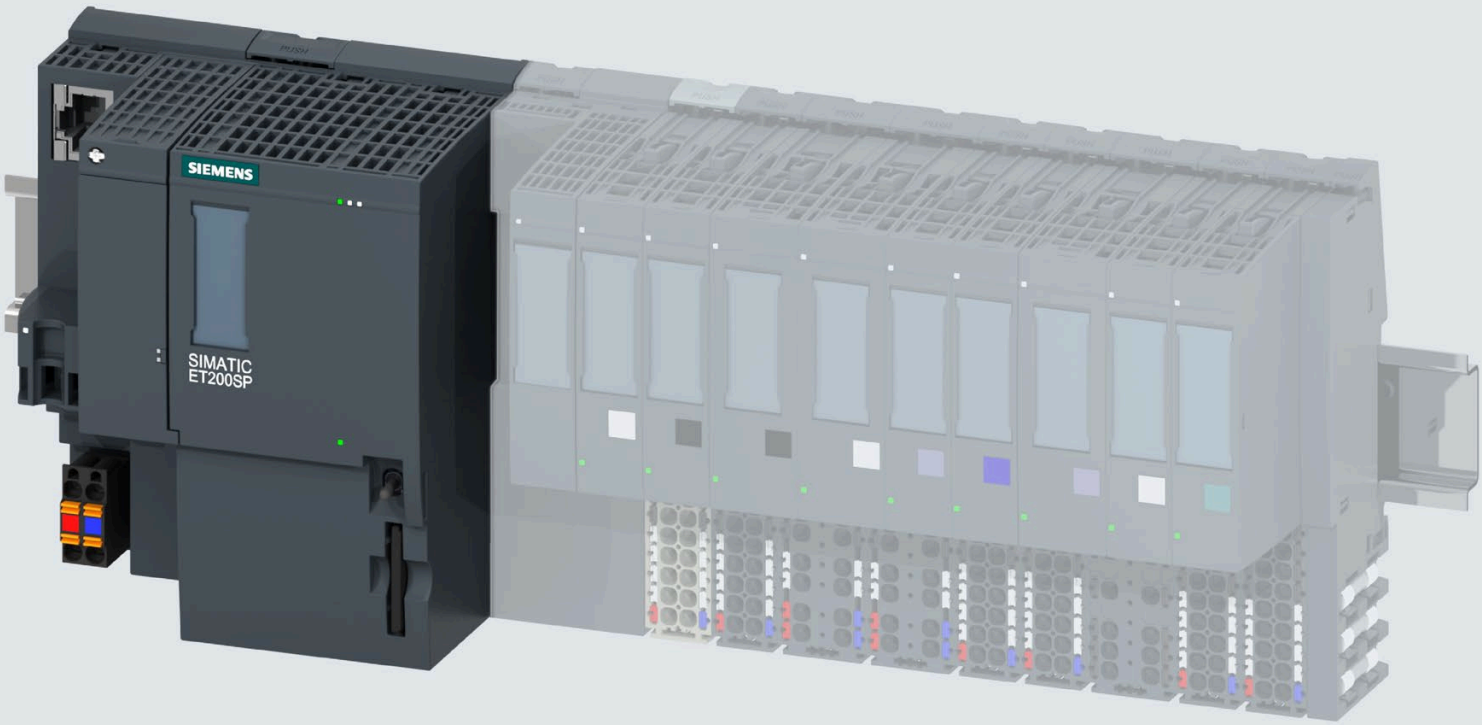
SIEMENS



Manual

SIMATIC

ET 200SP

CPU 1512SP-1 PN
(6ES7512-1DK01-0AB0)

Edition 05/2021

support.industry.siemens.com

SIEMENS

SIMATIC

ET 200SP
CPU 1512SP-1 PN
(6ES7512-1DK01-0AB0)

Equipment Manual

Preface

ET 200SP Documentation Guide 1

Product overview 2

Wiring 3

Interrupts, error messages, diagnostics and system alarms 4

Technical specifications 5

Dimension drawing A

05/2021
A5E03506268-AD

Legal information

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indicates that property damage can result if proper precautions are not taken.

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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 1512SP-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 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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- **Application examples**

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Industry Mall

The Industry Mall is the catalog and order system of Siemens AG for automation and drive solutions on the basis of Totally Integrated Automation (TIA) and Totally Integrated Power (TIP).

Catalogs for all the products in automation and drives are available on the Internet (https://mall.industry.siemens.com).

Table of contents

Preface **3**

1 ET 200SP Documentation Guide **6**

2 Product overview **10**

2.1 New functions 10

2.2 Operating principle 12

2.3 Properties 13

2.4 Operating and display elements 19

2.4.1 Front view of the module with BusAdapter 19

2.5 Mode switch 20

3 Wiring **21**

4 Interrupts, error messages, diagnostics and system alarms **29**

4.1 Status and error display of the CPU 29

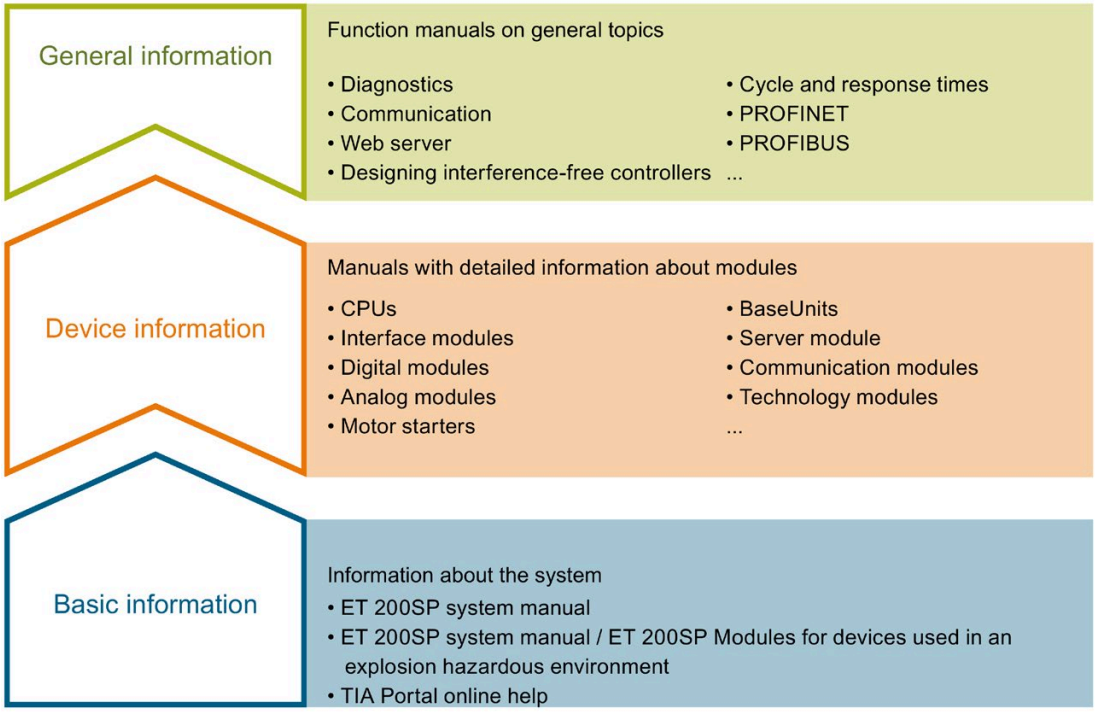
5 Technical specifications **32**

A Dimension drawing **52**

ET 200SP Documentation Guide

1

The documentation for the SIMATIC ET 200SP distributed I/O system is arranged into three areas.
This arrangement enables you to access the specific content you require.



Basic information

The System Manual and Getting Started describe in detail the configuration, installation, wiring and commissioning of the SIMATIC ET 200SP distributed I/O system. The STEP 7 online help supports you in the configuration and programming.

Device information

Product manuals contain a compact description of the module-specific information, such as properties, wiring diagrams, characteristics and technical specifications.

General information

The function manuals contain detailed descriptions on general topics regarding the SIMATIC ET 200SP distributed I/O system, e.g. diagnostics, communication, Web server, motion control and OPC UA.

You can download the documentation free of charge from the Internet (https://support.industry.siemens.com/cs/ww/en/view/109742709).

Changes and supplements to the manuals are documented in a Product Information.

You can download the product information free of charge from the Internet (https://support.industry.siemens.com/cs/us/en/view/73021864).

Manual Collection ET 200SP

The Manual Collection contains the complete documentation on the SIMATIC ET 200SP distributed I/O system gathered together in one file.

You can find the Manual Collection on the Internet (https://support.automation.siemens.com/WW/view/en/84133942).

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You configure your own download package with a few clicks.

In doing so you can select:

- Product images, 2D dimension drawings, 3D models, internal circuit diagrams, EPLAN macro files
- Manuals, characteristics, operating manuals, certificates
- Product master data

You can find "mySupport" - CAx data on the Internet (https://support.industry.siemens.com/my/ww/en/CAxOnline).

Application examples

The application examples support you with various tools and examples for solving your automation tasks. Solutions are shown in interplay with multiple components in the system - separated from the focus on individual products.

You will find the application examples on the Internet (https://support.industry.siemens.com/cs/ww/en/ps/ae).

TIA Selection Tool

With the TIA Selection Tool, you can select, configure and order devices for Totally Integrated Automation (TIA).
This tool is the successor of the SIMATIC Selection Tool and combines the known configurators for automation technology into one tool.
With the TIA Selection Tool, you can generate a complete order list from your product selection or product configuration.

You can find the TIA Selection Tool on the Internet (https://support.industry.siemens.com/cs/ww/en/view/109767888).

SIMATIC Automation Tool

You can use the SIMATIC Automation Tool to perform commissioning and maintenance activities simultaneously on various SIMATIC S7 stations as a bulk operation independent of TIA Portal.

The SIMATIC Automation Tool provides a multitude of functions:

- Scanning of a PROFINET/Ethernet system network and identification of all connected CPUs
- Address assignment (IP, subnet, gateway) and station name (PROFINET device) to a CPU
- Transfer of the date and the programming device/PC time converted to UTC time to the module
- Program download to CPU
- RUN/STOP mode switchover
- CPU localization by means of LED flashing
- Reading out of CPU error information
- Reading of the CPU diagnostics buffer
- Reset to factory settings
- Firmware update of the CPU and connected modules

You can find the SIMATIC Automation Tool on the Internet (https://support.industry.siemens.com/cs/ww/en/view/98161300).

PRONETA

SIEMENS PRONETA (PROFINET network analysis) allows you to analyze the plant network during commissioning. PRONETA features two core functions:

- The topology overview automatically scans the PROFINET and all connected components.
- The IO check is a fast test of the wiring and the module configuration of a plant, incl. fail-safe inputs and outputs.

You can find SIEMENS PRONETA on the Internet (https://support.industry.siemens.com/cs/ww/en/view/67460624).

SINETPLAN

SINETPLAN, the Siemens Network Planner, supports you in planning automation systems and networks based on PROFINET. The tool facilitates professional and predictive dimensioning of your PROFINET installation as early as in the planning stage. In addition, SINETPLAN supports you during network optimization and helps you to exploit network resources optimally and to plan reserves. This helps to prevent problems in commissioning or failures during productive operation even in advance of a planned operation. This increases the availability of the production plant and helps improve operational safety.

The advantages at a glance

- Network optimization thanks to port-specific calculation of the network load
- Increased production availability thanks to online scan and verification of existing systems
- Transparency before commissioning through importing and simulation of existing STEP 7 projects
- Efficiency through securing existing investments in the long term and the optimal use of resources

You can find SINETPLAN on the Internet (https://www.siemens.com/sinetplan).

Product overview

2

2.1 New functions

New functions of the CPU in firmware version V2.9

The following table provides an overview of the most important new functions of the CPU with firmware version V2.9.

New functions	Applications	Customer benefits	Where can I find information?
Communication of the CPU			
Secure PG/HMI communication	With STEP 7 and WinCC as of Version V17, SIMATIC S7-1500 CPUs and ET 200 CPUs from firmware version 2.9 support innovated and standardized secure PG/PC and HMI communication – referred to as Secure PG/HMI communication for short.	Secure and standardized creation or assignment of PLC communication certificates	Communication function manual (https://support.industry.siemens.com/cs/ww/en/view/59192925)
Protection of confidential configuration data	You have the option of assigning a password for protecting confidential configuration data of the respective CPU. This refers to data such as private keys that are required for the proper functioning of certificate-based protocols.	Additional password protection of confidential configuration data	
OPC UA: Alarms & Conditions	OPC UA clients from any manufacturer can subscribe to alarms of the CPU via OPC UA Alarms & Conditions.	Without further measures, alarms created once via OPC UA are available as events and alarms. The alarms can be displayed by any display device with corresponding OPC UA client functionality.	
OPC UA: Certificate management via Global Discovery Server (GDS)	Via GDS push management functions: • Automated update of OPC UA certificates of an S7-1500 CPU • Transfer of updated certificates and lists in RUN operating state of the CPU	The automation of the certificate management eliminates any manual work required for reconfiguring the CPU, for example, after a certificate has expired, and a new download to the CPU.	
DHCP (Dynamic Host Configuration Protocol)	The CPU can use the DHCP communication protocol to assign the network configuration via a DHCP server. The CPU uses a client ID for identification on the DHCP server. The following parameters can be obtained: • IP Suite • DNS server • NTP server The CPU can also send its host name to the DHCP server.	With DHCP, you can integrate the CPU into an existing IT network without having to make additional changes to the PROFINET interface.	Communication function manual (https://support.industry.siemens.com/cs/ww/en/view/59192925)

New functions	Applications	Customer benefits	Where can I find information?
MRP interconnection in PROFINET networks	The MRP interconnection procedure is an extension of MRP. MRP interconnection enables the redundant coupling of two or more rings with MRP in PROFINET networks.	There is no limit to the maximum number of 50 devices in a ring when setting up redundant network topologies. Monitoring of larger topologies with ring redundancy	PROFINET function manual (https://support.industry.siemens.com/cs/ww/en/view/49948856)
Web server of the CPU			
Web applications that can be loaded by the user	Additional methods to manage web applications via Web API You can use all available Web API methods within the web application	Web applications are also available in STOP mode of the CPU Reduced development times of web server user pages	Web server function manual (https://support.industry.siemens.com/cs/ww/en/view/59193560)
New Web API methods	Reading and changing the CPU operating state via Web API Ticket methods for transferring large amounts of data outside of the JSON RPC protocol	Additional applications for the web server	
Diagnostic information on motion control	Diagnostic information is available for all technology objects Improved display and grouping of the tags	Comprehensive diagnostic options by means of motion control applications are possible via the web server.	
Optimizations to the DNS (Domain Name System) functionality with OPC UA/Open User Communication and on the web server	The feedback messages of the OPC UA server with the "Application Name" can be sent via DNS. The NTP client of the CPU can address its relevant NTP servers via DNS. The Web server can be consistently reached via DNS addressing. DNS is taken into account during certificate handling.	A pool of NTP servers can be addressed.	Communication function manual (https://support.industry.siemens.com/cs/ww/en/view/59192925) Web server function manual (https://support.industry.siemens.com/cs/ww/en/view/59193560)
Technology functions of the CPU			
Axis functions	• Backlash compensation • Linear motor	The repeat accuracy of a movement is increased by compensation for the mechanical play of the real axis. Easier control of highly dynamic linear motors.	S7-1500T Motion Control function manuals (https://support.industry.siemens.com/cs/ww/en/view/109751049)

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 1512SP-1 PN supports operation as an IO controller, I-device or standalone CPU.

With its optional PROFIBUS interface, CM DP, CPU 1512SP-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 1512SP-1 PN as a DP master or as an intelligent DP slave (I-slave).

IO controller

CPU 1512SP-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 128 connected IO devices, a maximum of 64 of which use IRT (Isochronous Realtime).

I-device

The "I-device" (intelligent IO device) functionality allows you to exchange data with an IO controller. CPU 1512SP-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 1512SP-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.

Intelligent DP slave (I-slave)

To use the ET 200SP as an intelligent DP slave (I-slave), you need the CPU and the optional communication module, CM DP. As an I-slave, the ET 200SP CPU is connected via PROFIBUS DP to a higher-level DP master and exchanges data with it.

2.3 Properties

Article number

6ES7512-1DK01-0AB0

View of the module

The following figure shows the CPU 1512SP-1 PN.

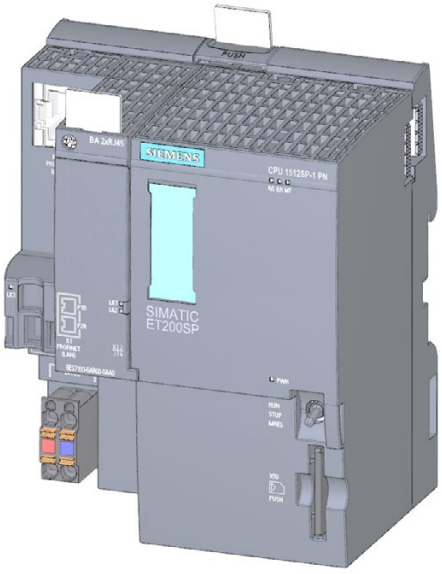


Figure 2-1 CPU 1512SP-1 PN

Properties

The CPU 1512SP-1 PN has the following technical properties:

1. Communication:
   - Interfaces

     The CPU 1512SP-1 PN has a PROFINET interface (X1 P3) with an integrated 3-port switch. Port 1 and port 2 are located on the optionally pluggable BusAdapter. Port 3 is integrated in the housing of the CPU. You connect the PROFINET IO to the CPU via the BusAdapter. You will find information on the BusAdapters supported by the CPU in section Wiring (Page 21).

     In addition to PROFINET basic functionality, the interface also supports PROFINET IO RT (real-time) and IRT (isochronous real-time). PROFINET IO communication or real-time settings can be configured. The basic functionality of PROFINET supports HMI communication, communication with the configuration system, communication with a higher-level network (backbone, router, Internet) and communication with another machine or automation cell.

     Port 1 and port 2 can also be used as ring ports for the configuration of redundant ring structures in Ethernet.

     Note

     The CPU is delivered without a BusAdapter. You can find the article numbers of the supported BusAdapters in the "Accessories/spare parts" section of the ET 200SP distributed automation system (http://support.automation.siemens.com/WW/view/en/58649293) system manual.

     The CM DP is optionally available with a PROFIBUS interface (X2). You can find additional information about this expansion module in the manual Communication module CM DP (http://support.automation.siemens.com/WW/view/en/90156526).

     You can find information about connecting the PROFINET IO BusAdapter to the CPU as well as connecting the optional PROFIBUS interface to the interface module in the system manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293).

   - OPC UA
     With OPC UA, data is exchanged via an open and vendor-neutral communication protocol. The CPU, as OPC UA server, can communicate with OPC UA clients such as HMI panels, SCADA systems, etc.

- Integrated Web server:

  A Web server is integrated in the CPU. You can read out the following information with the Web server:

  - Start page with general CPU information
  - Identification information
  - Contents of the diagnostics buffer
  - Query of module states
  - Firmware update
  - Alarms (without acknowledgment option)
  - Information about communication
  - PROFINET topology
  - Tag status, writing tags
  - Watch tables
  - Memory usage
  - User pages
  - Data logs (if used)
  - Online backup and restoration of the configuration.
  - Diagnostic information for the motion control technology objects
  - Display of trace recordings stored on the SIMATIC memory card
  - Readout service data
  - Basic Web pages
  - Display of the Web server in 3 project languages, for example, comments and message texts
  - Recipes
  - User-defined Web pages

- Integrated technology:
  - Motion Control

    The Motion Control functionality uses technology objects to support speed-controlled axes, positioning axes, synchronous axes, external encoders, cams, cam tracks and measuring inputs, as well as PLCopen blocks for programming the motion control functionality.
    You can find a detailed description of the use of Motion Control and its configuration in the S7-1500 Motion Control (https://support.industry.siemens.com/cs/ww/en/view/109751049) function manuals.
  - Integrated closed-loop control functionality

    - PID Compact (continuous PID controller)

    - PID 3Step (step controller for integrating actuators)

    - PID Temp (temperature controller for heating and cooling with two separate actuators)
- Trace functionality:
  - Trace functionality supports you in troubleshooting and optimizing the user program, especially for motion control or closed-loop control applications. Trace only supports saves measurements on a SIMATIC memory card.
    You will find additional information on "Trace" in the Using the trace and logic analyzer function (http://support.automation.siemens.com/WW/view/en/64897128) function manual.
- Integrated system diagnostics:
  - The alarms for the system diagnostics are automatically created by the system and displayed on a PG/PC, HMI device or the Web server. System diagnostics information is also available when the CPU is in STOP mode.

- Integrated security:
  - Know-how protection

    The assignment of passwords protects user blocks against unauthorized access and modifications.
  - Copy protection

    Copy protection links user blocks to the serial number of the SIMATIC memory card or to the serial number of the CPU. User programs cannot run without the corresponding SIMATIC memory card or CPU.
  - Access protection

    Extended access protection provides high-quality protection against unauthorized configuration changes. You can use authorization levels to assign separate rights to different user groups.
  - Integrity protection

    The system protects the data transferred to the CPU against manipulation. The CPU detects erroneous or manipulated engineering data.

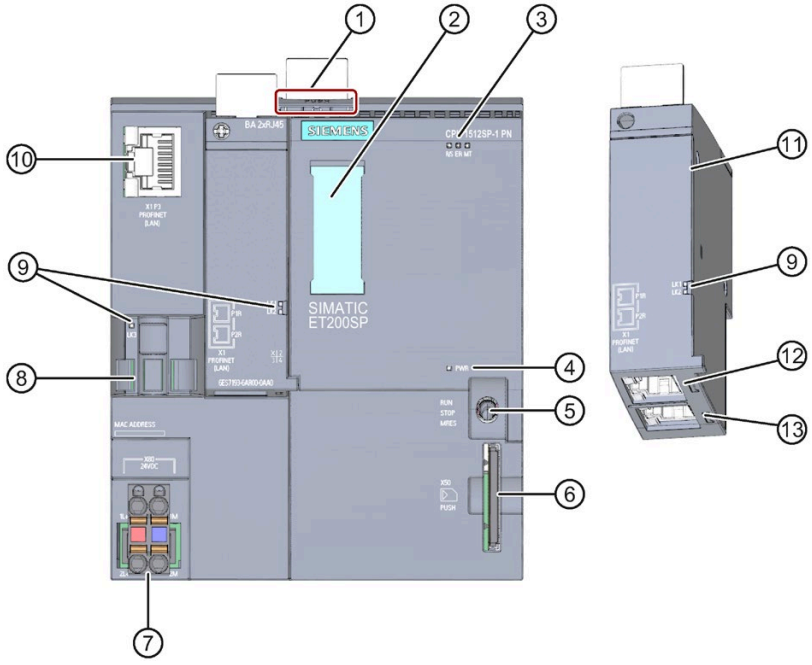
    You can find additional information on the topic of "Protection" in the system manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293).
- Support for ET 200AL
  - Simple connection of IP 65/67 I/O modules to the CPU.
- Communication CPs
  - CP 1542SP-1: Flexible expansion of the ET 200SP system with an additional Ethernet interface; network separation.
  - CP 1542SP-1 IRC: Seamless data recording with time stamping, support for standardized telecontrol protocols DNP3 and IEC.
  - CP 1543SP-1 ISEC: With the integrated security functions firewall (Stateful Inspection) and VPN protocol (IPSec), the communications processor protects ET200SP stations and subordinate networks against unauthorized access, and employs encryption to protect data transmission against manipulation and espionage.
- Address space
  - A larger address space of 2560 bytes (2048 bytes for ET 200SP module + 512 bytes for ET 200AL modules) is available within the station.

- CPU 1512SP-1 PN supports the following additional functions:
  - PROFIenergy
    You can find information on the topic of "PROFIenergy" in the PROFINET function manual (https://support.industry.siemens.com/cs/ww/en/view/49948856) and in the PROFINET specification on the Internet (http://www.profibus.com).
  - Shared device
    You can find information on the topic of "Shared device" in the PROFINET function manual (https://support.industry.siemens.com/cs/ww/en/view/49948856).
  - Configuration control
    You can find information on the topic of "Configuration control" in the system manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293).
  - Isochronous mode
    You can find information about the "Isochronous mode" topic in the PROFINET (https://support.industry.siemens.com/cs/ww/en/view/49948856) function manual.

2.4 Operating and display elements

2.4.1 Front view of the module with BusAdapter

The figure on the left shows the CPU 1512SP-1 PN including a plugged BA 2xRJ45 BusAdapter. The figure on the right shows a separate view of the BA 2xRJ45 BusAdapter.



① Mounting rail release
② Labeling strips
③ LEDs for status and error displays
④ LED for display of the supply voltage
⑤ Mode switch
⑥ Slot for the SIMATIC memory card
⑦ Connection for supply voltage (included in product package)
⑧ Cable support and attachment for port P3 of the PROFINET interface
⑨ LEDs for status displays of the PROFINET interface: LK1 and LK2 on BusAdapter, LK3 on CPU
⑩ Port P3 of the PROFINET interface: RJ45 socket
⑪ Separate view of the BusAdapter
⑫ Port P1 R of the PROFINET interface: RJ45 socket on BusAdapter BA 2×RJ45
R: Ring port for configuring a ring topology with media redundancy
⑬ Port P2 R of the PROFINET interface: RJ45 socket on BusAdapter BA 2×RJ45
R: Ring port for configuring a ring topology with media redundancy

Figure 2-2 Front view of the CPU 1512SP-1 PN with BusAdapter

2.5 Mode switch

Use the mode switch to set the CPU operating mode.

The following table shows the position of the switch and the corresponding meaning.

Table 2- 1 Mode switch settings

Position	Meaning	Explanation
RUN	RUN mode	The CPU is executing the user program.
STOP	STOP mode	The user program is not being executed.
MRES	Memory reset	Position for CPU memory reset.

Wiring

3

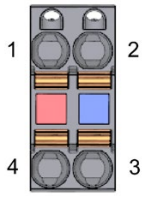
This section provides information on the pin assignment of the individual interfaces and the block diagram of the CPU 1512SP-1 PN.

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 Connector	Signal name [1]		Description
	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]

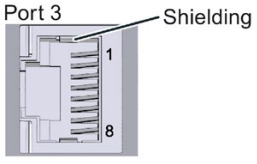
[1] 1L+ and 2L+ as well as 1M and 2M are bridged internally

[2] Maximum 10 A permitted

PROFINET IO interface on the CPU (X1 P3)

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

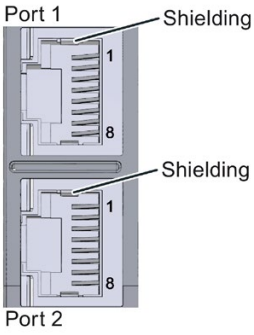
- When autonegotiation is deactivated, the RJ45 socket is allocated as a switch (MDI-X).
- If autonegotiation is activated, then autocrossing is active and the RJ45 socket has either a device assignment (MDI) or switch assignment (MDI-X).



PROFINET IO interface on the BusAdapter BA 2xRJ45 (X1 P1 R and X1 P2 R)

The assignment at the BA 2xRJ45 BusAdapter corresponds to the Ethernet standard for an RJ45 connector.

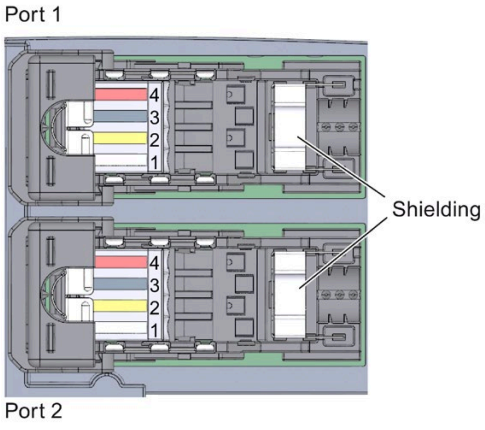
Table 3- 2 Pin assignment PROFINET IO interface on the BusAdapter BA 2xRJ45

View	Designation
	• 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).

PROFINET IO interface on the BusAdapter BA 2xFC (X1 P1 R and X1 P2 R)

The following table shows the pin assignment for the PROFINET IO interface on the BusAdapter BA 2xFC.

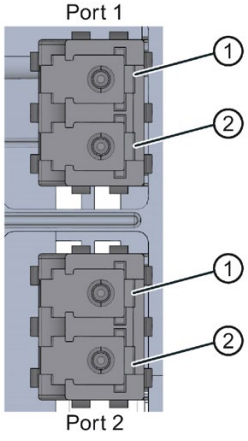
Table 3- 3 Pin assignment PROFINET IO interface on the BusAdapter BA 2xFC

View	Signal name		Designation
	1	TD	Transmit data +
	2	TD_N	Transmit data -
	3	RD	Receive data +
	4	RD_N	Receive data -

PROFINET IO interface with BusAdapter BA 2×LC (X1 P1 R and X1 P2 R) (as of V2.0)

The following table shows the signal names and description of the pin assignment for the BA 2×LC BusAdapter.

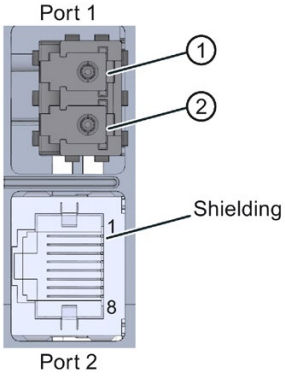
Table 3- 4 Pin assignment PROFINET IO with BusAdapter BA 2×LC

View	Signal name	Designation
	①	Receiver/Receive data
	②	Sender/Transmit data

PROFINET IO interface with BusAdapter BA LC/RJ45 (X1 P1 R and X1 P2 R) (as of V2.0)

The following table shows the signal names and description of the pin assignment for the BA LC/RJ45 BusAdapter.

Table 3- 5 Pin assignment PROFINET IO with BusAdapter BA LC/RJ45

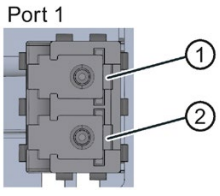
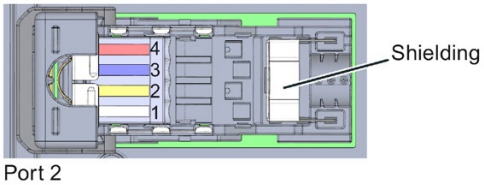
View	Signal name	Designation
	①	Receiver/Receive data
	②	Sender/Transmit data
	RJ45, Port2 • When autonegotiation is deactivated, the RJ45 socket is allocated as a switch (MDI-X). • If autonegotiation is activated, then auto-crossing is active and the RJ45 socket has either a device assignment (MDI) or switch assignment (MDI-X).	

PROFINET IO interface with BusAdapter BA LC/FC (X1 P1 R and X1 P2 R) (as of V2.0)

The following table shows the signal names and description of the pin assignment for the BA LC/FC BusAdapter.

The I/Os of the BA LC/FCBusAdapter are shown individually for a clearer overview.

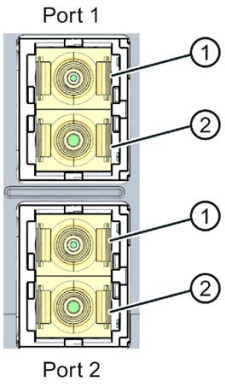
Table 3- 6 PROFINET IO pin assignment with BusAdapter BA LC/FC

View	Signal name		Designation
	①		Receiver/Receive data
	②		Sender/Transmit data
	1	TD	Transmit data +
	2	TD_N	Transmit data –
	3	RD	Receive data +
	4	RD_N	Receive data -

PROFINET IO interface with BusAdapter BA 2×SCRJ (X1 P1 R and X1 P2 R)

The following table shows the signal names and description of the pin assignment for the BA 2×SCRJ BusAdapter.

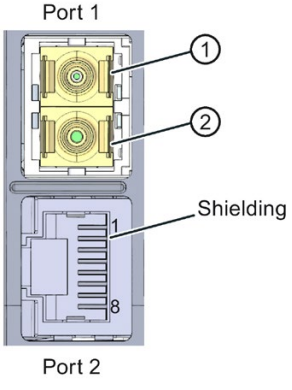
Table 3- 7 PROFINET IO pin assignment with BusAdapter BA 2×SCRJ

View	Signal name	Designation
	①	Receiver/Receive data
	②	Sender/Transmit data

PROFINET IO interface with BusAdapter BA SCRJ/RJ45 (X1 P1 R and X1 P2 R)

The following table shows the signal names and description of the pin assignment for the BA SCRJ/RJ45 BusAdapter.

Table 3- 8 Pin assignment PROFINET IO with BusAdapter BA SCRJ/RJ45

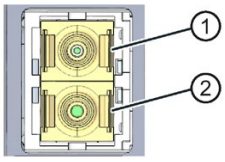
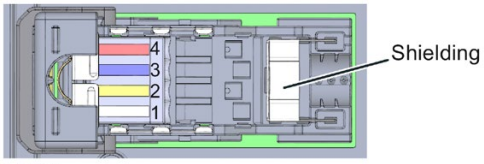
View	Signal name	Designation
	①	Receiver/Receive data
	②	Sender/Transmit data
	RJ45, Port2 • When autonegotiation is deactivated, the RJ45 socket is allocated as a switch (MDI-X). • If autonegotiation is activated, then auto-crossing is active and the RJ45 socket has either a device assignment (MDI) or switch assignment (MDI-X).	

PROFINET IO with BusAdapter BA SCRJ/FC (X1 P1 R and X1 P2 R)

The following table shows the signal names and description of the pin assignment for the BA SCRJ/FC BusAdapter.

The pin assignment for the BA SCRJ/FC BusAdapter is shown individually for a clearer overview.

Table 3- 9 PROFINET IO pin assignment with BusAdapter BA SCRJ/FC

View	Signal name		Designation
Port 1  	①		Receiver/Receive data
	②		Sender/Transmit data
 Port 2	1	TD	Transmit data +
	2	TD_N	Transmit data –
	3	RD	Receive data +
	4	RD_N	Receive data -

Reference

You can find additional information on the topics of "Connecting the CPU" and "Accessories/spare parts" in the system manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293).

Assignment of the MAC addresses

The MAC address is a globally unique device identifier that is assigned to each PROFINET device in the factory. Its 6 bytes are divided into 3 bytes for the manufacturer ID and 3 bytes for the device ID (serial number). The front of the CPU 1512SP-1 PN is lasered with the MAC address of the PROFINET interface.

The PROFINET interface (X1) of the CPU 1512SP-1 PN has three ports. Port 3 is located on the CPU. Ports 1 and 2 are located on the optional BusAdapter. In addition to the PROFINET interface, each PROFINET port also has a separate MAC address. There is therefore a total of four MAC addresses for the CPU 1512SP-1 PN.

The MAC addresses of the PROFINET ports are needed for the LLDP protocol, for example for the neighborhood discovery function.

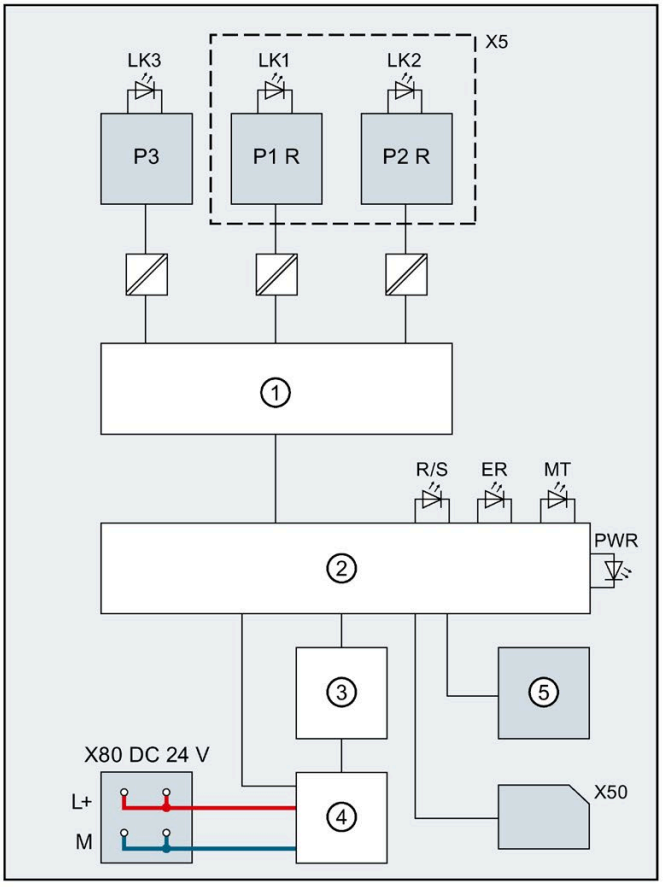
The table below shows how the MAC addresses are assigned.

Table 3- 10 Assignment of the MAC addresses

	Assignment
MAC address 1	PROFINET interface X1 • Visible in STEP 7 for accessible devices • Lasered on the front of the CPU (start of the number range)
MAC address 2	Port X1 P1 R (required for LLDP, for example)
MAC address 3	Port X1 P2 R (required for LLDP, for example)
MAC address 4	Port X1 P3 (required for LLDP, for example)

Block diagram

The following figure shows the block diagram of the CPU 1512SP-1 PN.



①	PROFINET switch	P1 R	PROFINET interface X1 Port 1
②	Electronics	P2 R	PROFINET interface X1 Port 2
③	Backplane bus interface	P3	PROFINET interface X1 Port 3
④	Internal supply voltage	L+	24 V DC supply voltage
⑤	RUN/STOP/MRES mode selector	M	Ground
X5	BusAdapter	LK1, 2, 3	LED Link TX/RX
X50	SIMATIC memory card	R/S	RUN/STOP LED (yellow/green)
X80 24 V DC	Infeed of supply voltage	ER	ERROR LED (red)
		MT	MAINT LED (yellow)
		PWR	POWER LED (green)

Figure 3-1 Block diagram of the CPU 1512SP-1 PN

Interrupts, error messages, diagnostics and system alarms

4

The status and error displays of the CPU 1512SP-1 PN are described below.

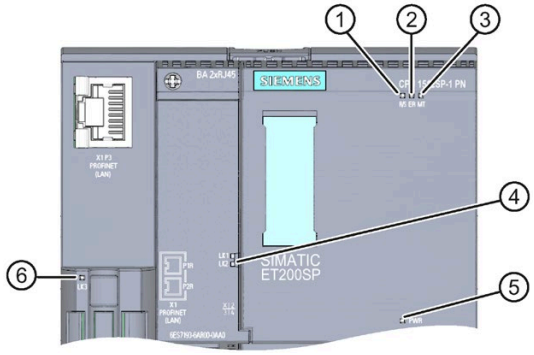
You will find additional information on "Interrupts" in the STEP 7 online help.

You can find additional information on the topics of "Diagnostics" and "System alarms" in the Diagnostics (http://support.automation.siemens.com/WW/view/en/59192926) function manual.

4.1 Status and error display of the CPU

LED displays

The figure below shows the LED displays of the CPU 1512SP-1 PN and the BA 2xRJ45 BusAdapter.



① RUN/STOP LED (yellow/green LED)
② ERROR LED (red LED)
③ MAINT LED (yellow LED)
④ LINK RX/TX LED for ports X1 P1 and X1 P2 (green LEDs on BusAdapter)
⑤ POWER LED (green LED)
⑥ LINK RX/TX LED for port X1 P3 (green LED on CPU)

Figure 4-1 LED displays on the CPU and BusAdapter

Meaning of the POWER, RUN/STOP, ERROR and MAINT LEDs

CPU 1512SP-1 PN features an LED for monitoring the supply voltage of the electronics (PWR) and three LEDs for displaying the current operating and diagnostics status. The following table shows the meaning of the various combinations of colors for the POWER, RUN/STOP, ERROR and MAINT LEDs.

Table 4- 1 Meaning of the LEDs

POWER LED	RUN/STOP LED	ERROR LED	MAINT LED	Meaning
LED off	LED off	LED off	LED off	Missing or insufficient supply voltage on the CPU.
LED lit green	LED off	LED flashes red	LED off	An error has occurred.
LED lit green	LED lit green	LED off	LED off	CPU is in RUN mode.
LED lit green	LED lit green	LED flashes red	LED off	A diagnostics event is pending.
LED lit green	LED lit green	LED off	LED lit yellow	Maintenance demanded for the plant. The affected hardware must be checked/replaced within a short period of time.
				Active Force job
LED lit green	LED lit green	LED off	LED flashes yellow	Bad configuration
LED lit green	LED lit yellow	LED flashes red	LED off	A diagnostics event is pending.
LED lit green	LED lit yellow	LED off	LED flashes yellow	Firmware update successfully completed.
LED lit green	LED lit yellow	LED off	LED off	CPU is in STOP mode.
LED lit green	LED lit yellow	LED flashes red	LED flashes yellow	The program on the SIMATIC memory card is causing an error.
				Firmware update using SIMATIC memory card has failed.
				The CPU has detected an error state. Additional information is available via the CPU diagnostic buffer.
LED lit green	LED flashes yellow	LED off	LED off	CPU is performing internal activities during STOP, e.g. startup after STOP.
				Download of the user program from the SIMATIC memory card
				CPU carries out a program with active breakpoint.
LED lit green	LED flashes yellow/green	LED off	LED off	Startup (transition from STOP → RUN)
LED lit green	LED flashes yellow/green	LED flashes red	LED flashes yellow	Startup (CPU booting)
				Test of LEDs during startup, inserting a module.
				LED flashing test

Meaning of the LINK LED

Each port has a LINK LED (LK1, LK2, LK3). The table below shows the various "LED scenarios" of ports for the CPU 1512SP-1 PN.

Table 4- 2 Meaning of the LEDs

LINK LED	Meaning
LED off	There is no Ethernet connection between the PROFINET interface of the PROFINET device and the communication partner. No data is currently being sent/received via the PROFINET interface. There is no LINK connection.
LED flashes green	The "LED flashing test" is being performed.
LED lit green	There is an Ethernet connection between the PROFINET interface of your PROFINET device and a communication partner.

Note

"LED" instruction

You can read the status (e.g. "On" or "Off") of LEDs of a CPU or a module using the "LED" instruction. Note, however, that it is not possible to read the LED status of the LINK RX/TX LEDs on all S7-1500 CPUs.

You can find additional information on the "LED" instruction in the STEP 7 online help.

Technical specifications

5

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/6ES7512-1DK01-0AB0/td?dl=en).

Article number	6ES7512-1DK01-0AB0
General information	
Product type designation	CPU 1512SP-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^2t	0.14 $A^2 \cdot s$
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	6ES7512-1DK01-0AB0
Work memory	
• integrated (for program)	200 kbyte
• integrated (for data)	1 Mbyte
Load memory	
• Plug-in (SIMATIC Memory Card), max.	32 Gbyte
Backup	
• maintenance-free	Yes
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
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.	1 Mbyte; For DBs with absolute addressing, the max. size is 64 KB
FB	
• Number range	0 ... 65 535
• Size, max.	200 kbyte
FC	
• Number range	0 ... 65 535
• Size, max.	200 kbyte
OB	
• Size, max.	200 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
• Number of diagnostic alarm OBs	1

Article number	6ES7512-1DK01-0AB0
Nesting depth	
• per priority class	24
Counters, timers and their retentivity	
S7 counter	
• Number	2 048
Retentivity	
– adjustable	Yes
IEC counter	
• Number	Any (only limited by the main memory)
Retentivity	
– adjustable	Yes
S7 times	
• Number	2 048
Retentivity	
– adjustable	Yes
IEC timer	
• Number	Any (only limited by the main memory)
Retentivity	
– adjustable	Yes
Data areas and their retentivity	
Retentive data area (incl. timers, counters, flags), max.	128 kbyte; Available retentive memory for bit memories, timers, counters, DBs, and technology data (axes): 88 KB
Flag	
• Size, max.	16 kbyte
• Number of clock memories	8; 8 clock memory bit, grouped into one clock memory byte
Data blocks	
• Retentivity adjustable	Yes
• Retentivity preset	No
Local data	
• per priority class, max.	64 kbyte; max. 16 KB per block
Address area	
Number of IO modules	2 048; max. number of modules / submodules
I/O address area	
• Inputs	32 kbyte; All inputs are in the process image
• Outputs	32 kbyte; All outputs are in the process image
per integrated IO subsystem	
– Inputs (volume)	8 kbyte
– Outputs (volume)	8 kbyte

Article number	6ES7512-1DK01-0AB0
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 IO 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	6ES7512-1DK01-0AB0
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	Yes; via BusAdapter
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 M12, BA 2x FC, BA 2x LC, BA LC/RJ45, BA LC/FC, BA 2x SCRJ, BA SCRJ/RJ45, BA SCRJ/FC,
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
– PROFIenergy	Yes; per user program
– 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

Article number	6ES7512-1DK01-0AB0
– 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)
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
– Isochronous mode	No
– IRT	Yes
– PROFIenergy	Yes; per user program
– Shared device	Yes
– Number of IO Controllers with shared device, max.	4
– activation/deactivation of I-devices	Yes; per user program
– Asset management record	Yes; per user program

Article number	6ES7512-1DK01-0AB0
2. Interface	
Interface types	
• RS 485	Yes; Via CM DP module
• Number of ports	1
Protocols	
• PROFIBUS DP master	Yes
• PROFIBUS DP slave	Yes
• SIMATIC communication	Yes
PROFIBUS DP master	
• Number of connections, max.	48; Of which 4 each reserved for ES and HMI
• Number of DP slaves, max.	125; In total, up to 512 distributed I/O devices can be connected via AS-i, PROFIBUS or PROFINET
Services	
– PG/OP communication	Yes
– Equidistance	No
– Isochronous mode	No
– Activation/deactivation of DP slaves	Yes
Interface types	
RJ 45 (Ethernet)	
• 100 Mbps	Yes
• Autonegotiation	Yes
• Autocrossing	Yes
• Industrial Ethernet status LED	Yes
RS 485	
• Transmission rate, max.	12 Mbit/s
Protocols	
Number of connections	
• Number of connections, max.	128; via integrated interfaces of the CPU and connected CPs / CMs
• Number of connections reserved for ES/HMI/web	10
• Number of connections via integrated interfaces	88
• Number of connections per CP/CM	32
• Number of S7 routing paths	16
Redundancy mode	
• H-Sync forwarding	Yes

Article number	6ES7512-1DK01-0AB0
Media redundancy	
– Media redundancy	Yes; only via BusAdapter
– MRP	Yes
– MRP interconnection, supported	Yes; as MRP ring node according to IEC 62439-2 Edition 3.0
– MRPD	Yes; Requirement: IRT
– Switchover time on line break, typ.	200 ms; For MRP, bumpless for MRPD
– Number of stations in the ring, max.	50
SIMATIC communication	
• PG/OP communication	Yes; encryption with TLS V1.3 pre-selected
• S7 routing	Yes
• Data record routing	Yes
• S7 communication, as server	Yes
• S7 communication, as client	Yes
• User data per job, max.	See online help (S7 communication, user data size)
Open IE communication	
• TCP/IP	Yes
– Data length, max.	64 kbyte
– several passive connections per port, supported	Yes
• ISO-on-TCP (RFC1006)	Yes
– Data length, max.	64 kbyte
• UDP	Yes
– Data length, max.	2 kbyte; 1 472 bytes for UDP broadcast
– UDP multicast	Yes; Max. 5 multicast circuits
• DHCP	Yes
• DNS	Yes
• SNMP	Yes
• DCP	Yes
• LLDP	Yes
• Encryption	Yes; Optional
Web server	
• HTTP	Yes; Standard and user pages
• HTTPS	Yes; Standard and user pages

Article number	6ES7512-1DK01-0AB0
OPC UA	
• Runtime license required	Yes; "Small" license required
• OPC UA Client	Yes
– Application authentication	Yes
– Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
– User authentication	"anonymous" or by user name & password
– Number of connections, max.	4
– Number of nodes of the client interfaces, max.	1 000
– Number of elements for one call of OPC_UA_NodeGetHandleList/OPC_UA_ReadList/OPC_UA_WriteList, max.	300
– Number of elements for one call of OPC_UA_NameSpaceGetIndexList, max.	20
– Number of elements for one call of OPC_UA_MethodGetHandleList, max.	100
– Number of simultaneous calls of the client instructions per connection (except OPC_UA_ReadList,OPC_UA_WriteList,OPC_UA_MethodCall), max.	1
– Number of simultaneous calls of the client instructions OPC_UA_ReadList,OPC_UA_WriteList and OPC_UA_MethodCall, max.	5
– Number of registerable nodes, max.	5 000
– Number of registerable method calls of OPC_UA_MethodCall, max.	100
– Number of inputs/outputs when calling OPC_UA_MethodCall, max.	20
• OPC UA Server	Yes; Data access (read, write, subscribe), method call, custom address space
– Application authentication	Yes
– Security policies	Available security policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
– User authentication	"anonymous" or by user name & password
– GDS support (certificate management)	Yes
– Number of sessions, max.	32
– Number of accessible variables, max.	50 000
– Number of registerable nodes, max.	10 000
– Number of subscriptions per session, max.	20
– Sampling interval, min.	100 ms

Article number	6ES7512-1DK01-0AB0
– Publishing interval, min.	500 ms
– Number of server methods, max.	20
– Number of inputs/outputs per server method, max.	20
– Number of monitored items, max.	1 000; for 1 s sampling interval and 1 s send interval
– Number of nodes for user-defined server interfaces, max.	1 000
• Alarms and Conditions	Yes
– Number of program alarms	100
– Number of alarms for system diagnostics	50
Further protocols	
• MODBUS	Yes; MODBUS TCP
S7 message functions	
Number of login stations for message functions, max.	32
Program alarms	Yes
Number of configurable program messages, max.	5 000; Program messages are generated by the "Program_Alarm" block, ProDiag or GRAPH
Number of loadable program messages in RUN, max.	2 500
Test commissioning functions	
Joint commission (Team Engineering)	Yes; Parallel online access possible for up to 5 engineering systems
Status block	Yes; Up to 8 simultaneously (in total across all ES clients)
Single step	No
Number of breakpoints	8
Status/control	
• Status/control variable	Yes
• Variables	Inputs/outputs, memory bits, DBs, distributed I/Os, timers, counters
• Number of variables, max.	
– of which status variables, max.	200; per job
– of which control variables, max.	200; per job
Forcing	
• Forcing	Yes
• Forcing, variables	Peripheral inputs/outputs
• Number of variables, max.	200

Article number	6ES7512-1DK01-0AB0
Diagnostic buffer	
• present	Yes
• Number of entries, max.	1 000
– of which powerfail-proof	500
Traces	
• Number of configurable Traces	4; Up to 512 KB of data per trace are possible
Interrupts/diagnostics/status information	
Diagnostics indication LED	
• RUN/STOP LED	Yes
• ERROR LED	Yes
• MAINT LED	Yes
• Monitoring of the supply voltage (PWR-LED)	Yes
• Connection display LINK TX/RX	Yes
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
• Number of available Motion Control resources for technology objects	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
• Positioning axis	
– Number of positioning axes at motion control cycle of 4 ms (typical value)	5
– Number of positioning axes at motion control cycle of 8 ms (typical value)	10
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	6ES7512-1DK01-0AB0
Standards, approvals, certificates	
Highest safety class achievable in safety mode	
• Performance level according to ISO 13849-1	none
• SIL acc. to IEC 61508	No
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 of confidential configuration data	Yes
• Protection level: Write protection	Yes
• Protection level: Read/write protection	Yes
• Protection level: Complete protection	Yes
Cycle time monitoring	
• lower limit	adjustable minimum cycle time
• upper limit	adjustable maximum cycle time
Dimensions	
Width	100 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	310 g

Technical specifications of the BusAdapter BA 2×RJ45

Article number	6ES7193-6AR00-0AA0
General information	
Product type designation	BA 2x RJ45
Interfaces	
Number of PROFINET interfaces	1
Supports protocol for PROFINET IO	
• Number of RJ45 ports	2
• Number of SCRJ ports	0
• Number of LC ports	0
Cable length	
– Cu conductors	100 m
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-30 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-30 °C
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	2 000 m; On request: Installation altitudes greater than 2 000 m
Dimensions	
Width	20 mm
Height	69.5 mm
Depth	59 mm
Weights	
Weight, approx.	46 g

Technical specifications of the BusAdapter BA 2×FC

Article number	**6ES7193-6AF00-0AA0**
General information	
Product type designation	BA 2xFC
Interfaces	
Number of PROFINET interfaces	1
Supports protocol for PROFINET IO	
• Number of FC (FastConnect) connections	2
Cable length	
– Cu conductors	100 m
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-30 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-30 °C
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	2 000 m; On request: Installation altitudes greater than 2 000 m
Dimensions	
Width	20 mm
Height	69.5 mm
Depth	59 mm
Weights	
Weight, approx.	53 g

Technical specifications of the BusAdapter BA 2×LC

Article number	6ES7193-6AG00-0AA0
General information	
Product type designation	BA 2xLC
HW functional status	from FS04
Interfaces	
Number of PROFINET interfaces	1; 2 ports (switch) LC Multimode Glass Fibre
Supports protocol for PROFINET IO	
• Number of SCRJ ports	0
• Number of LC ports	2; Wavelength of 1 270 ... 1 380 nm, corresponds to 100BASE-FX
Cable length	
– Multimode graded-index fiber 50/125 µm	3 km
– Multimode graded-index fiber 62.5/125 µm	3 km
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-30 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-30 °C
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	2 000 m; On request: Installation altitudes greater than 2 000 m
Dimensions	
Width	20 mm
Height	69.5 mm
Depth	59 mm
Weights	
Weight, approx.	40 g

Technical specifications of the BusAdapter BA 2×SCRJ

Article number	6ES7193-6AP00-0AA0
General information	
Product type designation	BA 2xSCRJ
HW functional status	from FS04
Interfaces	
Number of PROFINET interfaces	1; 2 ports (switch) SCRJ FO
Supports protocol for PROFINET IO	
• Number of SCRJ ports	2
• Number of LC ports	0
Cable length	
– PCF	100 m
– Plastic FOC (POF)	50 m
– PCF-GI	250 m
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-25 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-25 °C
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	2 000 m; On request: Installation altitudes greater than 2 000 m
Dimensions	
Width	20 mm
Height	69.5 mm
Depth	59 mm
Weights	
Weight, approx.	50 g

Technical specifications of the BusAdapter BA LC/RJ45

Article number	6ES7193-6AG20-0AA0
General information	
Product type designation	BA LC/RJ45
HW functional status	from FS04
Interfaces	
Number of PROFINET interfaces	1; 2 ports (switch) LC / RJ45
Supports protocol for PROFINET IO	
• Number of RJ45 ports	1
• Number of SCRJ ports	0
• Number of LC ports	1; Wavelength of 1 270 ... 1 380 nm, corresponds to 100BASE-FX
Cable length	
– Cu conductors	100 m
– Multimode graded-index fiber 50/125 µm	3 km
– Multimode graded-index fiber 62.5/125 µm	3 km
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-30 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-30 °C
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	2 000 m; On request: Installation altitudes greater than 2 000 m
Dimensions	
Width	20 mm
Height	69.5 mm
Depth	59 mm
Weights	
Weight, approx.	32 g

Technical specifications of the BusAdapter BA LC/FC

Article number	6ES7193-6AG40-0AA0
General information	
Product type designation	BA LC/FC
HW functional status	from FS04
Interfaces	
Number of PROFINET interfaces	1
Supports protocol for PROFINET IO	
• Number of FC (FastConnect) connections	1
• Number of SCRJ ports	0
• Number of LC ports	1; Wavelength of 1 270 ... 1 380 nm, corresponds to 100BASE-FX
Cable length	
– Cu conductors	100 m
– Multimode graded-index fiber 50/125 µm	3 km
– Multimode graded-index fiber 62.5/125 µm	3 km
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-30 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-30 °C
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	2 000 m; On request: Installation altitudes greater than 2 000 m
Dimensions	
Width	20 mm
Height	69.5 mm
Depth	59 mm
Weights	
Weight, approx.	50 g

Technical specifications of the BusAdapter BA SCRJ/RJ45

Article number	6ES7193-6AP20-0AA0
General information	
Product type designation	BA SCRJ/RJ45
HW functional status	from FS04
Interfaces	
Number of PROFINET interfaces	1; 2 ports (SCRJ + RJ45)
Supports protocol for PROFINET IO	
• Number of RJ45 ports	1
• Number of SCRJ ports	1
• Number of LC ports	0
Cable length	
– PCF	100 m
– Plastic FOC (POF)	50 m
– PCF-GI	250 m
– Cu conductors	100 m
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-25 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-25 °C
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	2 000 m; On request: Installation altitudes greater than 2 000 m
Dimensions	
Width	20 mm
Weights	
Weight, approx.	50 g

Technical specifications of the BusAdapter BA SCRJ/FC

Article number	6ES7193-6AP40-0AA0
General information	
Product type designation	BA SCRJ/FC
HW functional status	from FS04
Interfaces	
Number of PROFINET interfaces	1; 2 ports (SCRJ + FC)
Supports protocol for PROFINET IO	
• Number of FC (FastConnect) connections	1
• Number of SCRJ ports	1
• Number of LC ports	0
Cable length	
– PCF	100 m
– Plastic FOC (POF)	50 m
– PCF-GI	250 m
– Cu conductors	100 m
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-25 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-25 °C
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	2 000 m; On request: Installation altitudes greater than 2 000 m
Dimensions	
Width	20 mm
Height	69.5 mm
Depth	59 mm
Weights	
Weight, approx.	50 g

General technical specifications

You can find information on the general technical specifications, such as standards and approvals, electromagnetic compatibility, protection class, etc., in the system manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293).

Dimension drawing

A

This section contains a dimension drawing of the module mounted on a mounting rail. Always observe the specified dimensions for installation in cabinets, control rooms, etc.

Dimension drawing of the CPU 1512SP-1 PN

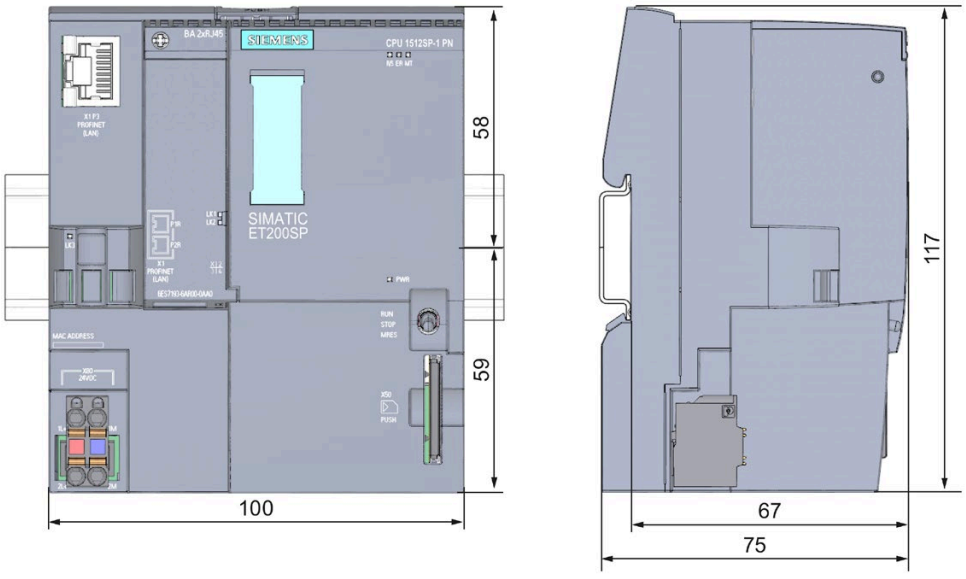


Figure A-1 Dimension drawing CPU 1512SP-1 PN