motion control functionalities for controlling speed-controlled and positioning axes, support for external encoders

Note:

SIMATIC memory card required for operation of the CPU.

The bus adapter is not included in the scope of supply and must be ordered separately.

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the corresponding standard products. SIPLUS extreme specific information was added.

■ Technical specifications

Article number	**6AG1512-1SK01-2AB0**
Based on	**6ES7512-1SK01-0AB0**
	SIPLUS ET 200SP CPU 1512SP F-1PN
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-25 °C; = Tmin
• horizontal installation, max.	60 °C; = Tmax
• vertical installation, min.	-25 °C; = Tmin
• vertical installation, max.	50 °C; = Tmax
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	2 000 m
• Ambient air temperature-barometric pressure-altitude	Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m)
Relative humidity	
• With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation / frost (no commissioning in bedewed state), horizontal installation
Resistance	
Coolants and lubricants	
- Resistant to commercially available coolants and lubricants	Yes; Incl. diesel and oil droplets in the air
Use in stationary industrial systems	
- to biologically active substances according to EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request
- to chemically active substances according to EN 60721-3-3	Yes; Class 3C4 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
- to mechanically active substances according to EN 60721-3-3	Yes; Class 3S4 incl. sand, dust, *
Use on ships/at sea	
- to biologically active substances according to EN 60721-3-6	Yes; Class 6B2 mold and fungal spores (excluding fauna); Class 6B3 on request
- to chemically active substances according to EN 60721-3-6	Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
- to mechanically active substances according to EN 60721-3-6	Yes; Class 6S3 incl. sand, dust; *
Remark	
- Note regarding classification of environmental conditions acc. to EN 60721	* The supplied plug covers must remain in place over the unused interfaces during operation!
Conformal coating	
• Coatings for printed circuit board assemblies acc. to EN 61086	Yes; Class 2 for high availability
• Military testing according to MIL-I-46058C, Amendment 7	Yes; Discoloration of coating possible during service life
• Qualification and Performance of Electrical Insulating Compound for Printed Board Assemblies according to IPC-CC-830A	Yes; Conformal coating, Class A

Distributed Controllers
based on ET 200SP
SIPLUS fail-safe CPUs

SIPLUS CPU 1512SP F-1 PN

Ordering data

	Article No.			Article No.
SIPLUS CPU 1512SP F-1 PN	6AG1512-1SK01-2AB0		**Accessories**	
(Extended temperature range and exposure to environmental substances)			**SIPLUS BusAdapter BA 2xRJ45**	6AG1193-6AR00-7AA0
			IE FC RJ45 plugs	
Work memory 300 KB for program, 1 MB for data, PROFINET IO IRT interface, SIMATIC memory card required			RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables	
			IE FC RJ45 plug 180	
			(Extended temperature range and exposure to environmental substances)	
			180° cable outlet	
			1 unit	6AG1901-1BB10-7AA0
			Other accessories	See SIMATIC ET 200SP, CPU 1512 F-1 PN, page 7/22

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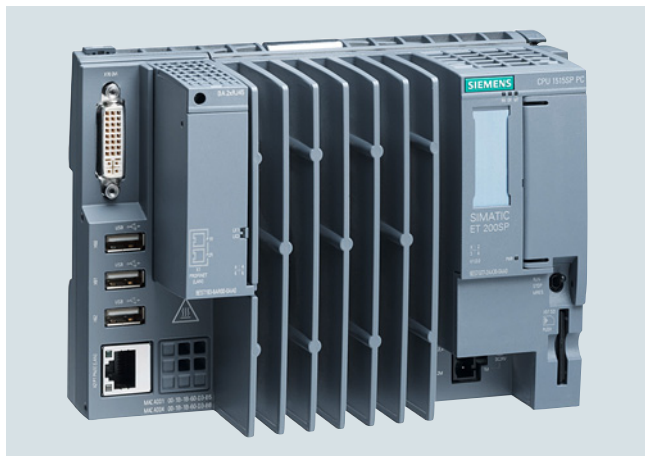# Distributed Controllers
based on ET 200SP
ET 200SP Open Controllers

Overview

- Turnkey all-in-one solution with pre-installed SIMATIC S7-1500 Software Controller Standard control and optional pre-installed WinCC Runtime Advanced
- Central expansion via ET 200SP modules (station width up to 1 m or up to 64 modules)
- SIMATIC Hypervisor: for separating Windows systems from control functions
- Dual-core processor for optimal use of the hypervisor

- Swappable flash memory (CFast card) for operating system, runtime and project data
- Integrated DVI-I graphics connection; 3x USB 2.0 connection
- 2 PROFINET interfaces: X1 via PN-IO bus adapter (RJ45 or FC) with 2 ports; X2: GB Ethernet interface (RJ45)
- PROFINET IRT
- Open Ethernet communication (TCP/IP, UDP, ISO-on-TCP)
- Web server functionality for information, status, diagnostics and user-defined web pages
- PROFIBUS DP communication optionally via CM DP module as DP master
- Configuration control (option handling)
- Improved know-how and copy protection; Security Integrated
- Integrated system diagnostics
- Integrated motion control functionalities for controlling speed-controlled and positioning axes with support for external encoders
- Trace function
- Especially suitable for high data volumes and user-specific, open applications
- Integration of control functions and applications implemented in C/C++ (using SIMATIC ODK-1500S Open Development Kit)

Technical specifications

Article number	6ES7677-2AA31-0EB0	6ES7677-2AA41-0FB0
	CPU 1515SP PC 4GB	CPU 1515SP PC 4GB
General information		
Product type designation	CPU 1515SP PC	CPU 1515SP PC
Engineering with		
• STEP 7 TIA Portal configurable/ integrated as of version	V14 SP1	V14 SP1
Installed software		
• Visualization	No	No
• Control	S7-1500 Software Controller CPU 1505SP V2.1	S7-1500 Software Controller CPU 1505SP V2.1
Supply voltage		
Type of supply voltage	24 V DC	24 V DC
Processor		
Processor type	Dual-Core 1 GHz, AMD G Series APU T40E	Dual-Core 1 GHz, AMD G Series APU T40E
Memory		
Type of memory	DDR3-SDRAM	DDR3-SDRAM
Main memory	4 GB RAM	4 GB RAM
CFast memory card	Yes; 30 GB flash memory	Yes; 30 GB flash memory
Work memory		
• integrated (for program)	1 Mbyte	1 Mbyte
• integrated (for data)	5 Mbyte	5 Mbyte
• integrated (for CPU function library of CPU Runtime)	10 Mbyte	10 Mbyte
Load memory		
• integrated (on PC mass storage)	320 Mbyte	320 Mbyte
CPU processing times		
for bit operations, typ.	10 ns	10 ns
for word operations, typ.	12 ns	12 ns
for fixed point arithmetic, typ.	16 ns	16 ns
for floating point arithmetic, typ.	64 ns	64 ns

Technical specifications (continued)

Article number	6ES7677-2AA31-0EB0	6ES7677-2AA41-0FB0
	CPU 1515SP PC 4GB	CPU 1515SP PC 4GB
Counters, timers and their retentivity		
S7 counter		
• Number	2 048	2 048
IEC counter		
• Number	Any (only limited by the main memory)	Any (only limited by the main memory)
S7 times		
• Number	2 048	2 048
IEC timer		
• Number	Any (only limited by the main memory)	Any (only limited by the main memory)
Data areas and their retentivity		
Flag		
• Number, max.	16 kbyte	16 kbyte
Address area		
I/O address area		
• Inputs	32 kbyte; All inputs are in the process image	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image	32 kbyte; All outputs are in the process image
Hardware configuration		
Integrated power supply	Yes	Yes
Time of day		
Clock		
• Type	Hardware clock	Hardware clock
• Hardware clock (real-time)	Yes; Resolution: 1 s	Yes; Resolution: 1 s
Interfaces		
Number of industrial Ethernet interfaces	2	2
Number of RS 485 interfaces	1; Via CM DP module	1; Via CM DP module
Number of USB interfaces	3; 3x USB 2.0 on the front, 500 mA each – of which 2x 500 mA and 1x 100 mA simultaneously	3; 3x USB 2.0 on the front, 500 mA each – of which 2x 500 mA and 1x 100 mA simultaneously
Number of SD card slots	1	1
Video interfaces		
• Graphics interface	1x DVI-I	1x DVI-I
1. Interface		
Interface type	PROFINET	PROFINET
automatic detection of transmission rate	Yes	Yes
Autonegotiation	Yes	Yes
Autocrossing	Yes	Yes
Interface types		
• Number of ports	2	2
• integrated switch	Yes	Yes
• RJ 45 (Ethernet)	Yes; Via BusAdapter BA 2x RJ45	Yes; Via BusAdapter BA 2x RJ45
- Transmission rate, max.	100 Mbit/s	100 Mbit/s
- Industrial Ethernet status LED	Yes	Yes
• BusAdapter (PROFINET)	Yes; Applicable BusAdapter: BA 2x RJ45, BA 2x FC	Yes; Applicable BusAdapter: BA 2x RJ45, BA 2x FC
Protocols		
• Number of connections via this interface	88	88
• PROFINET IO controller	Yes	Yes
• PROFINET IO Device	Yes	Yes
• SIMATIC communication	Yes	Yes
• Open IE communication	Yes	Yes
• Web server	Yes	Yes

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Distributed Controllers
based on ET 200SP
ET 200SP Open Controllers

■ Technical specifications (continued)

Article number	6ES7677-2AA31-0EB0	6ES7677-2AA41-0FB0
	CPU 1515SP PC 4GB	CPU 1515SP PC 4GB
PROFINET IO controller		
Services		
- Isochronous mode	Yes	Yes
- shortest clock pulse	500 µs	500 µs
- IRT	Yes	Yes
- MRP	Yes	Yes
- MRPD	Yes	Yes
- Prioritized startup	Yes; Max. 32 PROFINET devices	Yes; Max. 32 PROFINET devices
- Number of connectable IO Devices, max.	128	128
- Of which IO devices with IRT, max.	64	64
- of which in line, max.	64	64
- Number of connectable IO Devices for RT, max.	128	128
- of which in line, max.	128	128
- Number of IO Devices that can be simultaneously activated/deactivated, max.	8	8
- IO Devices changing during operation (partner ports), supported	Yes	Yes
- Number of IO Devices per tool, max.	8	8
- Updating times	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data
Update time for IRT		
- for send cycle of 500 µs	500 µs to 8 ms	500 µs to 8 ms
- for send cycle of 1 ms	1 ms to 16 ms	1 ms to 16 ms
- for send cycle of 2 ms	2 ms to 32 ms	2 ms to 32 ms
- for send cycle of 4 ms	4 ms to 64 ms	4 ms to 64 ms
- With IRT and parameterization of "odd" send cycles	Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)	Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)
Update time for RT		
- for send cycle of 500 µs	500 µs to 256 ms	500 µs to 256 ms
- for send cycle of 1 ms	1 ms to 512 ms	1 ms to 512 ms
- for send cycle of 2 ms	2 ms to 512 ms	2 ms to 512 ms
- for send cycle of 4 ms	4 ms to 512 ms	4 ms to 512 ms
PROFINET IO Device		
Services		
- Isochronous mode	No	No
- IRT	Yes	Yes
- MRP	Yes	Yes
- MRPD	Yes	Yes
- Prioritized startup	Yes	Yes
- Shared device	Yes	Yes
- Number of IO Controllers with shared device, max.	4	4
2. Interface		
Interface type	Integrated Ethernet interface	Integrated Ethernet interface
automatic detection of transmission rate	Yes	Yes
Autonegotiation	Yes	Yes
Autocrossing	Yes	Yes
Interface types		
• Number of ports	1	1
• RJ 45 (Ethernet)	Yes; Integrated	Yes; Integrated
- Transmission rate, max.	1 000 Mbit/s	1 000 Mbit/s
- Industrial Ethernet status LED	No	No

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Technical specifications (continued)

Article number	6ES7677-2AA31-0EB0	6ES7677-2AA41-0FB0
	CPU 1515SP PC 4GB	CPU 1515SP PC 4GB
3. Interface		
Interface type	PROFIBUS with CM DP	PROFIBUS with CM DP
Interface types		
• RS 485	Yes	Yes
Protocols		
• Number of connections via this interface	44	44
• PROFIBUS DP master	Yes	Yes
• PROFIBUS DP slave	Yes	Yes
• SIMATIC communication	Yes	Yes
PROFIBUS DP master		
• Number of DP slaves, max.	125	125
Services		
- Equidistance	No	No
- Isochronous mode	No	No
PROFIBUS DP slave		
Services		
- Equidistance	No	No
- Isochronous mode	No	No
Protocols		
Number of connections		
• Number of connections, max.	88	88
OPC UA		
• OPC UA server	Data access (read, write, subscribe), runtime license required	Yes; Data access (read, write, subscribe), runtime license required
Supported technology objects		
Motion Control	Yes	Yes
• Number of available Motion Control resources for technology objects (except cam disks)	2 400	2 400
• Required Motion Control resources		
- per speed-controlled axis	40; per axis	40; per axis
- per positioning axis	80; per axis	80; per axis
- per synchronous axis	160; per axis	160; per axis
- per external encoder	80; per external encoder	80; per external encoder
- per output cam	20; per cam	20; per cam
- per cam track	160; per cam track	160; per cam track
- per probe	40; per probe	40; per probe
Controller		
• PID_Compact	Yes; Universal PID controller with integrated optimization	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves	Yes; PID controller with integrated optimization for valves
• PID-Temp	Yes; PID controller with integrated optimization for temperature	Yes; PID controller with integrated optimization for temperature
Counting and measuring		
• High-speed counter	Yes	Yes
Ambient conditions		
Ambient temperature during operation		
• min.	0 °C	0 °C
• max.	Up to 60 °C with max. 32 ET 200SP modules and 3x 100 mA USB load; up to 55 °C with max. 64 ET 200SP modules and 2x max. 500 mA and 1x max. 100 mA USB load	Up to 60 °C with max. 32 ET 200SP modules and 3x 100 mA USB load; up to 55 °C with max. 64 ET 200SP modules and 2x max. 500 mA and 1x max. 100 mA USB load
• horizontal installation, min.	0 °C	0 °C
• horizontal installation, max.	60 °C	60 °C
• vertical installation, min.	0 °C	0 °C
• vertical installation, max.	50 °C; With max. 32 ET 200SP modules and 3x 100 mA USB load	50 °C; With max. 32 ET 200SP modules and 3x 100 mA USB load
Operating systems		
pre-installed operating system	Windows Embedded Standard 7 E 32-bit	Windows Embedded Standard 7 P 64-bit

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Distributed Controllers
based on ET 200SP
ET 200SP Open Controllers

Technical specifications (continued)

Article number	6ES7677-2AA31-0EB0	6ES7677-2AA41-0FB0
	CPU 1515SP PC 4GB	CPU 1515SP PC 4GB
Configuration		
Programming		
Programming language		
- LAD	Yes	Yes
- FBD	Yes	Yes
- STL	Yes	Yes
- SCL	Yes	Yes
- CFC	No	No
- GRAPH	Yes	Yes
Know-how protection		
• User program protection/password protection	Yes	Yes
• Copy protection	Yes	Yes
• Block protection	Yes	Yes
Access protection		
• Protection level: Write protection	Yes	Yes
• Protection level: Read/write protection	Yes	Yes
• Protection level: Complete protection	Yes	Yes
Open Development interfaces		
• Size of ODK SO file, max.	3.8 Mbyte	3.8 Mbyte
Peripherals/Options		
Peripherals		
• SD card	Optionally for additional mass storage	Optionally for additional mass storage
Dimensions		
Width	160 mm	160 mm
Height	117 mm	117 mm
Depth	75 mm	75 mm
Weights		
Weight, approx.	0.83 kg	0.83 kg

Ordering data

	Article No.		Article No.
SIMATIC ET 200SP Open Controller CPU 1515SP PC (+ HMI)		**Windows Embedded Standard 7 E 32-bit, 8 GB CFast card**	
ET 200SP CPU with Windows Embedded Standard 7 and pre-installed SIMATIC S7-1500 Software Controller (with WinCC RT Advanced as option);		• CPU 1515SP PC (4 GB RAM)	6ES7677-2AA31-0EB0
		Windows Embedded Standard 7 P 64-bit (multi-touch), 16 GB CFast card	
Type of delivery: en, de, fr, it, es, zh		• CPU 1515SP PC (4 GB RAM)	6ES7677-2AA41-0FB0
		• CPU 1515SP PC + HMI 128PT (4 GB RAM)	6ES7677-2AA41-0FK0
		• CPU 1515SP PC + HMI 512PT (4 GB RAM)	6ES7677-2AA41-0FL0
		• CPU 1515SP PC + HMI 2048PT (4 GB RAM)	6ES7677-2AA41-0FM0

■ **Ordering data**

	Article No.		Article No.
Accessories		**STEP 7 Professional V15.1**	
Upgrade from SIMATIC S7-1500 Software Controller CPU 1505SP to SIMATIC Open Controller	6ES7672-5DC01-0YK0	Target system: SIMATIC S7-1200, S7-1500, S7-300, S7-400, WinAC	
From V 1.x to V 2.0; software download incl. documentation and license key		Requirement: Windows 7 Home Premium SP1 (64-bit) Windows 7 Professional SP1 (64-bit)	
Email address required for delivery		Windows 7 Enterprise SP1 (64-bit) Windows 7 Ultimate SP1 (64-bit) Windows 10 Home	
BusAdapter BA 2xRJ45	6ES7193-6AR00-0AA0	Version 1709, 1803 Windows 10 Professional	
BusAdapter BA 2xFC	6ES7193-6AF00-0AA0	Version 1709, 1803 Windows 10 Enterprise	
BusAdapter BA 2xSCRJ	6ES7193-6AP00-0AA0	Version 1709, 1803 Windows 10 Enterprise 2016 LTSB	
BusAdapter BA SCRJ/RJ45	6ES7193-6AP20-0AA0	Windows 10 IoT Enterprise 2015 LTSB	
BusAdapter BA SCRJ/FC	6ES7193-6AP40-0AA0	Windows 10 IoT Enterprise 2016 LTSB	
For increased vibration and EMC loads		Windows Server 2012 R2 StdE (full installation) Windows Server 2016 Standard (full installation)	
BusAdapter BA 2XLC	6ES7193-6AG00-0AA0	Type of delivery: en, de, fr, it, es, zh	
BusAdapter BA LC/RJ45	6ES7193-6AG20-0AA0	STEP 7 Professional V15.1, floating license	6ES7822-1AA05-0YA5
BusAdapter BA LC/FC	6ES7193-6AG40-0AA0		
CM DP for ET 200SP CPU	6ES7545-5DA00-0AB0	STEP 7 Professional V15.1, floating license software download incl. license key [1]	6ES7822-1AE05-0YA5
PROFIBUS DP master with electrical interface for connecting the ET 200SP CPUs to PROFIBUS at up to 12 Mbps		Email address required for delivery	
Server module	6ES7193-6PA00-0AA0	**SIMATIC ODK 1500S**	
Spare part		Open Development Kit for support in developing Windows and real-time library functions for S7-1500 Software Controllers; supplied on DVD	6ES7806-2CD02-0YA0
Power supply connector	6ES7193-4JB00-0AA0		
Spare part; for connecting the 24 V DC supply voltage; with push-in terminals (10 units)		Open Development Kit for support in developing Windows and real-time library functions for S7-1500 Software Controllers; software download including license key [1]	6ES7806-2CD02-0YG0
Equipment labeling plates	6ES7193-6LF30-0AW0		
10 sheets of 16 plates		Email address required for delivery	
Labeling strips		**SIMATIC WinCC Advanced V15.1**	
500 labeling strips on roll, light gray, for inscription with thermal transfer roll printer	6ES7193-6LR10-0AA0	Engineering software in the TIA Portal; for engineering SIMATIC Panels, WinCC Runtime Advanced; runs with Windows 7 (64-bit), Windows 10 (64-bit), WinSrv 2012 R2/2016 (64-bit), Class A; 6 languages: en, de, fr, it, es, zh	
1 000 labeling strips DIN A4, light gray, card, for inscription with laser printer	6ES7193-6LA10-0AA0	• Floating license; software and documentation on DVD; license key on USB flash drive	6AV2102-0AA05-0AA5
		• Floating license; software, documentation and license key for download [1]: Email address required for delivery	6AV2102-0AA05-0AH5

[1] For up-to-date information and download availability, see:
http://www.siemens.com/tia-online-software-delivery

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Distributed Controllers
based on ET 200SP
ET 200SP Open Controllers

■ Overview

ET 200SP Open Controller, CPU 1515SP PC2, combines robustness and compact dimensions with the flexibility of centralized or decentralized communication in the highest industrial functionality. Furthermore, the CPU offers the entire value added of the ET 200SP system, the S7-1500 controller family and the TIA world together.

• Rugged, compact control system
• Combines the functions of a ET 200SP controller with those of a PC-based platform
• Turnkey all-in-one controller
• High performance automation tasks with the use of new generation Intel Quad Core processors
• Connects high-level language applications and processes high data volumes with support from SIMATIC ODK 1500S

■ Technical specifications

Article number	**6ES7677-2DB42-0GB0**
	CPU1515SP PC2
General information	
Product type designation	CPU 1515SP PC2
Engineering with	
• STEP 7 TIA Portal configurable/ integrated as of version	V15 with HSP 269
Installed software	
• Visualization	No
• Control	S7-1500 Software Controller CPU 1505SP
Supply voltage	
Type of supply voltage	24 V DC
Processor	
Processor type	Intel Atom E3940, 1.6 GHz, 4 cores
Memory	
Type of memory	DDR3L
Main memory	8 GB RAM
CFast memory card	Yes; 30 GB flash memory
Work memory	
• integrated (for program)	1 Mbyte
• integrated (for data)	5 Mbyte
• integrated (for CPU function library of CPU Runtime)	20 Mbyte
Load memory	
• integrated (on PC mass storage)	320 Mbyte
CPU processing times	
for bit operations, typ.	10 ns
for word operations, typ.	12 ns
for fixed point arithmetic, typ.	16 ns
for floating point arithmetic, typ.	64 ns

Article number	**6ES7677-2DB42-0GB0**
	CPU1515SP PC2
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
IEC counter	
• Number	Any (only limited by the main memory)
S7 times	
• Number	2 048
IEC timer	
• Number	Any (only limited by the main memory)
Data areas and their retentivity	
Flag	
• Number, max.	16 kbyte
Address area	
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image
Hardware configuration	
Integrated power supply	Yes
Time of day	
Clock	
• Type	Hardware clock
• Hardware clock (real-time)	Yes; Resolution: 1 s
Interfaces	
Number of industrial Ethernet interfaces	2
Number of RS 485 interfaces	1; Via CM DP module
Number of USB interfaces	4; 2x USB 2.0, 2x USB 3.0 on front side
Number of SD card slots	1
Video interfaces	
• Graphics interface	1x DisplayPort

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■ **Technical specifications** (continued)

Article number	6ES7677-2DB42-0GB0
	CPU1515SP PC2
1. Interface	
Interface type	PROFINET
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Interface types	
• Number of ports	2
• integrated switch	Yes
• RJ 45 (Ethernet)	Yes; Via BusAdapter BA 2x RJ45
- Transmission rate, max.	100 Mbit/s
- Industrial Ethernet status LED	Yes
• BusAdapter (PROFINET)	Yes; Compatible BusAdapter: BA 2x RJ45, BA 2x FC, BA 2x SCRJ (from FS03, V2.2), BA SCRJ / RJ45 (from FS03, V3.1), BA SCRJ / FC (from FS03, V3.1), BA 2x LC (from FS03, V3.3), BA LC / RJ45 (from FS03, V3.3), BA LC / FC (from FS03, V3.3)
Protocols	
• Number of connections via this interface	88
• PROFINET IO controller	Yes
• PROFINET IO Device	Yes
• SIMATIC communication	Yes
• Open IE communication	Yes
• Web server	Yes
PROFINET IO controller	
Services	
- Isochronous mode	Yes
- shortest clock pulse	500 µs
- IRT	Yes
- MRP	Yes
- MRPD	Yes
- PROFIenergy	Yes
- Prioritized startup	Yes; Max. 32 PROFINET devices; if you want to use the "Prioritized startup" functionality in STEP 7 for the PROFINET interface of the CPU, the CPU and the device must be separated by means of a switch (e.g. SCALANCE X205)
- Number of connectable IO Devices, max.	128
- Of which IO devices with IRT, max.	64
- of which in line, max.	64
- Number of connectable IO Devices for RT, max.	128
- of which in line, max.	128
- Number of IO Devices that can be simultaneously activated/deactivated, max.	8
- IO Devices changing during operation (partner ports), supported	Yes
- Number of IO Devices per tool, max.	8
- Updating times	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data

Article number	6ES7677-2DB42-0GB0
	CPU1515SP PC2
Update time for IRT	
- for send cycle of 500 µs	500 µs to 8 ms
- for send cycle of 1 ms	1 ms to 16 ms
- for send cycle of 2 ms	2 ms to 32 ms
- for send cycle of 4 ms	4 ms to 64 ms
- With IRT and parameterization of "odd" send cycles	Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)
Update time for RT	
- for send cycle of 500 µs	500 µs to 256 ms
- for send cycle of 1 ms	1 ms to 512 ms
- for send cycle of 2 ms	2 ms to 512 ms
- for send cycle of 4 ms	4 ms to 512 ms
Address area	
- Inputs, max.	8 kbyte
- Outputs, max.	8 kbyte
PROFINET IO Device	
Services	
- Isochronous mode	No
- shortest clock pulse	500 µs
- IRT	Yes
- MRP	Yes
- MRPD	Yes
- PROFIenergy	Yes
- Prioritized startup	Yes
- Shared device	Yes
- Number of IO Controllers with shared device, max.	4
- Asset management record	Yes
2. Interface	
Interface type	Integrated Ethernet interface
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Interface types	
• Number of ports	1
• RJ 45 (Ethernet)	Yes; Integrated
- Transmission rate, max.	1 000 Mbit/s
- Industrial Ethernet status LED	No

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Distributed Controllers
based on ET 200SP
ET 200SP Open Controllers

▪ Technical specifications (continued)

Article number	**6ES7677-2DB42-0GB0**
	CPU1515SP PC2
3. Interface	
Interface type	PROFIBUS with CM DP
Interface types	
• RS 485	Yes
Protocols	
• Number of connections via this interface	44
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes
• SIMATIC communication	Yes
PROFIBUS DP master	
• Number of DP slaves, max.	125
Services	
- Equidistance	No
- Isochronous mode	No
Address area	
- Inputs, max.	8 kbyte
- Outputs, max.	8 kbyte
PROFIBUS DP slave	
Services	
- Equidistance	No
- Isochronous mode	No
Protocols	
Number of connections	
• Number of connections, max.	88
OPC UA	
• OPC UA client	Yes; From SW CPU 1505SP V2.6
• OPC UA server	Yes; Data access (read, write, subscribe), runtime license required
Supported technology objects	
Motion Control	Yes
• Number of available Motion Control resources for technology objects (except cam disks)	2 400
• Required Motion Control resources	
- per speed-controlled axis	40; per axis
- per positioning axis	80; per axis
- per synchronous axis	160; per axis
- per external encoder	80; per external encoder
- per output cam	20; per cam
- per cam track	160; per cam track
- per probe	40; per probe
Controller	
• PID_Compact	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves
• PID-Temp	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
• High-speed counter	Yes

Article number	**6ES7677-2DB42-0GB0**
	CPU1515SP PC2
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• max.	Up to 60 °C with max. 32 ET 200SP modules; up to 55 °C with max. 64 ET 200SP modules
• horizontal installation, min.	-20 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-20 °C
• vertical installation, max.	50 °C; With max. 32 ET 200SP modules
Operating systems	
pre-installed operating system	Windows 10 IoT Enterprise 2016 LTSB, 64bit, MUI
Configuration	
Programming	
Programming language	
- LAD	Yes
- FBD	Yes
- STL	Yes
- SCL	Yes
- CFC	No
- GRAPH	Yes
Know-how protection	
• User program protection/password protection	Yes
• Copy protection	Yes
• Block protection	Yes
Access protection	
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Complete protection	Yes
Open Development interfaces	
• Size of ODK SO file, max.	5.8 Mbyte
Peripherals/Options	
Peripherals	
• SD card	Optionally for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

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Ordering data	Article No.
SIMATIC ET 200SP Open Controller CPU 1515SP PC2 (+ HMI)	
ET 200SP central module with Windows 10 IoT Enterprise 64-bit and pre-installed SIMATIC S7-1500 Software Controller (with WinCC RT Advanced option); 8 GB RAM, 30 GB CFast card	
Type of delivery: en, de, fr, it, es, zh	
• CPU 1515SP PC2	**6ES7677-2DB42-0GB0**
With pre-installed WinCC RT Advanced	
• CPU 1515SP PC2 + HMI 128PT	**6ES7677-2DB42-0GK0**
• CPU 1515SP PC2 + HMI 512PT	**6ES7677-2DB42-0GL0**
• CPU 1515SP PC2 + HMI 2048PT	**6ES7677-2DB42-0GM0**
Accessories	
Upgrade from SIMATIC S7-1500 Software Controller CPU 1505SP to SIMATIC Open Controller	**6ES7672-5DC01-0YK0**
From V 1.x to V 2.0; software download incl. documentation and license key	
Email address required for delivery	
BusAdapter BA 2xRJ45	**6ES7193-6AR00-0AA0**
BusAdapter BA 2xFC	**6ES7193-6AF00-0AA0**
BusAdapter BA 2xSCRJ	**6ES7193-6AP00-0AA0**
BusAdapter BA SCRJ/RJ45	**6ES7193-6AP20-0AA0**
BusAdapter BA SCRJ/FC	**6ES7193-6AP40-0AA0**
For increased vibration and EMC loads	
BusAdapter BA 2XLC	**6ES7193-6AG00-0AA0**
BusAdapter BA LC/RJ45	**6ES7193-6AG20-0AA0**
BusAdapter BA LC/FC	**6ES7193-6AG40-0AA0**
CM DP for ET 200SP CPU	**6ES7545-5DA00-0AB0**
PROFIBUS DP master with electrical interface for connecting the ET 200SP CPUs to PROFIBUS at up to 12 Mbps	
Server module	**6ES7193-6PA00-0AA0**
Spare part	
Power supply connector	**6ES7193-4JB00-0AA0**
Spare part; for connecting the 24 V DC supply voltage; with push-in terminals (10 units)	
Equipment labeling plates	**6ES7193-6LF30-0AW0**
10 sheets of 16 plates	
Labeling strips	
500 labeling strips on roll, light gray, for inscription with thermal transfer roll printer	**6ES7193-6LR10-0AA0**
1 000 labeling strips DIN A4, light gray, card, for inscription with laser printer	**6ES7193-6LA10-0AA0**

	Article No.
STEP 7 Professional V15.1	
Target system: SIMATIC S7-1200, S7-1500, S7-300, S7-400, WinAC	
Requirement: Windows 7 Home Premium SP1 (64-bit) Windows 7 Professional SP1 (64-bit) Windows 7 Enterprise SP1 (64-bit) Windows 7 Ultimate SP1 (64-bit) Windows 10 Home Version 1709, 1803 Windows 10 Professional Version 1709, 1803 Windows 10 Enterprise Version 1709, 1803 Windows 10 Enterprise 2016 LTSB Windows 10 IoT Enterprise 2015 LTSB Windows 10 IoT Enterprise 2016 LTSB Windows Server 2012 R2 StdE (full installation) Windows Server 2016 Standard (full installation)	
Type of delivery: en, de, fr, it, es, zh	
STEP 7 Professional V15.1, floating license	**6ES7822-1AA05-0YA5**
STEP 7 Professional V15.1, floating license software download incl. license key [1]	**6ES7822-1AE05-0YA5**
Email address required for delivery	
SIMATIC ODK 1500S	
Open Development Kit for support in developing Windows and real-time library functions for S7-1500 Software Controllers; supplied on DVD	**6ES7806-2CD03-0YA0**
Open Development Kit for support in developing Windows and real-time library functions for S7-1500 Software Controllers; software download including license key [1]	**6ES7806-2CD03-0YG0**
Email address required for delivery	
SIMATIC WinCC Advanced V15.1	
Engineering software in the TIA Portal; for engineering SIMATIC Panels, WinCC Runtime Advanced; runs with Windows 7 (64-bit), Windows 10 (64-bit), WinSrv 2012 R2/2016 (64-bit), Class A; 6 languages: en, de, fr, it, es, zh	
• Floating license; software and documentation on DVD; license key on USB flash drive	**6AV2102-0AA05-0AA5**
• Floating license; software, documentation and license key for download [1]: Email address required for delivery	**6AV2102-0AA05-0AH5**

[1] For up-to-date information and download availability, see: http://www.siemens.com/tia-online-software-delivery

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Distributed Controllers
based on ET 200SP
ET 200SP Open Controllers

■ Overview

- Turnkey all-in-one solution with pre-installed fail-safe SIMATIC S7-1500 Software Controller and optional pre-installed WinCC Runtime Advanced
- Fail-safe versions make it possible to control machines or plants in a fail-safe environment. This makes it possible to address applications which require an SIL3 (Safety Integrity Level) safety class according to IEC 61508 2nd Edition or a PL e (Performance Level) according to ISO 13849.
- Central expansion via ET 200SP modules (station width up to 1 m or up to 64 modules)
- SIMATIC Hypervisor: for separating Windows systems from control functions

- Dual-core processor for optimal use of the hypervisor
- Swappable flash memory (CFast card) for operating system, runtime and project data
- Integrated DVI-I graphics connection; 3x USB 2.0 connection
- 2 PROFINET interfaces:
  X1 via PN-IO bus adapter (RJ45 or FC) with 2 ports;
  X2: GB Ethernet interface (RJ45)
- PROFINET IRT
- Open Ethernet communication (TCP/IP, UDP, ISO-on-TCP)
- Web server functionality for information, status, diagnostics and user-defined web pages
- PROFIBUS DP communication optionally via CM DP module as DP master
- Configuration control (option handling)
- Improved know-how and copy protection; Security Integrated
- Integrated system diagnostics
- Integrated motion control functionalities for controlling speed-controlled and positioning axes with support for external encoders
- Trace function
- Especially suitable for high data volumes and user-specific, open applications
- Integration of control functions and applications implemented in C/C++ (using SIMATIC ODK-1500S Open Development Kit)

■ Technical specifications

Article number	6ES7677-2FA31-0EB0	6ES7677-2FA41-0FB0
	CPU 1515SP PC F	CPU 1515SP PC F
General information		
Product type designation	CPU 1515SP PC F	CPU 1515SP PC F
Engineering with		
• STEP 7 TIA Portal configurable/ integrated as of version	V14 SP1	V14 SP1
Installed software		
• Visualization	No	No
• Control	S7-1500 Software Controller CPU 1505SP F	S7-1500 Software Controller CPU 1505SP F
Supply voltage		
Type of supply voltage	24 V DC	24 V DC
Processor		
Processor type	Dual-Core 1 GHz, AMD G Series APU T40E	Dual-Core 1 GHz, AMD G Series APU T40E
Memory		
Type of memory	DDR3-SDRAM	DDR3-SDRAM
Main memory	4 GB RAM	4 GB RAM
CFast memory card	Yes; 30 GB flash memory	Yes; 30 GB flash memory
Work memory		
• integrated (for program)	1.5 Mbyte	1.5 Mbyte
• integrated (for data)	5 Mbyte	5 Mbyte
• integrated (for CPU function library of CPU Runtime)	10 Mbyte	10 Mbyte
Load memory		
• integrated (on PC mass storage)	320 Mbyte	320 Mbyte

Technical specifications (continued)

Article number	6ES7677-2FA31-0EB0	6ES7677-2FA41-0FB0
	CPU 1515SP PC F	CPU 1515SP PC F
CPU processing times		
for bit operations, typ.	10 ns	10 ns
for word operations, typ.	12 ns	12 ns
for fixed point arithmetic, typ.	16 ns	16 ns
for floating point arithmetic, typ.	64 ns	64 ns
Counters, timers and their retentivity		
S7 counter		
• Number	2 048	2 048
IEC counter		
• Number	Any (only limited by the main memory)	Any (only limited by the main memory)
S7 times		
• Number	2 048	2 048
IEC timer		
• Number	Any (only limited by the main memory)	Any (only limited by the main memory)
Data areas and their retentivity		
Flag		
• Number, max.	16 kbyte	16 kbyte
Address area		
I/O address area		
• Inputs	32 kbyte; All inputs are in the process image	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image	32 kbyte; All outputs are in the process image
Hardware configuration		
Integrated power supply	Yes	Yes
Time of day		
Clock		
• Type	Hardware clock	Hardware clock
• Hardware clock (real-time)	Yes; Resolution: 1 s	Yes; Resolution: 1 s
Interfaces		
Number of industrial Ethernet interfaces	2	2
Number of RS 485 interfaces	1; Via CM DP module	1; Via CM DP module
Number of USB interfaces	3; 3x USB 2.0 on the front, 500 mA each – of which 2x 500 mA and 1x 100 mA simultaneously	3; 3x USB 2.0 on the front, 500 mA each – of which 2x 500 mA and 1x 100 mA simultaneously
Number of SD card slots	1	1
Video interfaces		
• Graphics interface	1x DVI-I	1x DVI-I
1. Interface		
Interface type	PROFINET	PROFINET
automatic detection of transmission rate	Yes	Yes
Autonegotiation	Yes	Yes
Autocrossing	Yes	Yes
Interface types		
• Number of ports	2	2
• integrated switch	Yes	Yes
• RJ 45 (Ethernet)	Yes; Via BusAdapter BA 2x RJ45	Yes; Via BusAdapter BA 2x RJ45
- Transmission rate, max.	100 Mbit/s	100 Mbit/s
- Industrial Ethernet status LED	Yes	Yes
• BusAdapter (PROFINET)	Yes; Applicable BusAdapter: BA 2x RJ45, BA 2x FC	Yes; Applicable BusAdapter: BA 2x RJ45, BA 2x FC
Protocols		
• Number of connections via this interface	88	88
• PROFINET IO controller	Yes	Yes
• PROFINET IO Device	Yes	Yes
• SIMATIC communication	Yes	Yes
• Open IE communication	Yes	Yes
• Web server	Yes	Yes

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Distributed Controllers
based on ET 200SP
ET 200SP Open Controllers

■ **Technical specifications** (continued)

Article number	6ES7677-2FA31-0EB0	6ES7677-2FA41-0FB0
	CPU 1515SP PC F	CPU 1515SP PC F
PROFINET IO controller		
Services		
- Isochronous mode	Yes	Yes
- shortest clock pulse	500 μs	500 μs
- IRT	Yes	Yes
- MRP	Yes	Yes
- MRPD	Yes	Yes
- Prioritized startup	Yes; Max. 32 PROFINET devices	Yes; Max. 32 PROFINET devices
- Number of connectable IO Devices, max.	128	128
- Of which IO devices with IRT, max.	64	64
- of which in line, max.	64	64
- Number of connectable IO Devices for RT, max.	128	128
- of which in line, max.	128	128
- Number of IO Devices that can be simultaneously activated/ deactivated, max.	8	8
- IO Devices changing during operation (partner ports), supported	Yes	Yes
- Number of IO Devices per tool, max.	8	8
- Updating times	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data
Update time for IRT		
- for send cycle of 500 μs	500 μs to 8 ms	500 μs to 8 ms
- for send cycle of 1 ms	1 ms to 16 ms	1 ms to 16 ms
- for send cycle of 2 ms	2 ms to 32 ms	2 ms to 32 ms
- for send cycle of 4 ms	4 ms to 64 ms	4 ms to 64 ms
- With IRT and parameterization of "odd" send cycles	Update time = set "odd" send clock (any multiple of 125 μs: 375 μs, 625 μs ... 3 875 μs)	Update time = set "odd" send clock (any multiple of 125 μs: 375 μs, 625 μs ... 3 875 μs)
Update time for RT		
- for send cycle of 500 μs	500 μs to 256 ms	500 μs to 256 ms
- for send cycle of 1 ms	1 ms to 512 ms	1 ms to 512 ms
- for send cycle of 2 ms	2 ms to 512 ms	2 ms to 512 ms
- for send cycle of 4 ms	4 ms to 512 ms	4 ms to 512 ms
PROFINET IO Device		
Services		
- Isochronous mode	No	No
- IRT	Yes	Yes
- MRP	Yes	Yes
- MRPD	Yes	Yes
- Prioritized startup	Yes	Yes
- Shared device	Yes	Yes
- Number of IO Controllers with shared device, max.	4	4
2. Interface		
Interface type	Integrated Ethernet interface	Integrated Ethernet interface
automatic detection of transmission rate	Yes	Yes
Autonegotiation	Yes	Yes
Autocrossing	Yes	Yes
Interface types		
• Number of ports	1	1
• RJ 45 (Ethernet)	Yes; Integrated	Yes; Integrated
- Transmission rate, max.	1 000 Mbit/s	1 000 Mbit/s
- Industrial Ethernet status LED	No	No

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▮ Technical specifications (continued)

Article number	6ES7677-2FA31-0EB0	6ES7677-2FA41-0FB0
	CPU 1515SP PC F	CPU 1515SP PC F
3. Interface		
Interface type	PROFIBUS with CM DP	PROFIBUS with CM DP
Interface types		
• RS 485	Yes	Yes
Protocols		
• Number of connections via this interface	44	44
• PROFIBUS DP master	Yes	Yes
• PROFIBUS DP slave	Yes	Yes
• SIMATIC communication	Yes	Yes
PROFIBUS DP master		
• Number of DP slaves, max.	125	125
Services		
- Equidistance	No	No
- Isochronous mode	No	No
PROFIBUS DP slave		
Services		
- Equidistance	No	No
- Isochronous mode	No	No
Protocols		
Number of connections		
• Number of connections, max.	88	88
OPC UA		
• OPC UA client		No
• OPC UA server	Data access (read, write, subscribe), runtime license required	Yes; Data access (read, write, subscribe), runtime license required
Supported technology objects		
Motion Control	Yes	Yes
• Number of available Motion Control resources for technology objects (except cam disks)	2 400	2 400
• Required Motion Control resources		
- per speed-controlled axis	40; per axis	40; per axis
- per positioning axis	80; per axis	80; per axis
- per synchronous axis	160; per axis	160; per axis
- per external encoder	80; per external encoder	80; per external encoder
- per output cam	20; per cam	20; per cam
- per cam track	160; per cam track	160; per cam track
- per probe	40; per probe	40; per probe
Controller		
• PID_Compact	Yes; Universal PID controller with integrated optimization	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves	Yes; PID controller with integrated optimization for valves
• PID-Temp	Yes; PID controller with integrated optimization for temperature	Yes; PID controller with integrated optimization for temperature
Counting and measuring		
• High-speed counter	Yes	Yes
Standards, approvals, certificates		
Highest safety class achievable in safety mode		
Probability of failure (for service life of 20 years and repair time of 100 hours)		
- Low demand mode: PFDavg in accordance with SIL3	< 2.00E-05	< 2.00E-05
- High demand/continuous mode: PFH in accordance with SIL3	< 1.00E-09 1/h	< 1.00E-09 1/h

Distributed Controllers
based on ET 200SP
ET 200SP Open Controllers

Fail-safe CPUs > CPU 1515SP PC F

■ Technical specifications (continued)

Article number	6ES7677-2FA31-0EB0	6ES7677-2FA41-0FB0
	CPU 1515SP PC F	CPU 1515SP PC F
Ambient conditions		
Ambient temperature during operation		
• min.	0 °C	0 °C
• max.	Up to 60 °C with max. 32 ET 200SP modules and 3x 100 mA USB load; up to 55 °C with max. 64 ET 200SP modules and 2x max. 500 mA and 1x max. 100 mA USB load	Up to 60 °C with max. 32 ET 200SP modules and 3x 100 mA USB load; up to 55 °C with max. 64 ET 200SP modules and 2x max. 500 mA and 1x max. 100 mA USB load
• horizontal installation, min.	0 °C	0 °C
• horizontal installation, max.	60 °C	60 °C
• vertical installation, min.	0 °C	0 °C
• vertical installation, max.	50 °C; With max. 32 ET 200SP modules and 3x 100 mA USB load	50 °C; With max. 32 ET 200SP modules and 3x 100 mA USB load
Operating systems		
pre-installed operating system	Windows Embedded Standard 7 E 32-bit	Windows Embedded Standard 7 P 64-bit
Configuration		
Programming		
Programming language		
- LAD	Yes; incl. failsafe	Yes; incl. failsafe
- FBD	Yes; incl. failsafe	Yes; incl. failsafe
- STL	Yes	Yes
- SCL	Yes	Yes
- CFC	No	No
- GRAPH	Yes	Yes
Know-how protection		
• User program protection/password protection	Yes	Yes
• Copy protection	Yes	Yes
• Block protection	Yes	Yes
Access protection		
• Protection level: Write protection	Yes	Yes
• Protection level: Read/write protection	Yes	Yes
• Protection level: Complete protection	Yes	Yes
Open Development interfaces		
• Size of ODK SO file, max.	3.8 Mbyte	3.8 Mbyte
Peripherals/Options		
Peripherals		
• SD card	Optionally for additional mass storage	Optionally for additional mass storage
Dimensions		
Width	160 mm	160 mm
Height	117 mm	117 mm
Depth	75 mm	75 mm
Weights		
Weight, approx.	0.83 kg	0.83 kg

■ Ordering data

	Article No.		Article No.
SIMATIC ET 200SP Open Controller CPU 1515SP PC F (+ HMI)		**Windows Embedded Standard 7 E 32-bit, 8 GB CFast card**	
Fail-safe ET 200SP CPU with Windows Embedded Standard 7 and pre-installed fail-safe SIMATIC S7-1500 Software Controller (with WinCC RT Advanced option)		• CPU 1515SP PC F (4 GB RAM)	6ES7677-2FA31-0EB0
		Windows Embedded Standard 7 P 64-bit (multi-touch), 16 GB CFast card	
Type of delivery: en, de, fr, it, es, zh		• CPU 1515SP PC F (4 GB RAM)	6ES7677-2FA41-0FB0
		• CPU 1515SP PC F + HMI 128PT (4 GB RAM)	6ES7677-2FA41-0FK0
		• CPU 1515SP PC F + HMI 512PT (4 GB RAM)	6ES7677-2FA41-0FL0
		• CPU 1515SP PC F + HMI 2048PT (4 GB RAM)	6ES7677-2FA41-0FM0

■ **Ordering data**

	Article No.		Article No.
Accessories		**STEP 7 Professional V15.1**	
Upgrade from SIMATIC S7-1500 Software Controller CPU 1505SP to SIMATIC Open Controller	6ES7672-5DC01-0YK0	Target system: SIMATIC S7-1200, S7-1500, S7-300, S7-400, WinAC	
From V 1.x to V 2.0; software download incl. documentation and license key		Requirement: Windows 7 Home Premium SP1 (64-bit) Windows 7 Professional SP1 (64-bit)	
Email address required for delivery		Windows 7 Enterprise SP1 (64-bit) Windows 7 Ultimate SP1 (64-bit)	
BusAdapter BA 2xRJ45	6ES7193-6AR00-0AA0	Windows 10 Home Version 1709, 1803	
BusAdapter BA 2xFC	6ES7193-6AF00-0AA0	Windows 10 Professional Version 1709, 1803	
BusAdapter BA 2xSCRJ	6ES7193-6AP00-0AA0	Windows 10 Enterprise Version 1709, 1803	
BusAdapter BA SCRJ/RJ45	6ES7193-6AP20-0AA0	Windows 10 Enterprise 2016 LTSB Windows 10 IoT Enterprise 2015 LTSB	
BusAdapter BA SCRJ/FC	6ES7193-6AP40-0AA0	Windows 10 IoT Enterprise 2016 LTSB	
For increased vibration and EMC loads		Windows Server 2012 R2 StdE (full installation) Windows Server 2016 Standard (full installation)	
BusAdapter BA 2XLC	6ES7193-6AG00-0AA0	Type of delivery: en, de, fr, es, it, zh	
BusAdapter BA LC/RJ45	6ES7193-6AG20-0AA0	STEP 7 Professional V15.1, floating license	6ES7822-1AA05-0YA5
BusAdapter BA LC/FC	6ES7193-6AG40-0AA0	STEP 7 Professional V15.1, floating license software download incl. license key [1]	6ES7822-1AE05-0YA5
CM DP for ET 200SP CPU	6ES7545-5DA00-0AB0	Email address required for delivery	
PROFIBUS DP master with electrical interface for connecting the ET 200SP CPUs to PROFIBUS at up to 12 Mbps		**SIMATIC ODK 1500S**	
Server module	6ES7193-6PA00-0AA0	Open Development Kit for support in developing Windows and real-time library functions for S7-1500 Software Controllers; supplied on DVD	6ES7806-2CD02-0YA0
Spare part			
Power supply connector	6ES7193-4JB00-0AA0	Open Development Kit for support in developing Windows and real-time library functions for S7-1500 Software Controllers; software download including license key [1]	6ES7806-2CD02-0YG0
Spare part; for connecting the 24 V DC supply voltage; with push-in terminals (10 units)		Email address required for delivery	
Equipment labeling plates	6ES7193-6LF30-0AW0	**SIMATIC WinCC Advanced V15.1**	
10 sheets of 16 plates		Engineering software in the TIA Portal; for engineering SIMATIC Panels, WinCC Runtime Advanced; runs with Windows 7 (64-bit), Windows 10 (64-bit), WinSrv 2012 R2/2016 (64-bit), Class A; 6 languages: en, de, fr, it, es, zh	
Labeling strips			
500 labeling strips on roll, light gray, for inscription with thermal transfer roll printer	6ES7193-6LR10-0AA0	• Floating license; software and documentation on DVD; license key on USB flash drive	6AV2102-0AA05-0AA5
1 000 labeling strips DIN A4, light gray, card, for inscription with laser printer	6ES7193-6LA10-0AA0	• Floating license; software, documentation and license key for download [1]: Email address required for delivery	6AV2102-0AA05-0AH5

[1] For up-to-date information and download availability, see: http://www.siemens.com/tia-online-software-delivery
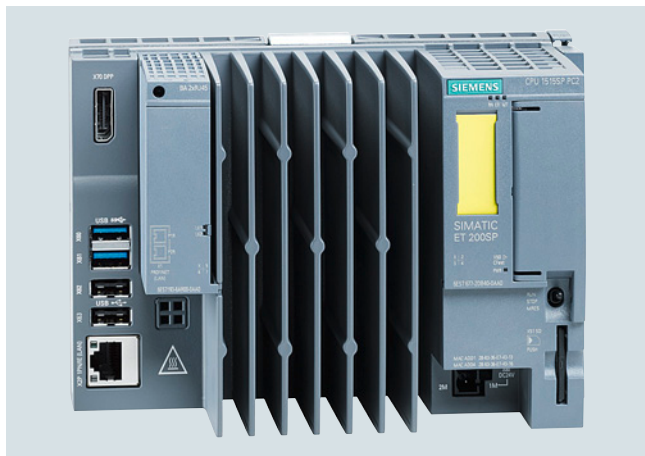
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Distributed Controllers
based on ET 200SP
ET 200SP Open Controllers

Fail-safe CPUs > CPU 1515SP PC2 F

■ Overview

ET 200SP Open Controller, CPU 1515SP PC2 F, combines robustness and compact dimensions with the flexibility of centralized or decentralized communication in the highest industrial functionality. Furthermore, the CPU offers the entire value added of the ET 200SP system, the S7-1500 controller family and the TIA world together.

- Rugged, compact control system
- Combines the functions of an ET 200SP controller with those of a PC-based platform
- Turnkey all-in-one controller
- Can be used up to safety class SIL3 (Safety Integrity Level) according to IEC 61508 2nd Edition or PL e (Performance Level) according to ISO 13849
- High performance automation tasks with the use of new generation Intel Quad Core processors
- Connects high-level language applications and processes high data volumes with support from SIMATIC ODK 1500S

■ Technical specifications

Article number	6ES7677-2SB42-0GB0
	CPU1515SP PC2 F
General information	
Product type designation	CPU 1515SP PC2 F
Engineering with	
• STEP 7 TIA Portal configurable/ integrated as of version	V15 with HSP 269
Installed software	
• Visualization	No
• Control	S7-1500 Software Controller CPU 1505SP F
Supply voltage	
Type of supply voltage	24 V DC
Processor	
Processor type	Intel Atom E3940, 1.6 GHz, 4 cores
Memory	
Type of memory	DDR3L
Main memory	8 GB RAM
CFast memory card	Yes; 30 GB flash memory
Work memory	
• integrated (for program)	1.5 Mbyte
• integrated (for data)	5 Mbyte
• integrated (for CPU function library of CPU Runtime)	20 Mbyte
Load memory	
• integrated (on PC mass storage)	320 Mbyte
CPU processing times	
for bit operations, typ.	10 ns
for word operations, typ.	12 ns
for fixed point arithmetic, typ.	16 ns
for floating point arithmetic, typ.	64 ns

Article number	6ES7677-2SB42-0GB0
	CPU1515SP PC2 F
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
IEC counter	
• Number	Any (only limited by the main memory)
S7 times	
• Number	2 048
IEC timer	
• Number	Any (only limited by the main memory)
Data areas and their retentivity	
Flag	
• Number, max.	16 kbyte
Address area	
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image
Hardware configuration	
Integrated power supply	Yes
Time of day	
Clock	
• Type	Hardware clock
• Hardware clock (real-time)	Yes; Resolution: 1 s
Interfaces	
Number of industrial Ethernet interfaces	2
Number of RS 485 interfaces	1; Via CM DP module
Number of USB interfaces	4; 2x USB 2.0, 2x USB 3.0 on front side
Number of SD card slots	1
Video interfaces	
• Graphics interface	1x DisplayPort

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■ **Technical specifications** (continued)

Article number	6ES7677-2SB42-0GB0
	CPU1515SP PC2 F
1. Interface	
Interface type	PROFINET
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Interface types	
• Number of ports	2
• integrated switch	Yes
• RJ 45 (Ethernet)	Yes; Via BusAdapter BA 2x RJ45
- Transmission rate, max.	100 Mbit/s
- Industrial Ethernet status LED	Yes
• BusAdapter (PROFINET)	Yes; Compatible BusAdapter: BA 2x RJ45, BA 2x FC, BA 2x SCRJ (from FS03, V2.2), BA SCRJ / RJ45 (from FS03, V3.1), BA SCRJ / FC (from FS03, V3.1), BA 2x LC (from FS03, V3.3), BA LC / RJ45 (from FS03, V3.3), BA LC / FC (from FS03, V3.3)
Protocols	
• Number of connections via this interface	88
• PROFINET IO controller	Yes
• PROFINET IO Device	Yes
• SIMATIC communication	Yes
• Open IE communication	Yes
• Web server	Yes
PROFINET IO controller	
Services	
- Isochronous mode	Yes
- shortest clock pulse	500 µs
- IRT	Yes
- MRP	Yes
- MRPD	Yes
- PROFIenergy	Yes
- Prioritized startup	Yes; Max. 32 PROFINET devices; if you want to use the "Prioritized startup" functionality in STEP 7 for the PROFINET interface of the CPU, the CPU and the device must be separated by means of a switch (e.g. SCALANCE X205)
- Number of connectable IO Devices, max.	128
- Of which IO devices with IRT, max.	64
- of which in line, max.	64
- Number of connectable IO Devices for RT, max.	128
- of which in line, max.	128
- Number of IO Devices that can be simultaneously activated/ deactivated, max.	8
- IO Devices changing during operation (partner ports), supported	Yes
- Number of IO Devices per tool, max.	8
- Updating times	The minimum value of the update time also depends on communi-cation share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data

Article number	6ES7677-2SB42-0GB0
	CPU1515SP PC2 F
Update time for IRT	
- for send cycle of 500 µs	500 µs to 8 ms
- for send cycle of 1 ms	1 ms to 16 ms
- for send cycle of 2 ms	2 ms to 32 ms
- for send cycle of 4 ms	4 ms to 64 ms
- With IRT and parameterization of "odd" send cycles	Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)
Update time for RT	
- for send cycle of 500 µs	500 µs to 256 ms
- for send cycle of 1 ms	1 ms to 512 ms
- for send cycle of 2 ms	2 ms to 512 ms
- for send cycle of 4 ms	4 ms to 512 ms
Address area	
- Inputs, max.	8 kbyte
- Outputs, max.	8 kbyte
PROFINET IO Device	
Services	
- Isochronous mode	No
- shortest clock pulse	500 µs
- IRT	Yes
- MRP	Yes
- MRPD	Yes
- PROFIenergy	Yes
- Prioritized startup	Yes
- Shared device	Yes
- Number of IO Controllers with shared device, max.	4
- Asset management record	Yes
2. Interface	
Interface type	Integrated Ethernet interface
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Interface types	
• Number of ports	1
• RJ 45 (Ethernet)	Yes; Integrated
- Transmission rate, max.	1 000 Mbit/s
- Industrial Ethernet status LED	No
3. Interface	
Interface type	PROFIBUS with CM DP
Interface types	
• RS 485	Yes
Protocols	
• Number of connections via this interface	44
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes
• SIMATIC communication	Yes

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Distributed Controllers
based on ET 200SP
ET 200SP Open Controllers

▪ Technical specifications (continued)

Article number	**6ES7677-2SB42-0GB0**
	CPU1515SP PC2 F
PROFIBUS DP master	
• Number of DP slaves, max.	125
Services	
- Equidistance	No
- Isochronous mode	No
Address area	
- Inputs, max.	8 kbyte
- Outputs, max.	8 kbyte
PROFIBUS DP slave	
Services	
- Equidistance	No
- Isochronous mode	No
Protocols	
Number of connections	
• Number of connections, max.	88
OPC UA	
• OPC UA client	Yes; From SW CPU 1505SP V2.6
• OPC UA server	Yes; Data access (read, write, subscribe), runtime license required
Supported technology objects	
Motion Control	Yes
• Number of available Motion Control resources for technology objects (except cam disks)	2 400
• Required Motion Control resources	
- per speed-controlled axis	40; per axis
- per positioning axis	80; per axis
- per synchronous axis	160; per axis
- per external encoder	80; per external encoder
- per output cam	20; per cam
- per cam track	160; per cam track
- per probe	40; per probe
Controller	
• PID_Compact	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves
• PID-Temp	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
• High-speed counter	Yes
Standards, approvals, certificates	
Highest safety class achievable in safety mode	
Probability of failure (for service life of 20 years and repair time of 100 hours)	
- Low demand mode: PFDavg in accordance with SIL3	< 2.00E-05
- High demand/continuous mode: PFH in accordance with SIL3	< 1.00E-09 1/h

Article number	**6ES7677-2SB42-0GB0**
	CPU1515SP PC2 F
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• max.	Up to 60 °C with max. 32 ET 200SP modules; up to 55 °C with max. 64 ET 200SP modules
• horizontal installation, min.	-20 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-20 °C
• vertical installation, max.	50 °C; With max. 32 ET 200SP modules
Operating systems	
pre-installed operating system	Windows 10 IoT Enterprise 2016 LTSB, 64bit, MUI
Configuration	
Programming	
Programming language	
- LAD	Yes; incl. failsafe
- FBD	Yes; incl. failsafe
- STL	Yes
- SCL	Yes
- CFC	No
- GRAPH	Yes
Know-how protection	
• User program protection/password protection	Yes
• Copy protection	Yes
• Block protection	Yes
Access protection	
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Complete protection	Yes
Open Development interfaces	
• Size of ODK SO file, max.	5.8 Mbyte
Peripherals/Options	
Peripherals	
• SD card	Optionally for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

Ordering data	Article No.
SIMATIC ET 200SP Open Controller CPU 1515SP PC2 F (+ HMI)	
Fail-safe ET 200SP CPU with Windows 10 IoT Enterprise 64-bit and pre-installed SIMATIC S7-1500 Failsafe Software Controller (with WinCC RT Advanced option); 8 GB RAM, 30 GB CFast card	
Type of delivery: en, de, fr, it, es, zh	
• CPU 1515SP PC2 F	**6ES7677-2SB42-0GB0**
With pre-installed WinCC RT Advanced	
• CPU 1515SP PC2 F + HMI 128PT	**6ES7677-2SB42-0GK0**
• CPU 1515SP PC2 F + HMI 512PT	**6ES7677-2SB42-0GL0**
• CPU 1515SP PC2 F + HMI 2048PT	**6ES7677-2SB42-0GM0**
Accessories	
Upgrade from SIMATIC S7-1500 Software Controller CPU 1505SP to SIMATIC Open Controller	**6ES7672-5DC01-0YK0**
From V 1.x to V 2.0; software download incl. documentation and license key	
Email address required for delivery	
BusAdapter BA 2xRJ45	**6ES7193-6AR00-0AA0**
BusAdapter BA 2xFC	**6ES7193-6AF00-0AA0**
BusAdapter BA 2xSCRJ	**6ES7193-6AP00-0AA0**
BusAdapter BA SCRJ/RJ45	**6ES7193-6AP20-0AA0**
BusAdapter BA SCRJ/FC	**6ES7193-6AP40-0AA0**
For increased vibration and EMC loads	
BusAdapter BA 2XLC	**6ES7193-6AG00-0AA0**
BusAdapter BA LC/RJ45	**6ES7193-6AG20-0AA0**
BusAdapter BA LC/FC	**6ES7193-6AG40-0AA0**
CM DP for ET 200SP CPU	**6ES7545-5DA00-0AB0**
PROFIBUS DP master with electrical interface for connecting the ET 200SP CPUs to PROFIBUS at up to 12 Mbps	
Server module	**6ES7193-6PA00-0AA0**
Spare part	
Power supply connector	**6ES7193-4JB00-0AA0**
Spare part; for connecting the 24 V DC supply voltage; with push-in terminals (10 units)	
Equipment labeling plates	**6ES7193-6LF30-0AW0**
10 sheets of 16 plates	
Labeling strips	
500 labeling strips on roll, light gray, for inscription with thermal transfer roll printer	**6ES7193-6LR10-0AA0**
1 000 labeling strips DIN A4, light gray, card, for inscription with laser printer	**6ES7193-6LA10-0AA0**

	Article No.
STEP 7 Professional V15.1	
Target system: SIMATIC S7-1200, S7-1500, S7-300, S7-400, WinAC	
Requirement: Windows 7 Home Premium SP1 (64-bit) Windows 7 Professional SP1 (64-bit) Windows 7 Enterprise SP1 (64-bit) Windows 7 Ultimate SP1 (64-bit) Windows 10 Home Version 1709, 1803 Windows 10 Professional Version 1709, 1803 Windows 10 Enterprise Version 1709, 1803 Windows 10 Enterprise 2016 LTSB Windows 10 IoT Enterprise 2015 LTSB Windows 10 IoT Enterprise 2016 LTSB Windows Server 2012 R2 StdE (full installation) Windows Server 2016 Standard (full installation)	
Type of delivery: en, de, fr, it, es, zh	
STEP 7 Professional V15.1, floating license	**6ES7822-1AA05-0YA5**
STEP 7 Professional V15.1, floating license software download incl. license key [1]	**6ES7822-1AE05-0YA5**
Email address required for delivery	
SIMATIC ODK 1500S	
Open Development Kit for support in developing Windows and real-time library functions for S7-1500 Software Controllers; supplied on DVD	**6ES7806-2CD03-0YA0**
Open Development Kit for support in developing Windows and real-time library functions for S7-1500 Software Controllers; software download including license key [1]	**6ES7806-2CD03-0YG0**
Email address required for delivery	
SIMATIC WinCC Advanced V15.1	
Engineering software in the TIA Portal; for engineering SIMATIC Panels, WinCC Runtime Advanced; runs with Windows 7 (64-bit), Windows 10 (64-bit), WinSrv 2012 R2/2016 (64-bit), Class A; 6 languages: en, de, fr, es, it, zh	
• Floating license; software and documentation on DVD; license key on USB flash drive	**6AV2102-0AA05-0AA5**
• Floating license; software, documentation and license key for download [1]: Email address required for delivery	**6AV2102-0AA05-0AH5**

[1] For up-to-date information and download availability, see: http://www.siemens.com/tia-online-software-delivery

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Distributed Controllers
based on ET 200SP
ET 200SP Open Controllers

Technology CPUs > CPU 1515SP PC2 T

Overview

ET 200SP Open Controller CPU 1515SP PC2 T combines robustness and compact dimensions with the flexibility of centralized or decentralized communication in the highest industrial functionality. Furthermore, the CPU offers the entire value added of the ET 200SP system, the S7-1500 controller family and the TIA world together.

- Rugged, compact control system
- Combines the functions of an ET 200SP controller with those of a PC-based platform
- Turnkey all-in-one controller
- High performance automation tasks with the use of new generation Intel Quad Core processors
- Connects high-level language applications and processes high data volumes with support from SIMATIC ODK 1500S

Technical specifications

Article number	6ES7677-2VB42-0GB0
	CPU1515SP PC2 T
General information	
Product type designation	CPU 1515SP PC2 T
Engineering with	
• STEP 7 TIA Portal configurable/ integrated as of version	V15 (FW V2.5)
Installed software	
• Visualization	No
• Control	S7-1500 Software Controller CPU 1505SP T
Supply voltage	
Type of supply voltage	24 V DC
Processor	
Processor type	Intel Atom E3940, 1.6 GHz, 4 cores
Memory	
Type of memory	DDR3L
Main memory	8 GB RAM
CFast memory card	Yes; 30 GB flash memory
Work memory	
• integrated (for program)	1 Mbyte
• integrated (for data)	5 Mbyte
• integrated (for CPU function library of CPU Runtime)	20 Mbyte
Load memory	
• integrated (on PC mass storage)	320 Mbyte
CPU processing times	
for bit operations, typ.	10 ns
for word operations, typ.	12 ns
for fixed point arithmetic, typ.	16 ns
for floating point arithmetic, typ.	64 ns

Article number	6ES7677-2VB42-0GB0
	CPU1515SP PC2 T
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
IEC counter	
• Number	Any (only limited by the main memory)
S7 times	
• Number	2 048
IEC timer	
• Number	Any (only limited by the main memory)
Data areas and their retentivity	
Flag	
• Number, max.	16 kbyte
Address area	
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image
Hardware configuration	
Integrated power supply	Yes
Time of day	
Clock	
• Type	Hardware clock
• Hardware clock (real-time)	Yes; Resolution: 1 s
Interfaces	
Number of industrial Ethernet interfaces	2
Number of RS 485 interfaces	1; Via CM DP module
Number of USB interfaces	4; 2x USB 2.0, 2x USB 3.0 on front side
Number of SD card slots	1
Video interfaces	
• Graphics interface	1x DisplayPort

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■ **Technical specifications** (continued)

Article number	6ES7677-2VB42-0GB0
	CPU1515SP PC2 T
1. Interface	
Interface type	PROFINET
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Interface types	
• Number of ports	2
• integrated switch	Yes
• RJ 45 (Ethernet)	Yes; Via BusAdapter BA 2x RJ45
- Transmission rate, max.	100 Mbit/s
- Industrial Ethernet status LED	Yes
• BusAdapter (PROFINET)	Yes; Compatible BusAdapter: BA 2x RJ45, BA 2x FC, BA 2x SCRJ (from FS03, V2.2), BA SCRJ / RJ45 (from FS03, V3.1), BA SCRJ / FC (from FS03, V3.1), BA 2x LC (from FS03, V3.3), BA LC / RJ45 (from FS03, V3.3), BA LC / FC (from FS03, V3.3)
Protocols	
• Number of connections via this interface	88
• PROFINET IO controller	Yes
• PROFINET IO Device	Yes
• SIMATIC communication	Yes
• Open IE communication	Yes
• Web server	Yes
PROFINET IO controller	
Services	
- Isochronous mode	Yes
- shortest clock pulse	500 µs
- IRT	Yes
- MRP	Yes
- MRPD	Yes
- PROFIenergy	Yes
- Prioritized startup	Yes; Max. 32 PROFINET devices; if you want to use the "Prioritized startup" functionality in STEP 7 for the PROFINET interface of the CPU, the CPU and the device must be separated by means of a switch (e.g. SCALANCE X205)
- Number of connectable IO Devices, max.	128
- Of which IO devices with IRT, max.	64
- of which in line, max.	64
- Number of connectable IO Devices for RT, max.	128
- of which in line, max.	128
- Number of IO Devices that can be simultaneously activated/ deactivated, max.	8
- IO Devices changing during operation (partner ports), supported	Yes
- Number of IO Devices per tool, max.	8
- Updating times	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data

Article number	6ES7677-2VB42-0GB0
	CPU1515SP PC2 T
Update time for IRT	
- for send cycle of 500 µs	500 µs to 8 ms
- for send cycle of 1 ms	1 ms to 16 ms
- for send cycle of 2 ms	2 ms to 32 ms
- for send cycle of 4 ms	4 ms to 64 ms
- With IRT and parameterization of "odd" send cycles	Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)
Update time for RT	
- for send cycle of 500 µs	500 µs to 256 ms
- for send cycle of 1 ms	1 ms to 512 ms
- for send cycle of 2 ms	2 ms to 512 ms
- for send cycle of 4 ms	4 ms to 512 ms
Address area	
- Inputs, max.	8 kbyte
- Outputs, max.	8 kbyte
PROFINET IO Device	
Services	
- Isochronous mode	No
- shortest clock pulse	500 µs
- IRT	Yes
- MRP	Yes
- MRPD	Yes
- PROFIenergy	Yes
- Prioritized startup	Yes
- Shared device	Yes
- Number of IO Controllers with shared device, max.	4
- Asset management record	Yes
2. Interface	
Interface type	Integrated Ethernet interface
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Interface types	
• Number of ports	1
• RJ 45 (Ethernet)	Yes; Integrated
- Transmission rate, max.	1 000 Mbit/s
- Industrial Ethernet status LED	No

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Distributed Controllers
based on ET 200SP
ET 200SP Open Controllers

Technology CPUs   > CPU 1515SP PC2 T

■ **Technical specifications** (continued)

Article number	6ES7677-2VB42-0GB0
	CPU1515SP PC2 T
3. Interface	
Interface type	PROFIBUS with CM DP
Interface types	
• RS 485	Yes
Protocols	
• Number of connections via this interface	44
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes
• SIMATIC communication	Yes
PROFIBUS DP master	
• Number of DP slaves, max.	125
Services	
- Equidistance	No
- Isochronous mode	No
Address area	
- Inputs, max.	8 kbyte
- Outputs, max.	8 kbyte
PROFIBUS DP slave	
Services	
- Equidistance	No
- Isochronous mode	No
Protocols	
Number of connections	
• Number of connections, max.	88
OPC UA	
• OPC UA client	Yes; From SW CPU 1505SP V2.6
• OPC UA server	Yes; Data access (read, write, subscribe), runtime license required
Supported technology objects	
Motion Control	Yes
• Number of available Motion Control resources for technology objects (except cam disks)	2 400
• Required Motion Control resources	
- per speed-controlled axis	40; per axis
- per positioning axis	80; per axis
- per synchronous axis	160; per axis
- per external encoder	80; per external encoder
- per output cam	20; per cam
- per cam track	160; per cam track
- per probe	40; per probe
• Number of available Extended Motion Control resources for technology objects	120
• Required Extended Motion Control resources	
- for each cam	2
- for each set of kinematics	30
Controller	
• PID_Compact	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves
• PID-Temp	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
• High-speed counter	Yes

Article number	6ES7677-2VB42-0GB0
	CPU1515SP PC2 T
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• max.	Up to 60 °C with max. 32 ET 200SP modules; up to 55 °C with max. 64 ET 200SP modules
• horizontal installation, min.	-20 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-20 °C
• vertical installation, max.	50 °C; With max. 32 ET 200SP modules
Operating systems	
pre-installed operating system	Windows 10 IoT Enterprise 2016 LTSB, 64bit, MUI
Configuration	
Programming	
Programming language	
- LAD	Yes
- FBD	Yes
- STL	Yes
- SCL	Yes
- CFC	No
- GRAPH	Yes
Know-how protection	
• User program protection/password protection	Yes
• Copy protection	Yes
• Block protection	Yes
Access protection	
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Complete protection	Yes
Open Development interfaces	
• Size of ODK SO file, max.	5.8 Mbyte
Peripherals/Options	
Peripherals	
• SD card	Optionally for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

■ Ordering data	Article No.		Article No.

		STEP 7 Professional V15.1	
SIMATIC ET 200SP Open Controller CPU 1515SP PC2 T		Target system: SIMATIC S7-1200, S7-1500, S7-300, S7-400, WinAC Requirement: Windows 7 Home Premium SP1 (64-bit) Windows 7 Professional SP1 (64-bit) Windows 7 Enterprise SP1 (64-bit) Windows 7 Ultimate SP1 (64-bit) Windows 10 Home Version 1709, 1803 Windows 10 Professional Version 1709, 1803 Windows 10 Enterprise Version 1709, 1803 Windows 10 Enterprise 2016 LTSB Windows 10 IoT Enterprise 2015 LTSB Windows 10 IoT Enterprise 2016 LTSB Windows Server 2012 R2 StdE (full installation) Windows Server 2016 Standard (full installation) Type of delivery: en, de, fr, it, es, zh	
ET 200SP CPU with Windows 10 IoT Enterprise 64-bit and pre-installed SIMATIC S7-1500 Software Controller; 8 GB RAM, 30 GB CFast card; with enhanced motion control functionality			
Type of delivery: en, de, fr, it, es, zh			
• CPU 1515SP PC2 T	**6ES7677-2VB42-0GB0**		
Accessories			
Upgrade from SIMATIC S7-1500 Software Controller CPU 1505SP to SIMATIC Open Controller	**6ES7672-5DC01-0YK0**		
From V 1.x to V 2.0; software download incl. documentation and license key		STEP 7 Professional V15.1, floating license	**6ES7822-1AA05-0YA5**
Email address required for delivery		STEP 7 Professional V15.1, floating license software download incl. license key [1]	**6ES7822-1AE05-0YA5**
BusAdapter BA 2xRJ45	**6ES7193-6AR00-0AA0**		
BusAdapter BA 2xFC	**6ES7193-6AF00-0AA0**	Email address required for delivery	
BusAdapter BA 2xSCRJ	**6ES7193-6AP00-0AA0**	**SIMATIC ODK 1500S**	
BusAdapter BA SCRJ/RJ45	**6ES7193-6AP20-0AA0**	Open Development Kit for support in developing Windows and real-time library functions for S7-1500 Software Controllers; supplied on DVD	**6ES7806-2CD03-0YA0**
BusAdapter BA SCRJ/FC	**6ES7193-6AP40-0AA0**		
For increased vibration and EMC loads			
BusAdapter BA 2XLC	**6ES7193-6AG00-0AA0**	Open Development Kit for support in developing Windows and real-time library functions for S7-1500 Software Controllers; software download including license key [1]	**6ES7806-2CD03-0YG0**
BusAdapter BA LC/RJ45	**6ES7193-6AG20-0AA0**		
BusAdapter BA LC/FC	**6ES7193-6AG40-0AA0**		
CM DP for ET 200SP CPU	**6ES7545-5DA00-0AB0**		
PROFIBUS DP master with electrical interface for connecting the ET 200SP CPUs to PROFIBUS at up to 12 Mbps		Email address required for delivery	
Server module	**6ES7193-6PA00-0AA0**	**SIMATIC WinCC Advanced V15.1**	
Spare part		Engineering software in the TIA Portal; for engineering SIMATIC Panels, WinCC Runtime Advanced; runs with Windows 7 (64-bit), Windows 10 (64-bit), WinSrv 2012 R2/2016 (64-bit), Class A; 6 languages: en, de, fr, it, es, zh	
Power supply connector	**6ES7193-4JB00-0AA0**		
Spare part; for connecting the 24 V DC supply voltage; with push-in terminals (10 units)			
Equipment labeling plates	**6ES7193-6LF30-0AW0**	• Floating license; software and documentation on DVD; license key on USB flash drive	**6AV2102-0AA05-0AA5**
10 sheets of 16 plates			
Labeling strips		• Floating license; software, documentation and license key for download [1]: Email address required for delivery	**6AV2102-0AA05-0AH5**
500 labeling strips on roll, light gray, for inscription with thermal transfer roll printer	**6ES7193-6LR10-0AA0**		
1 000 labeling strips DIN A4, light gray, card, for inscription with laser printer	**6ES7193-6LA10-0AA0**		

[1] For up-to-date information and download availability, see:
http://www.siemens.com/tia-online-software-delivery

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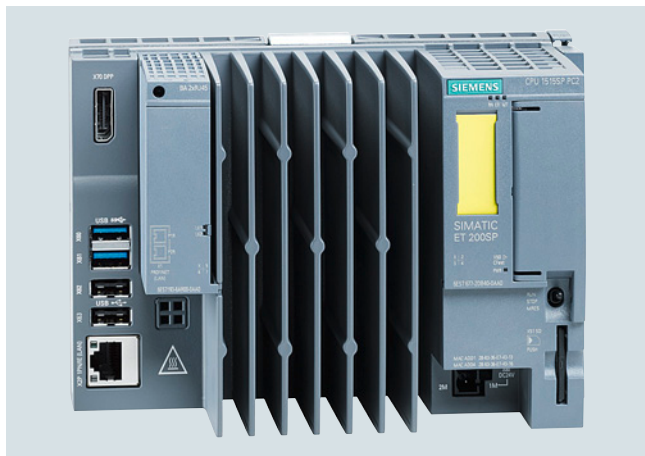# Distributed Controllers
based on ET 200SP
ET 200SP Open Controllers

■ Overview

ET 200SP Open Controller, CPU 1515SP PC2 TF, combines robustness and compact dimensions with the flexibility of centralized or decentralized communication in the highest industrial functionality. Furthermore, the CPU offers the entire value added of the ET 200SP system, the S7-1500 controller family and the TIA world together.

- Rugged, compact control system
- Combines the functions of a ET 200SP controller with those of a PC-based platform
- Turnkey all-in-one controller
- Can be used up to safety class SIL3 (Safety Integrity Level) according to IEC 61508 2nd Edition or PL e (Performance Level) according to ISO 13849
- High performance automation tasks with the use of new generation Intel Quad Core processors
- Connects high-level language applications and processes high data volumes with support from SIMATIC ODK 1500S

■ Technical specifications

Article number	6ES7677-2WB42-0GB0
	CPU1515SP PC2 TF
General information	
Product type designation	CPU 1515SP PC2 TF
Engineering with	
• STEP 7 TIA Portal configurable/ integrated as of version	V15 (FW V2.5)
Installed software	
• Visualization	No
• Control	S7-1500 Software Controller CPU 1505SP TF
Supply voltage	
Type of supply voltage	24 V DC
Processor	
Processor type	Intel Atom E3940, 1.6 GHz, 4 cores
Memory	
Type of memory	DDR3L
Main memory	8 GB RAM
CFast memory card	Yes; 30 GB flash memory
Work memory	
• integrated (for program)	1.5 Mbyte
• integrated (for data)	5 Mbyte
• integrated (for CPU function library of CPU Runtime)	20 Mbyte
Load memory	
• integrated (on PC mass storage)	320 Mbyte
CPU processing times	
for bit operations, typ.	10 ns
for word operations, typ.	12 ns
for fixed point arithmetic, typ.	16 ns
for floating point arithmetic, typ.	64 ns

Article number	6ES7677-2WB42-0GB0
	CPU1515SP PC2 TF
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
IEC counter	
• Number	Any (only limited by the main memory)
S7 times	
• Number	2 048
IEC timer	
• Number	Any (only limited by the main memory)
Data areas and their retentivity	
Flag	
• Number, max.	16 kbyte
Address area	
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image
Hardware configuration	
Integrated power supply	Yes
Time of day	
Clock	
• Type	Hardware clock
• Hardware clock (real-time)	Yes; Resolution: 1 s
Interfaces	
Number of industrial Ethernet interfaces	2
Number of RS 485 interfaces	1; Via CM DP module
Number of USB interfaces	4; 2x USB 2.0, 2x USB 3.0 on front side
Number of SD card slots	1
Video interfaces	
• Graphics interface	1x DisplayPort

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Technical specifications (continued)

Article number	6ES7677-2WB42-0GB0
	CPU1515SP PC2 TF
1. Interface	
Interface type	PROFINET
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Interface types	
• Number of ports	2
• integrated switch	Yes
• RJ 45 (Ethernet)	Yes; Via BusAdapter BA 2x RJ45
- Transmission rate, max.	100 Mbit/s
- Industrial Ethernet status LED	Yes
• BusAdapter (PROFINET)	Yes; Compatible BusAdapter: BA 2x RJ45, BA 2x FC, BA 2x SCRJ (from FS03, V2.2), BA SCRJ / RJ45 (from FS03, V3.1), BA SCRJ / FC (from FS03, V3.1), BA 2x LC (from FS03, V3.3), BA LC / RJ45 (from FS03, V3.3), BA LC / FC (from FS03, V3.3)
Protocols	
• Number of connections via this interface	88
• PROFINET IO controller	Yes
• PROFINET IO Device	Yes
• SIMATIC communication	Yes
• Open IE communication	Yes
• Web server	Yes
PROFINET IO controller	
Services	
- Isochronous mode	Yes
- shortest clock pulse	500 µs
- IRT	Yes
- MRP	Yes
- MRPD	Yes
- PROFIenergy	Yes
- Prioritized startup	Yes; Max. 32 PROFINET devices; if you want to use the "Prioritized startup" functionality in STEP 7 for the PROFINET interface of the CPU, the CPU and the device must be separated by means of a switch (e.g. SCALANCE X205)
- Number of connectable IO Devices, max.	128
- Of which IO devices with IRT, max.	64
- of which in line, max.	64
- Number of connectable IO Devices for RT, max.	128
- of which in line, max.	128
- Number of IO Devices that can be simultaneously activated/deactivated, max.	8
- IO Devices changing during operation (partner ports), supported	Yes
- Number of IO Devices per tool, max.	8
- Updating times	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data

Article number	6ES7677-2WB42-0GB0
	CPU1515SP PC2 TF
Update time for IRT	
- for send cycle of 500 µs	500 µs to 8 ms
- for send cycle of 1 ms	1 ms to 16 ms
- for send cycle of 2 ms	2 ms to 32 ms
- for send cycle of 4 ms	4 ms to 64 ms
- With IRT and parameterization of "odd" send cycles	Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)
Update time for RT	
- for send cycle of 500 µs	500 µs to 256 ms
- for send cycle of 1 ms	1 ms to 512 ms
- for send cycle of 2 ms	2 ms to 512 ms
- for send cycle of 4 ms	4 ms to 512 ms
Address area	
- Inputs, max.	8 kbyte
- Outputs, max.	8 kbyte
PROFINET IO Device	
Services	
- Isochronous mode	No
- shortest clock pulse	500 µs
- IRT	Yes
- MRP	Yes
- MRPD	Yes
- PROFIenergy	Yes
- Prioritized startup	Yes
- Shared device	Yes
- Number of IO Controllers with shared device, max.	4
- Asset management record	Yes
2. Interface	
Interface type	Integrated Ethernet interface
automatic detection of transmission rate	Yes
Autonegotiation	Yes
Autocrossing	Yes
Interface types	
• Number of ports	1
• RJ 45 (Ethernet)	Yes; Integrated
- Transmission rate, max.	1 000 Mbit/s
- Industrial Ethernet status LED	No
3. Interface	
Interface type	PROFIBUS with CM DP
Interface types	
• RS 485	Yes
Protocols	
• Number of connections via this interface	44
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes
• SIMATIC communication	Yes

Distributed Controllers
based on ET 200SP
ET 200SP Open Controllers

■ **Technical specifications** (continued)

Article number	**6ES7677-2WB42-0GB0**
	CPU1515SP PC2 TF
PROFIBUS DP master	
• Number of DP slaves, max.	125
Services	
- Equidistance	No
- Isochronous mode	No
Address area	
- Inputs, max.	8 kbyte
- Outputs, max.	8 kbyte
PROFIBUS DP slave	
Services	
- Equidistance	No
- Isochronous mode	No
Protocols	
Number of connections	
• Number of connections, max.	88
OPC UA	
• OPC UA client	Yes; From SW CPU 1505SP V2.6
• OPC UA server	Yes; Data access (read, write, subscribe), runtime license required
Supported technology objects	
Motion Control	Yes
• Number of available Motion Control resources for technology objects (except cam disks)	2 400
• Required Motion Control resources	
- per speed-controlled axis	40; per axis
- per positioning axis	80; per axis
- per synchronous axis	160; per axis
- per external encoder	80; per external encoder
- per output cam	20; per cam
- per cam track	160; per cam track
- per probe	40; per probe
• Number of available Extended Motion Control resources for technology objects	120
• Required Extended Motion Control resources	
- for each cam	2
- for each set of kinematics	30
Controller	
• PID_Compact	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves
• PID-Temp	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
• High-speed counter	Yes
Standards, approvals, certificates	
Highest safety class achievable in safety mode	
Probability of failure (for service life of 20 years and repair time of 100 hours)	
- Low demand mode: PFDavg in accordance with SIL3	< 2.00E-05
- High demand/continuous mode: PFH in accordance with SIL3	< 1.00E-09 1/h

Article number	**6ES7677-2WB42-0GB0**
	CPU1515SP PC2 TF
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• max.	Up to 60 °C with max. 32 ET 200SP modules; up to 55 °C with max. 64 ET 200SP modules
• horizontal installation, min.	-20 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-20 °C
• vertical installation, max.	50 °C; With max. 32 ET 200SP modules
Operating systems	
pre-installed operating system	Windows 10 IoT Enterprise 2016 LTSB, 64bit, MUI
Configuration	
Programming	
Programming language	
- LAD	Yes; incl. failsafe
- FBD	Yes; incl. failsafe
- STL	Yes
- SCL	Yes
- CFC	No
- GRAPH	Yes
Know-how protection	
• User program protection/ password protection	Yes
• Copy protection	Yes
• Block protection	Yes
Access protection	
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Complete protection	Yes
Open Development interfaces	
• Size of ODK SO file, max.	5.8 Mbyte
Peripherals/Options	
Peripherals	
• SD card	Optionally for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

■ Ordering data	Article No.		Article No.
SIMATIC ET 200SP Open Controller CPU 1515SP PC2 TF		**STEP 7 Professional V15.1**	
Fail-safe ET 200SP CPU with Windows 10 IoT Enterprise 64-bit and pre-installed fail-safe SIMATIC S7-1500 Software Controller; 8 GB RAM, 30 GB CFast card; with enhanced motion control functionality		Target system: SIMATIC S7-1200, S7-1500, S7-300, S7-400, WinAC	
		Requirement: Windows 7 Home Premium SP1 (64-bit) Windows 7 Professional SP1 (64-bit) Windows 7 Enterprise SP1 (64-bit) Windows 7 Ultimate SP1 (64-bit) Windows 10 Home Version 1709, 1803 Windows 10 Professional Version 1709, 1803 Windows 10 Enterprise Version 1709, 1803 Windows 10 Enterprise 2016 LTSB Windows 10 IoT Enterprise 2015 LTSB Windows 10 IoT Enterprise 2016 LTSB Windows Server 2012 R2 StdE (full installation) Windows Server 2016 Standard (full installation)	
Type of delivery: en, de, fr, it, es, zh			
• CPU 1515SP PC2 TF	6ES7677-2WB42-0GB0	Type of delivery: en, de, fr, it, es, zh	
Accessories		STEP 7 Professional V15.1, floating license	6ES7822-1AA05-0YA5
Upgrade from SIMATIC S7-1500 Software Controller CPU 1505SP to SIMATIC Open Controller	6ES7672-5DC01-0YK0	STEP 7 Professional V15.1, floating license software download incl. license key [1]	6ES7822-1AE05-0YA5
From V 1.x to V 2.0; software download incl. documentation and license key		Email address required for delivery	
Email address required for delivery		**SIMATIC ODK 1500S**	
BusAdapter BA 2xRJ45	6ES7193-6AR00-0AA0	Open Development Kit for support in developing Windows and real-time library functions for S7-1500 Software Controllers; supplied on DVD	6ES7806-2CD03-0YA0
BusAdapter BA 2xFC	6ES7193-6AF00-0AA0		
BusAdapter BA 2xSCRJ	6ES7193-6AP00-0AA0		
BusAdapter BA SCRJ/RJ45	6ES7193-6AP20-0AA0		
BusAdapter BA SCRJ/FC	6ES7193-6AP40-0AA0	Open Development Kit for support in developing Windows and real-time library functions for S7-1500 Software Controllers; software download including license key [1]	6ES7806-2CD03-0YG0
For increased vibration and EMC loads			
BusAdapter BA 2XLC	6ES7193-6AG00-0AA0		
BusAdapter BA LC/RJ45	6ES7193-6AG20-0AA0	Email address required for delivery	
BusAdapter BA LC/FC	6ES7193-6AG40-0AA0	**SIMATIC WinCC Advanced V15.1**	
CM DP for ET 200SP CPU	6ES7545-5DA00-0AB0	Engineering software in the TIA Portal; for engineering SIMATIC Panels, WinCC Runtime Advanced; runs with Windows 7 (64-bit), Windows 10 (64-bit), WinSrv 2012 R2/2016 (64-bit), Class A; 6 languages: en, de, fr, it, es, zh	
PROFIBUS DP master with electrical interface for connecting the ET 200SP CPUs to PROFIBUS at up to 12 Mbps			
Server module	6ES7193-6PA00-0AA0		
Spare part			
Power supply connector	6ES7193-4JB00-0AA0	• Floating license; software and documentation on DVD; license key on USB flash drive	6AV2102-0AA05-0AA5
Spare part; for connecting the 24 V DC supply voltage; with push-in terminals (10 units)			
Equipment labeling plates	6ES7193-6LF30-0AW0	• Floating license; software, documentation and license key for download [1]: Email address required for delivery	6AV2102-0AA05-0AH5
10 sheets of 16 plates			
Labeling strips			
500 labeling strips on roll, light gray, for inscription with thermal transfer roll printer	6ES7193-6LR10-0AA0		
1 000 labeling strips DIN A4, light gray, card, for inscription with laser printer	6ES7193-6LA10-0AA0		

[1] For up-to-date information and download availability, see: http://www.siemens.com/tia-online-software-delivery
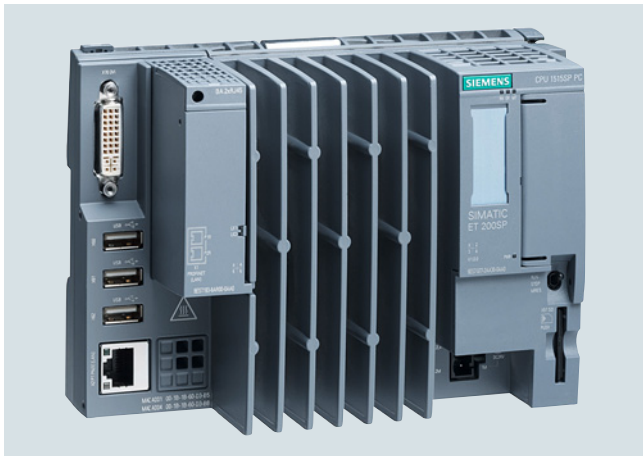
Distributed Controllers
based on ET 200SP
SIPLUS ET 200SP Open Controller

SIPLUS CPU 1515SP PC

Overview

- Turnkey, all-in-one solution with pre-installed SIMATIC S7-1500 Software Controller Standard or fail-safe, optionally pre-installed WinCC Runtime Advanced
- Fail-safe versions make it possible to control machines or plants in a fail-safe environment. This makes it possible to address applications which require an SIL3 (Safety Integrity Level) safety class according to IEC 61508 2nd Edition or a PL e (Performance Level) according to ISO 13849.
- Central expansion via ET 200SP modules (station width up to 1 m or up to 64 modules)
- SIMATIC Hypervisor: for separating Windows systems from control functions
- Dual-core processor for optimal use of the hypervisor

- Swappable flash memory (CFast card) for operating system, runtime and project data
- Integrated DVI-I graphics connection; 3x USB 2.0 connection
- 2 PROFINET interfaces:
  X1 via PN-IO bus adapter (RJ45 or FC) with 2 ports;
  X2: GB Ethernet interface (RJ45)
- PROFINET IRT
- Open Ethernet communication (TCP/IP, UDP, Iso-on-TCP)
- Web server functionality for information, status, diagnostics and user-defined web pages
- PROFIBUS DP communication optionally via CM DP module as DP master
- Configuration control (option handling)
- Improved know-how and copy protection; Security Integrated
- Integrated system diagnostics
- Integrated motion control functionalities for controlling speed-controlled and positioning axes with support for external encoders.
- Trace function
- Especially suitable for high data volumes and user-specific, open applications
- Integration of control functions and applications implemented in C/C++ (using SIMATIC ODK-1500S Open Development Kit)

Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme specific information was added.

Technical specifications

Article number	6AG1677-2AA31-4EB0	6AG1677-2AA40-4AA0
Based on	6ES7677-2AA31-0EB0	6ES7677-2AA40-0AA0
	SIPLUS ET 200SP CPU 1515SP PC 4GB	SIPLUS ET 200SP CPU 1515SP PC SPARE 4GB; **Spare part (module without CFast card and without installed software)**
Ambient conditions		
Ambient temperature during operation		
• min.	0 °C; = Tmin (incl. condensation/frost)	0 °C; = Tmin (incl. condensation/frost)
• max.	60 °C; Up to 60 °C with max. 32 ET 200SP modules and 3x 100 mA USB load; up to 55 °C with max. 64 ET 200SP modules and 2x max. 500 mA and 1x max. 100 mA USB load	60 °C; Up to 60 °C with max. 32 ET 200SP modules and 3x 100 mA USB load; up to 55 °C with max. 64 ET 200SP modules and 2x max. 500 mA and 1x max. 100 mA USB load
• horizontal installation, min.	0 °C; = Tmin	0 °C; = Tmin
• horizontal installation, max.	60 °C; = Tmax; up to 60 °C with max. 32 ET 200SP modules and 3x 100 mA USB load; up to 55 °C with max. 64 ET 200SP modules and 2x max. 500 mA and 1x max. 100 mA USB load	60 °C; = Tmax; up to 60 °C with max. 32 ET 200SP modules and 3x 100 mA USB load; up to 55 °C with max. 64 ET 200SP modules and 2x max. 500 mA and 1x max. 100 mA USB load
• vertical installation, min.	0 °C; = Tmin	0 °C; = Tmin
• vertical installation, max.	50 °C; = Tmax; at max. 32 ET 200SP modules and 3x 100 mA USB load	50 °C; = Tmax; at max. 32 ET 200SP modules and 3x 100 mA USB load
Altitude during operation relating to sea level		
• Installation altitude above sea level, max.	5 000 m	5 000 m
• Ambient air temperature-barometric pressure-altitude	Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m) // Tmin ... (Tmax - 10 K) at 795 hPa ... 658 hPa (+2 000 m ... +3 500 m) // Tmin ... (Tmax -20 K) at 658 hPa ... 540 hPa (+3 500 m ... +5 000 m)	Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m) // Tmin ... (Tmax - 10 K) at 795 hPa ... 658 hPa (+2 000 m ... +3 500 m) // Tmin ... (Tmax -20 K) at 658 hPa ... 540 hPa (+3 500 m ... +5 000 m)

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Technical specifications (continued)

Article number	**6AG1677-2AA31-4EB0**	**6AG1677-2AA40-4AA0**
Based on	**6ES7677-2AA31-0EB0**	**6ES7677-2AA40-0AA0**
	SIPLUS ET 200SP CPU 1515SP PC 4GB	SIPLUS ET 200SP CPU 1515SP PC SPARE 4GB; **Spare part (module without CFast card and without installed software)**
Relative humidity		
• With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation / frost (no commissioning in bedewed state), horizontal installation	100 %; RH incl. condensation / frost (no commissioning in bedewed state), horizontal installation
Resistance		
Coolants and lubricants		
- Resistant to commercially available coolants and lubricants	Yes; Incl. diesel and oil droplets in the air	Yes; Incl. diesel and oil droplets in the air
Use in stationary industrial systems		
- to biologically active substances according to EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request
- to chemically active substances according to EN 60721-3-3	Yes; Class 3C4 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *	Yes; Class 3C4 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
- to mechanically active substances according to EN 60721-3-3	Yes; Class 3S4 incl. sand, dust, *	Yes; Class 3S4 incl. sand, dust, *
Use on ships/at sea		
- to biologically active substances according to EN 60721-3-6	Yes; Class 6B2 mold and fungal spores (excluding fauna); Class 6B3 on request	Yes; Class 6B2 mold and fungal spores (excluding fauna); Class 6B3 on request
- to chemically active substances according to EN 60721-3-6	Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *	Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
- to mechanically active substances according to EN 60721-3-6	Yes; Class 6S3 incl. sand, dust; *	Yes; Class 6S3 incl. sand, dust; *
Remark		
- Note regarding classification of environmental conditions acc. to EN 60721	* The supplied plug covers must remain in place over the unused interfaces during operation!	* The supplied plug covers must remain in place over the unused interfaces during operation!
Conformal coating		
• Coatings for printed circuit board assemblies acc. to EN 61086	Yes; Class 2 for high availability	Yes; Class 2 for high availability
• Protection against fouling acc. to EN 60664-3	Yes; Type 1 protection	Yes; Type 1 protection
• Military testing according to MIL-I-46058C, Amendment 7	Yes; Discoloration of coating possible during service life	Yes; Discoloration of coating possible during service life
• Qualification and Performance of Electrical Insulating Compound for Printed Board Assemblies according to IPC-CC-830A	Yes; Conformal coating, Class A	Yes; Conformal coating, Class A

Ordering data

	Article No.		Article No.
SIPLUS ET 200SP Open Controller CPU 1515SP PC		**Accessories**	
(Extended temperature range and exposure to environmental substances)		**BusAdapter BA 2xRJ45**	**6AG1193-6AR00-7AA0**
ET 200SP CPU with Windows Embedded Standard 7 and pre-installed controller, SIMATIC S7-1500 Software Controller (optionally with WinCC RT Advanced);		(Extended temperature range and exposure to environmental substances)	
Type of delivery: en, de, fr, it, es, zh		**BusAdapter BA 2xFC for increased vibration and EMC loads**	**6AG1193-6AF00-7AA0**
Windows Embedded Standard 7 E 32-bit, 8 GB CFast card		(Extended temperature range and exposure to environmental substances)	
• CPU 1515SP PC (4 GB RAM)	**6AG1677-2AA31-4EB0**	**Other accessories**	See SIMATIC CPU 1515SP PC, page 7/32
Spare part (module without CFast card and without installed software)			
• CPU 1515SP PC (4 GB RAM)	**6AG1677-2AA40-4AA0**		

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Distributed Controllers
based on ET 200Pro
Standard CPUs

IM 154-8 PN/DP CPU

◼ Overview

- CPU with PLC functionality equivalent to S7-315-2 PN/DP provides distributed intelligence for preprocessing
- Interface module for exchanging pre-processed I/O data between the ET 200pro and a higher-level master/IO controller via PROFIBUS DP/PROFINET IO
- PROFINET IO controller for operating distributed I/O on PROFINET
- Component Based Automation (CBA) on PROFINET
- PROFINET proxy for intelligent devices on PROFIBUS DP in Component Based Automation (CBA)
- PROFINET interface with 3-port switch
- Isochronous mode on PROFIBUS or PROFINET
- Integrated web server with the option of creating user-defined web pages
- CPU with PLC functionality equivalent to S7-315-2 PN/DP provides distributed intelligence for preprocessing
- Fast, simple and end-to-end programming of a system with modular programs via STEP 7
- Fail-safe IM 154-8F PN/DP CPU PROFIsafe available

Note:

SIMATIC Micro Memory Card required for operation of CPU.

◼ Technical specifications

Article number	6ES7154-8AB01-0AB0
	ET 200pro: IM 154-8 PN/DP CPU, 384KB
Supply voltage	
Rated value (DC)	24 V
Power loss	
Power loss, typ.	8.5 W
Memory	
Work memory	
• integrated	384 kbyte
• expandable	No
Load memory	
• Plug-in (MMC), max.	8 Mbyte
CPU processing times	
for bit operations, typ.	0.05 µs
for word operations, typ.	0.09 µs
for fixed point arithmetic, typ.	0.12 µs
for floating point arithmetic, typ.	0.45 µs
Counters, timers and their retentivity	
S7 counter	
• Number	256
IEC counter	
• present	Yes
S7 times	
• Number	256
IEC timer	
• present	Yes
Data areas and their retentivity	
Flag	
• Number, max.	2 048 byte

Article number	6ES7154-8AB01-0AB0
	ET 200pro: IM 154-8 PN/DP CPU, 384KB
Address area	
I/O address area	
• Inputs	2 048 byte
• Outputs	2 048 byte
Process image	
• Inputs, adjustable	2 048 byte
• Outputs, adjustable	2 048 byte
Time of day	
Clock	
• Hardware clock (real-time)	Yes
Operating hours counter	
• Number	1
Interfaces	
Interfaces/bus type	1x MPI/PROFIBUS DP, 1x PROFINET (3 ports)
1. Interface	
Interface type	Integrated RS 485 interface
Interface types	
• RS 485	Yes
• Connection method	2x M12 b-coded
Protocols	
• MPI	Yes
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes
• Point-to-point connection	No
PROFIBUS DP master	
• Number of DP slaves, max.	124

■ **Technical specifications** (continued)

Article number	**6ES7154-8AB01-0AB0**
	ET 200pro: IM 154-8 PN/DP CPU, 384KB
2. Interface	
Interface type	PROFINET
Physics	Ethernet (2x M12 d-coded; 1x RJ45)
Interface types	
• Number of ports	3
Protocols	
• MPI	No
• PROFINET IO controller	Yes; Also simultaneously with IO-Device functionality
• PROFINET IO Device	Yes; Also simultaneously with IO Controller functionality
• PROFINET CBA	Yes
• PROFIBUS DP master	No
• PROFIBUS DP slave	No
PROFINET IO controller	
Services	
- Number of connectable IO Devices, max.	128
- Of which IO devices with IRT, max.	64
- Number of IO Devices with IRT and the option "high flexibility"	128
- Number of connectable IO Devices for RT, max.	128
Protocols	
Open IE communication	
• TCP/IP	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	8
• ISO-on-TCP (RFC1006)	Yes
- Number of connections, max.	8
• UDP	Yes
- Number of connections, max.	8
Web server	
• supported	Yes
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes; Via PROFIBUS DP or PROFINET interface

Article number	**6ES7154-8AB01-0AB0**
	ET 200pro: IM 154-8 PN/DP CPU, 384KB
Communication functions	
PG/OP communication	Yes
Global data communication	
• supported	Yes
S7 basic communication	
• supported	Yes
S7 communication	
• supported	Yes
Number of connections	
• overall	16
Degree and class of protection	
IP degree of protection	IP65/67
Configuration	
Programming	
Programming language	
- LAD	Yes
- FBD	Yes
- STL	Yes
- SCL	Yes
- CFC	Yes
- GRAPH	Yes
- HiGraph®	Yes
Know-how protection	
• User program protection/password protection	Yes
• Block encryption	Yes; With S7 block Privacy
Dimensions	
Width	135 mm
Height	130 mm
Depth	65 mm; 60 mm without cover for RJ45 socket; 65 mm with cover for RJ45 socket
Weights	
Weight, approx.	720 g

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Distributed Controllers
based on ET 200Pro
Standard CPUs

IM 154-8 PN/DP CPU

Ordering data	Article No.		Article No.
IM 154-8 PN/DP CPU interface module, V3.2	6ES7154-8AB01-0AB0	**IE connecting cable M12-180/M12-180**	
PROFINET IO controller for operating distributed I/Os on PROFINET, with integrated PLC functionality.		• Pre-assembled IE FC TP trailing cable GP 2 x 2 (PROFINET Type C) with two 4-pin M12 plugs (4-pin, D-coded), degree of protection IP65/IP67, in various lengths:	
Accessories		- 0.3 m	6XV1870-8AE30
MMC 64 KB [1]	6ES7953-8LF31-0AA0	- 0.5 m	6XV1870-8AE50
For program backup.		- 1.0 m	6XV1870-8AH10
MMC 128 KB [1]	6ES7953-8LG31-0AA0	- 1.5 m	6XV1870-8AH15
For program backup.		- 2.0 m	6XV1870-8AH20
MMC 512 KB [1]	6ES7953-8LJ31-0AA0	- 3.0 m	6XV1870-8AH30
For program backup.		- 5.0 m	6XV1870-8AH50
MMC 2 MB [1]	6ES7953-8LL31-0AA0	- 10 m	6XV1870-8AN10
For program backup and/or firmware updates.		- 15 m	6XV1870-8AN15
MMC 4 MB [1]	6ES7953-8LM31-0AA0	• PROFINET M12 trailing connecting cable, pre-assembled at both ends with angled M12 connectors (male insert), in various lengths:	
For program backup.		- 3.0 m	3RK1902-2NB30
MMC 8 MB [1]	6ES7953-8LP31-0AA0	- 5.0 m	3RK1902-2NB50
For program backup.		- 10 m	3RK1902-2NC10
Connection module	6ES7194-4AN00-0AA0	• PROFINET M12 trailing connecting cable, pre-assembled at one end with angled M12 connector (male insert at one end, other end open), in various lengths:	
For CPU IM154-8 PN/DP, with 4 x M12 and 2 x 7/8", for connecting PROFINET and PROFIBUS DP.		- 3.0 m	3RK1902-2HB30
		- 5.0 m	3RK1902-2HB50
SCALANCE X-200 Industrial Ethernet switches		- 10 m	3RK1902-2HC10
With integral SNMP access, web diagnostics, copper cable diagnostics and PROFINET diagnostics, for setting up linear, star and ring structures SCALANCE X208PRO, in degree of protection IP65, with eight 10/100 Mbps M12 ports, incl. eleven M12 dust caps.	6GK5208-0HA10-2AA6	**IE FC M12 Plug PRO**	
		PROFINET M12 plug connector, D-coded with fast connection system, axial cable outlet.	
		• 1 unit	6GK1901-0DB20-6AA0
		• 8 units	6GK1901-0DB20-6AA8
		• PROFINET M12 plug connector, D-coded, angled.	3RK1902-2DA00
Industrial Ethernet FC RJ45 plug 180		**IE panel feed-through**	
RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet		Cabinet feed-through for converting from the M12 connection system (D-coded, IP65/IP67) to the RJ45 connection system (IP20), 1 pack = 5 units.	6GK1901-0DM20-2AA5
• 1 unit	6GK1901-1BB10-2AA0		
• 10 units	6GK1901-1BB10-2AB0		
• 50 units	6GK1901-1BB10-2AE0		
Industrial Ethernet FastConnect installation cables			
• FastConnect standard cable	6XV1840-2AH10		
• FastConnect trailing cable	6XV1840-3AH10		
• FastConnect marine cable	6XV1840-4AH10		
Industrial Ethernet FastConnect installation cables			
• **IE FC TP trailing cable GP 2 x 2**; sold by the meter, max. delivery unit 1 000 m; minimum order quantity 20 m.	6XV1870-2D		
• **IE TP torsion cable GP 2 x 2**; sold by the meter, max. delivery unit 1 000 m; minimum order quantity 20 m.	6XV1870-2F		
Industrial Ethernet FastConnect			
Stripping tool	6GK1901-1GA00		

[1] An MMC is essential for operating the CPU

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■ **Ordering data**

	Article No.
7/8" connecting cable to power supply	
5-wire, 5 x 1.5 mm², trailing type, pre-assembled with two 7/8" connectors (axial cable outlet), 5-pin, up to 50 m, in various lengths:	
- 1.5 m	6XV1822-5BH15
- 2.0 m	6XV1822-5BH20
- 3.0 m	6XV1822-5BH30
- 5.0 m	6XV1822-5BH50
- 10 m	6XV1822-5BN10
- 15 m	6XV1822-5BN15
- Other special lengths with 90° or 180° cable outlet.	See http://support.automation.siemens.com/WW/view/en/26999294
• Power cable, can be trailed, 5 x 1.5 mm², pre-assembled at both ends with 7/8" angled connectors (female insert at one end, male insert at the other end), in various lengths:	
- 3.0 m	3RK1902-3NB30
- 5.0 m	3RK1902-3NB50
- 10 m	3RK1902-3NC10
• Power cable, can be trailed, 5 x 1.5 mm², pre-assembled at one end with 7/8" angled connector with female insert (female insert at one end, other end open), in various lengths:	
- 3.0 m	3RK1902-3GB30
- 5.0 m	3RK1902-3GB50
- 10 m	3RK1902-3GC10
Power line	6XV1830-8AH10
5-wire, 5 x 1.5 mm², trailing type, sold by the meter, minimum order quantity 20 m, maximum order quantity 1 000 m.	
7/8" cable connector	
For ET 200eco, with axial cable outlet	
• with male insert, 5-pack	6GK1905-0FA00
• with female insert, 5-pack	6GK1905-0FB00
• angled, with female insert, 1 unit	3RK1902-3DA00
• angled, with male insert, 1 unit	3RK1902-3BA00
7/8" cover cap, 10 per pack	6ES7194-3JA00-0AA0
Twisted Pair cables 4x2 with RJ45 connectors	
0.5 m	6XV1870-3QE50
1 m	6XV1870-3QH10
2 m	6XV1870-3QH20
6 m	6XV1870-3QH60
10 m	6XV1870-3QN10
Crossed Twisted Pair cables 4x2 with RJ45 connectors	
0.5 m	6XV1870-3RE50
1 m	6XV1870-3RH10
2 m	6XV1870-3RH20
6 m	6XV1870-3RH60
10 m	6XV1870-3RN10

	Article No.
M12 sealing cap	3RX9802-0AA00
For protection of unused M12 connections with ET 200pro	
M12 sealing caps with female thread	6ES7194-4JD60-0AA0
5 units	
PROFIBUS M12 connecting cable	
Pre-assembled, with two 5-pole M12 connectors/sockets, up to 100 m, in various lengths:	
1.5 m	6XV1830-3DH15
2.0 m	6XV1830-3DH20
3.0 m	6XV1830-3DH30
5.0 m	6XV1830-3DH50
10 m	6XV1830-3DN10
15 m	6XV1830-3DN15
Other special lengths with 90° or 180° cable outlet	See http://support.automation.siemens.com/WW/view/en/26999294
M12 bus termination connector for PROFIBUS, female insert	6GK1905-0ED00
M12 bus termination connector for PROFIBUS, male insert	6GK1905-0EC00
M12 plug connector, axial outlet, with male insert	6GK1905-0EA00
PROFIBUS FC standard cable GP	6XV1830-0EH10
Standard type with special design for fast mounting, 2-wire, shielded.	
Sold by the meter, max. delivery unit 1 000 m, minimum order quantity 20 m.	
PROFIBUS FC trailing cable	6XV1830-3EH10
2-wire, shielded.	
PROFIBUS FC food cable	6XV1830-0GH10
2-wire, shielded.	
Sold by the meter, max. delivery unit 1 000 m, minimum order quantity 20 m.	
PROFIBUS FC robust cable	6XV1830-0JH10
2-wire, shielded	
Sold by the meter, max. delivery unit 1 000 m, minimum order quantity 20 m.	
PROFIBUS M12 cable connector	
5-pole, B-coded, metal housing, 1 pack = 5 units.	
• Female insert	6GK1905-0EB00

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Distributed Controllers
based on ET 200Pro
Standard CPUs

CPU 1516pro-2 PN

◼ Overview

- CPU 1516pro-2 PN for SIMATIC ET 200pro based on S7-1500 CPU 1516-3 PN/DP
- For applications with high requirements on the program scope and processing speed, for distributed setup via PROFINET IO
- PROFINET IO controller for operating distributed I/O on PROFINET
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device with a SIMATIC or non-Siemens PROFINET IO controller
- PROFINET shared I-Device for 4 controllers
- PROFINET IO RT/IRT interface with integrated 3-port switch
- Additional PROFINET IO RT interface with separate IP address
- Isochronous mode on PROFINET
- Integrated motion control functionalities for controlling speed-controlled and positioning axes, support for external encoders, output cams/cam tracks and probes
- OPC UA server and client (data access) as runtime option for the easy connection of SIMATIC ET 200pro to third-party devices/systems
- Integrated web server with the option of creating user-defined web pages

Note:

SIMATIC memory card required for operation of the CPU

◼ Technical specifications

Article number	6ES7516-2PN00-0AB0
	ET 200pro: CPU 1516PRO-2 PN
General information	
Product type designation	CPU 1516pro-2 PN
Engineering with	
• STEP 7 TIA Portal configurable/ integrated as of version	V15.1 (FW V2.6)/V14 (FW V2.0) or higher
Supply voltage	
Type of supply voltage	24 V DC
Memory	
Work memory	
• integrated (for program)	1 Mbyte
• integrated (for data)	5 Mbyte
Load memory	
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte
CPU processing times	
for bit operations, typ.	10 ns
for word operations, typ.	12 ns
for fixed point arithmetic, typ.	16 ns
for floating point arithmetic, typ.	64 ns

Article number	6ES7516-2PN00-0AB0
	ET 200pro: CPU 1516PRO-2 PN
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
IEC counter	
• Number	Any (only limited by the main memory)
S7 times	
• Number	2 048
IEC timer	
• Number	Any (only limited by the main memory)
Data areas and their retentivity	
Flag	
• Number, max.	16 kbyte
Address area	
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image

■ **Technical specifications** (continued)

Article number	6ES7516-2PN00-0AB0	Article number	6ES7516-2PN00-0AB0
	ET 200pro: CPU 1516PRO-2 PN		ET 200pro: CPU 1516PRO-2 PN
Time of day		**PROFINET IO Device**	
Clock		**Services**	
• Type	Hardware clock	- PG/OP communication	Yes
1. Interface		- S7 routing	Yes
Interface types		- Isochronous mode	No
• Number of ports	3; 2x M12 + 1x RJ45	- Open IE communication	Yes
• integrated switch	Yes	- IRT	Yes
• RJ 45 (Ethernet)	Yes; X1 P3	- MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
Protocols		- MRPD	Yes; Requirement: IRT
• IP protocol	Yes; IPv4	- PROFIenergy	Yes
• PROFINET IO controller	Yes	- Prioritized startup	No
• PROFINET IO Device	Yes	- Shared device	Yes
• SIMATIC communication	Yes	- Number of IO Controllers with shared device, max.	4
• Open IE communication	Yes	- Asset management record	Yes; Per user program
• Web server	Yes	**2. Interface**	
• Media redundancy	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0	**Interface types**	
PROFINET IO controller		• Number of ports	1; 1x M12
Services		• integrated switch	No
- PG/OP communication	Yes	• RJ 45 (Ethernet)	No
- S7 routing	Yes	**Protocols**	
- Isochronous mode	Yes	• IP protocol	Yes; IPv4
- Open IE communication	Yes	• PROFINET IO controller	Yes
- IRT	Yes	• PROFINET IO Device	Yes
- MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50	• SIMATIC communication	Yes
		• Open IE communication	Yes
- MRPD	Yes; Requirement: IRT	• Web server	Yes
- PROFIenergy	Yes	• Media redundancy	No
- Prioritized startup	Yes; Max. 32 PROFINET devices	**PROFINET IO controller**	
- Number of connectable IO Devices, max.	256; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET	**Services**	
		- PG/OP communication	Yes
		- S7 routing	Yes
- Of which IO devices with IRT, max.	64	- Isochronous mode	No
- Number of connectable IO Devices for RT, max.	256	- Open IE communication	Yes
		- IRT	No
- of which in line, max.	256	- MRP	No
- Number of IO Devices that can be simultaneously activated/ deactivated, max.	8; in total across all interfaces	- MRPD	No
		- PROFIenergy	Yes
- Number of IO Devices per tool, max.	8	- Prioritized startup	No
- Updating times	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data	- Number of connectable IO Devices, max.	32; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
		- Number of connectable IO Devices for RT, max.	32
Update time for IRT		- of which in line, max.	32
- for send cycle of 250 µs	250 µs to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 500 µs of the isochronous OB is decisive	- Number of IO Devices that can be simultaneously activated/deactivated, max.	8; in total across all interfaces
		- Number of IO Devices per tool, max.	8
- for send cycle of 500 µs	500 µs to 8 ms	- Updating times	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data
- for send cycle of 1 ms	1 ms to 16 ms		
- for send cycle of 2 ms	2 ms to 32 ms		
- for send cycle of 4 ms	4 ms to 64 ms	**Update time for RT**	
- With IRT and parameterization of "odd" send cycles	Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)	- for send cycle of 1 ms	1 ms to 512 ms
Update time for RT			
- for send cycle of 250 µs	250 µs to 128 ms		
- for send cycle of 500 µs	500 µs to 256 ms		
- for send cycle of 1 ms	1 ms to 512 ms		
- for send cycle of 2 ms	2 ms to 512 ms		
- for send cycle of 4 ms	4 ms to 512 ms		

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Distributed Controllers
based on ET 200Pro
Standard CPUs

CPU 1516pro-2 PN

Technical specifications (continued)

Article number	**6ES7516-2PN00-0AB0**
	ET 200pro: CPU 1516PRO-2 PN
PROFINET IO Device	
Services	
- PG/OP communication	Yes
- S7 routing	Yes
- Isochronous mode	No
- Open IE communication	Yes
- IRT	No
- MRP	No
- MRPD	No
- PROFIenergy	Yes
- Prioritized startup	No
- Shared device	Yes
- Number of IO Controllers with shared device, max.	4
- Asset management record	Yes; Per user program
Protocols	
Number of connections	
• Number of connections, max.	128; Via integrated interfaces of the CPU
OPC UA	
• OPC UA client	Yes; Data access (read, write), method call, custom address space
• OPC UA server	Yes; Data access (read, write, subscribe), method call, custom address space; embedded 2017 UA server profile V1.02
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes; Via X1, with minimum OB 6x cycle of 500 µs
Supported technology objects	
Motion Control	Yes; Note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool or SIZER
• Number of available Motion Control resources for technology objects (except cam disks)	2 400
• Required Motion Control resources	
- per speed-controlled axis	40
- per positioning axis	80
- per synchronous axis	160
- per external encoder	80
- per output cam	20
- per cam track	160
- per probe	40
Controller	
• PID_Compact	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves
• PID-Temp	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
• High-speed counter	Yes

Article number	**6ES7516-2PN00-0AB0**
	ET 200pro: CPU 1516PRO-2 PN
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-25 °C
• horizontal installation, max.	55 °C
• vertical installation, min.	-25 °C
• vertical installation, max.	55 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Configuration	
Programming	
Programming language	
- LAD	Yes
- FBD	Yes
- STL	Yes
- SCL	Yes
- GRAPH	Yes
Know-how protection	
• User program protection/password protection	Yes
• Copy protection	Yes
• Block protection	Yes
Access protection	
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Complete protection	Yes
Dimensions	
Width	135 mm
Height	130 mm
Depth	65 mm
Weights	
Weight, approx.	614 g

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Ordering data

Ordering data	Article No.
CPU 1516pro-2 PN Work memory 1 MB for program, 5 MB for data, PROFINET IO IRT interface, PROFINET IO RT interface; SIMATIC memory card required	**6ES7516-2PN00-0AB0**
Accessories	
SIMATIC memory card	
4 MB[1]	**6ES7954-8LC03-0AA0**
12 MB[1]	**6ES7954-8LE03-0AA0**
24 MB[1]	**6ES7954-8LF03-0AA0**
256 MB[1]	**6ES7954-8LL03-0AA0**
2 GB[1]	**6ES7954-8LP02-0AA0**
32 GB[1]	**6ES7954-8LT03-0AA0**
Connection module CM CPU 2PN M12 / 7/8"; with 3 x M12 and 2 x 7/8", for connecting 2 x PROFINET	**6ES7194-4AP00-0AA0**
Industrial Ethernet FC RJ45 plug 180 RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet	
• 1 unit	**6GK1901-1BB10-2AA0**
• 10 units	**6GK1901-1BB10-2AB0**
• 50 units	**6GK1901-1BB10-2AE0**
Industrial Ethernet FastConnect installation cables	
• FastConnect standard cable	**6XV1840-2AH10**
• FastConnect trailing cable	**6XV1840-3AH10**
• FastConnect marine cable	**6XV1840-4AH10**
Industrial Ethernet FastConnect installation cables	
• IE FC TP trailing cable GP 2 x 2; sold by the meter, max. delivery unit 1 000 m; minimum order quantity 20 m.	**6XV1870-2D**
• IE TP torsion cable GP 2 x 2; sold by the meter, max. delivery unit 1 000 m; minimum order quantity 20 m.	**6XV1870-2F**
Industrial Ethernet FastConnect Stripping tool	**6GK1901-1GA00**

	Article No.
IE connecting cable M12-180/M12-180 • Preassembled IE FC TP trailing cable GP 2 x 2 (PROFINET Type C) with two 4-pin M12 plugs (4-pin, D-coded), degree of protection IP65/IP67, in various lengths:	
• 0.3 m	**6XV1870-8AE30**
• 0.5 m	**6XV1870-8AE50**
• 1.0 m	**6XV1870-8AH10**
• 1.5 m	**6XV1870-8AH15**
• 2.0 m	**6XV1870-8AH20**
• 3.0 m	**6XV1870-8AH30**
• 5.0 m	**6XV1870-8AH50**
• 10 m	**6XV1870-8AN10**
• 15 m	**6XV1870-8AN15**
• PROFINET M12 trailing connecting cable, pre-assembled at both ends with angled M12 connectors (male insert), in various lengths:	
• 3.0 m	**3RK1902-2NB30**
• 5.0 m	**3RK1902-2NB50**
• 10 m	**3RK1902-2NC10**
• PROFINET M12 trailing connecting cable, pre-assembled at one end with angled M12 connector (male insert at one end, other end open), in various lengths:	
• 3.0 m	**3RK1902-2HB30**
• 5.0 m	**3RK1902-2HB50**
• 10 m	**3RK1902-2HC10**
IE FC M12 Plug PRO PROFINET M12 plug connector, D-coded with fast connection system, axial cable outlet.	
• 1 unit	**6GK1901-0DB20-6AA0**
• 8 units	**6GK1901-0DB20-6AA8**
• PROFINET M12 plug connector, D-coded, angled	**3RK1902-2DA00**
IE panel feedthrough Cabinet feedthrough for converting from the M12 connection system (D-coded, IP65/IP67) to the RJ45 connection system (IP20), 1 pack = 5 units.	**6GK1901-0DM20-2AA5**

[1] An MMC is essential for operating the CPU

Distributed Controllers
based on ET 200Pro
Standard CPUs

CPU 1516pro-2 PN

Ordering data	Article No.		Article No.
7/8" connecting cable to power supply		**7/8" cable connector**	
5-wire, 5 x 1.5 mm^2, trailing, preassembled with two 7/8" connectors (axial cable outlet), 5-pin, up to 50 m, in various lengths:		For ET 200eco, with axial cable outlet	
		• with male insert, 5-pack	6GK1905-0FA00
		• with female insert, 5-pack	6GK1905-0FB00
• 1.5 m	6XV1822-5BH15	• angled, with female insert, 1 unit	3RK1902-3DA00
• 2.0 m	6XV1822-5BH20	• angled, with male insert, 1 unit	3RK1902-3BA00
• 3.0 m	6XV1822-5BH30	7/8" cover cap, 10 per pack	6ES7194-3JA00-0AA0
• 5.0 m	6XV1822-5BH50	**Twisted Pair cables 4x2 with RJ45 connectors**	
• 10 m	6XV1822-5BN10		
• 15 m	6XV1822-5BN15	0.5 m	6XV1870-3QE50
• Other special lengths with 90° or 180° cable outlet.	See: http://support.automation.siemens.com/WW/view/en/26999294	1 m	6XV1870-3QH10
		2 m	6XV1870-3QH20
		6 m	6XV1870-3QH60
• Trailing power cable, 5 x 1.5 mm^2, preassembled at both ends with 7/8" angled connectors (female insert at one end, male insert at the other end), in various lengths:		10 m	6XV1870-3QN10
		Crossed Twisted Pair cables 4x2 with RJ45 connectors	
• 3.0 m	3RK1902-3NB30	0.5 m	6XV1870-3RE50
• 5.0 m	3RK1902-3NB50	1 m	6XV1870-3RH10
• 10 m	3RK1902-3NC10	2 m	6XV1870-3RH20
• Trailing power cable, 5 x 1.5 mm^2, preassembled at one end with 7/8" angled connector with female contact insert (female contact insert at one end, other end open), in various lengths:		6 m	6XV1870-3RH60
		10 m	6XV1870-3RN10
• 3.0 m	3RK1902-3GB30	**M12 sealing cap**	3RX9802-0AA00
• 5.0 m	3RK1902-3GB50	For protection of unused M12 connections with ET 200pro	
• 10 m	3RK1902-3GC10		
Power line	6XV1830-8AH10	**M12 sealing caps with female thread**	6ES7194-4JD60-0AA0
5-wire, 5 x 1.5 mm^2, trailing type, sold by the meter, minimum order quantity 20 m, maximum order quantity 1 000 m.		5 units	

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Overview

- Interface module for SIMATIC ET 200pro with integrated fail-safe CPU
- CPU with PLC functionality equivalent to CPU S7-315F PN/DP; with distributed intelligence for preprocessing
- For constructing a fail-safe automation system for plants with increased safety requirements
- Complies with safety requirements up to SIL 3 according to IEC 61508, IEC 62061 and PL e according to ISO 13849.1:2006
- For high-performance control solutions in ET 200pro
- Increase in availability of systems and machines
- Integral web server with the option of creating user-defined web pages
- Isochronous mode on PROFIBUS or PROFINET
- PROFINET IO controller for up to 128 IO devices
- PROFINET interface with integrated 3-port switch
- With multiple communication options: PG/OP communication, PROFINET IO, PROFINET CBA, open IE communication (TCP, ISO-on-TCP and UDP), web server and S7-communication (with loadable FBs)
- Fast, simple and end-to-end programming of a system with modular programs via STEP 7
- Compact SIMATIC Micro Memory Card (MMC)

Note:

SIMATIC Micro Memory Card required for operation of CPU.

Technical specifications

Article number	**6ES7154-8FB01-0AB0**	**6ES7154-8FX00-0AB0**
	ET 200pro: IM 154-8F PN/DP CPU, 512KB	ET 200pro: IM 154-8FX PN/DP CPU, 1.5MB
Supply voltage		
Rated value (DC)	24 V	24 V
Power loss		
Power loss, typ.	8.5 W	8.5 W
Memory		
Work memory		
• integrated	512 kbyte	1 536 kbyte
• expandable	No	No
Load memory		
• Plug-in (MMC), max.	8 Mbyte	8 Mbyte
CPU processing times		
for bit operations, typ.	0.05 µs	0.025 µs
for word operations, typ.	0.09 µs	0.03 µs
for fixed point arithmetic, typ.	0.12 µs	0.04 µs
for floating point arithmetic, typ.	0.45 µs	0.16 µs
Counters, timers and their retentivity		
S7 counter		
• Number	256	256
IEC counter		
• present	Yes	Yes
S7 times		
• Number	256	256
IEC timer		
• present	Yes	Yes
Data areas and their retentivity		
Flag		
• Number, max.	2 048 byte	2 048 byte

Distributed Controllers
based on ET 200Pro
Fail-safe CPUs

IM 154-8 F PN/DP CPU

■ **Technical specifications** (continued)

Article number	6ES7154-8FB01-0AB0	6ES7154-8FX00-0AB0
	ET 200pro: IM 154-8F PN/DP CPU, 512KB	ET 200pro: IM 154-8FX PN/DP CPU, 1.5MB
Address area		
I/O address area		
• Inputs	2 048 byte	2 048 byte
• Outputs	2 048 byte	2 048 byte
Process image		
• Inputs, adjustable	2 048 byte	2 048 byte
• Outputs, adjustable	2 048 byte	2 048 byte
Time of day		
Clock		
• Hardware clock (real-time)	Yes	Yes
Operating hours counter		
• Number	1	1
1. Interface		
Interface type	Integrated RS 485 interface	Integrated RS 485 interface
Interface types		
• RS 485	Yes	Yes
• Connection method	2x M12 b-coded	2x M12 b-coded
Protocols		
• MPI	Yes	Yes
• PROFIBUS DP master	Yes	Yes
• PROFIBUS DP slave	Yes	Yes
• Point-to-point connection	No	No
PROFIBUS DP master		
• Number of DP slaves, max.	124	124
2. Interface		
Interface type	PROFINET	PROFINET
Physics	Ethernet (2x M12 d-coded; 1x RJ45)	Ethernet (2x M12 d-coded; 1x RJ45)
Interface types		
• Number of ports	3	3
Protocols		
• MPI	No	No
• PROFINET IO controller	Yes; Also simultaneously with IO-Device functionality	Yes; Also simultaneously with IO-Device functionality
• PROFINET IO Device	Yes; Also simultaneously with IO Controller functionality	Yes; Also simultaneously with IO Controller functionality
• PROFINET CBA	Yes	Yes
• PROFIBUS DP master	No	No
• PROFIBUS DP slave	No	No
PROFINET IO controller		
Services		
- Number of connectable IO Devices, max.	128	128
- Of which IO devices with IRT, max.	64	64
- Number of IO Devices with IRT and the option "high flexibility"	128	128
- Number of connectable IO Devices for RT, max.	128	128
Protocols		
Open IE communication		
• TCP/IP	Yes; via integrated PROFINET interface and loadable FBs	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	8	8
• ISO-on-TCP (RFC1006)	Yes	Yes
- Number of connections, max.	8	8
• UDP	Yes	Yes
- Number of connections, max.	8	8
Web server		
• supported	Yes	Yes
Isochronous mode		
Isochronous operation (application synchronized up to terminal)	Yes; Via PROFIBUS DP or PROFINET interface	Yes; Via PROFIBUS DP or PROFINET interface

Technical specifications (continued)

Article number	**6ES7154-8FB01-0AB0**	**6ES7154-8FX00-0AB0**
	ET 200pro: IM 154-8F PN/DP CPU, 512KB	ET 200pro: IM 154-8FX PN/DP CPU, 1.5MB
Communication functions		
PG/OP communication	Yes	Yes
Global data communication		
• supported	Yes	Yes
S7 basic communication		
• supported	Yes	Yes
S7 communication		
• supported	Yes	Yes
Number of connections		
• overall	16	16
Degree and class of protection		
IP degree of protection	IP65/67	IP65/67
Configuration		
Programming		
Programming language		
- LAD	Yes	Yes
- FBD	Yes	Yes
- STL	Yes	Yes
- SCL	Yes	Yes
- CFC	Yes	Yes
- GRAPH	Yes	Yes
- HiGraph®	Yes	Yes
Know-how protection		
• User program protection/password protection	Yes	Yes
• Block encryption	Yes; With S7 block Privacy	Yes; With S7 block Privacy
Dimensions		
Width	135 mm	135 mm
Height	130 mm	130 mm
Depth	65 mm; 60 mm without cover for RJ45 socket; 65 mm with cover for RJ45 socket	65 mm; 60 mm without cover for RJ45 socket; 65 mm with cover for RJ45 socket
Weights		
Weight, approx.	720 g	720 g

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Distributed Controllers
based on ET 200Pro
Fail-safe CPUs

IM 154-8 F PN/DP CPU

Ordering data | **Article No.**   **Article No.**

IM 154-8 F PN/DP CPU interface module, V3.2

Fail-safe PROFINET IO controller for operating distributed I/O on PROFINET, with integrated PLC functionality.
- 512 KB work memory — **6ES7154-8FB01-0AB0**
- 1.5 MB work memory — **6ES7154-8FX00-0AB0**

S7 Distributed Safety V5.4 SP5 Update 2 programming tool

Task:
Configuration software for configuring fail-safe user programs for SIMATIC S7-300F, S7-400F, WinAC RTX F, ET 200S, ET 200M, ET 200iSP, ET 200pro, ET 200eco, ET 200SP
Requirement:
Windows 7 SP1 (64-bit), Windows 10 Professional/Enterprise (64-bit), Windows Server 2008 R2 SP1 (64-bit), Windows Server 2012 R2 (64-bit), Windows Server 2016 (64-bit); STEP 7 from V5.5 SP1; Please also note the operating systems that have been released for the STEP 7 version used

Floating license for 1 user; software and documentation on DVD; license key on USB flash drive — **6ES7833-1FC02-0YA5**

Floating license for 1 user; software, documentation and license key for download[1]; email address required for delivery — **6ES7833-1FC02-0YH5**

S7 Distributed Safety upgrade

From V5.x to V5.4; floating license for 1 user; software and documentation on DVD; license key on USB flash drive — **6ES7833-1FC02-0YE5**

STEP 7 Safety Advanced V15.1

Task:
Engineering tool for configuring and programming fail-safe user programs for SIMATIC S7-1200 FC, S7-1500F, S7-1500F Software Controller, S7-300F, S7-400F, WinAC RTX F, ET 200SP F Controller and the fail-safe ET 200SP, ET 200MP, ET 200S, ET 200M, ET 200iSP, ET 200pro and ET 200eco I/O
Requirement:
STEP 7 Professional V15.1

Floating license for 1 user; software and documentation on DVD; license key on USB flash drive — **6ES7833-1FA15-0YA5**

Floating license for 1 user; software, documentation and license key for download[1]; email address required for delivery — **6ES7833-1FA15-0YH5**

Accessories

SIMATIC Micro Memory Cards

MMC 64 KB [2] — **6ES7953-8LF31-0AA0**
For program backup.

MMC 128 KB [2] — **6ES7953-8LG31-0AA0**
For program backup.

MMC 512 KB [2] — **6ES7953-8LJ31-0AA0**
For program backup.

MMC 2 MB [2] — **6ES7953-8LL31-0AA0**
For program backup and/or firmware updates.

MMC 4 MB [2] — **6ES7953-8LM31-0AA0**
For program backup.

MMC 8 MB [2] — **6ES7953-8LP31-0AA0**
For program backup.

Connection module — **6ES7194-4AN00-0AA0**
For CPU IM154-8 PN/DP, with 4 x M12 and 2 x 7/8", for connecting PROFINET and PROFIBUS DP.

SCALANCE X-200 Industrial Ethernet switches — **6GK5208-0HA10-2AA6**
With integral SNMP access, web diagnostics, copper cable diagnostics and PROFINET diagnostics, for setting up linear, star and ring structures SCALANCE X208PRO, in degree of protection IP65, with eight 10/100 Mbps M12 ports, incl. eleven M12 dust caps.

Industrial Ethernet FC RJ45 plug 90
RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 90° cable outlet.
- 1 unit — **6GK1901-1BB20-2AA0**
- 10 units — **6GK1901-1BB20-2AB0**

Industrial Ethernet FC RJ45 plug 180
RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet
- 1 unit — **6GK1901-1BB10-2AA0**
- 10 units — **6GK1901-1BB10-2AB0**
- 50 units — **6GK1901-1BB10-2AE0**

Industrial Ethernet FastConnect installation cables
- FastConnect standard cable — **6XV1840-2AH10**
- FastConnect trailing cable — **6XV1840-3AH10**
- FastConnect marine cable — **6XV1840-4AH10**

[1] For up-to-date information and download availability, see: http://www.siemens.com/tia-online-software-delivery

[2] An MMC is essential for operating the CPU

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▪ Ordering data

	Article No.
Industrial Ethernet FastConnect installation cables	
• **IE FC TP trailing cable GP 2 x 2**; sold by the meter, max. delivery unit 1 000 m; minimum order quantity 20 m.	6XV1870-2D
• **IE TP torsion cable GP 2 x 2**; sold by the meter, max. delivery unit 1 000 m; minimum order quantity 20 m.	6XV1870-2F
Industrial Ethernet FastConnect	
Stripping tool	6GK1901-1GA00
IE connecting cable M12-180/M12-180	
• Pre-assembled IE FC TP trailing cable GP 2 x 2 (PROFINET Type C) with two 4-pin M12 plugs (4-pin, D-coded), degree of protection IP65/IP67, in various lengths:	
- 0.3 m	6XV1870-8AE30
- 0.5 m	6XV1870-8AE50
- 1.0 m	6XV1870-8AH10
- 1.5 m	6XV1870-8AH15
- 2.0 m	6XV1870-8AH20
- 3.0 m	6XV1870-8AH30
- 5.0 m	6XV1870-8AH50
- 10 m	6XV1870-8AN10
- 15 m	6XV1870-8AN15
• PROFINET M12 trailing connecting cable, pre-assembled at both ends with angled M12 connectors (male insert), in various lengths:	
- 3.0 m	3RK1902-2NB30
- 5.0 m	3RK1902-2NB50
- 10 m	3RK1902-2NC10
• PROFINET M12 trailing connecting cable, pre-assembled at one end with angled M12 connector (male insert at one end, other end open), in various lengths:	
- 3.0 m	3RK1902-2HB30
- 5.0 m	3RK1902-2HB50
- 10 m	3RK1902-2HC10
IE FC M12 Plug PRO	
PROFINET M12 plug connector, D-coded with fast connection system, axial cable outlet.	
• 1 unit	6GK1901-0DB20-6AA0
• 8 units	6GK1901-0DB20-6AA8
• PROFINET M12 plug connector, D-coded, angled	3RK1902-2DA00
IE panel feed-through	
Cabinet feedthrough for converting from the M12 connection system (D-coded, IP65/IP67) to the RJ45 connection system (IP20), 1 pack = 5 units	6GK1901-0DM20-2AA5

	Article No.
7/8" connecting cable to power supply	
• 5-wire, 5 x 1.5 mm^2, trailing type, pre-assembled with two 7/8" connectors (axial cable outlet), 5-pin, up to 50 m, in various lengths:	
- 1.5 m	6XV1822-5BH15
- 2.0 m	6XV1822-5BH20
- 3.0 m	6XV1822-5BH30
- 5.0 m	6XV1822-5BH50
- 10 m	6XV1822-5BN10
- 15 m	6XV1822-5BN15
- Other special lengths with 90° or 180° cable outlet	See http://support.automation.siemens.com/WW/view/en/26999294
• Power cable, can be trailed, 5 x 1.5 mm^2, pre-assembled at both ends with 7/8" angled connectors (female insert at one end, male insert at the other end), in various lengths:	
- 3.0 m	3RK1902-3NB30
- 5.0 m	3RK1902-3NB50
- 10 m	3RK1902-3NC10
• Power cable, can be trailed, 5 x 1.5 mm^2, pre-assembled at one end with 7/8" angled connector with female contact insert (female contact insert at one end, other end open), in various lengths:	
- 3.0 m	3RK1902-3GB30
- 5.0 m	3RK1902-3GB50
- 10 m	3RK1902-3GC10
Power line	6XV1830-8AH10
5-wire, 5 x 1.5 mm^2, trailing type, sold by the meter, minimum order quantity 20 m, maximum order quantity 1 000 m.	
7/8" cable connector	
For ET 200eco, with axial cable outlet	
• with male contact insert, 5-pack	6GK1905-0FA00
• with female contact insert, 5-pack	6GK1905-0FB00
• angled, with female contact insert, 1 unit	3RK1902-3DA00
• angled, with male contact insert, 1 unit	3RK1902-3BA00
7/8" cover cap, 10 per pack	6ES7194-3JA00-0AA0
Twisted Pair cables 4x2 with RJ45 connectors	
0.5 m	6XV1870-3QE50
1 m	6XV1870-3QH10
2 m	6XV1870-3QH20
6 m	6XV1870-3QH60
10 m	6XV1870-3QN10
Crossed Twisted Pair cables 4x2 with RJ45 connectors	
0.5 m	6XV1870-3RE50
1 m	6XV1870-3RH10
2 m	6XV1870-3RH20
6 m	6XV1870-3RH60
10 m	6XV1870-3RN10

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Distributed Controllers
based on ET 200Pro
Fail-safe CPUs

IM 154-8 F PN/DP CPU

Ordering data

Ordering data	Article No.		Article No.
M12 sealing cap	**3RX9802-0AA00**	**PROFIBUS FC standard cable GP**	**6XV1830-0EH10**
For protection of unused M12 connections with ET 200pro		Standard type with special design for fast mounting, 2-wire, shielded.	
M12 sealing caps with female thread	**6ES7194-4JD60-0AA0**	Sold by the meter, max. delivery unit 1 000 m, minimum order quantity 20 m.	
5 units		**PROFIBUS FC trailing cable**	**6XV1830-3EH10**
PROFIBUS M12 connecting cable		2-wire, shielded.	
Pre-assembled, with two 5-pole M12 connectors/sockets, up to 100 m, in various lengths:		**PROFIBUS FC food cable**	**6XV1830-0GH10**
1.5 m	**6XV1830-3DH15**	2-wire, shielded.	
2.0 m	**6XV1830-3DH20**	Sold by the meter, max. delivery unit 1 000 m, minimum order quantity 20 m.	
3.0 m	**6XV1830-3DH30**	**PROFIBUS FC robust cable**	**6XV1830-0JH10**
5.0 m	**6XV1830-3DH50**	2-wire, shielded.	
10 m	**6XV1830-3DN10**	Sold by the meter, max. delivery unit 1 000 m, minimum order quantity 20 m.	
15 m	**6XV1830-3DN15**		
Additional special lengths with 90° or 180° cable outlet.	See http://support.automation.siemens.com/WW/view/en/26999294	**PROFIBUS M12 cable connector**	
M12 bus termination connector for PROFIBUS, female contact insert	**6GK1905-0ED00**	5-pole, B-coded, metal housing, 1 pack = 5 units.	
		• Female contact insert	**6GK1905-0EB00**
M12 bus termination connector for PROFIBUS, male contact insert	**6GK1905-0EC00**		
M12 plug connector, axial outlet, with male contact insert	**6GK1905-0EA00**		

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Overview

- Fail-safe CPU 1516pro F-2 PN for SIMATIC ET 200pro based on S7-1500 CPU 1516F-3 PN/DP
- For applications with high requirements on the program scope and processing speed, for distributed setup via PROFINET IO
- Can be used for safety functions up to SIL 3 according to IEC 61508 and up to PL e according to ISO 13849
- PROFINET IO controller for operating distributed I/O on PROFINET
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device with a SIMATIC or non-Siemens PROFINET IO controller
- Supports PROFIsafe in centralized and distributed configurations
- PROFINET shared I-Device for 4 controllers
- PROFINET IO RT/IRT interface with integrated 3-port switch
- Additional PROFINET IO RT interface with separate IP address
- Isochronous mode on PROFINET
- Integrated motion control functionalities for controlling speed-controlled and positioning axes, support for external encoders
- OPC UA server and client (data access) as runtime option for the easy connection of SIMATIC ET 200pro to third-party devices/systems
- Integrated web server with the option of creating user-defined web pages

Note:

SIMATIC memory card required for operation of the CPU.

Technical specifications

Article number	**6ES7516-2GN00-0AB0**
	ET 200pro: CPU 1516pro F-2 PN
General information	
Product type designation	CPU 1516pro F-2 PN
Engineering with	
• STEP 7 TIA Portal configurable/ integrated as of version	V15.1 (FW V2.6)/V14 (FW V2.0) or higher
Supply voltage	
Type of supply voltage	24 V DC
Memory	
Work memory	
• integrated (for program)	1.5 Mbyte
• integrated (for data)	5 Mbyte
Load memory	
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte
CPU processing times	
for bit operations, typ.	10 ns
for word operations, typ.	12 ns
for fixed point arithmetic, typ.	16 ns
for floating point arithmetic, typ.	64 ns
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
IEC counter	
• Number	Any (only limited by the main memory)
S7 times	
• Number	2 048
IEC timer	
• Number	Any (only limited by the main memory)
Data areas and their retentivity	
Flag	
• Number, max.	16 kbyte
Address area	
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image
Time of day	
Clock	
• Type	Hardware clock

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Distributed Controllers
based on ET 200Pro
Fail-safe CPUs

CPU 1516pro F-2 PN

■ **Technical specifications** (continued)

Article number	6ES7516-2GN00-0AB0
	ET 200pro: CPU 1516pro F-2 PN
1. Interface	
Interface types	
• Number of ports	3; 2x M12 + 1x RJ45
• integrated switch	Yes
• RJ 45 (Ethernet)	Yes; X1 P3
Protocols	
• IP protocol	Yes; IPv4
• PROFINET IO controller	Yes
• PROFINET IO Device	Yes
• SIMATIC communication	Yes
• Open IE communication	Yes
• Web server	Yes
• Media redundancy	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0
PROFINET IO controller	
Services	
- PG/OP communication	Yes
- S7 routing	Yes
- Isochronous mode	Yes
- Open IE communication	Yes
- IRT	Yes
- MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
- MRPD	Yes; Requirement: IRT
- PROFIenergy	Yes
- Prioritized startup	Yes; Max. 32 PROFINET devices
- Number of connectable IO Devices, max.	256; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
- Of which IO devices with IRT, max.	64
- Number of connectable IO Devices for RT, max.	256
- of which in line, max.	256
- Number of IO Devices that can be simultaneously activated/deactivated, max.	8; in total across all interfaces
- Number of IO Devices per tool, max.	8
- Updating times	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data
Update time for IRT	
- for send cycle of 250 µs	250 µs to 4 ms; Note: In the case of IRT with isochronous mode, the minimum update time of 500 µs of the isochronous OB is decisive
- for send cycle of 500 µs	500 µs to 8 ms
- for send cycle of 1 ms	1 ms to 16 ms
- for send cycle of 2 ms	2 ms to 32 ms
- for send cycle of 4 ms	4 ms to 64 ms
- With IRT and parameterization of "odd" send cycles	Update time = set "odd" send clock (any multiple of 125 µs: 375 µs, 625 µs ... 3 875 µs)
Update time for RT	
- for send cycle of 250 µs	250 µs to 128 ms
- for send cycle of 500 µs	500 µs to 256 ms
- for send cycle of 1 ms	1 ms to 512 ms
- for send cycle of 2 ms	2 ms to 512 ms
- for send cycle of 4 ms	4 ms to 512 ms

Article number	6ES7516-2GN00-0AB0
	ET 200pro: CPU 1516pro F-2 PN
PROFINET IO Device	
Services	
- PG/OP communication	Yes
- S7 routing	Yes
- Isochronous mode	No
- Open IE communication	Yes
- IRT	Yes
- MRP	Yes; As MRP redundancy manager and/or MRP client; max. number of devices in the ring: 50
- MRPD	Yes; Requirement: IRT
- PROFIenergy	Yes
- Prioritized startup	No
- Shared device	Yes
- Number of IO Controllers with shared device, max.	4
- Asset management record	Yes; Per user program
2. Interface	
Interface types	
• Number of ports	1; 1x M12
• integrated switch	No
• RJ 45 (Ethernet)	No
Protocols	
• IP protocol	Yes; IPv4
• PROFINET IO controller	Yes
• PROFINET IO Device	Yes
• SIMATIC communication	Yes
• Open IE communication	Yes
• Web server	Yes
• Media redundancy	No
PROFINET IO controller	
Services	
- PG/OP communication	Yes
- S7 routing	Yes
- Isochronous mode	No
- Open IE communication	Yes
- IRT	No
- MRP	No
- MRPD	No
- PROFIenergy	Yes
- Prioritized startup	No
- Number of connectable IO Devices, max.	32; In total, up to 1 000 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
- Number of connectable IO Devices for RT, max.	32
- of which in line, max.	32
- Number of IO Devices that can be simultaneously activated/deactivated, max.	8; in total across all interfaces
- Number of IO Devices per tool, max.	8
- Updating times	The minimum value of the update time also depends on communication share set for PROFINET IO, on the number of IO devices, and on the quantity of configured user data
Update time for RT	
- for send cycle of 1 ms	1 ms to 512 ms

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■ **Technical specifications** (continued)

Article number	6ES7516-2GN00-0AB0
	ET 200pro: CPU 1516pro F-2 PN
PROFINET IO Device	
Services	
- PG/OP communication	Yes
- S7 routing	Yes
- Isochronous mode	No
- Open IE communication	Yes
- IRT	No
- MRP	No
- MRPD	No
- PROFIenergy	Yes
- Prioritized startup	No
- Shared device	Yes
- Number of IO Controllers with shared device, max.	4
- Asset management record	Yes; Per user program
Protocols	
Number of connections	
• Number of connections, max.	128; Via integrated interfaces of the CPU
OPC UA	
• OPC UA client	Yes; Data access (read, write), method call, custom address space
• OPC UA server	Yes; Data access (read, write, subscribe), method call, custom address space; embedded 2017 UA server profile V1.02
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes; Via X1, with minimum OB 6x cycle of 500 µs
Supported technology objects	
Motion Control	Yes; Note: The number of axes affects the cycle time of the PLC program; selection guide via the TIA Selection Tool or SIZER
• Number of available Motion Control resources for technology objects (except cam disks)	2 400
• Required Motion Control resources	
- per speed-controlled axis	40
- per positioning axis	80
- per synchronous axis	160
- per external encoder	80
- per output cam	20
- per cam track	160
- per probe	40
Controller	
• PID_Compact	Yes; Universal PID controller with integrated optimization
• PID_3Step	Yes; PID controller with integrated optimization for valves
• PID-Temp	Yes; PID controller with integrated optimization for temperature
Counting and measuring	
• High-speed counter	Yes

Article number	6ES7516-2GN00-0AB0
	ET 200pro: CPU 1516pro F-2 PN
Standards, approvals, certificates	
Highest safety class achievable in safety mode	
Probability of failure (for service life of 20 years and repair time of 100 hours)	
- Low demand mode: PFDavg in accordance with SIL3	< 2.00E-05
- High demand/continuous mode: PFH in accordance with SIL3	< 1.00E-09
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-25 °C
• horizontal installation, max.	55 °C
• vertical installation, min.	-25 °C
• vertical installation, max.	55 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Configuration	
Programming	
Programming language	
- LAD	Yes; incl. failsafe
- FBD	Yes; incl. failsafe
- STL	Yes
- SCL	Yes
- GRAPH	Yes
Know-how protection	
• User program protection/password protection	Yes
• Copy protection	Yes
• Block protection	Yes
Access protection	
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Complete protection	Yes
Dimensions	
Width	135 mm
Height	130 mm
Depth	65 mm
Weights	
Weight, approx.	614 g

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Distributed Controllers
based on ET 200Pro
Fail-safe CPUs

CPU 1516pro F-2 PN

■ **Ordering data**

	Article No.		Article No.
CPU 1516pro F-2 PN 1.5 MB work memory for program, 5 MB for data, PROFINET IO IRT interface, PROFINET IO RT interface; SIMATIC memory card required	6ES7516-2GN00-0AB0	**IE connecting cable M12-180/M12-180** Preassembled IE FC TP trailing cable GP 2 x 2 (PROFINET Type C) with two 4-pin M12 plugs (4-pin, D-coded), degree of protection IP65/IP67, in various lengths:	
Accessories		• 0.3 m	6XV1870-8AE30
SIMATIC memory card		• 0.5 m	6XV1870-8AE50
4 MB[1]	6ES7954-8LC03-0AA0	• 1.0 m	6XV1870-8AH10
12 MB[1]	6ES7954-8LE03-0AA0	• 1.5 m	6XV1870-8AH15
24 MB[1]	6ES7954-8LF03-0AA0	• 2.0 m	6XV1870-8AH20
256 MB[1]	6ES7954-8LL03-0AA0	• 3.0 m	6XV1870-8AH30
2 GB[1]	6ES7954-8LP02-0AA0	• 5.0 m	6XV1870-8AH50
32 GB[1]	6ES7954-8LT03-0AA0	• 10 m	6XV1870-8AN10
Connection module	6ES7194-4AP00-0AA0	• 15 m	6XV1870-8AN15
CM CPU 2PN M12 / 7/8"; with 3 x M12 and 2 x 7/8", for connecting 2 x PROFINET		PROFINET M12 trailing connecting cable, pre-assembled at both ends with angled M12 connectors (male insert), in various lengths:	
Industrial Ethernet FC RJ45 plug 180		• 3.0 m	3RK1902-2NB30
RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet		• 5.0 m • 10 m	3RK1902-2NB50 3RK1902-2NC10
		PROFINET M12 trailing connecting cable, pre-assembled at one end with angled M12 connector (male insert at one end, other end open), in various lengths:	
• 1 unit	6GK1901-1BB10-2AA0	• 3.0 m	3RK1902-2HB30
• 10 units	6GK1901-1BB10-2AB0	• 5.0 m	3RK1902-2HB50
• 50 units	6GK1901-1BB10-2AE0	• 10 m	3RK1902-2HC10
Industrial Ethernet FastConnect installation cables		**IE FC M12 Plug PRO**	
• FastConnect standard cable	6XV1840-2AH10	PROFINET M12 plug connector, D-coded with fast connection system, axial cable outlet.	
• FastConnect trailing cable	6XV1840-3AH10	• 1 unit	6GK1901-0DB20-6AA0
• FastConnect marine cable	6XV1840-4AH10	• 8 units	6GK1901-0DB20-6AA8
Industrial Ethernet FastConnect installation cables		• PROFINET M12 plug connector, D-coded, angled.	3RK1902-2DA00
• **IE FC TP trailing cable GP 2 x 2**; sold by the meter, max. delivery unit 1 000 m; minimum order quantity 20 m.	6XV1870-2D	**IE panel feedthrough**	
• **IE TP torsion cable GP 2 x 2**; sold by the meter, max. delivery unit 1 000 m; minimum order quantity 20 m.	6XV1870-2F	Cabinet feedthrough for converting from the M12 connection system (D-coded, IP65/IP67) to the RJ45 connection system (IP20), 1 pack = 5 units.	6GK1901-0DM20-2AA5
Industrial Ethernet FastConnect Stripping tool	6GK1901-1GA00		

[1] An MMC is essential for operating the CPU

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Ordering data

	Article No.		Article No.
7/8" connecting cable to power supply		**7/8" cable connector**	
5-wire, 5 x 1.5 mm^2, trailing, preassembled with two 7/8" connectors (axial cable outlet), 5-pin, up to 50 m, in various lengths:		For ET 200eco, with axial cable outlet	
• 1.5 m	6XV1822-5BH15	• with male insert, 5-pack	6GK1905-0FA00
• 2.0 m	6XV1822-5BH20	• with female insert, 5-pack	6GK1905-0FB00
• 3.0 m	6XV1822-5BH30	• angled, with female insert, 1 unit	3RK1902-3DA00
• 5.0 m	6XV1822-5BH50	• angled, with male insert, 1 unit	3RK1902-3BA00
• 10 m	6XV1822-5BN10	7/8" cover cap, 10 per pack	6ES7194-3JA00-0AA0
• 15 m	6XV1822-5BN15	**Twisted Pair cables 4x2 with RJ45 connectors**	
• Other special lengths with 90° or 180° cable outlet.	See: http://support.automation. siemens.com/WW/view/en/26999294	0.5 m	6XV1870-3QE50
		1 m	6XV1870-3QH10
		2 m	6XV1870-3QH20
Trailing power cable, 5 x 1.5 mm^2, preassembled at both ends with 7/8" angled connectors (female insert at one end, male insert at the other end), in various lengths:		6 m	6XV1870-3QH60
		10 m	6XV1870-3QN10
• 3.0 m	3RK1902-3NB30	**Crossed Twisted Pair cables 4x2 with RJ45 connectors**	
• 5.0 m	3RK1902-3NB50		
• 10 m	3RK1902-3NC10	0.5 m	6XV1870-3RE50
		1 m	6XV1870-3RH10
Trailing power cable, 5 x 1.5 mm^2, preassembled at one end with 7/8" angled connector with female insert (female insert at one end, other end open), in various lengths:		2 m	6XV1870-3RH20
		6 m	6XV1870-3RH60
• 3.0 m	3RK1902-3GB30	10 m	6XV1870-3RN10
• 5.0 m	3RK1902-3GB50	**M12 sealing cap**	3RX9802-0AA00
• 10 m	3RK1902-3GC10	For protection of unused M12 connections with ET 200pro	
Power line	6XV1830-8AH10	**M12 sealing caps with female thread**	6ES7194-4JD60-0AA0
5-wire, 5 x 1.5 mm^2, trailing type, sold by the meter, minimum order quantity 20 m, maximum order quantity 1 000 m.		5 units	

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Notes

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