

SIMATIC S7-1500 Advanced Controllers

Central processing units

Compact CPUs

4

Overview CPU 1511C-1 PN



- The compact CPU with integral digital and analog inputs and outputs in the product spectrum of the S7-1500 Controllers
- With integrated technological functions, e.g. high-speed counter (HSC), frequency measurement, period duration measurement or stepper motor control, pulse width modulation, frequency output
- Suitable for applications with medium requirements for program scope and processing speed
- Used as central PLC in production lines with central and distributed I/O
- PROFINET IO IRT interface with 2-port switch
- PROFINET IO controller for operating distributed I/O on PROFINET
- PROFINET I-Device for connecting the CPU as an intelligent PROFINET device under a SIMATIC or non-Siemens PROFINET IO controller
- OPC UA Server and Client as runtime option for the easy connection of SIMATIC S7-1500 to non-Siemens devices/systems with the functions:
 - OPC UA Data Access
 - OPC UA Security
 - OPC UA Methods Call
 - Support of OPC UA Companion specifications
 - OPC UA Alarms & Conditions
- Isochronous mode (distributed)
- Integrated Motion Control functionalities for controlling speed-controlled and positioning axes, support for external encoders, output cams/cam tracks and probes
- Integrated web server for diagnostics with the option of creating user-defined web pages

Note

SIMATIC Memory Card required for operation of the CPU.

Overview CPU 1512C-1 PN



- The compact CPU with integral digital and analog inputs and outputs in the product spectrum of the S7-1500 Controllers
- With integrated technological functions, e.g. high-speed counter (HSC), frequency measurement, period duration measurement or stepper motor control, pulse width modulation, frequency output
- Suitable for applications with medium requirements for program scope and processing speed
- Used as central PLC in production lines with central and distributed I/O
- PROFINET IO IRT interface with 2-port switch
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Ordering data	Article No.	Ordering data	Article No.
CPU 1511C-1 PN 175 KB work memory for program, 1 MB for data, 16 digital inputs, 16 digital outputs, 5 analog inputs, 2 analog outputs, 6 high-speed counters, PROFINET IRT interface with 2-port switch, SIMATIC Memory Card required	6ES7511-1CK01-0AB0	System power supply For supplying the backplane bus of the S7-1500 Controller 24 V DC input voltage, power 25 W 24/48/60 V DC input voltage, power 60 W 24/48/60 V DC input voltage, power 60 W, buffering functionality 120/230 V AC input voltage, power 60 W	6ES7505-0KA00-0AB0 6ES7505-0RA00-0AB0 6ES7505-0RB00-0AB0 6ES7507-0RA00-0AB0
CPU 1512C-1 PN 250 KB work memory for program, 1 MB for data, 32 digital inputs, 32 digital outputs, 5 analog inputs, 2 analog outputs, 6 high-speed counters, PROFINET IRT interface with 2-port switch, SIMATIC Memory Card required	6ES7512-1CK01-0AB0	Power plug With coding element for power supply module; spare part, 10 units	6ES7590-8AA00-0AA0
Accessories SIMATIC Memory Card 4 MB 12 MB 24 MB 256 MB 2 GB 32 GB	6ES7954-8LC03-0AAA 6ES7954-8LE03-0AAA 6ES7954-8LF03-0AAA 6ES7954-8LL03-0AAA 6ES7954-8LP03-0AAA 6ES7954-8LT03-0AAA	Load current supply 24 V DC/3 A 24 V DC/8 A	6EP1332-4BA00 6EP1333-4BA00
Front connectors For 25 mm modules; including cable ties and individual labeling strips; push-in terminal 40-pin; spare part	6ES7592-1BM00-0XA0	Power supply connector Spare part; for connecting the 24 V DC supply voltage • With push-in terminals	6ES7193-4JB00-0AAA
Shielding set I/O For 25 mm modules; infeed element, shielding bracket, and shield terminal; 4 units, spare part (one shield set supplied with the module).	6ES7590-5CA10-0XA0	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	
Shield terminal element 10 units; spare part	6ES7590-5BA00-0AAA	IE FC RJ45 plug 180 180° cable outlet 1 unit 10 units 50 units	6GK1901-1BB10-2AA0 6GK1901-1BB10-2AB0 6GK1901-1BB10-2AE0
SIMATIC S7-1500 DIN rail Fixed lengths, with grounding elements • 160 mm • 245 mm • 482 mm • 530 mm • 830 mm For cutting to length by customer, without drill holes; grounding elements must be ordered separately • 2 000 mm	6ES7590-1AB60-0AAA 6ES7590-1AC40-0AAA 6ES7590-1AE80-0AAA 6ES7590-1AF30-0AAA 6ES7590-1AJ30-0AAA 6ES7590-1BC00-0AAA	IE FC TP standard cable GP 2x2 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	6XV1840-2AH10
PE connection element for 2 000 mm DIN rail 20 units	6ES7590-5AA00-0AAA	IE FC TP trailing cable 2 x 2 (type C) 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	6XV1840-3AH10
		IE FC TP marine cable 2 x 2 (type B) 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	6XV1840-4AH10
		IE FC stripping tool Pre-adjusted stripping tool for fast stripping of Industrial Ethernet FC cables	6GK1901-1GA00

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Ordering data

Article No.

Article No.

Display module 35 mm

For CPU 1511-1 PN, CPU 1513-1 PN, CPU 1511F-1 PN, CPU 1513F-1 PN, CPU 1511C-1 PN and CPU 1512C-1 PN; spare part

6ES7591-1AB00-0AA0

Cover 35 mm

For CPU 1511-1 PN, CPU 1513-1 PN, CPU 1511F-1 PN, CPU 1513F-1 PN, CPU 1511C-1 PN and CPU 1512C-1 PN; spare part

6ES7591-4AB00-0AA0

SIMATIC S7-1500 Starter Kit

Consisting of CPU 1511C-1 PN, SIMATIC Memory Card 4 MB, 160 mm DIN rail, front connector, STEP 7 Professional 365-day license, SIMATIC ProDiag 1500, SIMATIC OPC UA S7-1500 Small, PM 1507 24 V/3 A power supply, Ethernet cable, documentation

6ES7511-1CK03-4YB5

STEP 7 Professional V17

Target system:
SIMATIC S7-1200, S7-1500, S7-300, S7-400, WinAC

Requirement:

- Windows 10 (64-bit)
- Windows 10 Professional Version 1909, 2004, 20H2
 - Windows 10 Enterprise Version 1909, 2004, 20H2
 - Windows 10 IoT Enterprise 2016 LTSB
 - Windows 10 IoT Enterprise 2019 LTSC
- Windows Server (64-bit)
- Windows Server 2016 Standard (full installation)
 - Windows Server 2019 Standard (full installation)

Type of delivery:

9 languages: de, en, zh included, fr, es, it, ru, jp, kr as download

STEP 7 Professional V17, floating license

6ES7822-1AA07-0YA5

STEP 7 Professional V17, floating license, software download including license key ¹⁾

6ES7822-1AE07-0YA5

Email address required for delivery

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

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

Technical specifications

Article number	6ES7511-1CK01-0AB0	6ES7512-1CK01-0AB0
	CPU 1511C-1 PN, 175 KB Prog, 1 MB Data	CPU 1512C-1 PN, 250 KB Prog, 1 MB Data
General information		
Product type designation	CPU 1511C-1 PN	CPU 1512C-1 PN
Engineering with		
• STEP 7 TIA Portal configurable/integrated from version	V17 (FW V2.9) / V15 (FW V2.5) or higher; with older TIA Portal versions configurable as 6ES7511-1CK00-0AB0	V17 (FW V2.9) / V15 (FW V2.5) or higher; with older TIA Portal versions configurable as 6ES7512-1CK00-0AB0
Display		
Screen diagonal [cm]	3.45 cm	3.45 cm
Supply voltage		
Rated value (DC)	24 V	24 V
Memory		
Work memory		
• integrated (for program)	175 kbyte	250 kbyte
• integrated (for data)	1 Mbyte	1 Mbyte
Load memory		
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte	32 Gbyte

Technical specifications

Article number	6ES7511-1CK01-0AB0 CPU 1511C-1 PN, 175 KB Prog, 1 MB Data	6ES7512-1CK01-0AB0 CPU 1512C-1 PN, 250 KB Prog, 1 MB Data
CPU processing times		
for bit operations, typ.	60 ns	48 ns
for word operations, typ.	72 ns	58 ns
for fixed point arithmetic, typ.	96 ns	77 ns
for floating point arithmetic, typ.	384 ns	307 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		
• Size, 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
Time of day		
Clock		
• Type	Hardware clock	Hardware clock
Digital inputs		
integrated channels (DI)	16	32
Digital outputs		
integrated channels (DO)	16	32
Short-circuit protection	Yes; electronic/thermal	Yes; electronic/thermal
Analog outputs		
integrated channels (AO)	2	2
1. Interface		
Interface types		
• RJ 45 (Ethernet)	Yes; X1	Yes; X1
• Number of ports	2	2
• integrated switch	Yes	Yes
Protocols		
• IP protocol	Yes; IPv4	Yes; IPv4
• PROFINET IO Controller	Yes	Yes
• PROFINET IO Device	Yes	Yes
• SIMATIC communication	Yes	Yes
• Open IE communication	Yes; Optionally also encrypted	Yes; Optionally also encrypted
• Web server	Yes	Yes
• Media redundancy	Yes	Yes

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PROFINET IO Controller Services		
- PG/OP communication	Yes	Yes
- Isochronous mode	Yes	Yes
- Direct data exchange	Yes; Requirement: IRT and isochronous mode (MRPD optional)	Yes; Requirement: IRT and isochronous mode (MRPD optional)
- IRT	Yes	Yes
- PROFlenergy	Yes; per user program	Yes; per user program
- Prioritized startup	Yes; Max. 32 PROFINET devices	Yes; Max. 32 PROFINET devices
- Number of connectable IO Devices, max.	128; In total, up to 256 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET	128; 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	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; in total across all interfaces	8; in total across all interfaces
- 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
PROFINET IO Device Services		
- PG/OP communication	Yes	Yes
- Isochronous mode	No	No
- IRT	Yes	Yes
- PROFlenergy	Yes; per user program	Yes; per user program
- Shared device	Yes	Yes
- Number of IO Controllers with shared device, max.	4	4
- activation/deactivation of I-devices	Yes; per user program	Yes; per user program
- Asset management record	Yes; per user program	Yes; per user program
Protocols		
Number of connections		
• Number of connections, max.	96; via integrated interfaces of the CPU and connected CPs / CMs	128; via integrated interfaces of the CPU and connected CPs / CMs
Redundancy mode		
Media redundancy		
- Media redundancy	only via 1st interface (X1)	only via 1st interface (X1)
- MRP	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0, MRP Manager; MRP Client
- MRP interconnection, supported	Yes; as MRP ring node according to IEC 62439-2 Edition 3.0	Yes; as MRP ring node according to IEC 62439-2 Edition 3.0
- MRPD	Yes; Requirement: IRT	Yes; Requirement: IRT
- Switchover time on line break, typ.	200 ms; For MRP, bumpless for MRPD	200 ms; For MRP, bumpless for MRPD
- Number of stations in the ring, max.	50	50
SIMATIC communication		
• S7 routing	Yes	Yes
OPC UA		
• OPC UA Client	Yes	Yes
• OPC UA Server	Yes; Data access (read, write, subscribe), method call, custom address space	Yes; Data access (read, write, subscribe), method call, custom address space
• Alarms and Conditions	Yes	Yes

Technical specifications

Article number	6ES7511-1CK01-0AB0 CPU 1511C-1 PN, 175 KB Prog, 1 MB Data	6ES7512-1CK01-0AB0 CPU 1512C-1 PN, 250 KB Prog, 1 MB Data
Supported technology objects		
Motion Control	Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool	Yes; Note: The number of technology objects affects the cycle time of the PLC program; selection guide via the TIA Selection Tool
• Number of available Motion Control resources for technology objects	800	800
• Required Motion Control resources		
- per speed-controlled axis	40	40
- per positioning axis	80	80
- per synchronous axis	160	160
- per external encoder	80	80
- per output cam	20	20
- per cam track	160	160
- per probe	40	40
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		
• horizontal installation, min.	-25 °C; No condensation	-25 °C; No condensation
• horizontal installation, max.	60 °C; note derating data for onboard I/O in the manual. Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	60 °C; note derating data for onboard I/O in the manual. Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off
• vertical installation, min.	-25 °C; No condensation	-25 °C; No condensation
• vertical installation, max.	40 °C; note derating data for onboard I/O in the manual. Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off	40 °C; note derating data for onboard I/O in the manual. Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off
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	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Configuration		
Programming		
Programming language		
- LAD	Yes	Yes
- FBD	Yes	Yes
- STL	Yes	Yes
- SCL	Yes	Yes
- GRAPH	Yes	Yes
Know-how protection		
• User program protection/ password protection	Yes	Yes
• Copy protection	Yes	Yes
• Block protection	Yes	Yes
Access protection		
• protection of confidential configuration data	Yes	Yes
• Password for display	Yes	Yes
• Protection level: Write protection	Yes	Yes
• Protection level: Read/write protection	Yes	Yes
• Protection level: Complete protection	Yes	Yes
Dimensions		
Width	85 mm	110 mm
Height	147 mm	147 mm
Depth	129 mm	129 mm
Weights		
Weight, approx.	1 050 g	1 360 g