SIEMENS

SIMATIC NET

ET 200SP - Industrial Ethernet CP 154xSP-1

Operating Instructions

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CP 1542SP-1
CP 1542SP-1 IRC
CP 1543SP-1

02/2018
C79000-G8976-C426-04

Preface

Validity of this manual

This document contains information on the following modules:

- **CP 1542SP-1**
  Article number **6GK7542-6UX00-0XE0**
  Hardware version 1
  Firmware version V2.0
  Communications processor for connecting a SIMATIC ET 200SP CPU to Industrial Ethernet
- **CP 1542SP-1 IRC**
  Article number **6GK7542-6VX00-0XE0**
  Hardware version 1
  Firmware version V2.0
  Communications processor for connecting a SIMATIC ET 200SP CPU via Industrial Ethernet to a control room (TCSB, ST7, DNP3, IEC 60870-5-104)
- **CP 1543SP-1**
  Article number **6GK7543-6WX00-0XE0**
  Hardware version 1
  Firmware version V2.0
  Communications processor for connecting a SIMATIC ET 200SP CPU to Industrial Ethernet, Security



Figure 1 CP 1542SP-1 with plugged in BusAdapter (here BA 2xRJ45)

On the front of the module at the right edge, the hardware version is printed as a placeholder "X". If the printed text is, for example, "X 2 3 4", "X" would be the placeholder for hardware product version 1.

Directly below, you will find the firmware version of the CP as it shipped.

The MAC address is printed on the front at the bottom left, above the connectors for the power supply:

- 00:1B:1B:xx:xx:01 (interface)

Application and functions

1

1.1 Components of the product

The following components are supplied with the product:

- CP 154xSP-1
- Plug for the socket of the power supply (24VDC) of the CP
- DVD with documentation and license texts

A BusAdapter for the Ethernet connection of the CP does not ship with the product.

1.2 Application

Application of the CP variants

The CP is used to connect the ET 200SP to Industrial Ethernet via a copper cable or fiber-optic cable. It can be used as an additional Ethernet interface of the CPU for S7 communication.

For the Ethernet connection, the CP requires a BusAdapter. The BusAdapter is not supplied with the CP. For information on the compatible BusAdapters, refer to the section BusAdapter (Page 163).

The three CP types are intended for the following communication tasks:

- **CP 1542SP-1**

  The CP 1542SP-1 allows the ET 200SP a further Ethernet connection.

- **CP 1543SP-1**

  The CP 1543SP-1 has Security functions for network security, such as a firewall and VPN. This makes protected access to the ET 200SP possible.

- **CP 1542SP-1 IRC**

  The CP 1542SP-1 IRC supports telecontrol communication for connecting the ET 200SP CPU to a control center. One of the following telecontrol protocols can be used as an alternative:

  – TeleControl Basic

    For connection of the ET 200SP CPU to a control center with telecontrol server (TCSB)

  – ST7

    For connection of the ET 200SP CPU to a control center with SINAUT ST7

  – DNP3

    For connection of the ET 200SP CPU to DNP3 master

  – IEC 60870-5-104

    For connection of the ET 200SP CPU to IEC master

1.3 Communications services

Communications services

The following communications services are supported:

- **S7 communication and PG/OP communication with the following functions:**
  - PUT/GET as client and server for data exchange with S7 stations
  - USEND/URCV for uncoordinated data exchange with a remote partner
  - BSEND/BRCV for exchanging large volumes of data with a partner
  - PG functions
  - Operator control and monitoring functions (HMI)

  For S7 communication, the CP requires a fixed IP address.
- **S7 routing**
  - Routing of S7 connections via the backplane bus and the CPU to other S7 stations
- **SINEMA Remote Connect (SINEMA RC)**

  As of firmware version V2.0, the following CP types support SINEMA RC with software version V1.3:
  - CP 1542SP-1 IRC
  - CP 1543SP-1

  See section Connection to SINEMA RC (Page 19).

  For the manual, see /9/ (Page 169).
- **Open User Communication (OUC)**

  OUC via program blocks with the following protocols:
  - TCP/IP
  - ISO-on-TCP
  - UDP

  The CP 1543SP-1 supports Secure OUC.

  You will find the program blocks supported by the three CP types in the section Program blocks (Page 137).
- **E-mail using program blocks**
- **HTTP / HTTPS**

  Via HTTP / HTTPS you can access the Web server of the CPU.

For telecontrol communication of the CP 1542SP-1 IRC, see section Telecontrol communication of the CP 1542SP-1 IRC (Page 14).

For information on the Security functions of the CP 1543SP-1, refer to the section Security functions (CP 1542SP-1 IRC, CP 1543SP-1) (Page 16).

1.4 Other services and properties

Further services and properties of the CP

- **IP configuration**
  - Address types

    The CP supports IP addresses according to IPv4 and IPv6.
  - Addressing

    The IP address, the subnet mask and the address of a gateway can be set manually in the configuration. As an alternative, the IP address can be obtained using program blocks.
  - DHCP: As an alternative, the IP address can be obtained from a DHCP server.
  - DCP (Discovery and Configuration Protocol) is supported.
- **Time-of-day synchronization**
  - NTP

    The CP can synchronize its time of day via NTP.

    Only CP 1543SP-1: If the Security functions are enabled, the secure method NTP (secure) can be used.
  - Time from partner (only CP 1542SP-1 IRC)

    If telecontrol communication is enabled, the CP can also obtain its time of day via from the communications partner.

    UTC time is used for TeleControl Basic and DNP3.

    The local time of the partner PC is used for ST7 and IEC.

    The time of day of the CP can be read by the CPU using a PLC tag. For information on the format of the time stamp of the data frames, refer to the section Datapoint types (Page 86).

  For more detailed information, refer to section Time-of-day synchronization (Page 53).
- **SNMP**

  As SNMP agent, the CP supports queries via SNMPv1.

  The CP 1543SP-1 also supports SNMPv3.

  For more detailed information, refer to section SNMP (Page 55).
- **E-mail**

  The CP 1542SP-1 IRC and CP 1543SP-1 support sending e-mails.

1.5 Telecontrol communication of the CP 1542SP-1 IRC

Telecontrol protocols

In addition to the communications services named above, the CP 1542SP-1 IRC supports the following telecontrol protocols for communication with a master station:

- **TeleControl Basic ***

  Proprietary protocol for telecontrol applications. The IP-based protocol is used to connect the CP to the application TCSB.

  TCSB is installed on a PC in the master station, the telecontrol server. Via the OPC-DA or OPC-UA server of TCSB, an OPC client can access the process data of the CP.

  TCSb is supported as of the following version: V3.0 + SP3

  For the TCSB manual, see /4/ (Page 168).

- **ST7**

  Proprietary protocol for telecontrol applications in the SINAUT ST7 system. The protocol is used to connect the CP to ST7 control centers.

  The SINAUT ST7 supports the following functions, among others:

  – Communication with the master station

  – Communication with other stations

  – MSC transmission protocol

    Under SINAUT S7, the CP uses the following variants of the MSC transmission protocol on OSI layer 3:

    - MSC (default setting)

    - MSCsec when security requirements are higher ("Security" activated)

  – Communication using mobile wireless

    Communication via a mobile wireless network combined with the Internet is made possible by a SCALANCE M router. The SCALANCE M product series provides various VPN routers with IPsec, encryption software and their own firewall.

    You will find a list of routers in the appendix Router SCALANCE M (Page 165).

1.10 Configuration examples

Below you will find configuration examples for the use of the three CP types.

CP 1542SP-1 - Network separation

The CP is used in the ET 200SP to operate lower-level networks separately or to achieve separation from the higher-level network.

The ET 200SP can be expanded flexibly with further Ethernet interfaces via the CP. The network separation allows the setting up of identical machines with the same IP address. The CP takes over the communication and relieves the CPU.

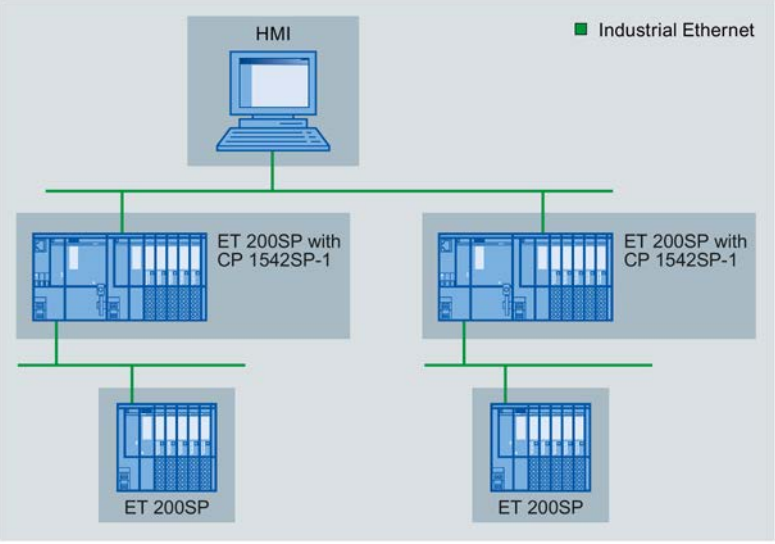


Figure 1-1 Configuration example of an ET 200SP with CP 1542SP-1

LEDs and connectors

2

2.1 LEDs

Meaning of the LED displays of the CP

The CP has the following light emitting diodes (LEDs) on the front:

LED name	Meaning
PWR	Power supply
RN	Operating mode
ER	Error
MT	Maintenance

Table 2- 1 Legend for the following tables

Symbol				-
Meaning / LED status	ON (LED lit)	OFF	LED flashes	Any

Table 2- 2 Meaning of the LED displays of the CP

PWR (green)	RN (green)	ER (red)	MT (yellow)	Meaning
				No supply voltage on the CP or supply voltage too low
				CP startup
				CP in RUN mode
	-			Error. LED display with the following events: • Duplicate IP address • Bus adapter not plugged in or pulled • No telecontrol connection (CP 1542SP-1 IRC)
				Error: CP defective
				Missing configuration data
				Firmware update running
				There is a maintenance request from the CP. Example: • End of the firmware update

LEDs of the bus adapter

Every port of a bus adapter has an LED "LKx" that informs about the connection status with Ethernet and the frame traffic of the port.

Table 2- 3 Meaning of the LED displays of the bus adapters

LK (green)	Meaning
○	No Ethernet connection. Possible causes: • No physical connection to the network • Port disabled in the configuration
☼	LED flashing test
●	There is an Ethernet connection between the port and communications partner.

2.2 Power supply

External power supply required

The connector for the external 24 VDC power supply is located on the front of the CP.

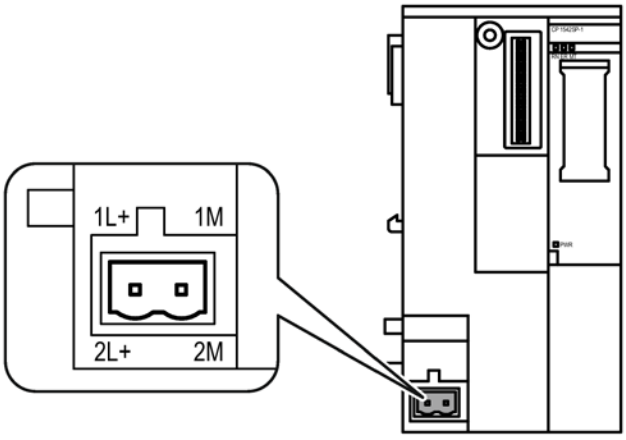


Figure 2-1 Power supply of the CP

Connector X80 is intended for connection to a single or redundant power supply. The power supply is connected to the CP with the supplied plug-in terminal block. The terminal block is plugged in to the socket X80 of the CP.

For information on installing and connecting up, refer to the sections Installing the CP (Page 40) and Connecting the CP (Page 44).

Reverse polarity protection

The plug-in terminal block for connector X80 is designed so that it can only be plugged in in one position. This provides constructional reverse polarity protection.

The connector X80 also has electronic reverse polarity protection.

You will find further data on the power supply in section Technical specifications (Page 155).

2.3 Connector for the BusAdapter

Operation of the device only with BusAdapter

For connecting to Ethernet the CP requires a BusAdapter. A BusAdapter does not ship with the CP.

The slot is on the front of the device:

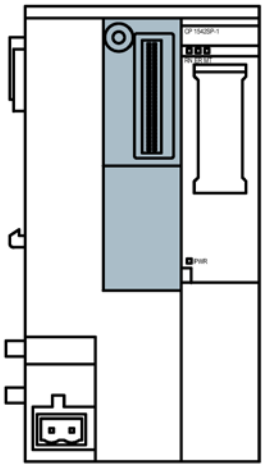


Figure 2-2 Front of the CP, the slot for the bus adapter is marked gray.

You will find the bus adapters supported by the CP in section BusAdapter (Page 163).

For information on installing and connecting up, refer to the sections Installing the CP (Page 40) and Connecting the CP (Page 44).

You will find the pinout of the Ethernet interface in section BusAdapter (Page 163). You will find further technical specifications of the bus adapter in the manual /3/ (Page 168).

WARNING

EXPLOSION HAZARD

The equipment is intended to be installed within an ultimate enclosure. The inner service temperature of the enclosure corresponds to the ambient temperature of the module. Use installation wiring connections with admitted maximum operating temperature of at least 30 ºC higher than maximum ambient temperature.

3.2 Installing the CP

NOTICE

Install and remove the CP only when the power is off.

Switch off the power supply of the ET 200SP and the CP before you install or remove modules. Installing and removing modules with the power supply on can lead to damage to the modules and to loss of data.

Note

Note the installation guidelines

When installing and connecting up the CP note the instructions in the manual /3/ (Page 168).

NOTICE

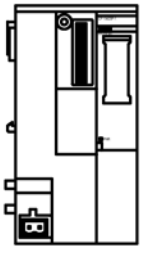
Installation location - Dependency of the temperature range

The module must be installed so that its upper and lower ventilation slits are not covered, allowing adequate ventilation. Above and below the modules, there must be a clearance of 25 mm to allow air to circulate and prevent overheating.

Note the dependency of the permitted temperature range on the installation location:

- Horizontal installation of the rack (DIN rail) means vertical position of the CP.
- Vertical installation of the rack (DIN rail) means horizontal position of the CP.

You will find the permitted temperature ranges in the section Technical specifications (Page 155).

Installation of the rack	Installation position of the CP
Horizontal installation of the rack	

"Functions" group

- **Firmware update**

  For a description, see section Downloading firmware (Page 151).

- **Assign IP address**
- **Assign PROFINET device name**
- **Save service data**

  The function is used for logging of internal module processes in situations in which you cannot eliminate unexpected or unwanted behavior of the module yourself.

  The log file is created with the "Save service data" button. The data is saved in a file with the format "*.dmp" that can be evaluated by the Siemens hotline.

Web server of the CPU

Via the CP you can access the Web server of the CPU and the information available there. For access, refer to the section Web server of the CPU (Page 147).

SNMP

For information on the functions, refer to the section Diagnostics with SNMP (Page 144).

Diagnostics e-mail

Validity: CP 1542SP-1 IRC / CP 1543SP-1

The two CPs can send a diagnostics e-mail if configurable events occur, for example a partner cannot be reached or CPU STOP.

The configuration is described in section Messages (e-mail) (Page 133).

Telecontrol diagnostics

Validity: CP 1542SP-1 IRC

- Partner status

  The CP can signal the status of the connection to the communications partner to the CPU via a PLC tag.

  For information on the configuration, see section Partner configuration (Page 65).

- CP diagnostics

  The CP can store extended diagnostic data in PLC tags.

  For information on the configuration, see section CP diagnostics (Page 72).

You can display the states of the PLC tags via the Web server of the CPU or via a watch table, for example.

6.2 Online security diagnostics via port 8448 (CP 1542SP-1 IRC, CP 1543SP-1)

Security diagnostics without opening port 102

If you want to perform security diagnostics without opening port 102, follow the steps below:

1. Select the CP in STEP 7.
2. Open the "Online & diagnostics" shortcut menu.
3. In the parameter group "Security" click the "Connect online" button.

In this way you perform the security diagnostics via port 8448.

See also

Settings for online security diagnostics and downloading to station with the firewall activated (Page 121)

6.3 Diagnostics with SNMP

Requirement

The requirement for using SNMP is the enabling of the function in the configuration, see section SNMP (Page 55).

SNMP (Simple Network Management Protocol)

SNMP is a protocol for diagnostics and managing networks and nodes in the network. To transmit data, SNMP uses the connectionless UDP protocol.

The information on the properties of SNMP-compliant devices is entered in MIB files (MIB = Management Information Base).

You will find detailed information on SNMP and the Siemens Automation MIB in the manual /7/ (Page 169).

Scope of performance of the CPs

The CPs support the following SNMP version:

- **CP 1542SP-1, CP 1542SP-1 IRC**
  - SNMPv1
- **CP 1543SP-1**
  - SNMPv1
  - SNMPv3 (with activated Security functions)

  For information on configuring SNMPv3, see section SNMP (Page 130).

Traps are not supported by the CP.

Supported MIBs in SNMPv1

The CPs support the following MIBs:

- **MIB II (acc. to RFC1213)**

  The CP supports the following groups of MIB objects:
  - System
  - Interfaces
  - IP
  - ICMP
  - TCP
  - UDP
  - SNMP
- **LLDP MIB**
- **Siemens Automation MIB**

  Note the rights for writing to the MIB objects, see the next section (SNMPv3).

Supported MIB objects in SNMPv3

If SNMPv3 is enabled, the CP returns the contents of the following MIB objects:

- **MIB II (acc. to RFC1213)**

  The CP supports the following groups of MIB objects:

  – System
  – Interfaces

    The "Interfaces" MIB object provides status information about the CP interfaces.
  – IP (IPv4/IPv6)
  – ICMP
  – TCP
  – UDP
  – SNMP

  The following groups of the standard MIB II are not supported:

  – Adress Translation (AT)
  – EGP
  – Transmission
- **LLDP MIB**
- **Siemens Automation MIB**

  Note that write access is permitted only for the following MIB objects of the "System" group:

  – sysContact
  – sysLocation
  – sysName

    A set sysName is sent as the host name using DHCP option 12 to the DHCP server to register with a DNS server.

  For all other MIB objects and groups, only read access is possible for security reasons.

Access rights using community names (SNMPv1)

TCP uses the following community strings to control the permissions for access to the SNMP agent:

Table 6- 1 Access rights in the SNMP agent

Type of access	Community string *)
Read access	public
Read and write access	private

*) Note the use of lowercase letters!

Technical specifications

7

Technical specifications		
Article numbers	CP 1542SP-1	6GK7542-6UX00-0XE0
	CP 1542SP-1 IRC	6GK7542-6VX00-0XE0
	CP 1543SP-1	6GK7543-6WX00-0XE0
Attachment to Industrial Ethernet		
Quantity	1	
Design	Slot for bus adapter	
Properties	For information on the properties of the BusAdapters and the permissible cable lengths, see /3/ (Page 168).	
Electrical data		
External power supply (X80), design	Socket Terminal block for socket	Two terminals with reverse polarity protection 2 x two terminal for single or redundant power supply
Power supply (external)	• Type of voltage • Permitted low limit • Permitted high limit	• 24 VDC • 19.2 V • 28.8 V
Current consumption	• From 24 VDC (external) • From backplane bus (3.3 V)	• 250 mA (typ.) • 4 mA (typ.)
Maximum Inrush current	(Rated value)	12 A
Effective power loss	(typical)	6 W
Overvoltage category according to IEC / EN 60664-1	Category I	
Permitted ambient conditions		
Ambient temperature	During operation with the rack installed horizontally	0 .. + 60 °C
	During operation with the rack installed vertically	0 .. + 50 °C
	During storage	-40 .. +70 °C
	During transportation	-40 .. +70 °C
Relative humidity	During operation	≤ 95 % at 25 °C, no condensation
Design, dimensions and weight		
Module format	Compact module ET 200SP	
Degree of protection	IP20	
Weight		
• Without bus adapter	• 180 g	
• With bus adapter 2xRJ45	• 230 g	

Technical specifications	
Dimensions (W x H x D)	60 x 117 x 74 mm
Installation options	DIN rail (35 mm)
Mean Time Between Failures (MTBF)	
• At + 40 °C	• 56.87 years
• At + 60 °C	• 24.78 years
Product functions	You will find additional properties and performance data in the section Application and functions (Page 11).

Accessories

C

C.1 BusAdapter

Compatible BusAdapter

To connect to the Ethernet network, the CP requires a BusAdapter. A BusAdapter does not ship with the CP.



Figure C-1 Example of a bus adapter, here BA SCRJ/RJ45

The CP supports the following bus adapters:

- BA 2×RJ45

  PROFINET bus adapter with the following connectors:

  – 2 x Ethernet jack RJ-45

  Article number: 6ES7193-6AR00-0AA0

- BA 2xFC

  PROFINET bus adapter with the following connectors:

  – 2 x direct connection of the bus cable (FastConnect)

  Article number: 6ES7193-6AF00-0AA0

- BA 2xSCRJ

  PROFINET bus adapter with the following connectors:

  – 2 x fiber-optic cable POF/PCF

  Article number: 6ES7193-6AP00-0AA0

- BA SCRJ/RJ45

  PROFINET bus adapter, media converter FO - copper with the following connectors:

  – 1 x fiber-optic cable POF/PCF

  – 1 x Ethernet jack RJ-45

  Article number: 6ES7193-6AP20-0AA0

- BA SCRJ/FC

  PROFINET bus adapter, media converter FO - copper with the following connectors:

  – 1 x fiber-optic cable POF/PCF

  – 1 x direct connection of the bus cable (FastConnect)

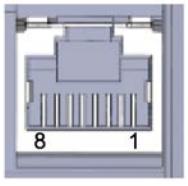
  Article number: 6ES7193-6AP40-0AA0

You will find further details in the manual /2/ (Page 168) and in the Siemens Industry Mall in Link: (https://mall.industry.siemens.com).

Pinout of the Ethernet interface

The table below shows the pin assignment of the Ethernet interface. The pin assignment corresponds to the Ethernet standard 802.3-2005, 100BASE-TX version.

Table C- 1 Pin assignment of the Ethernet interface

View of the RJ-45 jack	Pin	Signal name	Assignment
	1	TD	Transmit Data +
	2	TD_N	Transmit Data -
	3	RD	Receive Data +
	4	GND	Ground
	5	GND	Ground
	6	RD_N	Receive Data -
	7	GND	Ground
	8	GND	Ground