

SIMATIC S7-1500 Advanced Controllers

Central processing units

Redundant CPUs

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Overview CPU 1513R-1 PN



- The CPU for applications with medium requirements for program scope and processing speed, and increased requirements for availability.
- High processing speed for binary and floating-point arithmetic
- Used as the central controller in production lines with distributed I/O
- PROFINET IO RT interface with 2-port switch
- PROFINET IO controller for operating distributed I/O on PROFINET

Note:

SIMATIC Memory Card required for operation of the CPU

Overview CPU 1517H-3 PN



- The CPU for applications with high requirements for availability, very high requirements for program scope and networking, and very high requirements for processing speed.
- High processing speed for binary and floating-point arithmetic
- Used as central controller with distributed I/O
- PROFINET IO RT interface with 2-port switch
- Additional PROFINET interface with separate IP address
- PROFINET IO controller for operating distributed I/O on PROFINET

Note:

SIMATIC Memory Card required for operation of the CPU

Overview CPU 1515R-2 PN



- The CPU for applications with medium/high requirements for program scope, networking and processing speed, and with increased requirements for availability.
- High processing speed for binary and floating-point arithmetic
- Used as central controller with distributed I/O
- PROFINET IO RT interface with 2-port switch
- Additional PROFINET interface with separate IP address
- PROFINET IO controller for operating distributed I/O on PROFINET

Note:

SIMATIC Memory Card required for operation of the CPU

Overview CPU 1518HF-4 PN



- The CPU for applications with high availability requirements, also in connection with functional safety requirements
- Can be used for safety functions up to SIL 3 according to IEC 61508 and up to PLe according to ISO 13849
- A very large program data memory enables the realization of extensive applications.
- High processing speed for binary and floating-point arithmetic
- Used as central PLC with distributed I/O
- Supports PROFIsafe in distributed configurations
- PROFINET IO RT interface with 2-port switch
- Two additional PROFINET interfaces with separate IP addresses
- PROFINET IO controller for operating distributed I/O on PROFINET

Note:

SIMATIC Memory Card required for operation of the CPU

Ordering data

Ordering data	Article No.
CPU 1513R-1 PN SIMATIC S7-1500R CPU, 300 KB work memory for program, 1.5 MB for data, PROFINET RT interface with 2-port switch; SIMATIC Memory Card required	6ES7513-1RL00-0AB0
CPU 1515R-2 PN SIMATIC S7-1500R CPU, 450 KB work memory for program, 3 MB for data, PROFINET RT interface with 2-port switch, PROFINET interface; SIMATIC Memory Card required	6ES7515-2RM00-0AB0
CPU 1517H-3 PN SIMATIC S7-1500H CPU, 2 MB work memory for program, 8 MB for data, 1st PROFINET RT interface with 2-port switch, 2nd PROFINET interface, 3rd interface synchronization, command times for bit operations 4 ns; SIMATIC Memory Card required	6ES7517-3HP00-0AB0
SIMATIC S7-1500H CPU 1517H System Bundle Comprising 2 CPUs 1517H-3 PN, 4 synchronization modules up to 10 m, 2 FOC synchronization cables (1 m)	6ES7500-0HP00-0AB0
CPU 1518HF-4 PN SIMATIC S7-1500H CPU, 9 MB work memory for program, 60 MB for data, 1st PROFINET RT interface with 2-port switch, 2nd PROFINET interface, 3rd PROFINET interface, 4th/5th interface synchronization, command times for bit operations 4 ns; SIMATIC Memory Card required	6ES7518-4JP00-0AB0
SIMATIC S7-1500HF CPU 1518HF System Bundle Comprising 2 CPUs 1518HF-4 PN, 4 synchronization modules up to 10 m, 2 FOC synchronization cables (1 m)	6ES7 500-0JP00-0AB0

Accessories	Article No.
Synchronization modules For patch cable FOC up to 10 m For routing cable FOC up to 10 km	6ES7960-1CB00-0AA5 6ES7960-1FB00-0AA5
Synchronization connecting cables FOC for S7-1500H Length 1 m Length 2 m Length 10 m	6ES7960-1BB00-5AA5 6ES7960-1BC00-5AA5 6ES7960-1CB00-5AA5
SIMATIC Memory Card 4 MB 12 MB 24 MB 256 MB 2 GB 32 GB	6ES7954-8LC03-0AA0 6ES7954-8LE03-0AA0 6ES7954-8LF03-0AA0 6ES7954-8LL03-0AA0 6ES7954-8LP03-0AA0 6ES7954-8LT03-0AA0
SIMATIC S7-1500 DIN rail Fixed lengths, with grounding elements <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 2 000 mm 	6ES7590-1AB60-0AA0 6ES7590-1AC40-0AA0 6ES7590-1AE80-0AA0 6ES7590-1AF30-0AA0 6ES7590-1AJ30-0AA0 6ES7590-1BC00-0AA0
PE connection element for 2 000 mm DIN rail 20 units	6ES7590-5AA00-0AA0

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Ordering data

Article No.

Article No.

System power supply

For supplying the backplane bus of the S7-1500 Controller

24 V DC input voltage, power 25 W

6ES7505-0KA00-0AB0

24/48/60 V DC input voltage, power 60 W

6ES7505-0RA00-0AB0

24/48/60 V DC input voltage, power 60 W, buffering functionality

6ES7505-0RB00-0AB0

120/230 V AC input voltage, power 60 W

6ES7507-0RA00-0AB0

Power plug

6ES7590-8AA00-0AA0

With coding element for power supply module; spare part, 10 units

Load current supply

24 V DC/3 A

6EP1332-4BA00

24 V DC/8 A

6EP1333-4BA00

Power supply connector

Spare part; for connecting the 24 V DC supply voltage

- With push-in terminals

6ES7193-4JB00-0AA0

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

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

Pre-adjusted stripping tool for fast stripping of Industrial Ethernet FC cables

6GK1901-1GA00

Display

For CPU 1511-1 PN, CPU 1511F-1 PN, CPU 1513-1 PN, CPU 1513F-1 PN, CPU 1513R-1 PN; spare part

6ES7591-1AA01-0AA0

For CPU 1515-2 PN, CPU 1515F-2 PN, CPU 1515R-2 PN, CPU 1516-3 PN/DP, CPU 1516F-3 PN/DP, CPU 1517-3 PN/DP, CPU 1517H-3 PN, CPU 1517F-3 PN/DP, CPU 1518-4 PN/DP, CPU 1518F-4 PN/DP, CPU 1518-4 PN/DP ODK, CPU 1518F-4 PN/DP ODK and CPU 1518HF-4 PN; spare part

6ES7591-1BA02-0AA0

STEP 7 Professional V17 (required for S7-1500R/H)

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⁾

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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

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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>

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Technical specifications

Article number	6ES7513-1RL00-0AB0 CPU 1513R-1 PN, 300KB program/1,5MB data	6ES7515-2RM00-0AB0 CPU 1515R-2 PN, 500KB program/ 3MB data	6ES7517-3HP00-0AB0 CPU 1517H-3 PN, 2MB program/8MB data	6ES7518-4JP00-0AB0 CPU 1518HF-4 PN, 9MB program/60MB data
General information				
Product type designation	CPU 1513R-1 PN	CPU 1515R-2 PN	CPU 1517H-3 PN	CPU 1518HF-4PN
Engineering with				
• STEP 7 TIA Portal configurable/ integrated from version	V17 (FW V2.9) / V16 (FW V2.8) / V15.1 (FW V2.6)	V17 (FW V2.9) / V16 (FW V2.8) / V15.1 (FW V2.6)	V17 (FW V2.9) / V16 (FW V2.8) / V15.1 (FW V2.6)	V17
Display				
Screen diagonal [cm]	3.45 cm	6.1 cm	6.1 cm	6.1 cm
Supply voltage				
Rated value (DC)	24 V	24 V	24 V	24 V
Memory				
Work memory				
• integrated (for program)	300 kbyte	500 kbyte	2 Mbyte	9 Mbyte
• integrated (for data)	1.5 Mbyte	3 Mbyte	8 Mbyte	60 Mbyte
Load memory				
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte	32 Gbyte	32 Gbyte	32 Gbyte
CPU processing times				
for bit operations, typ.	80 ns	60 ns	4 ns	4 ns
for word operations, typ.	96 ns	72 ns	6 ns	6 ns
for fixed point arithmetic, typ.	128 ns	96 ns	6 ns	6 ns
for floating point arithmetic, typ.	512 ns	384 ns	24 ns	24 ns
Counters, timers and their retentivity				
S7 counter				
• Number	2 048	2 048	2 048	2 048
IEC counter				
• Number	Any (only limited by the main memory)	Any (only limited by the main memory)	Any (only limited by the main memory)	Any (only limited by the main memory)
S7 times				
• Number	2 048	2 048	2 048	2 048
IEC timer				
• Number	Any (only limited by the main memory)	Any (only limited by the main memory)	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	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	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	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	Hardware clock	Hardware clock
1. Interface				
Interface types				
• RJ 45 (Ethernet)	Yes; X1	Yes; X1	Yes; X1	Yes; X1
• Number of ports	2	2	2	2
• integrated switch	Yes	Yes	Yes	Yes
Protocols				
• IP protocol	Yes; IPv4	Yes; IPv4	Yes; IPv4	Yes; IPv4
• PROFINET IO Controller	Yes	Yes	Yes	Yes
• PROFINET IO Device	No	No	No	No
• SIMATIC communication	Yes; Only Server	Yes; Only Server	Yes; Only Server	Yes; Only Server
• Open IE communication	Yes	Yes	Yes	Yes
• Web server	No	No	No	No
• Media redundancy	Yes	Yes	Yes	Yes

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PROFINET IO Controller Services				
- PG/OP communication	Yes	Yes	Yes	Yes
- Isochronous mode	No	No	No	No
- IRT	No	No	No	No
- PROFINergy	Yes	Yes	Yes	Yes; per user program
- Number of connectable IO Devices, max.	64	64	256	256
- 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		
2. Interface				
Interface types				
• RJ 45 (Ethernet)		Yes; X2	Yes; X2	Yes; X2
• Number of ports		1	1	1
• integrated switch		No	No	No
Protocols				
• IP protocol		Yes; IPv4	Yes; IPv4	Yes; IPv4
• PROFINET IO Controller		No	No	No
• PROFINET IO Device		No	No	No
• SIMATIC communication		Yes; Only Server	Yes; Only Server	Yes; Only Server
• Open IE communication		Yes	Yes	Yes
• Web server		No	No	No
• Media redundancy		No	No	No
3. Interface				
Interface type			Pluggable synchronization submodule (FO)	
Plug-in interface modules			Synchronization module 6ES7960-1CB00-0AA5 or 6ES7960-1FB00-0AA5	
Interface types				
• RJ 45 (Ethernet)				Yes; X3
• Number of ports				1
• integrated switch				No
Protocols				
• IP protocol				Yes; IPv4
• SIMATIC communication				Yes; Only Server
• Open IE communication				Yes
4. Interface				
Interface type			Pluggable synchronization submodule (FO)	Pluggable synchronization submodule (FO)
Plug-in interface modules			Synchronization module 6ES7960-1CB00-0AA5 or 6ES7960-1FB00-0AA5	Synchronization module 6ES7960-1CB00-0AA5 or 6ES7960-1FB00-0AA5

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Protocols				
Number of connections				
• Number of connections, max.	88	108	288	320
Redundancy mode				
Media redundancy				
- Media redundancy				only via 1st interface (X1)
- MRP	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0
- 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	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	No	No	No	No
- Switchover time on line break, typ.	200 ms; PROFINET MRP	200 ms; PROFINET MRP	200 ms; PROFINET MRP	200 ms; PROFINET MRP
- Number of stations in the ring, max.	50; Only 16 are recommended, however	50; Only 16 are recommended, however	50	50
SIMATIC communication				
• S7 routing	No	Yes	Yes	Yes
OPC UA				
• OPC UA Client	No	No	No	No
• OPC UA Server	No	No	No	No
Supported technology objects				
Motion Control Controller	No	No	No	No
• PID_Compact	Yes; Universal PID controller with integrated optimization	Yes; Universal PID controller with integrated optimization	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	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	Yes; PID controller with integrated optimization for temperature	Yes; PID controller with integrated optimization for temperature
Counting and measuring	Yes	Yes	Yes	Yes
• High-speed counter	No	No	No	No
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.	0 °C	0 °C	0 °C	0 °C
• horizontal installation, max.	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off	60 °C; Display: 50 °C, at an operating temperature of typically 50 °C, the display is switched off
• vertical installation, min.	0 °C	0 °C	0 °C	0 °C
• vertical installation, max.	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off	40 °C; Display: 40 °C, at an operating temperature of typically 40 °C, the display is switched off	40 °C; 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	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual

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Configuration				
Programming				
Programming language				
- LAD	Yes	Yes	Yes	Yes; incl. failsafe
- FBD	Yes	Yes	Yes	Yes; incl. failsafe
- STL	Yes	Yes	Yes	Yes
- SCL	Yes	Yes	Yes	Yes
- CFC	No	No	No	
- GRAPH	Yes	Yes	Yes	Yes
Know-how protection				
• User program protection/password protection	Yes	Yes	Yes	Yes
• Copy protection	No	No	No	No
• Block protection	Yes	Yes	Yes	Yes
Access protection				
• protection of confidential configuration data	Yes	Yes	Yes	Yes
• Password for display	Yes	Yes	Yes	Yes
• Protection level: Write protection	Yes	Yes	Yes	Yes
• Protection level: Read/write protection	Yes	Yes	Yes	Yes
• Protection level: Write protection for Failsafe				Yes
• Protection level: Complete protection	Yes	Yes	Yes	Yes
Dimensions				
Width	35 mm	70 mm	210 mm	210 mm
Height	147 mm	147 mm	147 mm	147 mm
Depth	129 mm	129 mm	129 mm	129 mm
Weights				
Weight, approx.	430 g	830 g	2 119 g; Interface modules: 2x 18 g	