

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Selected official pages for procurement and maintenance review

PRODUCT BRAND

Siemens

PRODUCT MODEL

6ES7510-1DJ01-0AB0

SIMATIC ET 200SP. CPU 1510SP-1 PN controller.

OFFICIAL SOURCE

CPU 1510SP-1 PN Equipment Manual | A5E03506268-AD

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Open the original manufacturer document

Selected legal, safety, operating-role, wiring and exact-CPU specification pages. This CPU manual supplements the ET 200SP system instructions and is not a complete installation procedure.

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Amikon Limited prepared this independent reference package. Selected Siemens pages follow unchanged, retaining their original format and printed page numbers. This extract does not replace the complete applicable instructions.

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 DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.
 WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.
 CAUTION
indicates that minor personal injury can result if proper precautions are not taken.
NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Preface

Purpose of the documentation

This manual supplements the ET 200SP distributed I/O system (<http://support.automation.siemens.com/WW/view/en/58649293>) system manual as well as the function manuals. This manual contains a description of the module-specific information. The system-related functions are described in the system manual. All system-spanning functions are described in the function manuals.

The information provided in this manual and the system manual allows you to commission the CPU 1510SP-1 PN.

Conventions

STEP 7: In this documentation, "STEP 7" is used as a synonym for all versions of the configuration and programming software "STEP 7 (TIA Portal)".

Please also observe the notes marked as follows:

Note

A note contains important information on the product described in the documentation, on the handling of the product or on the section of the documentation to which particular attention should be paid.

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Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

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To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed visit (<https://www.siemens.com/industrialsecurity>).

Reference

You can find an overview of all new functions, improvements and revisions in the respective firmware versions on the Internet

(<https://support.industry.siemens.com/cs/ww/en/view/109478459>).

2.2 Operating principle

The CPU contains the operating system and executes the user program. The user program is located on the SIMATIC memory card and is processed in the work memory of the CPU.

The PROFINET interfaces on the CPU allow simultaneous communication with PROFINET devices, PROFINET controllers, HMI devices, programming devices, other controllers and other systems. The CPU 1510SP-1 PN supports operation as an IO controller, I-device or standalone CPU.

With its optional PROFIBUS interface, CM DP, CPU 1510SP-1 PN supports the configuration of PROFIBUS networks in addition to PROFINET IO. When you use the interface as a PROFIBUS DP interface, you can configure the CPU 1510SP-1 PN as a DP master or as an intelligent DP slave (I-slave).

IO controller

CPU 1510SP-1 PN sends and receives data from the connected IO devices within a PROFINET IO system. You can operate the CPU with a maximum of 64 connected IO devices, a maximum of 64 of which use IRT (Isochronous Real Time).

I-device

The "I-device" (intelligent IO device) functionality allows you to exchange data with an IO controller. CPU 1510SP-1 PN thus fulfills the role of an intelligent distributed pre-processing unit for sub-processes. The I-device is connected as an IO device to a higher-level IO controller for this purpose.

Advantages:

- Interference-resistant configuration due to short signal and encoder wiring
- Reduced wiring requirements for transmission of the data via PROFINET

Standalone CPU

You can also use the CPU 1510SP-1 PN in the ET 200SP distributed I/O system as a "central system" without a higher-level controller.

DP master

To use the ET 200SP as a DP master, you need the CPU and the optional communication module, CM DP. When used as a DP master, ET 200SP exchanges data with the connected DP slaves via PROFIBUS DP.

Wiring

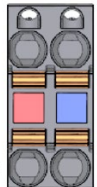
This section provides information on the pin assignment of the individual interfaces and the block diagram of the CPU 1510SP-1 PN.

24 V DC supply voltage (X80)

The connector for the supply voltage is plugged in when the CPU ships from the factory.

The following table shows the signal names and the descriptions of the pin assignment of the 24 V DC supply voltage.

Table 3- 1 Pin assignment 24 V DC supply voltage

View	Signal name ¹⁾		Description
Connector			
	1	1L+	+ 24 V DC of the supply voltage
	2	1M	Ground of the supply voltage
	3	2M	Ground of the supply voltage for loop-through ²⁾
	4	2L+	+ 24 V DC of the supply voltage for loop-through ²⁾

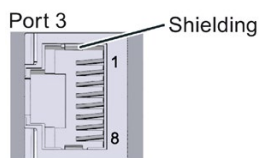
¹⁾ 1L+ and 2L+ as well as 1M and 2M are bridged internally

²⁾ Maximum 10 A permitted

PROFINET IO interface on the CPU (X1 P3)

The assignment corresponds to the Ethernet standard for an RJ45 connector.

- When autonegotiation is deactivated, the RJ45 socket is allocated as a switch (MDI-X).
- If autonegotiation is activated, then autocrossing is active and the RJ45 socket has either a device assignment (MDI) or switch assignment (MDI-X).



Technical specifications

The following table shows the technical specifications as of 05/2021. You will find a data sheet including daily updated technical specifications on the Internet (<https://support.industry.siemens.com/cs/ww/en/pv/6ES7510-1DJ01-0AB0/td?dl=en>).

Article number	6ES7510-1DJ01-0AB0
General information	
Product type designation	CPU 1510SP-1 PN
HW functional status	FS05
Firmware version	V2.9
Product function	
• I&M data	Yes; I&M0 to I&M3
• Module swapping during operation (hot swapping)	Yes; Multi-hot swapping
• Isochronous mode	Yes; Only with PROFINET; with minimum OB 6x cycle of 625 µs
Engineering with	
• STEP 7 TIA Portal configurable/integrated from version	V17 (FW V2.9) / V13 SP1 Update 4 (FW V1.8) or higher
Configuration control	
via dataset	Yes
Control elements	
Mode selector switch	1
Supply voltage	
Type of supply voltage	24 V DC
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Mains buffering	
• Mains/voltage failure stored energy time	5 ms
Input current	
Current consumption (rated value)	0.6 A
Current consumption, max.	0.9 A
Inrush current, max.	4.7 A; Rated value
I ² t	0.14 A ² ·s
Power	
Infeed power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	5.6 W
Memory	
Number of slots for SIMATIC memory card	1
SIMATIC memory card required	Yes

Article number	6ES7510-1DJ01-0AB0
Work memory	
• integrated (for program)	100 kbyte
• integrated (for data)	750 kbyte
Load memory	
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte
Backup	
• maintenance-free	Yes
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
CPU-blocks	
Number of elements (total)	4 000; Blocks (OB, FB, FC, DB) and UDTs
DB	
• Number range	1 ... 60 999; subdivided into: number range that can be used by the user: 1 ... 59 999, and number range of DBs created via SFC 86: 60 000 ... 60 999
• Size, max.	750 kbyte; For DBs with absolute addressing, the max. size is 64 KB
FB	
• Number range	0 ... 65 535
• Size, max.	100 kbyte
FC	
• Number range	0 ... 65 535
• Size, max.	100 kbyte
OB	
• Size, max.	100 kbyte
• Number of free cycle OBs	100
• Number of time alarm OBs	20
• Number of delay alarm OBs	20
• Number of cyclic interrupt OBs	20; With minimum OB 3x cycle of 500 µs
• Number of process alarm OBs	50
• Number of DPV1 alarm OBs	3
• Number of isochronous mode OBs	1
• Number of technology synchronous alarm OBs	2
• Number of startup OBs	100
• Number of asynchronous error OBs	4
• Number of synchronous error OBs	2

Article number	6ES7510-1DJ01-0AB0
per CM/CP	
– Inputs (volume)	8 kbyte
– Outputs (volume)	8 kbyte
Subprocess images	
• Number of subprocess images, max.	32
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
Hardware configuration	
Number of distributed I/O systems	32; A distributed I/O system is characterized not only by the integration of distributed I/O via PROFINET or PROFIBUS communication modules, but also by the connection of I/O via AS-i master modules or links (e.g. IE/PB-Link)
Number of DP masters	
• Via CM	1
Number of IO Controllers	
• integrated	1
• Via CM	0
Rack	
• Modules per rack, max.	80; CPU + 64 modules + server module (mounting width max. 1 m) + 16 ET 200AL modules
• Quantity of operable ET 200SP modules, max.	64
• Quantity of operable ET 200AL modules, max.	16
• Number of lines, max.	1
PtP CM	
• Number of PtP CMs	the number of connectable PtP CMs is only limited by the number of available slots
Time of day	
Clock	
• Type	Hardware clock
• Backup time	6 wk; At 40 °C ambient temperature, typically
• Deviation per day, max.	10 s; Typ.: 2 s
Operating hours counter	
• Number	16

Article number	6ES7510-1DJ01-0AB0
Clock synchronization	
• supported	Yes
• to DP, master	Yes; Via CM DP module
• to DP, slave	Yes; Via CM DP module
• in AS, master	Yes
• in AS, slave	Yes
• on Ethernet via NTP	Yes
Interfaces	
Number of PROFINET interfaces	1
Number of PROFIBUS interfaces	1; Via CM DP module
Optical interface	No
1. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; X1 P3; opt. X1 P1 and X1 P2 via BusAdapter BA 2x RJ45
• Number of ports	3; 1. integr. + 2. via BusAdapter
• integrated switch	Yes
• BusAdapter (PROFINET)	Yes; compatible BusAdapters: BA 2x RJ45, BA 2x FC, BA 2x M12
Protocols	
• IP protocol	Yes; IPv4
• PROFINET IO Controller	Yes
• PROFINET IO Device	Yes
• SIMATIC communication	Yes
• Open IE communication	Yes; Optionally also encrypted
• Web server	Yes
• Media redundancy	Yes; MRP Automanager according to IEC 62439-2 Edition 2.0
PROFINET IO Controller	
Services	
– PG/OP communication	Yes
– Isochronous mode	Yes
– Direct data exchange	Yes; Requirement: IRT and isochronous mode (MRPD optional)
– IRT	Yes
– PROFINergy	Yes; per user program
– 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

Article number	6ES7510-1DJ01-0AB0
Standards, approvals, certificates	
Highest safety class achievable in safety mode	none
- Performance level according to ISO 13849-1 - SIL acc. to IEC 61508	No
Ambient conditions	
Ambient temperature during operation	
- horizontal installation, min. - horizontal installation, max. - vertical installation, min. - vertical installation, max.	-25 °C; No condensation 60 °C -25 °C; No condensation 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 – FBD – STL – SCL – GRAPH	Yes Yes Yes Yes Yes
Know-how protection	
- User program protection/password protection - Copy protection - Block protection	Yes Yes Yes
Access protection	
- protection of confidential configuration data - Protection level: Write protection - Protection level: Read/write protection - Protection level: Complete protection	Yes Yes Yes Yes
Cycle time monitoring	
- lower limit - upper limit	adjustable minimum cycle time adjustable maximum cycle time
Dimensions	
Width	100 mm
Height	117 mm
Depth	75 mm