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SIMATIC NET

CP 243-1 communications processor for Industrial Ethernet and information technology

Operating Instructions

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Preface

Purpose of the manual

This manual supports you when you use the communications processor

CP 243-1. It provides you with information on how to communicate with this communications processor via Industrial Ethernet and how to use the Information Technology (IT) functions.

Requirements

To be able to understand how the CP 243-1 works, you should be familiar with this manual and the "SIMATIC S7-200 Automation System" manual.

You will find the document on the Internet under the following entry ID: 1109582 (http://support.automation.siemens.com/WW/view/en/1109582)

You also require a basic understanding of TCP/IP, FTP, e-mail, HTML, Web browsers and Java.

Target group

This manual is intended for engineers, programmers, commissioning personnel and maintenance personnel with a general knowledge of automation and communications systems as well as operator control and monitoring systems.

Sample program

This manual contains a sample program that will help you to program the CP 243-1. This sample program can be run on an S7-200 CPU, type 224. If you want to run this sample program on another S7-200 CPU, you may need to adjust the configuration for the sample program. The CP 243-1 cannot be operated with every S7-200 CPU.

Address label: MAC address

The CP 243-1 ships with a fixed MAC address. You will find the MAC address beneath the top cover of the device.

MLFB (order) number, components of the product

Product name	MLFB (order number)	Components of the product
CP 243-1	6GK7243-1EX01-0XE0	CP, documentation on CD-ROM

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Introduction

1

Definition and use

The CP 243-1 is a communications processor intended for operation in an S7-200 automation system. It allows the connection of an S7-200 system to Industrial Ethernet (IE). The use of the CP 243-1 means that communication via Ethernet is also possible at the lower performance end of the S7 product family.
As a result, an S7-200 can be configured, programmed and diagnosed even at a distance using STEP 7 Micro/WIN 32 via Ethernet. Using a CP 243-1 also means that an S7-200 can communicate with another S7-200, an S7-300 or S7-400 controller via Ethernet. Communication with an OPC server is also possible.

The IT functions of the CP 243-1 form the basis for monitoring and, if necessary, also manipulating automation systems with a Web browser from a networked PC. In addition, diagnostics messages can also be e-mailed from a system. Using the IT functions, it is very easy to exchange entire files with other computer and controller systems.

Industrial Ethernet is the network for the process control level and the cell level of the SIMATIC NET open communication system. Physically, Industrial Ethernet is an electrical network based on shielded, coaxial lines, twisted pair cabling, and an optical network of fiber-optic conductors. Industrial Ethernet is defined by the international standard IEEE 802.3.

Continuous communication in industry - worldwide

Industrial Ethernet is embedded in the SIMATIC NET concept which permits continuous networking of the process control level, cell level, and field level with PROFIBUS and AS Interface. The IT functions, characterized by their worldwide uniform standards and protocols, serve as the bridges between the world of industrial controllers and the typical PCs used by the office world of today.

Compatibility

The CP 243-1 (6GK7243-1EX01-0XE0) described here is the successor to the previous CP 243-1 (6GK7243-1EX00-0XE0) and CP 243-1 IT (6GK7243-1GX00-0XE0) and is fully compatible with its predecessors:

CPU 222 Rel. 1.10 or higher	(1.20 or higher is recommended
CPU 224 Rel. 1.10 or higher	(1.20 or higher is recommended)
CPU 226 Rel. 1.00 or higher	(1.20 or higher is recommended)
CPU 226XM Rel. 1.00 or higher	(1.20 or higher is recommended)

A maximum of 2 expansion modules can be installed on the CPU 222. In contrast, up to 7 expansion modules can be connected to CPUs 224, 226 and 226XM.

You will find a compatibility table in Appendix D

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NOTICE
Only one CP 243-1 may be connected to an S7-200 CPU. If additional CP 243-1 communications processors are connected, the S7-200 system may not function correctly.

The software of the CP 243-1 is compatible with the following standards:

- S7 XPUT/XGET and S7 READ/WRITE
- S7-200 I/O bus specification
- HTTP 1.0 to RFC 1945
- FTP to RFC 959
- SMTP to RFC 2821/2822 (only functions for sending e-mails)

The position in an S7-200 system at which a CP 243-1 can be operated depends on the firmware version of the S7-200 CPU, see also Chapter Installation and commissioning (Page 35).

Configuration

The CP 243-1 is configured with Micro/WIN Version 4.0.8. To allow compatibility it can also be configured with version 3.2.3 or higher, but in this case the functionality is restricted. The standard CP 243-1 ships with a fixed MAC address. IP address and subnet mask must be configured or obtained from a BOOTP/DHCP server.

Programming

Use the Internet wizard of STEP 7 Micro/WIN 32 to program communication in the user program (see chapters Configuration (Page 43) and Programming (Page 81).

Configuration

The firmware of the CP 243-1 is programmed on flash memory during production and is stored there permanently. System states or dynamic variables that result during operation of the CP 243-1 are lost when power is turned off.

Configuration of the CP 243-1 is divided into Industrial Ethernet and IT services.

The Ethernet configuration is stored retentively in the variables memory of the S7-200 CPU. During startup, the CP 243-1 reads the configuration from the CPU and initializes itself accordingly.

The configuration of the IT services is stored in the file system of the CP 243-1 in the form of configuration files, one each for user administration, FTP client and e-mail service. These configuration files are continuously evaluated during ongoing operation.

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Features and functions

2

2.1 Overview

The CP 243-1 provides the following functions:

- S7 communication
  - High-speed data communication via Industrial Ethernet. Communication is based on standard TCP/IP
  - Ethernet access via RJ-45 jack
  - Simple connection to an S7-200 system via the S7-200 bus
  - Permits a flexible and distributed automation structure
  - Basis for simple further processing and archiving of process data
  - Permits simultaneous communication with up to 8 S7 controllers
  - Provides a link to S7-OPC
  - Simple network administration
  - S7 communication services "XPUT/XGET" as client and server
  - S7 communication services "READ/WRITE" as server
  - A keepalive time can be configured for all TCP transport connections with active and passive partners
- IT communication
  - File system for permanent storage of Web and configuration files on the CP 243-1
  - SMTP client for sending e-mails. In addition to pure text information, embedded variables can also be transferred. The current value of such a variable obtained only when the e-mail is sent.
  - Configuration of up to 32 e-mails with up to 1024 characters each
  - FTP server for access to the file system of the CP 243-1
  - FTP client for exchanging data with an FTP server
  - Configuration of up to 32 FTP client operations
  - The FTP client function supports the READ, WRITE and DELETE commands.
  - Access by the FTP client to the FTP server of the CP 243-1
  - HTTP server for read and write access to process and status data of the S7-200 system via up to four Web browsers at one time
  - Ready-made HTML pages for diagnostics of the S7-200 system and for access to process variables
  - Sending a test e-mail via a ready-made HTML page
  - Storage of your own HTML pages and Java applets in the file system of the CP 243-1

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  - Availability of Java applets and beans for development of user-defined HTML pages and Java applets
  - User administration for up to 8 users with user-specific privileges for access to files, status information and process variables
- Configuration:
  - Remote programming, configuration and diagnostics of an S7-200 system (for example program upload and download or status indications) via Industrial Ethernet and STEP 7 Micro/WIN 32.
  - Module replacement possible without having to program/configure the Ethernet functions again (Plug & Play). Since the configuration of the IT functions is stored on the CP 243-1, this must be downloaded to the module again when the CP 243-1 is replaced.
- Watchdog timer

The CP 243-1 is equipped with a watchdog function. The watchdog starts each time the CP 243-1 starts up. If the watchdog monitoring is triggered, the CP 243-1 is automatically reset. This restarts the CP 243-1. During this time, the CP 243-1 reports a parity error to the S7-200 CPU. Handling such an error is described in the documentation of STEP 7 Micro/WIN 32.

- Can be addressed using preset MAC address (48-bit value)

The MAC address is set for each CP 243-1 in the factory. The MAC address can be found under the upper front panel. An IP address can be assigned to the CP 243-1 using BOOTP/DHCP and the preset MAC address.

Note

The Telnet protocol is implemented on this device. This is used only for manufacturing purposes and is not released for productive applications.

2.2 S7 communication via Industrial Ethernet

2.2.1 Preliminary overview

S7 communication via Industrial Ethernet permits program-controlled communication using communication SFBs/FBs and configured S7 connections. The CP 243-1 supports S7 communication via Industrial Ethernet with the XPUT/XGET and READ/WRITE services. Up to 212 bytes of user data can generally be transmitted per request. If the CP 243-1 is operating as a server, up to 212/222 bytes of user data can be transferred in read requests (see Appendix A).

The CP 243-1 supports a maximum of eight S7 communications channels to clients or servers on one or more remote communications partners. The CP 243-1 works according to the client/server principle on each channel. Per channel only one request at a time is accepted, processed and answered with a positive or negative response. The CP 243-1 only accepts a new request after a response has been sent.

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If the CP 243-1 receives several requests on a channel configured as a server, only the first request is processed. The subsequent requests are ignored until completion of the transaction, in other words, until a response is sent. The CP 243-1 has no channel-specific request administration and does not buffer requests.

Requirements for communication with a PC/PG

Just as previously, a PG/PC can access the S7-200 CPU via the PPI interface. This access is also possible via Ethernet using a CP 243-1. The following requirements must first be met:

- An Ethernet card is installed and configured on the PG/PC and an Ethernet and TCP/IP connection to the CP 243-1 exists (where necessary via routers, firewalls, etc.)
- STEP 7 Micro/WIN 32, version 3.2.3 or higher, is installed on the PG/PC.
- The CP 243-1 has a valid IP address. This address may be permanently specified in the configuration or obtained from a BOOTP/DHCP server.

At any one time, only one STEP 7 Micro/WIN 32 can communicate via a CP 243-1 with the S7-200 CPU. The Ethernet interface must be used when configuring the IT services.

2.2.2 Types of communication

The CP 243-1 has three types of S7 communication relationships that can be used individually or as a combination.

1. Link to STEP 7-Micro/WIN 32
2. Link to other remote components of the SIMATIC S7 family
3. Link to OPC-based applications on a PC/PG

2.2.3 Communications partners

- S7-200 CPU with CP 243-1
- S7-300 CPU with CP 343-1, CP 343-1 Lean or CP 343-1 IT / Advanced
- S7-400 CPU with CP 443-1 or CP 443-1 IT / Advanced
- PG/PC with OPC server
- PG/PC with STEP 7 Micro/WIN 32

The STEP 7 HW Config program shows you the types of S7-300 CPUs and S7-400 CPUs that support the S7 protocol XPUT/XGET and can therefore communicate with the CP 243-1. When you select an S7-300 or S7-400 CPU in the catalog of HW Config, this CPU must support the function "S7 communication".

Remember that the CP 243-1 does not support pure ISO connections. Since the CP 443-1 ISO has neither TCP/IP nor RFC 1006 on board, it cannot communicate with a CP 243-1.

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NOTICE
Only one CP 243-1 may be connected to an S7-200 CPU. If additional CP 243-1 communications processors are connected, the S7-200 system may not function correctly.

Note

If you require communication with an OPC server, remember that the CP 243-1 does not support automatic querying of the objects on the S7-200 (for example DBxx etc.).

A CP 243-1 can only communicate with an OPC server when this server supports the two S7 services READ and WRITE.

Overview

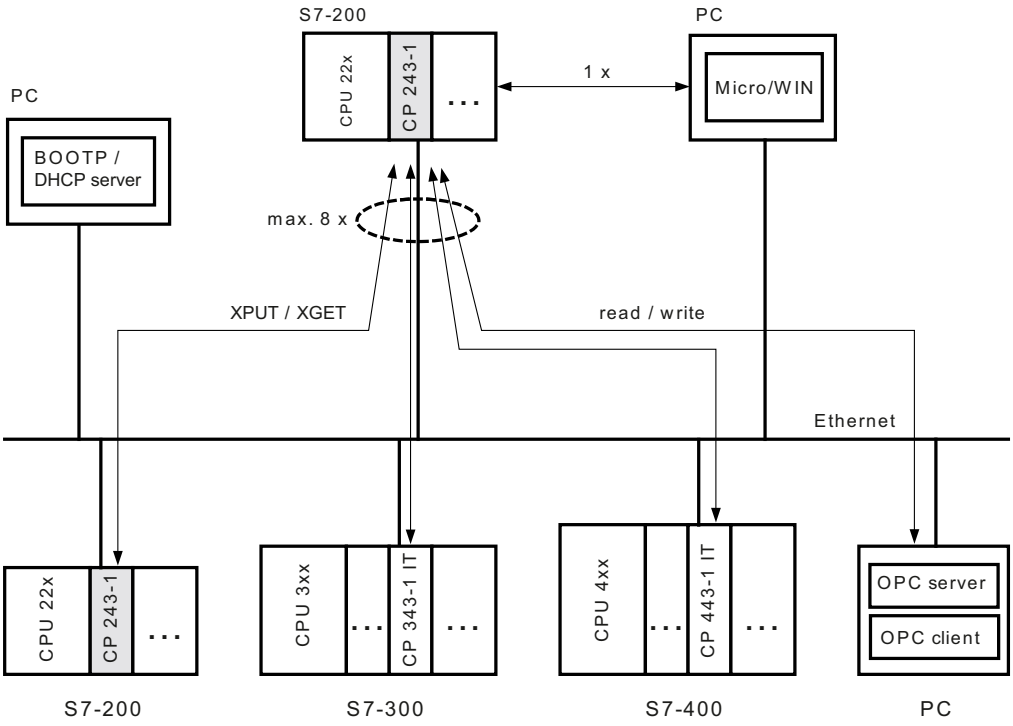


Figure 2-1 System overview

A CPU 22x with CP 243-1 can communicate both with other S7-200, S7-300 and S7-400 systems and with an OPC server.

A maximum of 8 connections are possible in addition to a STEP 7 Micro/WIN connection.

Configuring and programming connections for S7 stations

To configure communication between an S7-200 and an S7-300, S7-400 or an OPC server, you will need both STEP 7 Micro/WIN 32, version 3.2.3 or higher, and STEP 7, version 5.1 with service pack 3 or higher (with NCM for Industrial Ethernet).

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The S7-200 station is configured and programmed with STEP 7 Micro/WIN 32. You will need STEP 7 with NCM for Industrial Ethernet to configure and program the S7-300 or S7-400 or the OPC server.

Data exchange via Industrial Ethernet

10 and 100 Mbps networks are supported in full and half duplex. The CP 243-1 also supports the autonegotiation function for automatically negotiating the operating mode and the transmission rate to be used. The mode and the transmission rate can also be permanently specified by the user when configuring the CP 243-1. If the CP 243-1 does not have a valid configuration, it uses "autonegotiation" mode as default.

Note

Autonegotiation mode only works when all connected network components support this mode.

Industrial Ethernet and TCP/IP do not allow time-deterministic data flows. There is no way to know when a remote CPU will execute the requests. The responses of the remote CPU are asynchronous to the CPU cycle of the local S7-200 CPU. This is why TCP/IP-based communication is not ideally suitable for use in distributed applications with strict time requirements (for example control circuits, cyclic precisely timed sampling).

S7 communication

The XPUT and XGET S7 services are used to exchange data between two controllers. The CP 243-1 can be used both as client and as server.

Communication between a CP 243-1 and an OPC server running on a PC/PG is based on the READ and WRITE S7 services. In this case, the CP 243-1 always functions as the server. Other S7 services, for example the service for automatic querying of objects currently on an S7-200

(DBs, etc.) are not supported here.

The following data types or data areas are supported by the CP 243-1:

CP 243-1 as client:

Read and write access:

- Data type is always BYTE
- Only variables can be accessed on the local system.
- Accessible memory areas on the partner system are inputs, outputs, bit memory and variables when an S7-200 is the partner.
- Accessible memory areas on the partner system are inputs, outputs, bit memory and data areas when an S7-300 or an S7-400 is the partner.

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CP 243-1 as server:

Write access:

- Data type is BOOL, BYTE, WORD or DWORD
- The use of the data types CHAR, INT, DINT and REAL depends on the firmware version of the S7-200 CPU being used.
- Accessible memory areas on the local system are inputs, outputs, variables, bit memory and status bits.

Read access:

- Data type is BOOL, BYTE, WORD or DWORD
- The use of the data types CHAR, INT, DINT and REAL depends on the firmware version of the S7-200 CPU being used.
- Accessible memory areas on the local system are inputs, outputs, variables, bit memory, system area and status bits.

Note

When an S7-300 or S7-400 is acting as the server for a client running on an S7-200 system, the CP 243-1 expects that this server will always have a passive role. This means that, the S7-300 or S7-400 system is not allowed to send S7 requests to the S7-200 system.

Communication with STEP 7 Micro/WIN 32

With communication between a CP 243-1 and STEP 7 Micro/WIN 32, the CP 243-1 is always the server. STEP 7 Micro/WIN 32 always acts as the client.

S7 bus communication

All access to all data areas of the S7-200 CPU is always possible. Read and write access does not depend on the CPU mode (RUN, TERM or STOP).

2.3 IT communication

2.3.1 Preliminary overview

Preliminary overview

The CP 243-1 supports not only S7 communication via Industrial Ethernet but also a series of IT functions at the same time. These include data exchange with FTP, sending e-mails and allowing up to four Web browsers to access data and status information on the S7-200 system simultaneously.

Sending an e-mail or active file access using FTP is initiated by the S7-200 user program. Only one request can be active for each of these two functions at any one time. The user

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program cannot start another request until the CP 243-1 has positively or negatively acknowledged the currently active request.

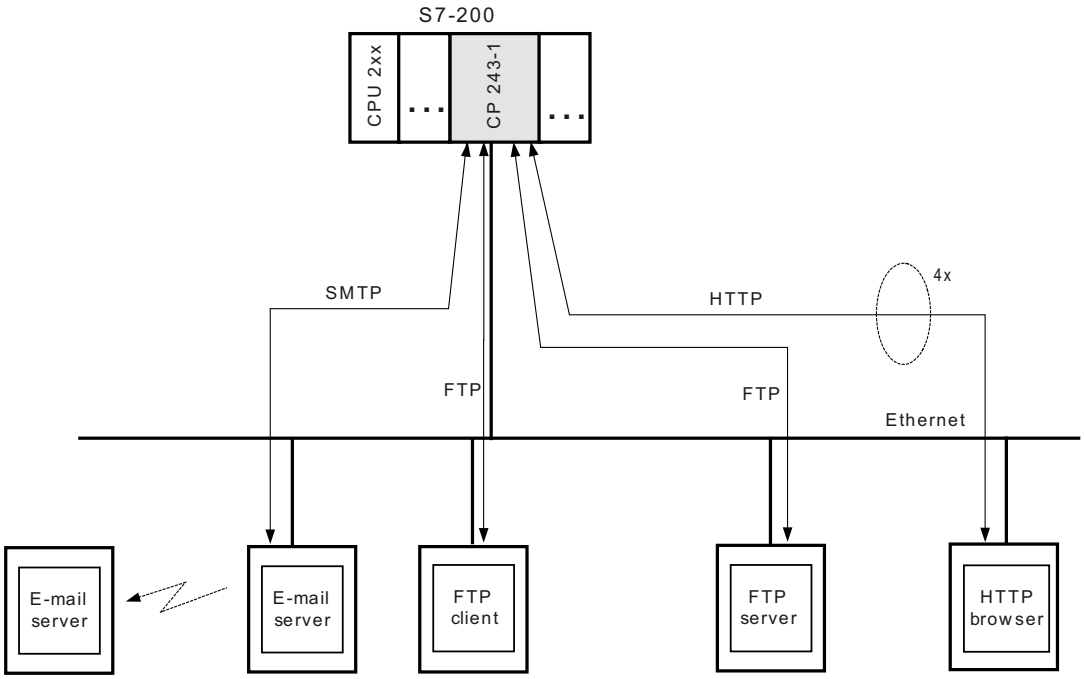


Figure 2-2 Overview of the IT functions

2.3.2 Types of communication

In addition to the S7 communication relations described in chapter Types of communication (Page 11), the CP 243-1 allows four types of IT communication relations that can be used individually or as a combination.

1. Communication with an e-mail server
2. Communication with an FTP client located on a remote system.
3. Communication with an FTP server. Such a server is typically located on a remote system. A link to the FTP server running on the CP 243-1 of the local S7-200 system is also possible.
4. Communication with up to four Web browsers running on remote systems

2.3.3 E-mails

How it works

The SMTP protocol controls the transfer of e-mails. An e-mail consists of one or two address fields, a subject field and a field for the actual text message.

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The text message is made up of ASCII characters. The text may contain placeholders for variables that reference a data value within the local S7-200 system. When the e-mail is sent, the CP 243-1 reads each specified value from the local S7-200 CPU and inserts it in the desired format at the specified location in the message. With the CP 243-1, it is possible to send e-mails preconfigured by an S7-200 user program to an e-mail server specified during the configuration phase. The e-mail server then forwards the e-mail to the recipient specified in the address field of the e-mail.

The FTP server specified in the configuration must be located in the subnet of the CP 243-1 or must be accessible via a gateway. If this e-mail server cannot be accessed, the e-mail is sent to a substitute e-mail server that is also specified when the CP 243-1 is configured. If this substitute e-mail server is also not accessible, an error message is generated to this effect.

NOTICE
The CP 243-1 only monitors whether or not an e-mail could be delivered to the configured e-mail server. It cannot detect whether this e-mail was forwarded to or read by the specified recipient.

Note

Depending on the configuration, memory areas of the S7-200 CPU need to be read before an e-mail is sent. This means that resetting the S7-200 CPU or a power down may cause the e-mail transfer to be aborted.

This, in turn, means that no e-mail can be sent to indicate that the S7-200 CPU has been reset.

The CP 243-1 does not support the receipt of e-mails. The e-mails and the address parameters of the e-mail server are configured in STEP 7 Micro/WIN 32.

Note

To allow e-mails to be sent by the CP 243-1, make sure that it can access a functioning e-mail server.

One of the ways in which you can test whether or not a e-mail server is accessible is to use HTML page sendmail.htm, which ships with the CP 243-1 (see chapter HTTP server (Page 22)).

Configuration

The e-mails and the address parameters of the e-mail server are configured with the Internet wizard of STEP 7 Micro/WIN 32. The configuration data entered here is stored permanently in a file with the extension .edb in the file system of the CP 243-1. The data is transferred from the system on which the configuration was created with STEP 7 Micro/WIN 32 to the CP 243-1 via FTP.

Up to 32 e-mails can be configured. Each e-mail text can consist of up to 1024 characters.

These e-mails have the following structure:

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- E-mail number:

  This number can be used by the S7-200 user program to reference a configured e-mail.

- Recipient address:

  The e-mail address of the recipient. This address must always be specified.

- Additional recipient address:

  The address of a recipient that will receive a copy of the e-mail. This address does not have to be specified.

- Subject:

  A short description of the e-mail. The subject must always be specified.

- E-mail text incl. placeholders and formatting characters:

  The actual information to be transferred is located here.

Each address field may only contain one recipient address. If an e-mail needs to be sent to several recipients, a distribution list must be set up on the e-mail server and this list must be specified as the e-mail recipient.

In addition to the control characters for the placeholders of data values, the following formatting characters are supported in the e-mail text:

- \nline feed
- \ttab

Note

The maximum length of the e-mail text of 1024 characters relates to the actual message text including all embedded placeholders and all formatting characters ("\n" and "\t").

If the maximum permitted length of 1024 characters is exceeded when the placeholders are replaced by values, the e-mail text is truncated after 1024 characters and an error message to this effect is returned. The truncated e-mail is nevertheless sent.

Conversion procedures such as MIME or UUENCODE are not supported. It is also not possible to add attachments such as files to e-mails.

The e-mail function of the CP 243-1 can always be enabled or disabled in the configuration.

Communications partners

In addition to conventional PCs, it is possible in principle to specify any terminal with e-mail capability as the e-mail recipient (for example cell phones or FAX machines).

Performance/constraints

Sending of e-mails is subordinate to S7 communication.

Reaction times when sending an e-mail depend on the configuration and cannot be specified in general. The greater the number of simultaneous S7 connections and the more data that is transmitted over these connections, the longer it takes to process and send e-mails.

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NOTICE
The variables for the placeholders embedded in the e-mail text are read out individually from the S7-200 CPU. Only one such value can be transferred per S7 cycle from the S7-200 CPU to the CP 243-1. This means that the time needed to set up an e-mail depends on the amount of data to be inserted, the cycle time of the S7-200 CPU and the load on the S7 bus.

2.3.4 FTP server

How it works

The FTP server of the CP 243-1 can be used to read and write Web files and configuration files from a remote FTP client via Ethernet to the file system of the CP 243-1.

The FTP client always initiates the file transfer. The FTP server of the CP 243-1 never initiates FTP transfers itself.

All types of files can be transferred to the file system of the CP 243-1. The relevance of these files to operation of the CP 243-1 is not checked.

NOTICE
The BINARY transmission mode should be used to transfer files between the FTP server of the CP 243-1 and a remote FTP client. The transmission mode must be set at the FTP client end.

Note

The CP 243-1 does not have a real-time clock. The files stored on or read from the CP 243-1 using FTP therefore all have the date 01.01.1980 and the time 00:00.

Access protection

FTP is a protocol in which users must authenticate themselves before they can access the FTP server. This requires a valid user name and a password on the server. After a connection has been established between the FTP client and the FTP server of the CP 243-1, the user name and password must be entered. After successful authentication, the user can then access the file system of the CP 243-1. Users can navigate through the directory tree, transmit files and manage directories.

Up to 8 users and an administrator can be configured for the CP 243-1. Compared with the 8 users, the administrator has special rights and the administrator's fixed user name and corresponding password are stored at a different location.

The user names and passwords are configured with STEP 7 Micro/WIN 32. The configuration file created with the Internet wizard is transferred with FTP to the CP 243-1 and stored permanently in the file system in a file with the extension .udb. The user name and

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the password of the administrator are required to be able to transfer the user configuration to the CP 243-1.

Note

The CP 243-1 does not support FTP access without a user name and/or password. An anonymous login is not supported.

Auto logout

Simultaneous access by several FTP clients to the FTP server of the CP 243-1 is not supported.

The FTP server is equipped with an auto logout mechanism to prevent it from being blocked by an undefined connection abort of an FTP client.

If the FTP server on the CP 243-1 is connected to an FTP client and a second FTP client wants to establish a connection to the FTP server, the server checks whether or not there was FTP-based communication between it and the first FTP client during the last 60 seconds. If there was no communication, the connection to the first FTP client is terminated and the second FTP client's request to establish a connection is accepted. Otherwise, the connection to the first FTP client is maintained and the second FTP client's request for a connection is rejected.

Supported FTP commands

After the HELP command is entered in the console window of the FTP client, a list of the FTP commands supported by this client normally appears. While these commands are being executed, they are converted internally by the FTP client into subcommands and sent to the FTP server.

Some FTP clients on the market have additional commands available that are not included in the RFC 959 standard or whose inclusion is not generally binding. There is no guarantee that the FTP server on the CP 243-1 will support all of these commands.

Communications partners

In principle, all FTP clients that communicate via Ethernet and comply with RFC 959 can be considered possible communications partners of the FTP server on the CP 243-1. This means that communication is not only possible with PC-based FTP clients but also with FTP clients supported by an S7-200, S7-300 or S7-400.

Performance/constraints

FTP communication is subordinate to S7 communication. This means that the reaction times of FTP communication depend on the particular configuration and cannot be predicted in general terms.

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Note

Only one FTP client can access the FTP server at any one time. When the FTP server of the CP 243-1 is accessed by the S7 user program via the FTP client function, access by a remote FTP client is not possible. The reverse also applies.

2.3.5 FTP client

How it works

The FTP client of the CP 243-1 can be used to transfer data from an S7-200 system to the file system of an FTP server, or the contents of a file can be copied to the DB of the local S7-200 system.

You can choose whether to transfer a file completely or only part of it. The number of bytes to be transferred can be specified for a read or write request.

If 0 is specified as the number of bytes to be transferred in a write request, an empty file with the name specified in the write request is created in the file system of the addressed FTP server. The length 0 in a read request means that the specified file is transferred completely to the DB of the local S7-200 system assuming that this does not exceed its storage space. If the number of bytes to be read is specified for a read request, this must match the length of the file to be read. Otherwise the CP 243-1 reports an error when the read request is executed.

The FTP client can also delete specified files in the file system of an FTP server initiated by the local S7-200 system.

When transferring files with FTP, the files being replaced are not modified and the data they contain is not converted. All the data to be transferred is taken as bytes. The data to be written is stored as bytes in the specified file.

The FTP client of the CP 243-1 always initiates the file transfer, triggered by the S7-200 user program. An FTP server itself does not generate FTP requests.

The CP 243-1 only accepts one FTP client request at a time from the S7-200 user program. As soon as this is completely processed, the CP 243-1 returns a positive or negative acknowledgment. Only then can the S7-200 user program send a new FTP client request.

The FTP servers specified in the configuration with their IP addresses must be located in the subnet of the CP 243-1 or must be accessible via a gateway.

NOTICE
The data transferred from or to the memory of the S7-200 CPU via FTP is transferred in binary mode. There is no conversion or formatting of this data whatsoever. The data to be transferred is not stored permanently on the CP 243-1.

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Configuration

The FTP requests are configured with the Internet wizard of STEP 7 Micro/WIN 32. The configuration data entered here is stored permanently in the file system of the CP 243-1 in a file with the extension .fdb. The data is transferred from the system on which the configuration was created with STEP 7 Micro/WIN 32 to the CP 243-1 via FTP.

Up to 32 FTP requests can be predefined each with a separate file transaction. Each of these requests is described by the following set of parameters:

- FTP request number:

  With this number, the S7-200 user program can reference every configured FTP request.
- IP address of the FTP server:

  IP address of the system whose file system will be accessed.
- User name on the FTP server:

  The login on the FTP server is made using this name. This means that the name specified here must have access rights for the addressed FTP server.
- Password on the FTP server:

  The encrypted password specified here is used for the login on the FTP server.
- Path name of the relevant file:

The file name including the complete path must be specified here.

- Request type to be executed: Possible request types are as follows:
  - Write to the file system of the FTP server
  - Read from the file system of the FTP server
  - Delete from file system of the FTP server
- Start address and length of the data in the data block:

  Here, you specify the start address at which the data to be read will be stored in the memory of the S7-200 CPU or the start address from which the data to be written will be sent to the FTP server and how many bytes will be transferred.

Note

The connection to an FTP server always uses port 20 for data exchange and port 21 for transferring commands.

Note

The FTP client supports file names in upper case/lower case letters if the FTP server with which the data is exchanged and the file system permit file names with upper case/lower case letters.

NOTICE

During configuration, the Internet wizard of STEP 7 Micro/WIN 32 only checks that the syntax of the FTP client configuration is correct. Checks relating to the semantics of this configuration can only be performed while the file transaction is taking place.

The FTP client function of the CP 243-1 can always be enabled/disabled by the configuration.

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Communications partners

In principle all FTP servers that communicate via Ethernet and that comply with RFC 959 represent possible communications partners for the FTP client. This means that communication is not only possible with PC-based FTP servers but, for example, also with FTP servers running on S7-200, S7-300 or S7-400 systems.

Performance/constraints

Note

If data from a remote FTP server is loaded on the local S7-200 CPU, it is up to the user to ensure that this data is not stored in memory areas that are already being used for other purposes. In this context, the CP 243-1 only performs rudimentary checks.

The CP 243-1 does not check that all data to be transferred originates from the same cycle of the local S7-200 CPU or becomes effective at the same time in one cycle. The transfer of this data to and from the local S7-200 CPU is asynchronous to the cycle of the local S7-200 CPU and its duration cannot be predicted.

With FTP write requests, the CP 243-1 can read 246 bytes per cycle from the memory of the S7-200 CPU. On the other hand, with FTP read requests, the CP 243-1 IT can transfer up to 254 bytes per cycle to the memory of the S7-200 CPU.

To ensure consistency with large amounts of data, appropriate measures must be taken in the S7-200 application program.

When a transfer between the FTP client of the CP 243-1 and an FTP server is interrupted, it is possible that only parts of the transferred data are stored on the destination system. In such cases, an error message is output in the S7-200 user program. The transaction is not repeated automatically.

On the CP 243-1, data exchange via FTP is subordinate to S7 communication. Reaction times vary with the particular configuration as well as the length of the S7-200 application program and it is not possible to make a generalized prediction.

Note

The file DB mechanism of the CP 343-1 IT and CP 443-1 IT communications processors is not supported by the CP 243-1. The CP 243-1 reads or writes one binary image of the data block to or from a file. This file contains no other information about lengths, source addresses etc.

2.3.6 HTTP server

Basics

Java applets are small application programs created in the Java programming language. At a browser's request, such applets are usually transferred from an HTTP server to a browser and executed there. The browser must be capable of handling Java and must permit

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execution of applets. Most browsers used today are Java compliant. They can usually be configured to allow execution of Java applets.

Java beans are software components with a standardized interface written in the programming language Java. It is easy to link these beans into conventional Java development environments and connect them with graphic tools to create complete Java applications or Java applets.

How it works

The HTTP server functionality integrated on the CP 243-1 permits the user to access the S7-200 system with most Web browsers and to read status information and read or change process values.

To do this, the user can make use of predefined HTML pages and Java applets stored in the file system of the CP 243-1. Users can also create their own HTML pages or Java applets and transfer them to the file system of the CP 243-1 using an external FTP client.

Java beans are available on the documentation CD supplied with the CP 243-1 making it easy for the user to create Java applets. They can be copied to a development computer and then linked to form your own Java applets in a Java development environment. The beans included with the CP 243-1 are Java components that provide functions that can be used repeatedly when creating an operator control and monitoring interface. This not only includes functions for read or write access to individual process values but also graphic functions for visualization of such values.

The document "SIMATIC NET IT-CP Programming Help" included with the CP 243-1 on the documentation CD contains a more detailed description of the individual beans. This also includes a detailed description of how to put these beans together to form Java applets. If the Java beans described in this document are used to access an S7-200 via a CP 243-1, symbolic addressing cannot be used.

Using the HTML pages and Java applets supplied in the file system of the CP 243-1, the following data areas and data types of the S7-200 system can be accessed:

- Data types:

  BOOL, BYTE, CHAR, WORD, INT, DWORD, DINT and REAL

- Data areas:

  Inputs (I), outputs (Q), bit memory (M), variables (V) and special memory (SM).

Note

The availability of the data types CHAR, INT, DINT and REAL depends on the firmware version of the S7-200 CPU being used, see Appendix D

Access protection

There is no access protection when calling the HTML pages stored in the file system of the CP 243-1 with a Web browser. Such protection is not activated until status or process variables are accessed by a Web browser or when an attempt is made to send a test e-mail using the HTML page.

The basic access authentication described in RFC 2617 is used as the authentication mechanism for all password-protected HTML pages.

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In this case, users must authenticate themselves with their user names and the corresponding passwords. Access is then granted or refused by the HTTP server of the CP 243-1 depending on the access rights assigned to the user by user administration.

The HTTP server of the CP 243-1 can always be enabled/disabled in the configuration.

HTML pages on the CP 243-1

The file system of the CP 243-1 contains predefined HTML pages in English in which the linked Java applets supply status and diagnostic information. These HTML pages can be edited or expanded by the user with an HTML editor or a standard editor.

The following table lists the predefined HTML pages included in the file system of the CP 243-1 or that can be put together dynamically by the CP 243-1 as soon as a request is received from a Web browser. These HTML pages have been optimized for monitor settings:

- Resolution: 1152 x 864
- Font size: Small fonts

HTML page call	Meaning
http://<destination IP address>/index.htm	Start page of the CP 243-1 with links to further internal and external HTML pages If only <destination IP address> is specified in the Web browser, index.htm is automatically opened.
http://<destination IP address>/__S7Sys/rack	Shows the structure of the S7-200 destination system. The available status information for each module is also shown. This page is not automatically updated. To show the current status of the S7-200 system correctly, this page must be loaded again in the Web browser. Note: "rack" is not an HTML page located physically in the file system of the CP 243-1. When the address is called from within a Web browser, the HTTP server dynamically sets up an HTML page with the system-specific information. The layout of this page cannot be changed by the user.
http://<destination IP address>/__S7Sys/sendmail.htm	Shows a page with which a test e-mail can be sent to a specified recipient. The address fields (TO, CC) and the fields for the subject and the text are limited to a maximum of 64 characters each. When the page is called, the user is asked for authentication with a user name and a password. Only the administrator is authorized to send a test e-mail. The errors that can occur are described in chapter Error messages of the test mechanism for e-mails (Page 104).

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HTML page call	Meaning
http://<destination IP address>/__S7Sys/it_info	Current status of the CP 243-1. This page shows information relevant to the operation of the CP 243-1, such as: • Module name • Firmware and hardware version • Network parameters • Status of the STEP 7 Micro/WIN-32 connection • Configuration and availability of S7, FTP and e-mail connections • Information relating to the file system This information is only provided to users authorized by user administration. These users must authenticate themselves with a user name and a password. This page is not automatically updated. To show the current status of the CP 243-1 correctly, the Web browser must load this page again. Note: "it_info" is not an HTML page located physically in the file system of the CP 243-1 IT. When the address is called from within a Web browser, the HTTP server dynamically sets up an HTML page with the system-specific information. The layout of this page cannot be changed by the user.
http://<destination IP address>/examples/info.htm	General information page of the CP 243-1 with external links to the IT CP and SIMATIC NET Web page. An internal link references the Web page readme.htm.
http://<destination IP address>/examples/statuschart.htm	This page can be used to read process values of the S7-200 system. The data or data areas to be read are identified by the address. Remember that the values shown on this page are read out cyclically. Depending on the cycle time, a displayed value may differ from the current value actually in the S7-200 system.

Predefined HTML pages

Note

Some of the HTML pages included with the CP 243-1 have linked Java applets. To ensure that these function correctly, the execution of Java applets must be enabled in the Web browser.

Communications partners

All HTTP clients (for example Web browsers) represent potential communications partners for the HTTP server. The HTTP server of the CP 243-1 supports simultaneous access by up to 4 Web browsers.

The TCP/IP connection to the HTTP server is always handled via port 80.

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Performance/constraints

On the CP 243-1, HTTP communication is subordinate to S7 communication. Reaction times vary with the particular configuration and a generalized prediction is not possible.

The HTTP server located on the CP 243-1 has four communications channels (in other words, it can process up to four requests at the same time). If a request arrives at the HTTP server when all four communication channels are in use, the request is rejected. New requests cannot be processed until at least one of the four communication channels is free again.

2.4 File syste

How it works

A file system is available on the CP 243-1 to permanently store Web and configuration files. This file system uses flash memory technology and provides a storage capacity of 8 Mbytes minus the memory needed for administration of the flash file system.

Note

The amount of memory actually available in the file system can be called with the HTML page "CP 243-1 Information" (ships with the CP 243-1) via a Web browser at the address:

http://<destination IP address>/__S7Sys/it_info.htm

Due to the formatting of the file system, the amount of memory specified on this page cannot always be fully utilized.

The file system supports path and file names up to a total length of 254 characters. The drive name of the flash file system (/flash:) is also included in these 254 characters. This means that, after the drive name is deducted, 247 characters remain for a maximum path including the file name. The actual file name and every name of a directory can have a maximum length of 99 characters. The maximum nesting depth of the directories is 19.

The following characters must not be used in either the file or directory name:

\ ; / ; < ; > ; " ; : ; * ; ?

Note

We recommend that you store files in suitable subdirectories and not in the root directory.

The CP 243-1 has no real-time clock for the date or time. For this reason, all files stored in the file system of the CP 243-1 have the date 01.01.1980 and the time 00:00.

Access

The file system can only be accessed via the FTP server of the CP 243-1. The file system does not distinguish between upper case and lower case letters.

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Restriction

NOTICE
The life of a file system based on flash memory technology is primarily determined by the total number of write or delete operations performed on it. This means that such a file system is not suitable for fast cyclic write or delete operations.

The file system of the CP 243-1 uses an internal optimization routine to assign all available cells of the flash memory uniformly. When individual memory cells fail due to aging, these cells are detected and marked internally as unusable. Despite this, fast cyclic write or delete access to the file system of the CP 243-1 should be avoided.

Structure of the file system

Directory	Meaning
/flash:	The root directory of the file system contains a predefined home page of the CP 243-1 (index.htm) that you can adapt to your specific requirements. This home page requires files from the directories /__S7Sys and /examples. When storing user files, you should always create appropriate subdirectories to store these files.
/flash:/applets	This directory contains several *.jar files which are required for S7 applets. These *.jar files contain the Java beans (supplied with the CP 243-1 on the documentation CD) in compressed format. This directory should not be deleted.
/flash:/config	This directory contains the configuration files of the CP 243-1 that were created by STEP 7 Micro/WIN 32. This directory should not be deleted.
/flash:/examples	This directory contains HTML files of the CP 243-1 that can be accessed using links on the predefined HTML start page. Some of these HTML pages contain Java applets.
/flash:/__S7Sys	This directory contains important, write-protected system pages. These pages are needed to set up the dynamic rack and it-info HTML pages. This directory should not be deleted. Only the administrator has access to this directory.
/flash:/user	User-defined HTML pages and user data should be stored in this directory.

Directory structure of the CP 243-1

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2.5 User administration

How it works

When process data is exchanged using Intranet/Internet services, security takes on a new meaning.

To ensure security, user administration with graded password protection was integrated on the CP 243-1. Up to 8 users can be configured with the Internet wizard of STEP 7 Micro/WIN 32. During configuration, each of these users is assigned a user name, a password and certain access rights. These access rights control authorization to access process data and the file system.

The configuration of up to 8 users is stored on the file system of the CP 243-1 in a file with the extension .udb. To increase security, the passwords assigned during the configuration are stored in encrypted form in this file.

Note

The user administration of the CP 243-1 does not support user groups.

Administrator

In addition to these 8 users, the user administration of the CP 243-1 recognizes another user with special access rights - the administrator. The administrator is the only user who can access the directory /__S7Sys and store the .udb configuration file for user administration in the file system of the CP 243-1 using FTP.

The user name and the password of the administrator are configured with the Internet wizard of STEP 7 Micro/WIN 32. However, unlike the configuration of the 8 users, this configuration is not stored in the file system of the CP 243-1 IT but on the S7-200 CPU. Before the configuration of the 8 users can be transferred to the file system of the CP 243-1 with FTP, an administrator with a user name and password must be configured for the CP 243-1.

Assignment of access rights

Access rights can be divided into rights for the administrator and rights for the 8 other users.

The following user rights can be configured for the administrator:

- Access to all IT functions
- Access to the FTP server only

The following user rights can be configured for the other 8 users:

- Read access to process data of the S7-200 system using a Web browser.
- Read and write access to process data of the S7-200 system using a Web browser.
- Read access to status information of the CP 243-1 from a Web browser
- Access to the file system via the FTP server with the following restrictions:
  - Only the administrator may access the directory /__S7Sys.
  - Only the administrator may store the configuration file for the user administration (.udb file) in the file system of the CP 243-1.

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Note

HTML pages can be accessed by a Web browser without password protection. Password protection is not activated until process values of the S7-200 system are accessed by such pages.

Note

We recommend that the 8 configurable users do not have access with FTP. If a user is permitted access with FTP, this user can also change the configuration data stored in the file system of the CP 243-1

Note

To keep the configuration effort involved in user administration as low as possible, we recommend that you configure abstract users with special rights (for example "commissioning" "maintenance" or "production") instead of natural users (for example "John Anyman").

Character set and number of characters for entering the user name/password

Role	User name	Password
Administrator	1 to 16 characters	8 to 16 characters
User	1 to 32 characters	1 to 32 characters

Length of the user names and passwords

All ASCII characters between 0x21 and 0x7E can be used for a user name and password.

2.6 Safety

2.6.1 Configuration

Part of the configuration of the CP 243-1 is stored retentively on the S7-200 CPU and part in the file system of the CP 243-1. The validity of the part of the configuration stored on the S7-200 CPU is checked using by a CRC mechanism. In contrast, no CRC mechanism is used for the part of the configuration stored in the file system of the CP 243-1.

When you save a configuration for the CP 243-1, STEP 7 Micro/WIN 32 calculates a CRC checksum. This checksum is stored together with one part of the configuration. While reading out the part of the configuration stored on the S7-200 CPU, the CP 243-1 checks this checksum so that it can detect undesired changes in the stored configuration data.

This CRC mechanism can, however, also be deactivated. The configuration can then be changed manually or by an S7-200 user program.

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NOTICE
Since, after the CRC check is disabled, the CP 243-1 is no longer able to check the configuration data for consistency in terms of desired or undesired changes, there is no guarantee that the CP or the components connected to the network will function correctly.

NOTICE
The CP 243-1 recognizes that the CRC is disabled by a special value of a byte in its configuration. If this value is set in the configuration either accidentally or intentionally, this will disable the CRC check. This is why we strongly recommend that you only create the configuration with the Internet wizard integrated in STEP 7 Micro/WIN 32 and check the S7-200 program for memory operations that affect in the data area in which the configuration data of the CP 243-1 is stored.

2.6.2 Data security

The CP 243-1 represents a physical connection between the Internet, Ethernet and the S7-200 bus. It provides:

- No protection against intended or accidental manipulation of the data areas and/or system states of the local or remote CPUs
- No firewall functionality

Internet access by the CP 243-1 to data stored on the S7-200 CPU is possible but always harbors the risk of misuse. For this reason, it is a good idea to change the passwords assigned to the various users at regular intervals.

Additional information on the subject of security can be found in the document "Data Security in Industrial Communication".

The CP 243-1 terminates an active STEP 7 Micro/WIN 32 connection when no STEP 7 Micro/WIN request was sent to the CPU for a period of 60 seconds. This prevents the Micro/WIN server on the CP 243-1 from being blocked by network errors which would in turn prevent a new connection to STEP 7 Micro/WIN 32.

Note

Access by the server to the S7-200 CPU via the CP 243-1 is possible both in CPU RUN and STOP mode. In STOP mode, however, program variables or I/O values are not updated.

NOTICE
The user name and related password required to log in on an FTP server are not encrypted when transmitted over the network in compliance with the specifications of the FTP protocol.

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2.6.3 Reliability of communication

The CP 243-1 is equipped with a "keepalive"

mechanism. This means that the CP 243-1 can recognize the failure of a communications partner or the relevant connection automatically within a configurable period of time.

The keepalive time specified when the CP 243-1 is configured is the time after which this internal mechanism is started and an attempt is made to reach the communications parter. These mechanisms take approximately 10 seconds. If the communications parter cannot be reached during this time, the CP 243-1 automatically terminates the connection to this partner. If the CP 243-1 is the client, it then attempts to establish this connection again. Failure of the communications parter is reported to the user with the mechanisms described in chapter Diagnostics (Page 93).

You should always enable the keepalive monitoring on all systems involved in communication if these systems have such a mechanism.

Note

The keepalive mechanism will not work unless the communications parter also supports this mechanism in compliance with with RFC 1122 and RFC 793.

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2.7 Connectors

2.7.1 Connectors

Front view:



Figure 2-3 Connectors

The CP 243-1 has the following connectors:

- Terminal block for 24 V DC power and grounding connector
- 8-pin RJ-45 jack for Ethernet connector
- Male connector for S7 bus
- Integrated ribbon cable with connection socket for the S7 bus

The connectors are located under the covers of the front doors.

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2.8 Codes: Front LEDs

2.8.1 Codes: Front LEDs



Figure 2-4 Front with the LEDs

There are 5 LEDs on the front to indicate the following:

SF	Red, on continuously	System fault: Lit when a fault/error has occurred
	Red, flashing	System fault: Flashes (at an interval of approximately 1 second) if the configuration is incorrect or no BOOTP/DHCP server could be found.
LINK	Green, on continuously	Connection via the RJ-45 interface: Ethernet connection is established

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RX/TX	Green, flickering	Ethernet activity: Data is being received or sent via Ethernet Note: A packet received via Ethernet may not be intended for the CP 243-1. The CP 243-1 first accepts all packets transmitted via Ethernet. and then decides whether the packet is intended for it.
RUN	Green, on continuously	Ready for operation: The CP 243-1 is ready for communication
CFG	Yellow, on continuously	Configuration: Lit when STEP 7 Micro/WIN 32 is actively maintaining a connection to the S7-200 CPU via the CP 243-1

Function of the individual LEDs

During the startup phase of the CP 243-1, the SF LED flashes twice. The LINK and the RX/TX LEDs then flash several times. As soon as the RUN LED is lit, the CP 243-1 startup has completed.

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Installation and commissioning

3

3.1 Important notes on installation and commissioning

Safety notices relating to the use of the device

The following safety notices must be adhered to when installing, commissioning, connecting, replacing components and opening the device.

General information

⚠ WARNING

Safety extra-low voltage

The equipment is designed for operation with Safety Extra-Low Voltage (SELV) by a Limited Power Source (LPS).

This means that only SELV / LPS complying with IEC 60950-1 / EN 60950-1 / VDE 0805-1 must be connected to the power supply terminals. The power supply unit for the equipment power supply must comply with NEC Class 2, as described by the National Electrical Code (r) (ANSI / NFPA 70).

There is an additional requirement if devices are operated with a redundant power supply:

If the equipment is connected to a redundant power supply (two separate power supplies), both must meet these requirements.

General notices for use in hazardous areas

⚠ WARNING

Risk of explosion when connecting or disconnecting the device

EXPLOSION HAZARD

DO NOT CONNECT OR DISCONNECT EQUIPMENT WHEN A FLAMMABLE OR COMBUSTIBLE ATMOSPHERE IS PRESENT.

⚠ WARNING

Replacing components

EXPLOSION HAZARD

SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2 OR ZONE 2.

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⚠ WARNING

Opening the device

EXPLOSION HAZARD

DO NOT OPEN WHEN ENERGIZED.

General notices for use in hazardous areas according to ATEX

⚠ WARNING

Requirements for the cabinet/enclosure

When used in hazardous environments corresponding to Class I, Division 2 or Class I, Zone 2, the device must be installed in a cabinet or a suitable enclosure.

To comply with EU Directive 94/9 (ATEX95), this enclosure must meet the requirements of at least IP54 in compliance with EN 60529.

⚠ WARNING

Suitable cables for temperatures in excess of 70 °C

If the cable or conduit entry point exceeds 70 °C or the branching point of conductors exceeds 80 °C, special precautions must be taken. If the equipment is operated in an air ambient in excess of 50 °C, only use cables with admitted maximum operating temperature of at least 80 °C.

⚠ WARNING

Protection against transient voltage surges

Take measures to prevent transient voltage surges of more than 40% of the rated voltage. This is the case if you only operate devices with SELV (safety extra-low voltage).

3.2 Installation and commissioning

Installation

You can install the devices of the S7-200 series either in a switching panel or on a DIN rail. You can arrange the modules both horizontally and vertically. The S7-200 CPU and the expansion modules are designed for natural heat dissipation by convection. For this reason, leave at least 25 mm of free space above and below the devices so that the heat is free to escape. Long operating times at maximum ambient temperatures and maximum loads will shorten the lifespan of the electrical components of the device.

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Note

The position in an S7-200 system at which a CP 243-1 can be operated depends on the firmware version of the S7-200 CPU you are using.

When using firmware version 1.2 or higher, the CP 243-1 can be installed in any one of 7 positions in an S7-200 system. With firmware versions lower than version 1.2, the CP 243-1 must be installed in position 0 unless another intelligent module is installed in position 0, in which case the CP 243-1 may be installed in position 1.

Wiring

⚠ WARNING

If you attempt to install or remove the CP 243-1 or other devices while they are on, you may receive an electric shock or the devices may not work properly.

If the power for the CP 243-1 and all connected devices is not switched off while the devices are being installed/removed, this may cause injury and/or property damage.

Take all necessary safety precautions and make sure that the power for the S7-200 and the CP 243-1 is turned off before you begin wiring.

General guidelines

Below, you will find some general guidelines for wiring your programmable controller:

- Make sure that you comply with all valid and binding standards when you wire your CP 243-1. When installing and operating the device, keep to the relevant national and regional regulations. Ask your local authorities for the standards and regulations that apply to your specific situation.
- Only wire up the S7-200 CPU and the CP 243-1 when the power is turned off!
- Use cables with a cross section suitable for power you are using. The 24 V power supply of the CP 243-1 can be wired with wires with a cross section between 0.50 mm² and 1.50 mm². When wiring of the grounding terminal, use wires with a cross section of 1.50 mm².
- Do not screw down the connection terminals too tightly. The maximum tightening torque is 0.56 Nm.
- Keep the wires as short as possible. You should wire in pairs: one neutral or zero conductor together with a phase conductor or a signal line.
- Separate alternating current wiring and high voltage direct current wiring with fast switching sequences from the low voltage signal wiring.
- Provide suitable surge protection for cables that may be hit by lightning.
- The S7-200 CPU and the CP 243-1 should be connected to the same power supply!
- The CP 243-1 is equipped with an integrated ribbon cable with a socket for fast connection to other S7-200 components.

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- The slot in which a CP 243-1 can be operated depends on the firmware version of the S7-200 CPU being used (see note in section 3.2).
- A maximum of one CP 243-1 per CPU is supported.

Electrical requirements

The input voltage must always be +24 V DC. Apply 24 V direct current only from power sources that provide safe electrical isolation from 120/230 V AC and similar sources of danger. Safe electrical isolation is, for example, defined in the following standards:

- PELV complying with EN 60204-1
- Class 2 or circuit with limited voltage/current according to UL 508

The power supply on the S7-200 bus is provided by the S7-200 CPU.

Make sure that the CP 243-1 is correctly grounded.

Space requirements for installation

When installing your module, keep to the following guidelines:

- The CP 243-1 is designed for natural heat dissipation by convection. For this reason, leave at least 25 mm free space above and below the device to allow heat to escape. Long operating times at maximum ambient temperatures and maximum loads will shorten the lifespan of the electrical components of the device.
- When installed vertically, the maximum permissible ambient temperature drops by 10 °C. The CP 243-1 must be positioned above the CPU. If you are using a vertical standard DIN rail, you should use standard DIN rail stoppers to prevent the module from slipping.
- Installation depth is 75 mm.

Note

Set up your devices so that there is still enough space to wire the inputs and outputs and to connect the communication cables.

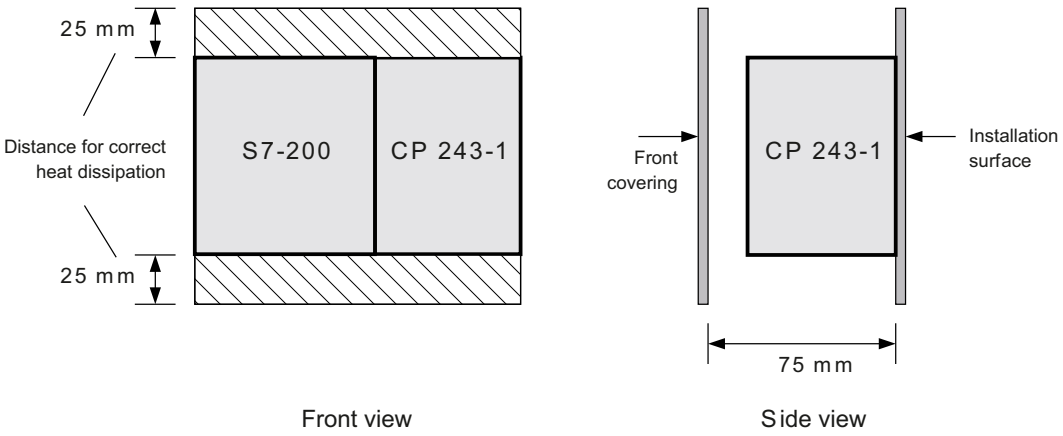


Figure 3-1 Space requirements for installation

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3.3 Dimensions for installation in a switching panel

The CP 243-1 has holes that make it easier to install in a switching panel.

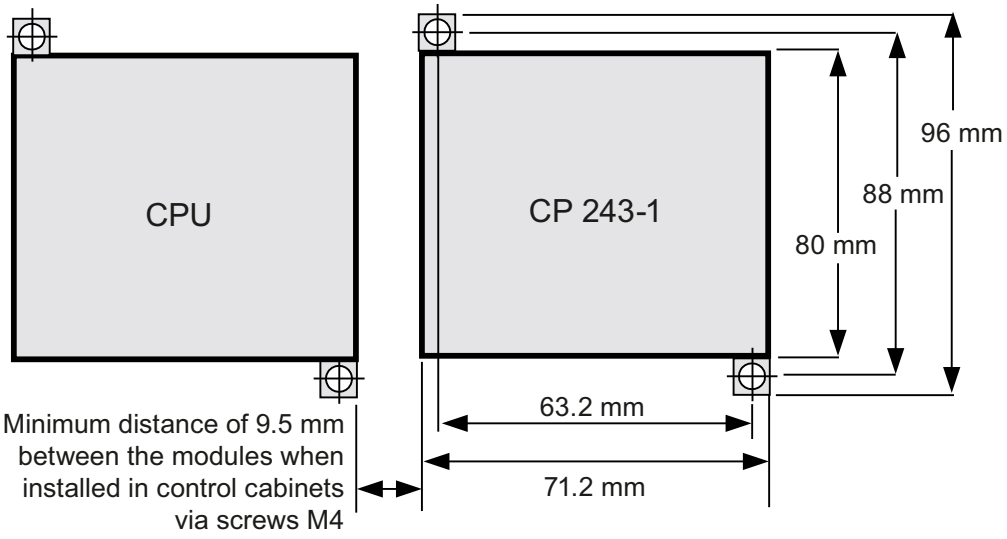


Figure 3-2 Dimensions for installation in a switching panel

3.4 Dimensions for installation on a DIN rail

The CP 243-1 can be mounted on a DIN rail (DIN EN 50 022).

The following figure shows the dimensions of a standard DIN rail:

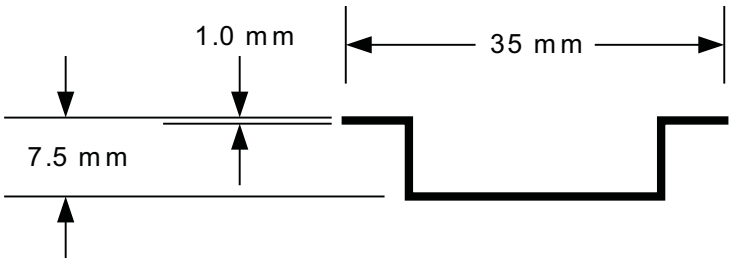


Figure 3-3 Dimensions for installation on a DIN rail

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3.5 Installation in a panel

3.5.1 Installation in a panel

What to do / steps

1. Bore holes for DIN M4 screws on the panel. Read and follow the instructions and use the dimensions in sections 3 and 3.1 for installation in a panel.
2. Screw the CP 243-1 to the panel to the right of the CPU for horizontal installation and above the CPU for vertical installation. Use DIN M4 screws.
3. Insert the ribbon cable of the CP 243-1 in the connector under the front cover of the adjacent module or the S7-200 CPU. The shape of the plug prevents it from being incorrectly inserted.
4. Connect the grounding terminal:

   Connect the grounding terminal of the CP 243-1 with the nearest available ground to obtain the highest possible interference immunity. We recommend that you connect all grounding terminals individually. Use wires with a cross section of 1.5 mm^2.
5. Connect the power supply.
6. Connect the Ethernet cable.

The transmission medium is a 2 x 2-wire, twisted pair, shielded cable with a characteristic impedance of 100 ohms. The transmission properties of this cable must meet category 5 requirements (Cat5 cable). The maximum length of the connection between an end device and network component (link segment) is limited to 100 m with the components defined in IEEE802.3.

The RJ-45 plug on the CP 243-1 is shielded so that, in combination with a shielded Ethernet cable, a continuous cable shield is created that ensures interference-free Ethernet transmission. The shield of the RJ-45 plug is connected via the grounding terminal of the CP 243-1.

We recommend that you shield and ground the Ethernet connection as described in the document "SIMATIC NET Twisted Pair and Fiber-Optic Networks".

Installation is now complete.

Note

Keep the front cover of the CP 243-1 closed during operation.

During installation, make sure that the upper and lower ventilation slits of the module are not obstructed and good ventilation is possible.

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3.6 Installation on a standard DIN rail

Installation on a standard DIN rail

1. Open the catch and hang the CP 243-1 on the DIN rail to the right of or above the CPU.
2. Close the catch to secure the CP 243-1 to the rail. Make sure that the catch snaps in correctly and that the device is firmly secured to the rail.

Note

In environments in which strong vibration occurs or when the devices are installed vertically, it may be necessary to use standard DIN rail stoppers to keep the devices from slipping down the DIN rail.

3. Insert the ribbon cable of the CP 243-1 in the connector under the front cover of the adjacent module or the S7-200 CPU. The shape of the plug prevents it from being incorrectly inserted.
4. Connect the grounding terminal:
5. Connect the grounding terminal of the CP 243-1 with the nearest available ground to obtain the highest possible interference immunity. We recommend that you connect all grounding terminals individually. Use wires with a cross section of 1.5 mm^2.
6. Connect the power supply.
7. Connect the Ethernet cable.

   The transmission medium is a 2 x 2-wire, twisted pair, shielded cable with a characteristic impedance of 100 ohms. The transmission properties of this cable must meet category 5 requirements (Cat5 cable). The maximum length of the connection between an end device and network component (link segment) is limited to 100 m with the components defined in IEEE802.3.

   The RJ-45 plug on the CP 243-1 is shielded so that, in combination with a shielded Ethernet cable, a continuous cable shield is created that ensures interference-free Ethernet transmission. The shield of the RJ-45 plug is connected via the grounding terminal of the CP 243-1.

   We recommend that you shield and ground the Ethernet connection as described in the document "SIMATIC NET Twisted Pair and Fiber-Optic Networks".

Installation is now complete.

Note

Keep the front cover of the CP 243-1 closed during operation.

During installation, make sure that the upper and lower ventilation slits of the module are not obstructed and good ventilation is possible.

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3.7 Replacing a module

3.7.1 Replacing a module

When the CP 243-1 (6GK7243-1EX01-0XE0) module is replaced, no new programming is required on the S7 communication side since the configuration data and the user program are stored retentively on the S7-200 CPU. The CP 243-1 must be programmed again for the IT functions since the configuration files for the IT services are stored in the file system of the CP 243-1.

3.8 Uninstalling the CP 243-1

⚠ WARNING

If you attempt to install or remove the CP 243-1 or other devices while they are on, you may receive an electric shock or the devices may not work properly.

If the power for the CP 243-1 and all connected devices is not switched off while the devices are being installed/removed, this may cause injury and/or property damage.

Take all necessary safety precautions and make sure that the power is turned off before you install or remove a device.

Follow the steps below to remove the CP 243-1 or any other expansion module of the S7-200:

1. Turn off the power supply of the S7-200 CPU, the CP 243-1 and all expansion modules.
2. Disconnect all cables and wires from the device you want to remove.
3. Open the front cover and disconnect the ribbon cable from the adjacent modules.
4. Remove the screws or open the catch and remove the module from the panel or the DIN rail.

⚠ WARNING

If you install the wrong device, the S7-200 may become unpredictable.

If the CP 243-1 is not aligned correctly, this may cause injury and/or property damage.

Make sure that you always align the CP 243-1 correctly.

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Configuration

4

4.1 Configuration options

Using the CP 243-1, an S7-200 system can communicate via the S7 protocol with another S7-200 system or an S7-300 / S7-400 or an OPC-based system. Using the IT protocols SMTP, FTP and HTTP, communication is also possible with any computer system that supports these protocols.

There are two ways to configure one of these communication modes for an S7-200 system:

- Configuration using STEP 7 Micro/WIN 32, version 3.2.3 or higher
- Configuration by an S7-200 user program

The configuration data for the IT services is located in the file system of the CP 243-1. This is read during startup and then monitored continuously for changes. This means that every change to this data during ongoing operation is immediately adopted by CP 243-1. All other configuration data is stored in the data block of the S7-200 CPU. From there, this data is read once each time the CP 243-1 restarts.

NOTICE
A change to the configuration stored on the S7-200 CPU by an S7-200 user program is only possible when the CRC mechanism is disabled. After the CRC check is disabled, the CP 243-1 is no longer able to check the configuration data for consistency in terms of desired or undesired changes, so there is no guarantee that the CP or the components connected to the network will function correctly.

NOTICE
To ensure that the configuration data of the CP 243-1 stored on the S7-200 CPU will also be retained if a power failure occurs, this data must be stored in a retentive memory area on the S7-200 CPU. As default in an S7-200 system, the entire data block is defined as retentive. However, a reconfiguration could change this default setting on your S7-200 system.

Changes to the configuration data stored on the S7-200 CPU do not take effect until the next CP 243-1 restart. When STEP 7 Micro/WIN 32 is used for new/modified configuration of the CP 243-1, this automatically triggers a restart of the CP 243-1 as soon as the mode changes from STOP to RUN. If, on the other hand, the CP 243-1 is configured directly by the S7-200 user program, this configuration can be activated by the user program by calling the subroutine "ETHx_CFG". Calling this subroutine also triggers a restart on the CP 243-1.

The TCP/IP address parameters (IP address, subnet mask, IP address of a gateway) can be specified during configuration in one of two ways. They can be specified permanently or dynamically (the CP 243-1 obtains the TCP/IP address parameters from a BOOTP/DHCP server during startup).

The configuration data stored in the memory of the S7-200 CPU can be downloaded to the S7-200 CPU via the PPI interface. If the CP 243-1 already has an IP address, this

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configuration data can also be downloaded to the S7-200 CPU using TCP/IP and the Ethernet interface of the CP 243-1. The CP 243-1 must already have an IP address before the configuration data of the IT services can be downloaded to the CP 243-1. If you want an S7-200 system to communicate via a CP 243-1 with an S7-300, an S7-400 or an OPC-based system, use STEP 7 with at least version 5.1 and service pack 3 or higher (with NCM S7 for Industrial Ethernet) for configuration.

Note

After startup, the CP 243-1 may automatically change the configured gateway due to special network-based services ("ICMPRedirect"). After approximately 30 seconds, however, the CP 243-1 returns to the originally configured gateway. This means that the gateway actually used by the CP 243-1 may sometimes differ from the one in the configuration.

You can change the gateway currently used by the CP 243-1 either using the diagnostics window for the CP 243-1 in STEP 7 Micro/WIN 32 or a user program that reads from the memory area of the S7-200 CPU in which the NPB data block is stored (see chapter Structure of the network parameter block (NPB) (Page 61)).

4.2 Value ranges of the configuration data

4.2.1 IP addresses

The IP addresses that need to be specified at various points in the configuration must comply with the general conventions governing the validity of IP addresses.

According to this convention, the following IP addresses have a special significance:

Loopback	127.0.0.0 - 127.255.255.255
Class D addresses	224.0.0.0 - 239.255.255.255
Class E addresses	240.0.0.0 - 247.255.255.255
Broadcast addresses	for example 255.255.255.255

The CP 243-1 does not accept these addresses. The only exception is the loopback address 127.0.0.1 that can be used during configuration of the FTP client service. This causes data to be transferred between the memory of the local S7-200 CPU and the file system of the local CP 243-1 when the relevant function is called.

4.2.2 Subnet mask

If a subnet mask is specified in the configuration, its structure must comply with the general conventions governing the validity of subnet masks.

Remember that the validity of an IP address and a related subnet mask are dependent on each other.

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4.2.3 TSAPs

TSAPs consist of 2 bytes. The first byte specifies the connection. The second byte is created from the rack number and the slot of the communications module. The following value ranges apply to the first byte.

Range of values for the local TSAP	16#02, 16#10 - 16#FE
Range of values for the remote TSAP	16#02, 16#03, 16#10 - 16#FE

The CP 243-1 does not check the value of the second byte.

4.2.4 Ports

Each standard protocol from the TCP/IP protocol family (for example HTTP, FTP or SMTP) is assigned to a separate fixed port number with which a related communication service can usually be accessed in a TCP/IP network. These permanently assigned port numbers are called "well-known" port numbers since they were specified worldwide in the definition of the protocol. Standard protocols usually use port numbers between 0 and 1024. Port numbers higher than 1024 are not fixed and can be assigned by the user programs as required.

Thanks to modern protection mechanisms in TCP/IP networks (for example firewalls), the ports usually used by standard protocols are rerouted to other ports. To allow the CP 243-1 to be able to communicate with external SMTP servers even in such environments, you can explicitly specify the port via which such a server can be accessed when you configure the e-mail service with the Internet wizard of STEP 7 Micro/WIN 32. Standard SMTP servers can be accessed with port 25.

4.2.5 E-mail tags

An e-mail consists of one or two address fields, a field for the subject and a field for the text message. The text message is made up of ASCII characters. In addition to the two control characters \n and \t, the text can also contain placeholders defining an embedded data value. When an e-mail is sent, the CP 243-1 reads the current value of such a placeholder from the local S7-200 CPU, formats it and inserts it in the message.

Such placeholders use the following syntax:

%address:places_before_decimal_point.places_after_decimal_pointFormat%

The percent character (%) indicates the beginning and the end of a placeholder. The colon (:) separates the address from the formatting instructions. The period (.) separates the places before the decimal point and the places after the decimal point within the formatting instructions.

Note

Use the notation %% to represent individual % characters in a text message.

Example:

Required text: "The fill level is specified in %"

Text you enter: "The fill level is specified in %%"

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The address element specifies the address, the data type and the size of the embedded data value (for example VD100, VW50 or MB20). The permitted data types are input, output, bit memory, special memory bits, variables and analog input. The CP 243-1 supports both the German designations of these data types (E, A, M, SM, V and AE) and the international notations (I, Q, M, SM, V and AI).

Each of these data types can be addressed as byte, word and double word. The size of the address depends on the type of data or the type of S7-200 CPU used. (A CPU 226XM provides a variable memory area of 10240 bytes.)

The element "places_before_decimal_point" defines the minimum number of digits that are shown to the left of the decimal point. This value should be high enough to hold the expected data value range and, where necessary, a sign.

If there are not enough places specified in the element "places_before_decimal_point" to completely represent a current value, this value is still shown completely. The specified format is ignored in this case. If the representation of a current value requires fewer places than specified in the element "places_before_decimal_point," the remaining places are padded with blanks. The valid range for the element "places_before_decimal_point" is between 1 and 10.

The element "places_after_decimal_point" defines the number of digits shown to the right of the decimal point. If a data value to the right of the decimal point contains zeros, these are represented as defined by the element "places_after_decimal_point". If the element "places_after_decimal_point" is zero, the value is shown without decimal point. The valid range for the element "places_after_decimal_point" is between 0 and 10.

The format element specifies the format for representing the embedded value. The following characters are permitted in the format element:

I,i:	Integer with sign
U,u:	Unsigned integer
H,h:	Hexadecimal
F,f:	Floating point/real

Example:

Below, you will find several examples of how different formatting instructions affect the representation of a current value:

Current value	Formatting instruction	Output (□ corresponds to a blank)
16#F4 in address VB0	%VB0:1.0I%	-12
16#F4 in address VB0	%VB0:6.0I%	□□□-12
16#F4 in address VB0	%VB0:6.3I%	□□□□-0.012
16#0C in address VB0	%VB0:2.0H%	16#0C
16#0C in address VB0 (16#00 for the next byte)	%VW0:4.0H%	16#000C
16#0C in address VB0 (16#00 for the next 3 bytes)	%VD0:8.0H%	16#0000000C

Examples of formatting for placeholder information in e-mails

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Note

Integers with sign (format element I) and unsigned integers without sign (format element U) can be interpreted as fixed point decimal numbers.

Example:

VD100 contains the fixed point number for the value to be interpreted 12345dec.

If the placeholder %VD100:2.3U% is used for this value in an e-mail, this value is transferred in the e-mail as 12.345.

Calculation: Result = value / (10^number of desired places after the decimal point) --> 12.345 =12345/10^3

Note

Received e-mails may also contain #### in the placeholder instead of the expected value. This always happens when a placeholder could not be filled with a value that conformed to the formatting instructions.

4.3 Configuring a CP 243-1 with STEP 7

Once you have installed and started STEP 7 Micro/WIN 32 on your PC, start the wizard for the CP 243-1. You will find this in the "Options" menu under "Internet Wizard..." or in the left window area of STEP 7 Micro/WIN 32 in the window with the navigation bar under "Options" if the correct view is enabled in STEP 7 Micro/WIN 32.

The Internet wizard supports you when configuring your CP 243-1. You can enter all the relevant configuration data in a series of dialogs. User prompting is designed so that you cannot move on to the next dialog until all your entries are correct and complete. If they are not, an error message appears to this effect.

The Internet wizard consists of four internal wizards that are used to configure the various IT services. You always work through the configuration wizard first. In this wizard, basic configuration data is specified (such as TCP/IP address parameters) and you also configure S7 communication here. All configuration information specified here is stored on the S7-200 CPU when downloaded to your S7-200 system. After you have completed this wizard, you can exit the configuration or configure the various IT services of the CP 243-1 with further wizards.

If you want to do this, the Internet wizard includes an FTP wizard and an e-mail wizard as well as a wizard for configuring user administration. The information specified in these wizards is stored in the file system of the CP 243-1 when downloaded to the S7-200 system. The configuration of each CP 243-1 can be completed after working through one of these three wizards. If one of these wizards is not worked through before you complete the configuration, this IT service is not configured.

Below is a short description of the individual wizards and the individual steps in configuration through which these wizards will guide you.

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Note

For detailed information, refer to the STEP 7 Micro/WIN 32 documentation included with STEP 7 Micro/WIN 32.

4.3.1 Basic configurations

After starting the Internet wizard, you will see the configuration wizard. All the settings you enter here will be stored on the S7-200 CPU when you download to the S7-200 system.

The introductory dialog of the configuration wizard provides you with general information. After reading this, click "Next>" to continue with the wizard.

Specifying of the position of the CP 243-1 in the S7-200 system

The position of the CP 243-1 in the S7-200 system must be specified in the second dialog.

This position can be set manually or the wizard can search for a CP 243-1 in your S7-200 system. If it finds a CP 243-1, its position in the S7-200 system is displayed. If you double-click on the displayed CP 243-1, you accept its position in the configuration.

Specifying TCP/IP address parameters and transmission type

In the next dialog, you specify the TCP/IP address parameters and the type of transmission to be used.

There are two ways of entering the TCP/IP address parameters:

1. Enter these parameters manually in the relevant input boxes.
2. Enable access to a BOOTP/DHCP server. In this case, the CP 243-1 obtains its TCP/IP address parameters from a BOOTP/DHCP server during startup. If the CP 243-1 is unable to find a BOOTP/DHCP server in your TCP/IP network, it performs a reset, restarts and tries again to establish contact with a BOOTP/DHCP server. It repeats this until it finds a BOOTP/DHCP server from which it can obtain TCP/IP address parameters.

Specifying the module command byte and the number of S7 point-to-point links

In the next dialog, you enter the address of the bytes in the address area of your S7-200 system via which the CP 243-1 can be accessed by the S7-200 CPU. This address depends on the position of the CP 243-1 in your S7-200 system and the number of outputs in your S7-200 system. If you used the wizard to search for the position of the CP 243-1 in your S7-200 system at the beginning of the configuration, the wizard will set the address to be used here.

You can always use STEP 7 Micro/WIN 32 to identify the address areas occupied by the modules in your S7-200 system by enabling the entry "Information…" in the "PLC" menu. This also finds the address with which your CP 243-1 can be accessed in your S7-200 system.

In this dialog, you also specify how many S7 connections need to be set up on your CP 243-1. Up to 8 such connections are possible. A dialog appears for each connection that you specify here. You can then configure the connection in this dialog.

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Configuring the individual S7 connections

The following dialogs are used to configure the S7 connections that you set up in the previous dialog. First, specify for each of these connections whether your S7-200 system will be client or server. The layout of the dialog changes according to the option you choose.

If you want your S7-200 system to be a client on a connection, enter the address of the communications partner and the Transport Service Access Point (TSAP) for this partner. In an additional dialog, you also need to specify the data to be exchanged between your S7-200 system and the specified communications partner. Here, you also specify whether this data will be read or written. Up to 32 read/write requests can be specified per connection.

If you want your S7-200 system to be a server on a connection, you can assign an IP address to specify which communications partner will have access to your system. You can also set each server so that it allows access from every IP address. You must also specify the transport service access point (TSAP) in the communications partner you are allowing to access your S7-200 system.

Keepalive monitoring can be enabled for both client and server connections.

For the transport communication access points (TSAPs) of your communications partner, refer to the configuration of the specific partner. With an S7-200 system, this is created with STEP 7 Micro/WIN 32. With an S7-300, S7-400 or OPC-based system, use STEP 7 (see also chapter Other options when configuring a CP 243-1 (Page 54)).

Note

The specified communication access points (TSAPs) in STEP 7 and in STEP 7 Micro/WIN 32 must be compatible.

Enabling/disabling the CRC mechanism and specifying the monitoring time

After you have finished configuring the S7 connection, another dialog opens in which you decide whether your configuration data on the S7-200 CPU will be protected against accidental overwriting by using CRC.

If CRC is activated, during startup the CP 243-1 checks whether the configuration that it reads from the memory of the S7-200 CPU was overwritten by the user program. If it was, it interrupts the startup and attempts to obtain its TCP/IP address parameters from a BOOTP/DHCP server. If it succeeds, startup is continued. However, only the Micro/WIN channel is enabled afterwards. The CP 243-1 can then only communicate with STEP 7 Micro/WIN 32 but not with other partners.

We recommend that you always activate CRC. This is the only way in which the CP 243-1 can detect that the user program has made undesired changes to the configuration data.

If CRC is not enabled, your user program can change the configuration data of the CP 243-1. However, the CP 243-1 does not recognize that data has been accidentally overwritten.

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NOTICE
An S7-200 user program can only change the configuration data on the S7-200 CPU when CRC is disabled. After CRC is disabled, the CP 243-1 can no longer check the configuration data for consistency in terms of desired or undesired changes, and there is therefore no guarantee that the CP or the components connected to the network will function correctly.

In the same dialog you also can set a common keepalive time for all configured connections. The value entered here is the time after which the CP 243-1 recognizes the problem described in chapter Reliability of communication (Page 31).

You specified which connections are to be monitored with this time when you configured the individual connections.

Setting up an administrator

The next dialog (administrator account) is used to specify the user identifier and the password for the administrator. You also specify whether the administrator will have the right to access the process data of the S7-200 system with a Web browser.

Enabling the individual IT services

The next dialog can be used to enable various IT services of the CP 243-1 individually. Every IT service that will be used later with the CP 243-1 must be selected as enabled in this dialog. Any service not selected in this dialog will not be started when the CP 243-1 starts up and will remain unavailable.

The exception to this is the FTP server on the CP 243-1 which is always enabled.

When configuring the CP 243-1, only enable the IT services that will actually be used in your application.

At this point in the configuration, whether or not you enable an IT service has no effect on the configuration steps below.

Specifying the area for storing the configuration

In the next dialog, specify the memory area in which your configuration data will be stored on the S7-200 CPU. The wizard supports you throughout.

Information on the created subroutines

In the next dialog, the wizard shows you which subroutines it has set up based on your configuration and where their configuration data is stored.

NOTICE
Make sure that the memory area in which the configuration data of the Internet wizard is stored is not used by your S7-200 user program.

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Completion of the first configuration phase

You have now worked through the configuration wizard and completed the first phase of configuration. In the next dialog, you can call the wizards for the IT services. Click the required icon in the left-hand pane of the dialog.

If you do not want to use any of the IT services on your CP 243-1, you can complete configuration at this point. Simply click "Finish".

4.3.2 Configuration of user administration

To change to the wizard for configuring user administration, click the relevant icon in the left-hand pane of the dialog. All the information entered in this wizard is stored in the file system of the CP 243-1 in a file with the extension .udb when you download to the S7-200 system.

Configuring the users

Using the dialogs that open now, you can configure up to 8 users. You assign a user identifier, a password and user-specific access rights to each user.

Make sure that the user identifiers are unique.

As soon as you have configured the necessary number of users, you can click "Next" to complete user configuration.

Then either change to another wizard or complete the configuration of the CP 243-1 by clicking "Finish".

4.3.3 Configuration of the e-mail functions

To change to the wizard to configure the e-mail functions, click the icon in the left-hand pane of the dialog. All the information entered in this wizard is stored in the file system of the CP 243-1 in a file with the extension .edb when the configuration is downloaded to the S7-200 system.

Configuring the e-mail address and the e-mail server to be used

In the first dialog of the e-mail wizard, assign an e-mail address to your S7-200 system. The e-mail address specified here will be entered as the sender address in all e-mails sent.

Then select an e-mail server to which your CP 243-1 will send the e-mails. Enter the IP address and the port of this e-mail server. An e-mail server can usually be accessed via port 25. This port is the default. If the e-mail server you specified uses a different port, enter this port in the relevant box.

To increase reliability, you can enter a second e-mail server. The CP 243-1 attempts to send an e-mail to the e-mail server specified first. If this server cannot be reached (for example due to a network malfunction), the CP 243-1 then attempts to send the e-mail to the second e-mail server. If the second e-mail server is also unreachable, the CP 243-1 aborts its attempts to send the e-mail and outputs an error message to this effect.

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Configuring the e-mails

The next dialog is used to configure the e-mails. In this dialog, enter the address to which the e-mail will be sent for every e-mail to be sent by the CP 243-1. You can also enter a second recipient to receive a a copy of the e-mail. Here, you also enter the subject.

Placeholders for data from the S7-200 system can be inserted in the actual e-mail text to be sent. When the e-mail is sent, the CP 243-1 replaces each of these placeholders with the current value of the data.

To insert such a placeholder in your e-mail, click "Insert Data". In the dialog that then opens, create the placeholder you want to insert. Specify the address of the data to be transferred and the format in which this data will be shown in the e-mail.

A total of up to 32 different e-mails can be configured.

As soon as you have configured the required number of e-mails, click "Next" to exit the e-mail wizard.

Then either change to another wizard or complete the configuration of the CP 243-1 by clicking "Finish".

Authentication

CPs that use ESMTP with authentication support the following authentication methods:

- PLAIN
- LOGIN
- CRAM−MD5
- DIGEST−MD5

In terms of authentication for communication between the CP and mail server, the following situations are possible:

- CP and mail server use authentication (same method)

  Once the CP has established a connection to the mail server, the mail server sends a list of the authentication methods it supports. The CP searches through the received list for the supported authentication method. The authentication methods are searched for in the order shown above. The first method found in the list is then used. The CP informs the mail server of this.

  The data required for authentication (user name and password) is generated by the Micro/WIN wizard and stored in the file system of the CP when the configuration is downloaded. The user name and password correspond to the login data at the mail service provider.

  If you do not specify a user name and password in the DB, there will be no authentication.

- CP and mail server use authentication (different methods)

  If the CP does not find a matching authentication method, it aborts the attempt to send and generates a diagnostics message.

- The CP uses authentication, the mail server does not

  If you use a CP that supports authentication and you want to work without authentication, do not store a user name or password in the e-mail data block. In this situation, the CP transfers data using SMTP.

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- The mail server uses authentication, the CP does not

  The mail server aborts the attempt to send.

  Note

  If you use authenticated e-mail, you can only specify one e-mail server.

To be able to use authentication for the e-mail server, select the check box in the dialog after you have entered the e-mail address. The lower part of the dialog changes. Now enter the address or the symbolic name of the SMTP server. If you address the SMTP server by name, you will also need to specify the IP address of the DNS server. Although the number of the port can be changed, it is normally 25. To complete your entries in the dialog, enter a user name and password.

4.3.4 Configuring the FTP functions

To change to the wizard for configuring the FTP functions, click its icon in the left-hand pane of the dialog. All the information entered in the FTP wizard is stored in the file system of the CP 243-1 in a file with the extension .fdb when you download to the S7-200 system.

Using the FTP wizard, you can configure the FTP requests to be sent by your S7-200 user program via the FTP client on the CP 243-1.

The FTP server does not need to be configured. This server is automatically started by the CP 243-1 during startup. Access rights to this FTP server are specified in the configuration of the user administration.

Configuring the FTP requests

To configure an FTP request, you must first specify whether this is a read, write or delete request and the FTP server to which the request will be sent.

With write requests, enter which data you want to send to the specified FTP server from the memory of your S7-200 CPU. You do this by specifying the start address and the length of the data to be transferred.

With read requests, specify where the received data will be stored in the memory of your S7-200 CPU. Also specify how many bytes will be transmitted. If you enter a zero as the length, the entire contents of the specified file are copied to the memory of your S7-200 CPU, starting at the specified start address.

NOTICE
The CP 243-1 and the FTP wizard can only perform very limited plausibility checks on the address and length information entered when the FTP requests are configured. In particular with read requests, only a rudimentary check can be made as to whether system or user data is overwritten in the memory of the S7-200 CPU based on the specified address and length information. This is the responsibility of the user alone.

For each FTP request, you must specify the FTP server to which the request will be sent and the name of the file to which the request applies. You do this by entering the IP address of the FTP server and the name of the file including any required path information. Execution of

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an FTP request also requires that you specify a valid user identifier for the FTP server including the related password.

Up to 32 FTP requests can be configured.

As soon as you have configured the required number of FTP requests, click "Next" to exit the FTP wizard.

Then either change to another wizard or complete the configuration of the CP 243-1 by clicking "Finish".

4.3.5 Completing configuration

During completion of the configuration of the CP 243-1, the Internet wizard sets up all required subroutines so that an S7-200 user program can access the CP 243-1 as specified in the configuration. This means that the subroutine required to enable a certain service is only set up if this service was actually configured.

4.4 Other options when configuring a CP 243-1

Some of the configuration data of the CP 243-1 is stored in the memory of the S7-200 CPU while some is stored in the file system of the CP 243-1.

The memory of the S7-200 CPU contains the Ethernet configuration and the basic settings (for example enabling or disabling individual IT services) made for an IT configuration. While it is starting up, the CP 243-1 reads this part of the configuration from the memory of the S7-200 CPU and evaluates it (during ongoing operation, it monitors it continuously for changes).

The IT-specific configurations consisting of the configuration of the e-mail client, the FTP client and the user administration are stored in the file system of the CP 243-1 IT in the directory /flash:/config in files with the extensions .edb, .fdb and .udb.

Each one of these configuration files has a TIMESTAMP element containing a time stamp that is read cyclically by the CP 243-1. If the CP 243-1 detects that a TIMESTAMP element has changed since it was read the last time, the file involved is read completely and the CP 243-1 reconfigures itself dynamically with the configuration in this file. This means that a change in one of the three configuration files only affects the CP 243-1 if the TIMESTAMP element was also changed.

Access to the configuration data in the memory of the CPU

The configuration data stored in the memory of the S7-200 CPU can also be changed directly by an S7-200 user program. For the CP 243-1 to accept configuration data changed in this way when it restarts, the CRC protective mechanism for configuration data must be disabled. The value 16#AC must be entered in byte 13 of the CDB data structure. This happens automatically as soon as the CRC mechanism is disabled in the Internet wizard.

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NOTICE
Configuration of the CP 243-1 by a user program is only recommended for experienced programmers. Since, after the CRC check is disabled, the CP 243-1 is no longer able to check the configuration data on the S7-200 CPU completely for consistency in terms of desired and undesired changes, there is no guarantee whatsoever in this use case that the CP or the components connected to the network will function correctly.

Note

Data of the type "WORD" (2 bytes) or "DWORD" (4 bytes) is stored on an S7-200 in "big-endian" format, in other words,

Address n: MSB

Address n+1: LSB (and analogously for DWORD).

Alternative configuration of the IT functions

STEP 7 Micro/WIN 32 is used to create the configuration files for the IT functions. In principle, these files could also be created or manipulated by a conventional text editor without STEP 7 Micro/WIN 32. The structures of the configuration files are explained in chapters Structure of the configuration file for user administration (.udb file) (Page 65), Structure of the configuration file for the e-mail client (.edb file) (Page 68) and Structure of the configuration file for the FTP client (.fdb file) (Page 73).

NOTICE
You should use only STEP 7 Micro/WIN 32 to create and change the IT configuration files. If other tools (for example text editors) are used to create or change these files, configuration errors may not be detected. In this case, there is no guarantee whatsoever that the CP 243-1 or the components connected to the network will function correctly.

4.4.1 Occupied special memory (SM area)

The CP 243-1 occupies 50 bytes in the special memory area of the S7-200 CPU. The address of these 50 bytes depends on the current position at which a CP 243-1 IT is located in an S7-200 system. These 50 bytes primarily contain general information and status information of the CP 243-1. The last four bytes contain a pointer with which the configuration data of the CP 243-1 can be accessed. This configuration data is located contiguously in the variable memory of the S7-200 CPU. This can be divided into:

- Configuration data block (CDB)
- Network parameter block (NPB)
- Network data block (NDB)
- Internet data block (IDB)

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The following table shows the relationship between the position of a module in the S7-200 system and the related special memory area.

Position in the S7-200 system	Occupied special memory area
CPU	-
0	200..249
1	250..299
2	300..349
3	350..399
4	400..449
5	450..499
6	500..549

Special memory area

Note

With firmware version 1.20, the CP 243-1 must be installed in position 0 unless another intelligent module is installed in position 0, in which case the CP 243-1 may be installed in position 1.

4.4.2 Structure of the configuration data block (CDB)

The CDB is created by the Internet wizard in STEP 7 Micro/WIN 32. The structure of the CDB is shown below in the following table.

Byte offset in variable memory	Description	Data format	Example
Header			
0-4	Module name	5 bytes ASCII	16#4350323433 "CP243"
5-6	Length of the CDB	2 bytes, hex	16#006C (108 decimal)
7-8	Length of the NPB	2 bytes, hex	16#0014 (20 decimal)
General information			
9	Internal system use	1 byte, hex	
10	Internal system use	1 byte, hex	
11-12	Reserved for STEP 7 Micro/WIN 32	2 bytes, hex	

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Byte offset in variable memory	Description	Data format	Example
13-14	Common flag • Bit [0] duplex mode – 0: half duplex – 1: full duplex • Bit [1] data rate – 0: 10 Mbps – 1: 100 Mbps • Bit [2] autonegotiation – 0: no autonegotiation – 1: autonegotiation • Bit [3] aut. address assignment – 0: use configured network parameters – 1: BOOTP/DHCP • Bit [4] protocol – 0: BOOTP – 1: DHCP • Bit [5-7] not used • Bit [8-15] CRC validation – 16#00 CRC check enabled – 16#AC CRC check disabled	2 bytes, hex	16#0004: Autonegotiation, use configured network parameters, CRC check enabled 16#AC04: Autonegotiation, use configured network parameters, CRC check enabled
15-18	Configured IP address This field should be set to 16#00000000 when BOOTP/DHCP is being used.	4 bytes, hex	192.12.45.23: 16#C00C2D17
19-22	Configured subnet mask This field should be set to 16#00000000 when BOOTP/DHCP is being used	4 bytes, hex	255.255.255.0: 16#FFFFFF00
23-26	IP address of the gateway. 16#00000000 means: do not use a gateway. This field should be set to 16#00000000 when BOOTP/DHCP is being used.	4 bytes, hex	192.12.45.24: 16#C00C2D18
27-28	Keepalive time parameter in seconds	2 bytes, hex	16#001E: 30 seconds

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Byte offset in variable memory	Description	Data format	Example
S7 connection 0 section (If some bytes of this section are unused, pad them with16#00)			
29	Flag byte • Bit [0] server/client – 0: server – 1: client • Bit [1] keepalive – 0: no keepalive support – 1: keepalive support • Bit [2-6] not used • Bit [7] section valid – 0: section not used – 1: section used	1 byte, hex	16#82: server, keepalive support, S7 connection 0 is used and contains valid data.
30-33	With server functionality: IP address area of client for access protection 16#00000000: no protection 16#XXXXXX00 client of same class C segment is permitted 16#XXXXXXXX only exactly the same address is permitted With client functionality: IP address of the S7 server	4 bytes, hex	192.12.45.22: 16#C00C2D16.
34-35	Local TSAP	2 bytes, hex	16#1000
S7 connection 1 section (If some bytes of this section are unused, pad them with16#00)			
38	Flag byte See S7 connection 0 section.	1 byte, hex	See S7 connection 0 section.
39-42	IP address of the partner See S7 connection 0 section.	4 bytes, hex	See S7 connection 0 section.
43-44	Local TSAP	2 bytes, hex	16#1100
45-46	Remote TSAP	2 bytes, hex	See S7 connection 0 section.
S7 connection 2 section (If some bytes of this section are unused, pad them with16#00)			
47	Flag byte See S7 connection 0 section.	1 byte, hex	See S7 connection 0 section.
48-49	IP address of the partner See S7 connection 0 section.	4 bytes, hex	See S7 connection 0 section.
52-53	Local TSAP	2 bytes, hex	16#1200
54-55	Remote TSAP	2 bytes, hex	See S7 connection 0 section.
S7 connection 3 section (If some bytes of this section are unused, pad them with16#00)			
56	Flag byte See S7 connection 0 section.	1 byte, hex	See S7 connection 0 section.

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Byte offset in variable memory	Description	Data format	Example
57-60	IP address of the partner See S7 connection 0 section.	4 bytes, hex	See S7 connection 0 section.
61-62	Local TSAP	2 bytes, hex	16#1300
63-64	Remote TSAP	2 bytes, hex	See S7 connection 0 section.
S7 connection 4 section (If some bytes of this section are unused, pad them with16#00)			
65	Flag byte See S7 connection 0 section.	1 byte, hex	See S7 connection 0 section.
66-69	IP address of the partner See S7 connection 0 section.	4 bytes, hex	See S7 connection 0 section.
70-71	Local TSAP	2 bytes, hex	16#1400
72-73	Remote TSAP	2 bytes, hex	See S7 connection 0 section.
S7 connection 5 section (If some bytes of this section are unused, pad them with16#00)			
74	Flag byte See S7 connection 0 section.	1 byte, hex	See S7 connection 0 section.
75-78	IP address of the partner See S7 connection 0 section.	4 bytes, hex	See S7 connection 0 section.
79-80	Local TSAP	2 bytes, hex	16#1500
81-82	Remote TSAP	2 bytes, hex	See S7 connection 0 section.
S7 connection 6 section (If some bytes of this section are unused, pad them with16#00)			
83	Flag byte See S7 connection 0 section.	1 byte, hex	See S7 connection 0 section.
84-87	IP address of the partner See S7 connection 0 section.	4 bytes, hex	See S7 connection 0 section.
88-89	Local TSAP	2 bytes, hex	16#1600
90-91	Remote TSAP	2 bytes, hex	See S7 connection 0 section.
S7 connection 7 section (If some bytes of this section are unused, pad them with16#00)			
92	Flag byte See S7 connection 0 section.	1 byte, hex	See S7 connection 0 section.
93-96	IP address of the partner See S7 connection 0 section.	4 bytes, hex	See S7 connection 0 section.
97-98	Local TSAP	2 bytes, hex	16#1700
99-100	Remote TSAP	2 bytes, hex	See S7 connection 0 section.

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Byte offset in variable memory	Description	Data format	Example
STEP 7 Micro/Win server section			
101	Flag byte • Bit [0] server – 0: server – 1: not supported • Bit [1] keepalive – 0: no keepalive support – 1: keepalive support • Bit [2-6] not used • Bit [7] section valid – 0: not supported – 1: section used	1 byte, hex	16#82: server, keepalive support, STEP 7 Micro/WIN server section is used and contains valid data.
102-105	Internal system use	4 bytes, hex	
CRC section			
106-107	CRC covering all CDB bytes without the CRC section itself	2 bytes, hex	

Structure of the CDB

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4.4.3 Structure of the network parameter block (NPB)

The CP 243-1 creates this data block automatically based on the current set of network parameters. It contains the currently used TCP/IP parameter values if the CP 243-1 was configured correctly. If configuration errors occurred, the NPB does not contain valid entries.

Byte offset in variable memory	Description	Calculation of the value	Data Format	Example
108-109	Common flag byte • Bit [0] duplex mode – 0: half duplex – 1: full duplex • Bit [1] data rate – 0: 10 Mbps – 1: 100 Mbps • Bit [2] autonegotiation – 0: no autonegotiation – 1: autonegotiation • Bit [3] aut. address assignment – 0: use configured network parameters – 1: BOOTP/DHCP • Bit [4] protocol – 0: BOOTP – 1: DHCP • Bit [5-15] not used	Depends on the current configuration	2 bytes, hex	16#04: Autonegotiation, use configured network parameters
110-113	Current IP address	Depends on the current configuration	4 bytes, hex	192.12.45.23: 16#C00C2D17
114-117	Current subnet mask	Depends on the current configuration	4 bytes, hex	255.255.255.0: 16#FFFFFF00
118-121	IP address of the current gateway	Depends on the current configuration	4 bytes, hex	192.12.45.24: 16#C00C2D18
122-127	MAC address	Read from hardware	6 bytes, hex	16#080006021F04 08-00-06-02-1F-04

Structure of the NPB

4.4.4 Structure of the network data block (NDB)

The NDB is created by the Internet wizard in STEP 7 Micro/WIN 32. The read/write requests possible for clients are configured in this data block. Up to 32 read/write requests can be configured for each of the 8 possible S7 channels. if the CP 243-1 is the server on a channel, there is no entry in the NDB structure for this channel.

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The structure of the NDB is shown in the following table. The identifiers for read/write requests are represented by the letters n, m, p = 0, ..., 31 and the channel identifiers by the letters r = 0, ...,7.

Byte offset in variable memory	Name	Description	Data format
Header			
128-129			
Entries for the first client channel			
130	COM_CH0_ID		1 byte, hex
131	COM_CH0_OFF		1 byte, hex
132	COM_CH0_LEN0		1 byte, hex
...	...		n bytes
n+132	COM_CH0_LENn		1 byte, hex
n+5	COM_CH0_0		ASCII
...	...		ASCII
	COM_CH0_n		ASCII
Entries for the second client channel			
...	COM_CH1_ID	Identifier of the second client channel	1 byte, hex
...	COM_CH1_OFF		1 byte, hex
...	COM_CH1_LEN0		1 byte, hex
...	...		1 byte, hex
...	COM_CH1_LENm		1 byte, hex
...	COM_CH1_0		ASCII
...	...		ASCII
...	COM_CH1_m		ASCII
...	...	(up to 8 channels)	
Entries for the rth client channel			
	COM_CHr_ID	Identifier of the last client channel	1 byte, hex
	COM_CHr_OFF		1 byte, hex
	COM_CHr_LEN0		1 byte, hex
	...		1 byte, hex
	COM_CHr_LENp		1 byte, hex
	COM_CHr_0		ASCII
	...		ASCII
	COM_CHr_p		ASCII
CRC section			
The last two bytes of the NDB	CRC for all NDB bytes without the CRC section itself	2 bytes, hex	The last two bytes of the NDB

Structure of the NDB

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Name	Description	Data format
<op>	Request type • Value range: – "R" for read, – "W" for write	ASCII
<cnt>	Number of bytes to be transferred • Value range: – "1" to "212"	ASCII
<local_buffer>	Address of the memory area in the local system • Value range: – "VB0" to "VBx", where x is the max. V address	ASCII
<remote_buffer>	Address of the memory area on the communications partner • Value range: – "IB0" to "IBx", where x is the max. input address (S7-200 / S7-300 / S7-400) – "QB0" to "QBx", where x is the max. output address (S7-200 / S7-300 / S7-400) – "MB0" to "MBx", where x is the max. bit memory address (S7-200 / S7-300 / S7-400) – "VB0" to "VBx", where x is the max. variable address (S7-200) – "DB0.DBB0" to "DBx.DBBy", where x is the max DB number, and y is the highest address in the relevant data block within the DB (S7-300 / S7-400)	ASCII

Configuration of the read/write requests

4.4.5 Structure of the Internet data block (IDB)

The IDB is created by the Internet wizard in STEP 7 Micro/WIN 32. The structure of the IDB is shown in the following table.

The IDB immediately follows the NDB in variable memory. Since the length of the NDB depends on the current configuration, no general start address can be given for the IDB. The byte offsets in the table below all relate to this start address.

Byte offset in variable memory	Description	Data format	Example
Header			
0-1	Length of the IDB (with CRC)	2 bytes, hex	16#43 = 67 bytes

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Byte offset in variable memory	Description	Data format	Example
2	Length of the general section	1 byte, hex	16#32 = 50 bytes
3	Length of the SMTP client section	1 byte, hex	16#02 = 2 bytes
4	Length of the FTP client section	1 byte, hex	16#02 = 2 bytes
5	Length of the FTP server section	1 byte, hex	16#02 = 2 bytes
6	Length of the HTTP server section	1 byte, hex	16#02 = 2 bytes
General section			
7	Internal system use	1 byte, hex	
8	Global flag byte • Bit [0] admin rights flag – 0: Access to the FTP server only – 1: Access to all IT functions (incl. Web) • Bit [1] - [7] reserved	1 byte, hex	16#01 Admin. is enabled for all IT functions
9 - 24	CP 243-1 admin. user name User name min. 1, max. 16 characters long unused bytes are padded with 16#00	16 ASCII characters (bytes)	"admin" 16#61'a'Byte 0 16#64'd'Byte 1 16#6d'm'Byte 2 16#69'i'Byte 3 16#6e'n'Byte 4 16#00'\0'Byte 5 - 15
25 -56	CP 243-1 admin. password The password is encrypted and stored with a character length of up to 32 characters The actual password length is a minimum of 8 and a maximum of 16 characters unused bytes are padded with 16#00	32 ASCII characters (bytes)	"admin123" 16#31'1'Byte 0 16#72'r'Byte 1 16#4A'J'Byte 2 16#7B'{'Byte 3 16#66'f'Byte 4 16#77'w'Byte 5 16#79'y'Byte 6 16#72'r'Byte 7 16#00'\0'Byte 8 - 31
SMTP client section			
57-58	SMTP client flag • Bit [0] enable bit – 0: locked – 1: enabled • Bit [1] - [15] reserved	2 bytes, hex	16#0001 SMTP client enabled

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Byte offset in variable memory	Description	Data format	Example
FTP client section			
59 - 60	FTP client flag • Bit [0] enable bit – 0: locked – 1: enabled • Bit [1] - [15] reserved	2 bytes, hex	16#0001 FTP client enabled
FTP server section			
61 - 62	FTP server flag • Bit [0] - [15] reserved	2 bytes, hex	16#0000
HTTP client section			
63 - 64	HTTP server flag • Bit [0] enable bit – 0: locked – 1: enabled • Bit [1] - [15] reserved	2 bytes, hex	16#0001 HTTP client enabled
CRC section			
65 –66	CRC	2 bytes, hex	

Structure of the IDB

4.4.6 Structure of the configuration file for user administration (.udb file)

The configuration file for the user administration is created by the Internet wizard in STEP 7 Micro/WIN 32 and stored in a file with the extension .udb. The structure of this file is shown in the table below.

Only the administrator entered in the configuration of the CP 243-1 is permitted to transmit a .udb file via FTP to the file system of the CP 243-1. This means it is not possible to transfer the configuration file for the user administration to the file system of the CP 243-1 until an administrator is created.

Keyword in the .udb file	Description	Example
General section		
TIMESTAMP	Time stamp Time in seconds since 01.01.1970, in hexadecimal format (PC time of the creation of the *.fdb file by STEP 7 Micro/WIN 32). During operation, the CP 243-1 continuously monitors this element for changes. When a change is detected, the .udb file is read completely and the user administration of the CP 243-1 is reconfigured.	TIMESTAMP=3D2C4E48 Corresponds to 15:10:00 on July 10, 2002
FILETYPE	File type Used internally by the system.	FILETYPE=UDB Do not change, fixed value!

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Keyword in the .udb file	Description	Example
FILEFORMAT	File format Used internally by the system	FILEFORMAT=xx Do not change, fixed value!
User 00 (identification of the 8 possible users with 00, 01, ...06, 07)		
00|	Parameter record of user 00 Access rights, user name, password, each separated by |	00|<access_right>|<user_name>|<password> For a description, refer to following table.
User 01 (identification of the 8 possible users with 00, 01, ...06, 07)		
01|	Parameter record of user 01 Access rights, user name, password, each separated by |	01|<access_right>|<user_name>|<password> For a description, refer to following table.
...	...	...
...	...	...
User 07 (identification of the 8 possible users with 00, 01, ...06, 07)		
07|	Parameter record of user 07 Access rights, user name, password, each separated by |	07|<access_right>|<user_name>|<password> For a description, refer to following table.
END	End identifier	

Structure of the configuration file for user administration

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Parameter	Description	Example
Access right	The access rights are represented in hexadecimal format. • Bit [0-1] not used • Bit [2] read access to data of the S7-200 CPU via the HTTP server – 0: No – 1: Yes • Bit [3] read and write access to data of the S7-200 CPU via the HTTP server – 0: No – 1: Yes • Bit [4-5] not used • Bit [6] access to status page of the CP 243-1 IT via HTTP server – 0: No – 1: Yes • Bit [7-15] not used • Bit [16] access to all FTP functions – 0: No – 1: Yes • Bit [17-31] not used	00|00010048|<User name>|<Password> read and write access via HTTP; - Access to status page of the CP 243-1 via HTTP server - Access to all FTP functions
User name	The user name is shown in plain text and consists of 1 to 32 characters	00|00000040|Status_CP|<password> The user with the user name Status_CP is authorized to read the status of the CP 243-1
Password	The password is encrypted and stored with a character length of up to 64 characters (actual password length is between 1 and 32 characters).	00|00010000|<user_name>|W9vQ}G cfH The user with password !state_Cp1 (encrypted: W9vQ}G cfH) is authorized to use all FTP functions

Structure of the parameter record of a user

Example of a user configuration file

```
# This is a comment
TIMESTAMP=3D2C4E48
FILETYPE=UDB
FILEFORMAT=01
00|00010048|user_with_all_rights|C~WB1"
01|00000040|Status_CP|UX3MUppLjRzn*R
02|00010000|FTP_access|W9vQ}G cfH
03|00000000||
04|00000000||
05|00000000||
06|00000000||
07|00000000||
END
# End of File
```


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Note

- Comments are inserted in the file with the # character.
- A blank user entry is stored in the .udb file as follows: 0x|00000000||| (where x stands for the current user number)
- The last character of a line is \n.
- All ASCII characters between 0x21HEX and 0x7E HEX can be used for the user name and password if they are accepted by the communications partners involved.
- Empty lines are not permitted.

NOTICE
If you change the .udb file manually, make sure that you use a unique user name. Keep to the specified lengths for the user names and the passwords. The maximum number of users must not be exceeded.

4.4.7 Structure of the configuration file for the e-mail client (.edb file)

The configuration file for the e-mail client is created by the Internet wizard in STEP 7 Micro/WIN 32 and stored in a file with the extension .edb or .adb. The structure of the .edb file is shown in the table below.

Keyword in the .edb file	Description	Example
General section		
TIMESTAMP	Time stamp Time in seconds since 01.01.1970, in hexadecimal format (PC time of the creation of the *.edb file by STEP 7 Micro/WIN 32). During operation, the CP 243-1 continuously monitors this element for changes. When a change is detected, the .edb file is read completely and the e-mail service of the CP 243-1 is reconfigured.	TIMESTAMP=3D2C4E48 Corresponds to 15:10:00 on July 10, 2002
FILETYPE	File type Used internally by the system.	FILETYPE=EDB Do not change, fixed value!
FILEFORMAT	File format Used internally by the system	FILEFORMAT=xx Do not change, fixed value!
FROM	Sender address of the station sending the e-mail	FROM=plant.factory2@company.com
SMTPSA1	IP address of the e-mail server	SMTPSA1=192.168.1.10
SMTPSP1	Port address of the e-mail server	SMTPSP1=25
SMTPSA2	IP address of the substitute e-mail server	SMTPSA2=192.168.162.97
SMTPSP2	Port address of the substitute e-mail server	SMTPSP2=25

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Keyword in the .edb file	Description	Example
E-mail 00 (identification of the 32 possible e-mails with 00, 01, 02...30, 31)		
00|TO|	Recipient address of e-mail 00	00|TO|Name.Name@provider.de
00|CC|	Optional recipient address to receive a copy of e-mail 00 (max. of 64 characters)	00|CC|Name.Name@provider.de
00|SU|	Subject	00|SU|Status Station 4
00|TX|	Text	00|TX|problem in plant section 10
E-mail 01 (identification of the 32 possible e-mails with 00, 01, 02...30, 31)		
01|TO|	Recipient address of e-mail 01	01|TO|Name.Name@provider.de
01|CC|	Recipient address to receive a copy of e-mail 01	01|CC|Name.Name@provider.de
01|SU|	Subject	01|SU|notice about station 4
01|TX|	Text	01|TX|This is a \n\t text with formatting
...	...	...
...	...	...
E-mail 31 (identification of the 32 possible e-mails with 00, 01, 02...30, 31)		
31|TO|	Recipient address of e-mail 31	31|TO|Name.Name@provider.de
31|CC|	Recipient address to receive a copy of e-mail 31	31|CC|Name.Name@provider.de
31|SU|	Subject	31|SU|temperature station 4
31|TX|	Text	31|TX|temperature = %VD100:4.2F%°C
END	End identifier	

Structure of the .edb configuration file for the e-mail client

Example of an e-mail configuration file

```
# This is a comment
TIMESTAMP=3D2C4E48
FILETYPE=EDB
FILEFORMAT=01
FROM= plant.factory2@company.com
SMTPSA1=192.168.1.10
SMTPSP1=25
SMTPSA2=192.168.162.97
SMTPSP2=25
00|TO|Name.Name@provider.de
00|CC|Name.Name@provider.de
00|SU|Status Station 4
00|TX|problem in plant section 10
01|TO|Name.Name@provider.de
01|CC|Name.Name@provider.de
01|SU|notice about station 4
01|TX|This is a \n\t text with formatting
02|TO|
02|CC|
02|SU|
02|TX|
....
```


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```
30|TO|
30|CC|
30|SU|
30|TX|
31|TO|Name.Name@provider.de
31|CC|Name.Name@provider.de
31|SU|temperature station 4
31|TX|temperature = %VD100:4.2F%°C
END
# End of File
```

Note

- Comments are inserted in the file with the # character.
- Valid e-mails must have entries in the fields TO, SU and TX.
- The last character of a line is \n.
- The recipient address TO and CC must not contain more than 64 ASCII characters.
- The subject SU must not contain more than 128 ASCII characters
- The e-mail text TX must not contain more than 1024 ASCII characters (incl. e-mail tags and formatting characters)
- The sender address FROM must not contain more than 64 ASCII characters.
- All characters between 0x21 HEX and 0x7E HEX can be used for TO, CC, SU and TX if this is accepted by the e-mail partners involved.
- Empty lines are not permitted.

4.4.8 Structure of the configuration file for the e-mail client (.adb file)

The structure of the .adb file is shown in the table below.

Keyword in the .adb file	Description	Example
General section		
TIMESTAMP	Time stamp Time in seconds since 01.01.1970, in hexadecimal format (PC time of the creation of the *.edb file by STEP 7 Micro/WIN 32). During operation, the CP 243-1 continuously monitors this element for changes. When a change is detected, the .edb file is read completely and the e-mail service of the CP 243-1 is reconfigured.	TIMESTAMP=3D2C4E48 Corresponds to 15:10:00 on July 10, 2002
FILETYPE	File type Used internally by the system.	FILETYPE=EDB Do not change, fixed value!
FILEFORMAT	File format Used internally by the system	FILEFORMAT=xx Do not change, fixed value!

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Keyword in the .adb file	Description	Example
FROM	Sender address of the station sending the e-mail	FROM=plant.factory2@company.com
SMTPUSR	User name	it@pt2it.khe.siemens.de
SMTPPWD	Password	it
SMTPSN	DNS name of the SMTP server or IP address	smtp.gmx.net or 195.20.224.234
SMTPSP	Port address of the SMTP server	25
DNSSA1	IP address of the DNS server	194.25.2.129
E-mail 00 (identification of the 32 possible e-mails with 00, 01, 02...30, 31)		
00|TO|	Recipient address of e-mail 00	00|TO|Name.Name@provider.de
00|CC|	Optional recipient address to receive a copy of e-mail 00 (max. of 64 characters)	00|CC|Name.Name@provider.de
00|SU|	Subject	00|SU|Status Station 4
00|TX|	Text	00|TX|problem in plant section 10
E-mail 01 (identification of the 32 possible e-mails with 00, 01, 02...30, 31)		
01|TO|	Recipient address of e-mail 01	01|TO|Name.Name@provider.de
01|CC|	Recipient address to receive a copy of e-mail 01	01|CC|Name.Name@provider.de
01|SU|	Subject	01|SU|notice about station 4
01|TX|	Text	01|TX|This is a \n\t text with formatting
...	...	...
...	...	...
E-mail 31 (identification of the 32 possible e-mails with 00, 01, 02...30, 31)		
31|TO|	Recipient address of e-mail 31	31|TO|Name.Name@provider.de
31|CC|	Recipient address to receive a copy of e-mail 31	31|CC|Name.Name@provider.de
31|SU|	Subject	31|SU|temperature station 4
31|TX|	Text	31|TX|temperature = %VD100:4.2F%°C
END	End identifier	

Structure of the .adb configuration file for the e-mail client

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Example of an e-mail configuration file

```
# This is a comment
TIMESTAMP=3D2C4E48
FILETYPE=EDB
FILEFORMAT=01
FROM= plant.factory2@company.com
SMTPUSR=it@pt2it.khe.siemens.de
SMTPPWD=it
SMTPSN=smtp.gmx.net // DNS name (or IP address) of the SMTP server
SMTPSP=25 // TCP/IP port SMTP server
DNSSA1=194.25.2.129
00|TO|Name.Name@provider.de
00|CC|Name.Name@provider.de
00|SU|Status Station 4
00|TX|problem in plant section 10
01|TO|Name.Name@provider.de
01|CC|Name.Name@provider.de
01|SU|notice about station 4
01|TX|This is a \n\t text with formatting
02|TO|
02|CC|
02|SU|
02|TX|
....
30|TO|
30|CC|
30|SU|
30|TX|
31|TO|Name.Name@provider.de
31|CC|Name.Name@provider.de
31|SU|temperature station 4
31|TX|temperature = %VD100:4.2F%°C
END
# End of File
```

Note

- Comments are inserted in the file with the # character.
- Valid e-mails must have entries in the fields TO, SU and TX.
- The last character of a line is \n.
- The recipient address TO and CC must not contain more than 64 ASCII characters.
- The subject SU must not contain more than 128 ASCII characters
- The e-mail text TX must not contain more than 1024 ASCII characters (incl. e-mail tags and formatting characters)
- The sender address FROM must not contain more than 64 ASCII characters.
- All characters between 0x21 HEX and 0x7E HEX can be used for TO, CC, SU and TX if this is accepted by the e-mail partners involved.
- Empty lines are not permitted.

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4.4.9 Structure of the configuration file for the FTP client (.fdb file)

The configuration file for the FTP client is created by the Internet wizard in STEP 7 Micro/WIN 32 and stored in a file with the extension .fdb. The structure of this file is shown in the table below.

Keyword for the .fdb file	Description	Example
General section		
TIMESTAMP	Time stamp Time in seconds since 01.01.1970, in hexadecimal format (PC time of the creation of the *.fdb file by STEP 7 Micro/WIN 32). During operation, the CP 243-1 continuously monitors this element for changes. When a change is detected, the .fdb file is read completely and the FTP client service of the CP 243-1 is reconfigured.	TIMESTAMP=3D2C4E48 Corresponds to 15:10:00 on July 10, 2002
FILETYPE	File type Used internally by the system.	FILETYPE=FDB Do not change, fixed value!
FILEFORMAT	File format Used internally by the system	FILEFORMAT=xx Do not change, fixed value!
FTP request 00 (identification of the 32 possible FTP requests with 00, 01, ...30, 31)		
00|	Parameter record of FTP request 00 Action, number of bytes, DB start address, path/file name, server address, user name, password, all separated by |	00|<action>|<number_of_bytes>|<DB_start_address>|<path/file_number>|<server_address>|<user_name>|<password> For a description, see following table.
FTP request 01 (identification of the 32 possible FTP requests with 00, 01, ...30, 31)		
01|	Parameter record of FTP request 01 Action, number of bytes, DB start address, path/file name, server address, user name, password, all separated by |	01|<action>|<number_of_bytes>|<DB_start_address>|<path/file_number>|<server_address>|<user_name>|<password> For a description, see following table.
...	...	...
...	...	...
FTP request 31 (identification of the 32 possible FTP requests with 00, 01, ...30, 31)		
31|	Parameter record of FTP request 31 Action, number of bytes, DB start address, path/file name, server address, user name, password, all separated by |	31|<action>|<number_of_bytes>|<DB_start_address>|<path/file_number>|<server_address>|<user_name>|<password> For a description, see following table.
END	End identifier	

Structure of the configuration file for the FTP client

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Parameter	Description	Example
Action	The FTP client supports the following actions: W: Read out the data block or part of the data block and write it to a file in binary format. This file is then transferred to an FTP server and copied to the file system there. R: Request file from an FTP server. Content of the file is then copied to this data block or parts of this data block. D: Delete file from file system of the FTP server	00|W|<number_of_bytes>|<DB_start_address>|<path/file_number>|<server_address>|<user_name>|<password> 00|R|<number_of_bytes>|<DB_start_address>|<path/file_name>|<recipient_address>|<user_name>|<password> 00|D|||<path/file_name>|<recipient_address>|<user_name>|<password>
Number of bytes	Number of bytes (0 to max. of 10240 with CPU226XM) that can be written to the DB or read from the DB.	00|W|5354|<DB_start_address>|<path/_file name>|<server_address>|<user_name>|<password> Starting with address <DB_start_address>, 5354 bytes are read from the DB of the CPU and, using <user_name> and <password>, written to the file <path/file_name> on the computer specified by <server_address>.
DB start address	Start address starting at which the DB block is be read from or written to. The value range refers to the size of the existing DB (depends on the CPU, with CPU226XM between 0 and 10239)	00|R|5354|VB2308|<path/file_name>|<server_address>|<user_name>|<password> The file <path/file_name> is transferred from the file system of the FTP server addressed via the IP <server_address> (stating <user_name> and <password>) to the FTP client of the CP 243-1. There, 5354 bytes from the file are written to the DB of the CPU starting at address VB2308.
Path/file name	Specification of the file from which/to which data will read or written, including the related path information. The file name may contain up to 254 characters. The complete path including file name must not exceed 1024 characters.	00|R|23|VB11|/flash:/dat/CPU10_VB11_23.dat| <server_address>|<user_name>|<password> The file /flash:/dat/CPU10_VB11_23.dat is transferred from the file system of the FTP server addressed via the IP <server_address> (stating <user_name> and <password>) to the CP 243-1. There, 23 bytes from the file are written to the DB of the CPU starting at address VB11.

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Parameter	Description	Example
Server address	Entry of the IP address at which the FTP server can be accessed	00|R|23|VB11|/flash:/dat/CPU10_VB11_23.dat| 192.168.162.65|<user_name>|<password> The file /flash:/dat/CPU10_VB11_23.dat is transferred from the file system of the FTP server obtainable with the IP 192.168.162.65 (stating <user_name> and <password>) to the CP 243-1. There, 23 bytes from the file are written to the DB of the CPU starting at address VB11.
User name	Valid user name on the addressed FTP server Written in plain text and consisting of 1 to 32 characters	00|R|23|VB11|/flash:/dat/CPU10_VB11_23.dat| 192.168.162.65|FTP_server_4|<password> The file /flash:/dat/CPU10_VB11_23.dat is transferred from the file system of the FTP server obtainable with the IP 192.168.162.65 (stating user_name FTP_server_4 and <password>) to the CP 243-1. There, 23 bytes from the file are written to the DB of the CPU starting at address VB11.
Password	The password belonging to the specified user name Is encrypted and stored with a character length of up to 64 characters. The actual password length is between 1 and 32 characters.	00|R|23|VB11|/flash:/dat/CPU10_VB11_23.dat| 192.168.162.65|FTP_server_4|W9vQ}GcfH The file /flash:/dat/CPU10_VB11_23.dat is transferred from the file system of the FTP server obtainable with the IP 192.168.162.65 (stating user_name FTP_server_4 and password !state_Cp1) to the CP 243-1. There, 23 bytes from the file are written to the DB of the CPU starting at address VB11.

Structure of the parameter record for an FTP request

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Example of an FTP client configuration file

```
# This is a comment
TIMESTAMP=3D2C4E48
FILETYPE=FDB
FILEFORMAT=01
00|W|1|VB0|station99_VB0_1.dump|192.168.232.13|FTP_server_2|3AqW&4Cv
01|W|1024|VB256|/station36_VB256_1024.data|192.168.232.13|FTP_server
_2|3AqW&4Cv
02|R|5|VB2|/data/station36_VB2_5.err|192.168.232.2|FTP_server_3|asw3
45Df
03|R|23|VB11|/flash:/dat/CPU10_VB11_23.dat|192.168.162.65|
FTP_server_4| W9vQ}G cfH
04|||||||
05|||||||
06|||||||
07|D|||/data/station36_VB2_5.err|192.168.232.2|FTP_server_3|asw345Df
08|||||||
.....
30|||||||
31|||||||
END
# End of File
```

Note

- Comments are inserted in the file with the # character.
- An empty user entry is stored in the .fdb file in the following format: xx||||||| (where xx stands for the current FTP client request number)
- The last character of a line is \n.
- All ASCII characters between 0x21HEX and 0x7E HEX can be used for the path, file name, user name and password if they are accepted by the communications partner involved.
- The following restrictions also apply to the path and file name:
- The following characters are not supported: blank ; \ ; / ; | ; < ; > ; " ; : ; * and ?
- Empty lines are not permitted.

NOTICE

With a READ action, <number_of_bytes> is usually between 0 and 10240 (maximum for CPU 226XM).

If the value 0 is entered, the CP 243-1 does not check the actual file length. All data in the file is read and, starting with <DB_start_address>, copied to the DB of the S7-200 CPU if this does not exceed the memory size.

If the number of data bytes to be read is not 0, the CP 243-1 checks during the data transfer whether the specified number of bytes has already been reached and, if it has, terminates copying. This guarantees a high degree of safety and protects the unprotected memory area of the S7-200 CPU from being overwritten accidentally.

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4.5 Configuration of a communications partner with STEP 7

Based on the example of an S7-300 system, this section describes the configuration steps that need to be performed in STEP 7 so that such a system can communicate with an S7-200 system via the relevant Ethernet communications processor. The procedure is similar for S7-400 systems.

For detailed information on the configuration steps, refer to the STEP 7 description or the manuals of the CP 343-1 and CP 443-1.

In S7-300 and S7-400 systems, a distinction is made between configured and free connections. With configured connections, the connection parameters are specified by the user. Free connections, on the other hand, do not need to be configured in STEP 7.

Configured connections

If you want to use a configured connection, first insert a new S7 connection in the NetPro STEP 7 program package. In the "Insert New Connection" dialog, specify the type of station to which you want to establish a connection. As connection partner, select the type "unspecified".

The next step is to configure this connection. In the "Properties - S7 connection" dialog (see figure), specify whether your S7-300 or S7-400 system is to be the active or passive node.

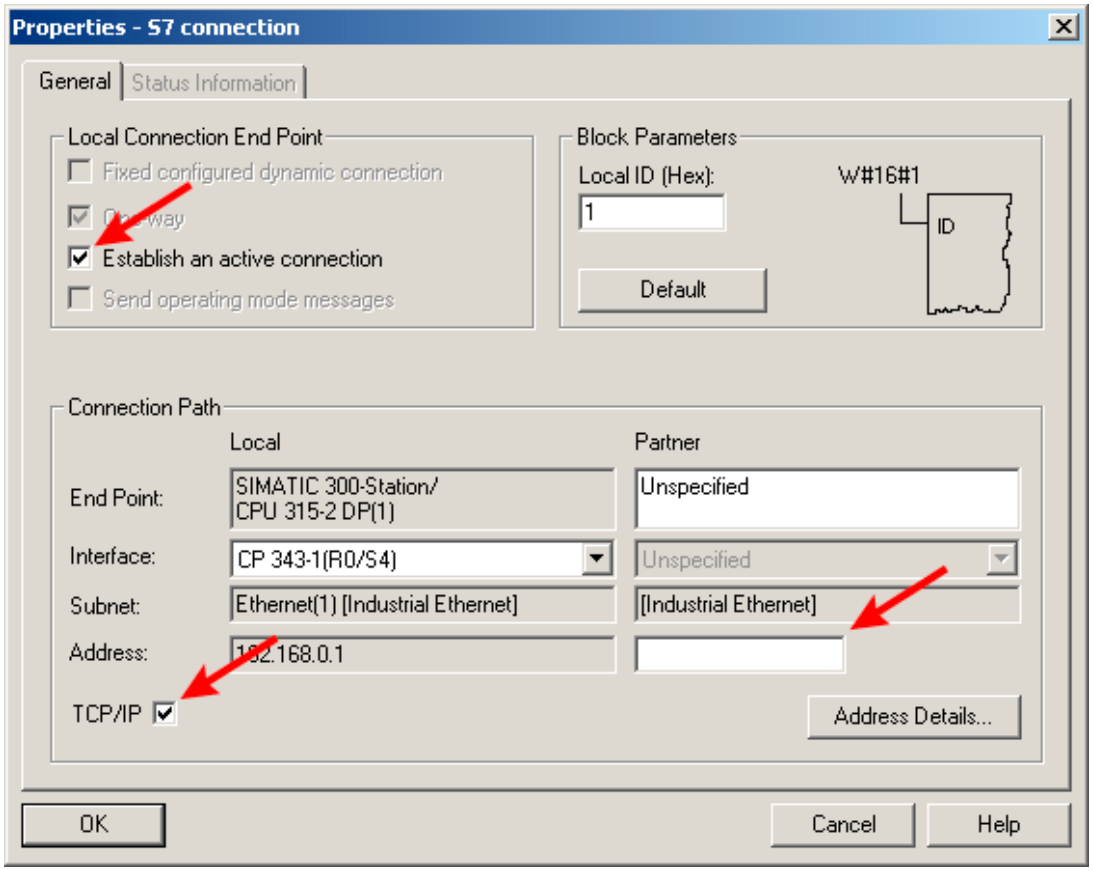


Figure 4-1 Dialog "Properties – S7 connection"

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If your S7-300 or S7-400 system is to communicate with an S7-200 system, you will also need to specify whether your system is acting as client or server. If you want your S7-300 or S7-400 to be the client, select the entry "Establish an active connection". If this entry is not selected, your system will be the server. Then specify that your S7 connection is to be handled via TCP/IP. Select the item "TCP/IP". To allow an TCP/IP connection to be established to your partner, you also need to specify its IP address.

In the "Address details" dialog, specify the communication end points (TSAPs) to be used. You will find the TSAP of a connection in the S7-200 system in STEP 7 Micro/WIN 32 in the dialog in which you configured the individual connections under the entry "Local Properties". Enter the communication access point specified there in the "Address details" dialog in the boxes provided for the TSAP of the partner. The communication access point assigned in your S7-300 or S7-400 system for the connection is located in the same dialog under the entry "Local" in the "TSAP" box. Take the value indicated there and enter it in the entry "Remote Properties" in the "TSAP" box with STEP 7 Micro/WIN 32.

S7-300 system as client

If you want to use an S7-300 system as client (i.e., you have enabled "Establish an active connection" in the "Properties - S7 connection" dialog), you cannot simply use STEP 7 Micro/WIN 32 and enter the TSAP specified in STEP 7 in the "Local" entry as the connection access point for your S7-300 system. Instead you must convert this TSAP according to the following rules:

1st byte of the TSAP:

Is taken from STEP 7, "Address details" dialog, "Local" entry, "TSAP" box.

2nd byte of the TSAP:

Is derived from the rack and the slot of your Ethernet communications processor on your S7-300 system. The first 3 bits contain the number of the rack in which your Ethernet communications processor is installed on your S7-300 system. The remaining 5 bits contain the slot of your Ethernet communications processor in your S7-300 system.

You will find these two pieces of information in the STEP 7 program package HW Config.

Example:

Your S7-300 system contains a CP 343-1 in slot 4 of rack 0. When you configure a connection with STEP 7, this is indicated as local TSAP value 10.02. With STEP 7 Micro/WIN 32, use TSAP 10.04 as the communication access point on the S7-300 system. The 1st byte (10 in our example) is adopted. The 2nd byte is derived from the rack (0 in our example) and the slot (4 in our example).

NOTICE
The way communication access points (TSAPs) are specified in STEP 7 and in STEP 7 Micro/WIN 32 must be compatible. No client services may be operated from partners on a client connection of the CP 243-1. A clear client-server relation must exist.

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Free connections

A free connection can only be used when your S7-300 or S7-400 system is acting as server. Free connections do not need to be configured in STEP 7. Standard S7-300 and S7-400 systems are designed so that they can communicate via free connections.

If you want to make use of the free connections on your S7-300 or S7-400 system, the client end must still be configured for each of these connections. In STEP 7 Micro/WIN 32, there is no difference in the use of such connections and communication via connections that were configured on the S7-300 or S7-400 system. Here, you simply need to remember that, with free connections, the first byte of the TSAP via which such connections operate on S7-300 and S7-400 systems must always have the value 0x03. The second byte of the TSAP is derived in a way similar to the procedure described above from the rack and the slot number of the CPU used in your S7-300 or S7-400 system. This means that, with a free connection, the communication access point on the S7-300 or S7-400 system is always located on the CPU and not on the Ethernet communications processor.

Note

S7-200 systems do not support free connections. This means that, with an S7-200 system, you will always have to configure each connection regardless of whether your system is being used as a client or a server.

4.6 Reaction of the CP 243-1 to configuration errors

When the CP 243-1 detects an invalid configuration, it tries to obtain its TCP/IP address parameters (IP address, subnet mask and IP address of the gateway) via a BOOTP/DHCP service. The CP 243-1 continues to attempt this for approximately 1 minute. When it fails to receive a reply from a BOOTP/DHCP service within this time or the reply is invalid or contains errors, the red LED ("SF") flashes for approximately 30 seconds. This procedure continues cyclically until the CP 243-1 either finds a valid configuration in the memory of the S7-200 CPU or receives a valid reply from a BOOTP/DHCP server.

When the CP 243-1 receives a valid BOOTP response, it configures itself as explained below:

- IP address, subnet mask and IP address of the gateway are taken from the BOOTP/DHCP response
- The transmission type is set to "Autonegotiation" (automatic setting).
- The monitoring time for connections (keepalive) is set to 30 seconds

With this configuration, the CP 243-1 is then able to access the S7-200 CPU via Ethernet with STEP 7 Micro/WIN 32. A new valid configuration can now be obtained in this way. Communication with other controllers is not possible in this status. After a reset, the CP 243-1 then adopts the settings of the new configuration.

Note

Autonegotiation (automatic settings) mode will only work when all connected network components support this mode.

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Note

If no valid CDB/NDB/IDB configuration exists but the CP 243-1 will start up with the aid of a BOOTP/DHCP server, the functions FTP server and client, e-mail client and HTTP server are not supported. The file system of the CP 243-1 can only be accessed by STEP 7 Micro/WIN 32 after successful configuration of the administrator. Only then can the configuration files be transferred to the CP 243-1 via FTP.

NOTICE

The configuration files stored in the file system of the CP 243-1 are recognized by the CP 243-1 based on their extensions (.edb, .udb and .fdb). When configuring, the user must make sure that only one file of each configuration file type is located in the file system of the CP 243-1.

If the file system contains several configuration files with the same extension, there is no way to predict which of these files will be loaded by the CP 243-1.

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Programming

5

Use STEP 7 Micro/WIN 32 to develop S7-200 user programs. The STEP 7 Micro/WIN 32 version must be V3.2.3 or higher so that you can use the functions of the CP 243-1 in these programs.

To be able to use the CP 243-1 as an S7, e-mail or FTP client, at least one of the communication channels of the CP 243-1 must be configured for this purpose. The user program of the S7-200 must have the relevant programming.

The CP 243-1 is programmed in the S7-200 user program with the following subroutines. The position at which a CP 243-1 is located in the S7-200 system is reflected in the name of the subroutines:

- ETHx_CTRL (x corresponds to the slot position, possible values: 0,1, ...6)
- ETHx_CFG (x corresponds to the slot position, possible values: 0,1, ...6)
- ETHx_XFR (x corresponds to the slot position, possible values: 0,1, ...6)
- ETHx_EMAIL (x corresponds to the slot position, possible values: 0,1, ...6)
- ETHx_FTPC (x corresponds to the slot position, possible values: 0,1, ...6)

When the configuration is complete, these subroutines are generated by the Internet wizard integrated in STEP 7 Micro/WIN 32. You will then find these subroutines in STEP 7 Micro/WIN 32 in the window with the operations tree under the entry "Subroutine". The data you entered during configuration decides which subroutines the wizard creates at the end of the configuration.

Note

Regardless of the timeouts defined in Appendix C, we strongly recommend that all application programmers define an application-specific timeout in the STL program for these functions after the S7, e-mail or FTP client requests are started. When this time is exceeded, the request can be terminated by the "abort command" of subroutines ETHx_XFR, ETHx_EMAIL or ETHx_FTPC.

Calls for a Web browser to the HTTP server of the CP 243-1 can usually be canceled by clicking a button in the Web browser dialog.

NOTICE
The subroutines for programming the CP 243-1 must not be called by interrupt routines in the S7-200 user program.

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5.1 ETHx_CTRL

The ETHx_CTRL subroutine is used to initialize and monitor the CP 243-1. Call this subroutine in your S7-200 user program at the beginning of every cycle if you want to utilize the functions of a CP 243-1. If the CRC check is enabled, calling the subroutine initiates a restart of the CP 243-1 if a change is detected in the configuration data by the CP 243-1. If, on the other hand, the CRC check is disabled, there is always a restart of the CP 243-1 after the download of the user program or a new configuration from STEP 7 Micro/WIN 32 to the S7-200-CPU and the restart on the S7-200 CPU.

The return values contain information on the general status of the CP 243-1, the status of up to eight possible S7 communication channels and the status of the IT services.

If an error occurs on the CP 243-1, you can read out the error or message code with the Error return parameter. This code is available for a maximum of 60 seconds. The CP 243-1 assumes that, during this time, the S7-200 user program has evaluated the error or message code and sets the Error return parameter back to 0 after 60 seconds. This routine prevents outdated error or message codes of the CP 243-1 from being returned via the Error parameter over a long period of time.

The subroutine ETHx_CTRL is always created by the Internet wizard of STEP 7 Micro/WIN 32 as soon as the configuration CP 243-1 is completed.

Call

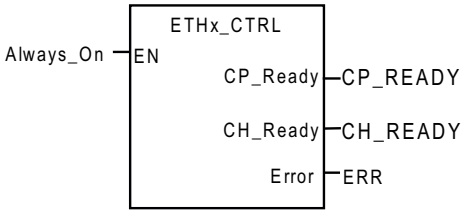


Figure 5-1 Calling the ETHx_CTRL subroutine

Input parameters

Name	Type	Meaning
-	-	-

Input parameters (ETHx_CTRL)

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Return parameters

Name	Type	Meaning
CP_Ready	BOOL	Status of the CP 243-1 0: CP not ready 1: CP ready for operation
CH_Ready	WORD	Status of the individual channels or IT services (first byte): Bit 0 corresponds to channel 0 Bit 1 corresponds to channel 1 Bit 2 corresponds to channel 2 Bit 3 corresponds to channel 3 Bit 4 corresponds to channel 4 Bit 5 corresponds to channel 5 Bit 6 corresponds to channel 6 Bit 7 corresponds to channel 7 (second byte): Bit 0 corresponds to e-mail service Bit 1 corresponds to FTP client service Bit 2 corresponds to FTP server service Bit 3 corresponds to HTTP server service Bits 4 to 7: Reserved 0: Channel or service not ready 1: Channel or service ready
Error	WORD	Error or message code 0x0000: No error occurred Otherwise: Error (description: refer to Error messages of the CP 243-1 (Page 96)) The error or message code is only available for a maximum of 60 seconds.

Return parameters (ETHx_CTRL)

The value 1 in a bit of the CH_Ready return parameter indicates that the related channel or service is ready. This means that a communication connection to the partner specified in the configuration could be established with the communication parameters specified there (IP address, TSAPs etc.) or a service was started on the CP 243-1.

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5.2 ETHx_CFG

5.2.1 ETHx_CFG

Calling the subroutine ETHx_CFG causes the CP 243-1 to read in the configuration data that is stored in the memory of the S7-200 CPU. The CP 243-1 then automatically performs a reset after the ETHx_CFG subroutine is called. The configuration read from the memory of the S7-200 CPU takes effect after the restart following the reset.

You will need this subroutine if you want to reconfigure a CP 243-1 dynamically from this program while your S7-200 user program is running. This program is only created by the Internet wizard in STEP 7 Micro/WIN 32 when the CRC mechanism is not activated for your configuration. When the subroutine ETHx_CFG is called, the CP 243-1 terminates all existing connections and performs a reset. As soon as the CRC mechanism is activated, however, you can no longer change the configuration from a user program. This is then only possible using the Internet wizard in STEP 7 Micro/WIN 32.

Call

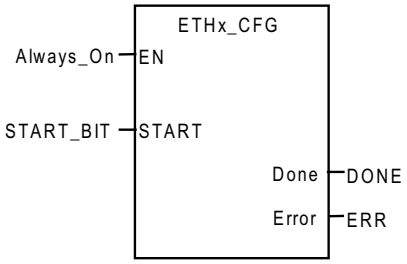


Figure 5-2 Calling the subroutine ETHx_CFG

Input parameters

Name	Type	Meaning
START	BOOL	Input condition for triggering a new configuration 0: Do not trigger new configuration 1: Trigger a new configuration

Input parameters (ETHx_CFG)

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Return parameters

Name	Type	Meaning
Done	BOOL	Status of the subroutine call 0: Subroutine not executed yet 1: Subroutine executed, ready for next execution
Error	BYTE	Error code 16#00: No error occurred Otherwise: Error (description: see section 6.2)

Return parameters (ETHx_CFG)

5.3 ETHx_XFR

Calling the subroutine ETHx_XFR causes the CP 243-1 to transfer data to or request data from another S7 system. The type of data access that your CP 243-1 uses is specified in the configuration. This means that you have already specified the following during configuration:

- What data is to be accessed.
- Whether the data is to be read or written.
- The communications partner from which this data is obtained or to which this data is transferred.

When you call the ETHx_XFR subroutine, you specify which of the configured client channels you want to use for which configured data accesses.

The ETHx_XFR subroutine is only created by the Internet wizard in STEP 7 Micro/WIN 32 if you have configured at least one of the channels of the CP 243-1 as client. Only then can you trigger data access from a S7-200 user program via a CP 243-1.

Only one ETHx_XFR subroutine per channel can be active at any one time. Parallel execution of several data accesses to one channel is impossible. As a result, it is advisable to link the "START" input with both the return value "Done" of the ETHx_XFR subroutine and the corresponding bit of the return value "CH_Ready" from the ETHx_CTRL subroutine.

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Call

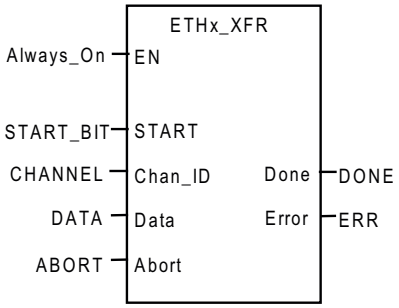


Figure 5-3 Calling the ETHx_XFR subroutine

Input parameters

Name	Type	Meaning
START	BOOL	Input condition for triggering a read/write request 0: Do not trigger read/write request 1: Trigger read/write request
Chan_ID	BYTE	Number of the channel via which the data will be be accessed. This channel must be configured as client. Value range: 0 .. 7
Data	BYTE	Number of the channel-specific data block from the configuration that describes the read/write request to be executed. Value range: 0 .. 31
Abort	BOOL	Input condition for aborting a data access 0: Do not abort data access 1: Abort data access

Input parameters (ETHx_XFR)

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Return parameters

Name	Type	Meaning
Done	BOOL	Status of the subroutine call 0: Subroutine not executed yet 1: Subroutine executed, read/write request completed, subroutine ready for next execution
Error	BYTE	Error code 16#00: No error occurred Otherwise: Error (description: refer to Error messages of the CP 243-1 (Page 96))

Return parameters (ETHx_XFR)

NOTICE
The execution time of an S7-200 user program has a direct effect on the duration of the read/write requests used in it. If you want to minimize the execution time of your read/write requests, try to keep the cycle time of your user program as short as possible.

5.4 ETHx_EMAIL

Calling the subroutine ETHx_EMAIL causes the CP 243-1 to transfer a predefined e-mail to an e-mail server. Both the e-mail to be transmitted and the e-mail server to be used are specified in the configuration of the CP 243-1.

A total of up to 32 different e-mails can be configured.

The following is therefore already specified during configuration:

- Which e-mail server will be used
- Which data from the S7-200 system, in addition to the actual e-mail text, will be embedded in the e-mail.
- Who will receive the e-mail.

When you call the subroutine ETHx_EMAIL, you specify which of the configured e-mails will be sent by the subroutine.

The ETHx_EMAIL subroutine is created by the Internet wizard in STEP 7 Micro/WIN 32 if you activated the e-mail service while configuring the CP 243-1. Only then can you send e-mails via the CP 243-1 from an S7-200 user program.

Only one ETHx_EMAIL subroutine can be active at any one time. Sending several e-mails at the same time is not possible. As a result, it is advisable to link the "START" input with both the return value "Done" of the ETHx_E-MAIL subroutine and the corresponding bit of the return value "CH_Ready" from the ETHx_CTRL subroutine.

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Call

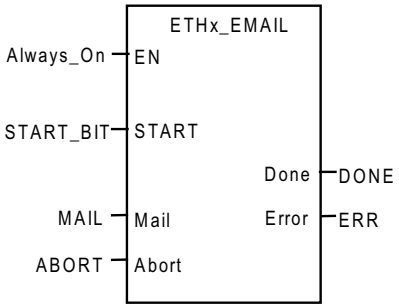


Figure 5-4 Calling the ETHx_EMAIL subroutine

Input parameters

Name	Type	Meaning
START	BOOL	Input condition for triggering an e-mail request 0: Do not trigger e-mail request 1: Trigger e-mail request
Mail	BYTE	Number of the e-mail from the configuration that describes the e-mail request to be executed. Value range: 0 .. 31
Abort	BOOL	Input condition for aborting an e-mail request 0: Do not abort e-mail request 1: Abort e-mail request

Input parameters (ETHx_EMAIL)

Return parameters

Name	Type	Meaning
Done	BOOL	Status of the subroutine call 0: Subroutine not executed yet 1: Subroutine executed, e-mail request completed, subroutine ready for next execution.
Error	BYTE	Error code 16#00: No error occurred Otherwise: Error (description: see section Error messages of the CP 243-1 (Page 96))

Return parameters (ETHx_EMAIL)

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NOTICE
E-mail communication is subordinate to S7 communication. Since reaction times vary depending on the particular configuration, no general predictions can be made. The greater the number of simultaneous S7 connections and the more data transferred per request, the longer the reaction times will be for an e-mail request.

5.5 ETHx_FTPC

Calling the subroutine ETHx_FTPC causes the CP 243-1 to transfer data to or request data from an FTP server. This subroutine can also be used to delete files from the file system of an FTP server.

The type of data access that your CP 243-1 uses is specified in the configuration.

A total of up to 32 FTP requests can be configured.

The following is specified during configuration:

- Whether you want data to be read from your S7-200 CPU and transferred to an FTP server.
- Whether you want to request a file from an FTP server and copy it to your S7-200 CPU.
- Whether you want to delete a file from the file system of an FTP server.
- Which data lengths, start addresses, file names, FTP server addresses, user names and passwords you want to use for the action.

When the subroutine ETHx_FTPC is called, you specify which of the configured FTP client requests you want the subroutine to execute.

The ETHx_FTPC subroutine is created by the Internet wizard in STEP 7 Micro/WIN 32 if you activated the FTP client service in the configuration of the CP 243-1. Only then can you sent FTP client requests via a CP 243-1 from an S7-200 user program.

Only one ETHx_FTPC subroutine can be active at any one time. Several FTP client requests cannot be sent at the same time. As a result, it is advisable to link the "START" input with both the return value "Done" of the ETHx_FTPC subroutine and the corresponding bit of the return value "CH_Ready" from the ETHx_CTRL subroutine.

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Call

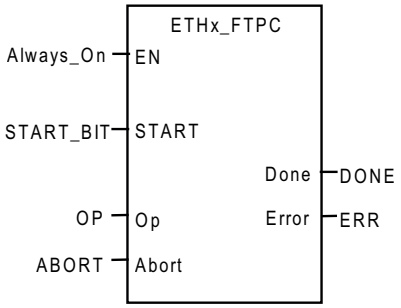


Figure 5-5 Calling the ETHx_FTPC subroutine

Input parameters

Name	Type	Meaning
START	BOOL	Input condition for triggering a read/write/delete request 0: Do not trigger read/write/delete request 1: Trigger read/write/delete request
Op	BYTE	FTP client request number from the configuration that describes the read/write/delete request to be executed. Value range: 0 .. 31
Abort	BOOL	Input condition for aborting of an FTP client request 0: Do not abort FTP client request 1: Abort FTP client request

Input parameters (ETHx_FTPC)

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Return parameters

Name	Type	Meaning
Done	BOOL	Status of the subroutine call 0: Subroutine not executed yet 1: Subroutine executed, read/write/delete request completed, subroutine ready for next execution
Error	BYTE	Error code 16#00: No error occurred Otherwise: Error (description: see section Error messages of the CP 243-1 (Page 96))

Return parameters (ETHx_FTPC)

NOTICE

FTP client communication is subordinate to S7 communication. Reaction times depend on the configuration and cannot be predicted in general terms.

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Diagnostics

6

6.1 Diagnostic options

The following tools are available for diagnostics:

- Ping server:

  Using the "ping" program that exists on all standard computers with a Windows operating system from Microsoft, you can check whether a CP 243-1 can be reached at all at a specified IP address.

- STEP 7 Micro/WIN 32:

  Under the entry "Information ..." in the "PLC" menu, you can see general the information about your S7-200 system. This also includes information that shows you which modules are connected to your S7-200 system. After you double-click on the module "CP 243-1 INTERNET" in the module overview, a window appears with the following specific information about your CP 243-1:

  – General module information (module type and versions used)

  – TCP/IP address parameters (IP address, subnet mask, IP address of the gateway and the MAC address). When a configuration error occurs and a restart is performed afterwards with the BOOTP/DHCP mechanism, the values shown here are not valid. This same applies when the user program has not completed at least one cycle.

  – Status messages

  – Information on the embedding of the CP 243-1 in the address area of the S7-200 CPU

  – Configuration and statuses of the S7 channels

  – Error messages

  – Configuration and statuses of the IT functions (FTP server, FTP client, HTTP server and e-mail client)

- Reading the SM memory area:

  During run time, CP 243-1 specific information can also be read and processed by an S7-200 user program from the SM area currently being used by the CP (see example in section 4.2.5). When global errors occur on a CP 243-1, the relevant error identifiers are located in this area. The locations where the information can be found are described below.

Byte offset in the SM area	Meaning	Format
0-15	Module type	16 bytes ASCII
16-19	Software version	4 bytes ASCII
20-21	Error code (see chapter Error messages of the CP 243-1 (Page 96)).	2 byte, hex

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Byte offset in the SM area	Meaning	Format
22	Status of the CP 243-1 Bit [0] 0: CP 243-1 not starting up 1:CP 243-1 starting up Bit [1] 0: BOOTP/DHCP sequence not performed 1: BOOTP/DHCP sequence being performed Bit [2] 0: CP 243-1 not ready 1: CP 243-1 ready for operation Bit [3] 0: STEP 7 Micro/WIN 32 inactive 1: STEP 7 Micro/WIN 32 active Bit [4] 0: Configuration according to CDB 1: No valid configuration in CDB Bit [5] reserved Bit [6] 0: No Ethernet connection 1: CP 243-1 connected to Ethernet Bit [7] 0: No error on CP 243-1 1: CP 243-1 in error status	1 byte, hex
23	Reserved	
24	Hardware version	1 byte ASCII

Addressing global errors and module information

- Reading the NPB memory area:

  A pointer to the memory area in which the configuration data of the CP 243-1 is stored is located in bytes 46 to 49 of the SM area currently being used for the CP 243-1. If you increase this pointer by 108, you will find the NPB memory area in which the TCP/IP configuration parameters currently being used by the CP 243-1 are stored (provided the CP 243-1 was configured correctly and has completed at least one cycle of the user program). If the configuration is not correct, the values of the NPB are not valid. The following table shows the layout of this memory area.

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Byte offset in variable memory	Meaning	Format
108 - 109	Common flag byte • Bit [0] duplex mode – 0: half duplex – 1: full duplex • Bit [1] data rate – 0: 10 Mbps – 1: 100 Mbps • Bit [2] autonegotiation – 0: autonegotiation not activated – 1: autonegotiation activated • Bit [3] aut. address assignment – 0: network parameters from configuration – 1: network parameters from BOOTP/DHCP • Bit [4] protocol – 0: BOOTP – 1: DHCP • Bit [5-15]: Reserved	2 bytes, hex
110-113	Current IP address	4 bytes, hex
114- 117	Current subnet mask	4 bytes, hex
118-121	IP address of the gateway currently being used	4 bytes, hex
122-127	MAC address	6 bytes, hex

Structure of the NPB memory area

- LEDs (see chapter Codes: Front LEDs (Page 33))
- Test e-mail:

  The CP 243-1 can send a test e-mail with an HTML page that is called from a Web browser. This mechanism makes it easy to check whether a desired e-mail server or e-mail receiver can be reached from the CP 243-1. The user name and the password of the administrator must be specified before this test e-mail mechanism can be triggered. The error messages that can occur while a test e-mail is being sent are explained in chapter Error messages of the test mechanism for e-mails (Page 104).
- Status applet:

  Using the Web browser, an HTML page can be requested by the CP 243-1 indicating the status information of the S7-200 system. This page includes, among others, information on the status of the S7 and IT channels. The call for this page is shown in Table 1 together with an overview of the information on this page.
- FTP server:

  Using the FTP server, the contents of the file system can be changed. If there are effects that indicate errors in the file system while the CP 243-1 is running, the contents of the file system on the CP 243-1 should be checked from an FTP client. If necessary, bad files can sometimes be corrected in this way.

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Note

The abrupt shutdown of a CP 243-1 with active client connections (for example due to a power failure) while the server continues running may result in the server not recognizing that the connections have been interrupted. When the client then attempts to connect again, a delay (determined by the configured keepalive time) may occur when the CP 243-1 resumes operation before all connections are reestablished.

Note

During the startup of the CP 243-1, its file system is automatically checked for consistency. If inconsistencies are found, these are corrected as far as possible.

6.2 Error messages of the CP 243-1

This section lists the error messages of the CP 243-1 of most importance to the user. All other error messages indicate special internal errors on the CP 243-1. If you receive these error messages, please contact the service hotline.

NOTICE
Turn the module off and on again if a module error/system error occurs.

The CP 243-1 uses two different mechanisms to report errors:

- As return value of a subroutine:

  Errors are reported here with the return value "Error". This parameter can be the data type BYTE or WORD depending on which subroutine is involved.

- Error codes returned via the SM memory area of the S7-200 CPU:

  Which SM memory area is currently being used depends on the position of your CP 243-1 in the S7-200 system (see example in section 4.2.5). Depending on the type of error, the following bytes are used for the error message in the current SM area of your CP 243-1:

  – Global errors and general messages are transferred at byte offset 20 and 21. They are interpreted as a word (SMW). The error or message codes transferred here are deleted again after a maximum of 60 seconds. This mechanism prevents outdated error or message codes from blocking these two bytes for a longer period of time.

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- Channel-specific errors are transferred in the following bytes based on the S7 channel:

  Byte offset 25 for channel 0

  Byte offset 26 for channel 1

  Byte offset 27 for channel 2

  Byte offset 28 for channel 3

  Byte offset 29 for channel 4

  Byte offset 30 for channel 5

  Byte offset 31 for channel 6

  Byte offset 32 for channel 7
- Command-specific errors are returned in the byte with offset 33.
- E-mail-specific errors are returned in the byte with offset 34.
- The FTP client reports errors with the byte with offset 35.
- Errors on the FTP server are returned with the byte with offset 36.
- The HTTP server reports errors using the byte with offset 37.

The following sections list the error codes for the individual errors along with their meaning. These sections also show how the individual errors are returned, which error codes apply to which subroutines, and which error is transferred in which byte of the current SM memory area. If error messages occur that are not described in these sections, please contact the service hotline.

If these next few sections do not provide a solution, manual correction of the errors via STEP 7 Micro/WIN 32 is always necessary. The Internet wizard of STEP 7 Micro/WIN 32 should always be used to configure the CP 243-1.

If your CP 243-1 returns errors indicating a problem with the configuration, check whether your user program has overwritten the configuration.

NOTICE
During failure of the 24 V power supply, the CP 243-1 can no longer return errors.

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6.2.1 Error messages in byte format

Error byte		Description	Reaction/remedy	Transfer mechanism	
hex	dec			Byte offset in the SM area	Return value (ETHx_)
16#01	1	Timeout on the S7 bus	Automatic restart	25 - 32 33 34 35	_XFR _CFG _EMAIL _FTPC
16#02	2	Data access terminated due to an ABORT command	A new read/write request can be started	25 - 32 34 35	_XFR _EMAIL _FTPC
16#03	3	The transfer parameter DATA or MAIL or OP is outside the configured area	Check user program or configuration	25 - 32 34 35	_XFR _EMAIL _FTPC
16#04	4	The connection could not be set up at the S7 level	The attempt to establish a connection is repeated	25 - 32	_XFR
16#05	5	The connection was aborted or an attempt was made to execute a read/write request on a channel that was not ready	Check connection path to the communications partner or configuration of the communications partner	25 - 32	_XFR
		The connection could not be established or was aborted or the e-mail configuration file on the CP 243-1 was changed or an attempt was made to execute a request and the parameter assignment for the e-mail service was not correct.	Check connector of connection to the communications partner Check .edb file on the CP 243-1 for uniqueness and completeness	34	_EMAIL
		The connection could not be established or was aborted or the FTP configuration file on the CP 243-1 was changed or an attempt was made to execute a request and the parameter assignment of the FTP client service was not correct.	Check connector of connection to the communications partner Check .fdb file on the CP 243-1 for uniqueness and completeness	35	_FTPC
		The FTP connection was aborted	Check connection path to the communications partner Check FTP server configuration for completeness	36	

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Error byte		Description	Reaction/remedy	Transfer mechanism	
hex	dec			Byte offset in the SM area	Return value (ETHx_)
		The connection could not be established or was aborted or an attempt was made to execute a request and the parameter assignment of the HTTP server was not correct.	Check connection path to the communications partner Check HTTP server configuration for completeness	37	
16#06	6	The response packet contains logical errors	A new read/write request can be triggered. Check the configuration.	25 - 32 34 35	_XFR _EMAIL _FTPC
16#07	7	The read request failed	A new read/write request can be triggered. The parameters of the read request should be checked.	25 - 32	_XFR
16#08	8	The write request failed	A new read/write request can be triggered. The parameters of the write request should be checked.	25 - 32	_XFR
16#09	9	Channel not configured	A new read/write request with other parameters can be triggered.	25 - 32 34 35	_XFR _EMAIL _FTPC
16#0A	10	The channel is configured as SERVER but an attempt was made to trigger a read/write request	A new read/write request with other parameters can be triggered.	25 - 32	_XFR
16#0B	11	Previous read/write request not yet completed.	A new read/write request can be triggered. Evaluate "DONE" return parameter of the previous read/write request	25 - 32 34 35	_XFR _EMAIL _FTPC
16#0C	12	Invalid request identifier	A new read/write request can be triggered	25 - 32 34 35	_XFR _EMAIL _FTPC
16#0D	13	All data transfers are aborted because a new configuration was triggered by the user program.	Restart of the system	25 - 32 33 34	_XFR _CFG _EMAIL

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Error byte		Description	Reaction/remedy	Transfer mechanism	
hex	dec			Byte offset in the SM area	Return value (ETHx_)
16#0E	14	The data to be transferred could not be read from the CPU	Check configuration, particularly the .fdb file	35	_FTPC _EMAIL
16#0F	15	The data to be transferred could not be written to the CPU	Check configuration, particularly the .fdb file	35	_FTPC
16#10	16	Connection to one of the configured e-mail servers not possible	Check connection path to the configured e-mail servers Check configuration, particularly the .edb file	34	_EMAIL
16#11	17	The login was rejected by the e-mail server	Check whether the e-mail server is configured correctly Check configuration, particularly the .edb file	34	_EMAIL
16#12	18	An error occurred while generating the e-mail to be sent	Check configuration, particularly the .edb file and the placeholders used in the e-mail	34	_EMAIL
16#13	19	The e-mail configuration was detected as incorrect	Check configuration, particularly the .edb file and the placeholders used in the e-mail	34	_EMAIL
16#14	20	The generated e-mail text is too long	Check configuration, particularly the .edb file and the placeholders used in the e-mail	34	_EMAIL
16#17	23	No connection to the configured FTP server possible	Check communication path to the FTP server Check configuration, particularly the .fdb file	35	_FTPC
16#18	24	Login with FTP server failed	Check whether the FTP server is configured correctly Check configuration, particularly the .fdb file	35	_FTPC
16#19	25	Error in the FTP transfer protocol	Check whether the FTP server is configured correctly Check whether this file can be accessed at all Check configuration, particularly the .fdb file	35	_FTPC

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Error byte		Description	Reaction/remedy	Transfer mechanism	
hex	dec			Byte offset in the SM area	Return value (ETHx_)
16#1A	26	A memory area was exceeded while files were being transferred or the specified length does not match the actual length of the file.	Check whether this file has sufficient memory space Check configuration, particularly the .fdb file	35	_FTPC
16#1B	27	Error during data transfer using FTP	Check whether the FTP server is configured correctly Check whether network problems exist Check configuration, particularly the .fdb file	35	_FTPC
16#80	128	External 24 V power supply is not present	Apply power or wait till ready	25 - 37	_XFR _CFG _EMAIL _FTPC
16#81	129	This channel is not ready or is not operating correctly	Wait until ready Evaluate the return parameters of the ETHx_CTRL subroutine		_XFR _CFG _EMAIL _FTPC
16#82	130	This channel is busy or the START input parameter is not set.	Wait until ready Set the START input parameter		_XFR _CFG _EMAIL _FTPC
16#83	131	A request was started with an illegal channel number	A new read/write request can be triggered Check the user program		_XFR
16#84	132	A request was started with an illegal data block number.	A new read/write request can be triggered Check the user program		_XFR _EMAIL _FTPC

Error messages in byte format

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6.2.2 Error messages in word format

Error word		Description	Reaction/remedy	Transfer mechanism	
Hex	dec			Byte offset in the SM area	Return value (ETHx_)
16#0001	1	Timeout on the S7 bus	Automatic restart	20, 21	_CTRL
16#000D	13	All data transfers are aborted because a new configuration was triggered by the user program.	Restart of the system	20, 21	_CTRL
16#0030	48	The configuration could not be called up by the CPU within the time specified.	Automatic restart	20, 21	_CTRL
16#0031	49	No CDB configuration with correct syntax found in the memory of the S7-200 CPU	Check the configuration	20, 21	_CTRL
16#0032	50	The CRC checksum of the configuration data (CDB, NDB, IDB) is incorrect	Reconfiguration of the CP 243-1 with STEP 7 Micro/WIN 32 Check the user program to find out whether configuration data was accidentally overwritten	20, 21	_CTRL
16#0033	51	The configuration data for the CP 243-1 contains errors or is not stored correctly.	Reconfiguration of the CP 243-1 with STEP 7 Micro/WIN 32	20, 21	_CTRL
16#0034	52	The pointer to the CDB is wrong or no CDB is loaded	Make sure that the ETHx_CTRL subroutine generated by the wizard is called at the beginning of the user program.	20, 21	_CTRL
16#0035	53	The format identifier of the transferred configuration is invalid	Check the configuration	20, 21	_CTRL
16#0036	54	TSAPs are not unique in the configuration or exist more than once	Check the configuration	20, 21	_CTRL
16#0038	56	The configuration is not unique (IP addresses are incorrect, neither clients nor servers are configured, channel for STEP 7 Micro/WIN 32 not activated)	Check the configuration	20, 21	_CTRL
16#003A	58	The module name for the CP 243-1 was changed in the configuration.	Check the configuration	20, 21	_CTRL
16#003B	59	The configuration has an invalid IP address	Check the configuration	20, 21	_CTRL
16#003C	60	The configuration has an invalid gateway address	Check the configuration	20, 21	_CTRL

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Error word		Description	Reaction/remedy	Transfer mechanism	
Hex	dec			Byte offset in the SM area	Return value (ETHx_)
16#003D	61	The configuration has an invalid value in the keepalive parameter	Check the configuration	20, 21	_CTRL
16#003E	62	No valid configuration received from memory of the S7-200 CPU or from BOOTP/DHCP	Cyclic attempt to obtain a valid configuration either from the memory of the S7-200 CPU or via a BOOTP/DHCP server	20, 21	_CTRL
16#0042	66	The NDB contains syntax errors in the read/write requests or length information.	Check the configuration	20, 21	_CTRL
16#0093	147	The BOOTP/DHCP request failed	Automatic restart	20, 21	_CTRL
16#0094	148	The reply of the BOOTP/DHCP server contains invalid data	Automatic restart	20, 21	_CTRL
16#0095	149	The TCP/IP stack did not accept the specified monitoring time (keepalive).	Automatic restart	20, 21	_CTRL
16#0096	150	The TCP/IP stack did not accept the IP address specified for a client.	Automatic restart	20, 21	_CTRL
16#0097	151	The TCP/IP stack did not accept the specified subnet mask.	Automatic restart	20, 21	_CTRL
16#0098	152	The TCP/IP stack did not accept the specified gateway address.	Automatic restart	20, 21	_CTRL
16#00B0	176	The IDB contains invalid values.	Create configuration with STEP 7 Micro/WIN 32	20, 21	_CTRL
16#00B1	177	The CRC check of the IDB failed.	Create configuration with STEP 7 Micro/WIN 32 Check the user program to find out whether configuration data was accidentally overwritten	20, 21	_CTRL
16#00B2	178	No administrator name is specified in the IDB.	Create configuration with STEP 7 Micro/WIN 32	20, 21	_CTRL
16#00B3	179	The administrator password check failed or no password was specified	Create configuration with STEP 7 Micro/WIN 32	20, 21	_CTRL
16#00B7	183	The administrator password is too short.	Create configuration with STEP 7 Micro/WIN 32	20, 21	_CTRL

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Error word		Description	Reaction/remedy	Transfer mechanism	
Hex	dec			Byte offset in the SM area	Return value (ETHx_)
16#00BB	187	Bad IDB format	Create configuration with STEP 7 Micro/WIN 32	20, 21	_CTRL
16#00BD	189	Initialization of the file system failed	Delete files from the file system	20, 21	_CTRL
16#00BF	191	System files could not be set up in the file system	Delete files from the file system	20, 21	_CTRL
16#00F0	240	The S7-200 CPU failed to recognize the CP 243-1	Check configuration and structure of the S7-200 system		_CTRL
16#00F1	241	The address of the output byte via which the CP 243-1 is supposed to be accessible according to the configuration is not compatible with the current position of the CP 243-1 in the S7-200 system.	Check configuration and structure of the S7-200 system		_CTRL
16#0100 bis 16#0108	256 bis 264	Timeout on the S7 bus	Automatic restart	20, 21	_CTRL
16#8080	32896	CP 243-1 not yet completely started up.	If necessary, check 24 V supply	20, 21	_CTRL

Error messages in word format

6.2.3 Error messages of the test mechanism for e-mails

The error messages of the test routine for e-mails are shown in the Web browser as an error code with explanatory text in English. The errors that can occur here are listed in the table below.

Error code	Error text	Description
0	E-Mail successful delivered to E-Mail server	Test e-mail sent successfully to e-mail server
1	No valid configuration file	No valid e-mail configuration file on the CP 243-1
2	General error	Contact hotline if necessary
3	General error	Contact hotline if necessary
4	No E-Mail server reachable	E-mail server not configured or not accessible
5	No E-Mail server reachable	E-mail server not configured or not accessible
6	No E-Mail server reachable	E-mail server not configured or not accessible
7	General protocol error	Error during transfer with SMTP

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Error code	Error text	Description
8	General protocol error	Error during transfer with SMTP
9	General protocol error	Error during transfer with SMTP
10	FROM command failed	FROM (CP's own e-mail address) not correctly configured or unknown to e-mail server
11	TO command failed	TO addressee not specified correctly or unknown to e-mail server
12	CC command failed	CC addressee not specified correctly or unknown to e-mail server
13	General protocol error	Error during transfer with SMTP
14	Sending E-Mail failed	Error during transfer of the e-mail
15	General protocol error	Error during transfer with SMTP
16	Expanding E-Mail text failed	Error while expanding e-mail placeholder in -mail text, check e-mail text configuration
17	Expanding E-Mail text failed	Error while expanding e-mail placeholder in -mail text, check e-mail text configuration
18	Expanding E-Mail text failed	Error while expanding e-mail placeholder in -mail text, check e-mail text configuration
19	Timeout sending E-Mail	Timeout while sending, e-mail server not accessible
20	Test-E-Mail functionality already in use	Another user called the test e-mail function at the same time. Try again
21	General error	Contact hotline if necessary
22	General error	Contact hotline if necessary

Error messages of the test mechanism for e-mails

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Appendix A: Technical specifications

A

Construction: Module format Dimensions (W x H x D) Weight	 S7-200 expansion module 71.2 x 80 x 62 mm approx. 150 g
Transmission rate	10 Mbps and 100 Mbps
Flash memory size	8 Mbytes as ROM for firmware of the CP 243-1 and 8 Mbytes as ROM for the file system
SDRAM memory size	16 Mbytes
Guaranteed life of flash memory for the file system	100 000 million write or delete operations
Interfaces Connection to Industrial Ethernet (10/100 Mbps)	8-pin RJ-45 jack
Input voltage	+24 V DC (-15%/+20%)
Current consumption From S7 bus From external 24 V DC	 55 mA 60 mA
Power dissipation	1.5 W
Max. number of connections	Max. of 8 S7 connections (XPUT/XGET or READ/WRITE) + 1 connection to STEP 7 Micro/WIN 32
Max. Max. number of IT connections	One connection each for the FTP server, the FTP client and the e-mail client plus 4 HTTP connections
Permissible ambient conditions Operating temperature Transport/storage temperature Max. relative humidity. Operating altitude	 0 °C to +55 °C for horizontal installation 0 °C to +45 °C for vertical installation -40 °C to +70 °C 95% at +25 °C Up to 2000 m above sea level. At higher altitudes, cooling may be reduced which then requires a reduction of the maximum operating temperature
Type of protection	IP20
Ethernet standard	IEEE 802.3

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Standards / approvals	CE mark UL 508 or cULus CSA C22.2, number 142 or cULus FM 3611 EN 50081-2 / EN 61000-6-4 EN 55011 group 1 class A EN 60529 EN 61000-6-2 EN 61131-2  ATEX: EN 60079-0:2006, EN 60079-15:2005 II 3 G Ex nA II T4 KEMA 03 ATEX I228X
Startup time or restart time after a reset	approx. 10 seconds
Amount of user data	• as client: with XPUT/XGET: up to 212 bytes • as server: – with XGET or READ: up to 222 bytes – with XPUT or WRITE: up to 212 bytes
Max. e-mail size	1024 characters
File system	• Max. path length incl. file and drive names: 254 characters • Max. length of a file name: 99 characters • Max. nesting depth of the directories: 49
Server ports used	HTTP: 80 FTP command channel: 21 FTP data channel for FTP server: 3100 - 3199 S7 connection establishment: 102

Technical specifications

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Appendix B: Example

B

Below, you will find an example of how to handle the CP 243-1 as an S7 client. This example shows how to use the subroutines created by the Internet wizard integrated in STEP 7 Micro/WIN 32 at the end of configuration. The data block in which the configuration is stored by the Internet wizard is specified at the end of the program code.

The sample program is included on the QuickStart CD for SIMATIC NET along with the configuration as a STEP 7 Micro/WIN 32 project. To run this program you will need Ethernet access to a second S7-200 system on which there is a suitably configured S7 server.

The user name for the administrator in the sample program is "root" and the password is "rootroot".

Program code

Project name: Example_Client

Version: 02.01

Date: 20.01.2003

Target hardware: CPU 224 with CP 243-1 in slot 0

Description: Sample program for communication between two S7-200 stations via Industrial Ethernet.

A character string ("CP243") that is stored starting at address VB500 and with a length of 5 bytes is sent from the local S7-200 system to another S7-200 system. It is stored there at the same address and then read back from there. This procedure is repeated continuously.

The associated server must be configured as a suitable counterpart. The user program that runs on the server simply has to call up the ETHx_CTRL subroutine. Calls for the ETHx_XFR subroutine are not required for operating the server.

The CRC check is enabled.

The configuration (IP addresses, …) must be adapted to the current situation. The "CP243" string must be stored starting at address VB500.

NETWORK 1

The ETHT0_CTRL subroutine initializes and monitors the CP 243-1.

Status bit SM0.0 is generated at input "EN". This ensures that the subroutine is always activated. As soon as the CP 243-1 has completed startup, the "CP_Ready" and "CH_Ready" outputs are set. If an error occurred in the configuration, the "Error" output is set. The transferred error code is stored in memory word 2. It can be read out in the status table.

```
LD Always_On
CALL ETH0_CTRL, cp_ready, ch_ready, cp_error
```


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Symbol	Address	Comment
Always_On	SM0.0	Due the system, always 1
ch_ready	MW8	
cp_error	MW2	
cp_ready	M0.0	
ETH0_CTRL	SBR1	This POU was generated by the Internet wizard for use with CP 243-1

NETWORK 2

As soon as channel 0 is ready for the transfer and "ch0_ready" is set, the "start" variable is set. This may take several cycles.

```
LD ch0_ready
Sstart, 1
```

Symbol	Address	Comment
ch0_ready	M8.0	Bit for channel 0 in the CH_READY return value of the ETH0_CTRL subroutine
start	M4.0	Flip flop for automatic start of the data transfer

NETWORK 3

For an S7-200, the "First_Scan_ON" bit is only set in the first cycle for system-related reasons. This resets the "start" variable. This is necessary so that the "start" variable always generates a signal edge for the start of the ETHx_XFR subroutine, even when the CPU starts and stops repeatedly.

```
LD First_Scan_On
Rstart, 1
```

Symbol	Address	Comment
First_Scan_On	SM0.1	Due to the system, 1 in the first cycle, otherwise always 0
start	M4.0	Flip flop for automatic start of the data transfer

NETWORK 4

The local S7-200 station sends data from VB500 (data length of 5 bytes) via the Ethernet connection to another S7-200 station. There the data is stored starting at VB500.

The read/write request is only possible after a positive edge at the "START" parameter, when the "Done" bit of any preceding read request is set. The "Done" bit is transferred in the "ch0_done_read" variable. The outputs of the read and write request are linked so that only one request per channel can be processed at any one time. This means that a new request is only initiated after the preceding request is completed.

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The "Chan_ID" parameter specifies the number of the channel via which the data access will take place. In the present case, this would be the channel with the number 0. The "Data" parameter specifies the number of the channel-specific block of data. A request that has been initiated could be stopped using the "Abort" parameter. To do this, the M7.0 memory bit must be set. In this example, this memory bit also impacts the read request from Network 5.

After M7.0 is cleared, read/write requests are sent again since the "Done" bit is always set along with the "Error" bit after a request is aborted.

Applying special memory bit SM0.0 ensures that the ETH0_XFR subroutine is always enabled.

As soon as the write request is completed, a 1 is returned in the "Done" return parameter. Any errors that occurred are transferred using by the "Error" parameter. Otherwise, a 0 is returned in this parameter.

```
LD Always_On
=L60.0
LD ch0_done_read
EU
Uch0_ready
LD start
EU
OLD
=L63.7
LD L60.0
CALL ETH0_XFR, L63.7, Connection0_0, Write_1,
 Connection_abort, ch0_done_write, ch0_error_write
```

Symbol	Address	Comment
Always_On	SM0.0	Due the system, always 1
ch0_done_read	M5.0	Done bit of the read request
ch0_done_write	M5.1	Done bit of the write request
ch0_error_write	MB14	Error memory bit of channel 0, "write" request
ch0_ready	M8.0	Bit for channel 0 in the CH_READY return value of the ETH0_CTRL subroutine
Connection0_0	VB233	
Connection_abort	M7.0	Transfer aborted
ETH0_XFR	SBR2	This POU was generated by the Internet wizard for use with CP 243-1
start	M4.0	Flip flop for automatic start of the data transfer
Write_1	VB234	

NETWORK 5

The local S7-200 station now reads out data from VB500 of another S7-200 station and stores this starting at VB500 of the local S7-200 station.

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Before the read request is executed, the two variables "ch0_done_write" and "ch0_ready" are evaluated to ensure, firstly, that the preceding write request is completed and, secondly, that the status of channel 0 is "ready".

```
LDAlways_On
= L60.0
LDch0_done_write
EU
U ch0_ready
= L63.7
LDL60.0
CALLETH0_XFR, L63.7, Connection0_0, Read_1, Connection_abort,
ch0_done_read, ch0_error_read
```

Symbol	Address	Comment
Always_On	SM0.0	Due the system, always 1
ch0_done_read	M5.0	Done bit of the read request
ch0_done_write	M5.1	Done bit of the write request
ch0_error_read	MB6	Error memory bit of channel 0, "read" request
ch0_ready	M8.0	Bit for channel 0 in the CH_READY return value of the ETH0_CTRL subroutine
Connection0_0	VB233	
Connection_abort	M7.0	Transfer aborted
ETH0_XFR	SBR2	This POU was generated by the Internet wizard for use with CP 243-1
Read_1	VB235	

Data block for this configuration

```
//
//DATA BLOCK COMMENTS
//
//Press F1 for help and example data block
//
//--------------------------------------------------------------------
--
// CP 243-1 Module Configuration block. Generated by the Internet
// Wizard
//--------------------------------------------------------------------
--
VB0'CP243'// Module ID for CP 243-1 module at position 0
VW516#006C// Length of CDB
VW716#0014// Length of NPB
VB916#81// Configuration Data Version
VB10 16#00// Project Configuration Version
VW11 16#0000
VW13 16#0004// Auto Detect Communications,User Configured
     // IP Address, CRC protection enabled.
VD15 16#C1012807 // IP Address for module (193.1.40.7)
VD19 16#FFFFFF00 // Subnet mask address for module (255.255.255.0)
```


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```
VD23 16#C1012801 // Gateway Address (193.1.40.1)
VW27 30 // Keep Alive Interval in seconds
//---------------------------------------- Connection 0
VB29 16#83// Client Connection,Keep Alive Enabled.
VD30 16#C1012812 // Address of Server for this connection
    //(193.1.40.18)
VW34 16#1000// Local TSAP for this connection (10.00).
VW36 16#1000// Remote TSAP for this connection (10.00).
//---------------------------------------- Connection 1
VB38 16#00// Connection not defined.
VD39 16#00000000
VW43 16#0000
VW45 16#0000
//---------------------------------------- Connection 2
VB47 16#00// Connection not defined.
VD48 16#00000000
VW52 16#0000
VW54 16#0000
//---------------------------------------- Connection 3
VB56 16#00// Connection not defined.
VD57 16#00000000
VW61 16#0000
VW63 16#0000
//---------------------------------------- Connection 4
VB65 16#00// Connection not defined.
VD66 16#00000000
VW70 16#0000
VW72 16#0000
//---------------------------------------- Connection 5
VB74 16#00// Connection not defined.
VD75 16#00000000
VW79 16#0000
VW81 16#0000
//---------------------------------------- Connection 6
VB83 16#00// Connection not defined.
VD84 16#00000000
VW88 16#0000
VW90 16#0000
//---------------------------------------- Connection 7
VB92 16#00// Connection not defined.
VD93 16#00000000
VW97 16#0000
VW99 16#0000
//----------------------------- STEP 7-Micro/WIN reserved
connection.
VB10116#82
VD10216#00000000
VW10616#A9A8
//------------------------------------------------------------------
--
// Network Parameter Block Section
// This section is used by the CP 243-1 Module
//------------------------------------------------------------------
--
VW10816#0000
```


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```
VD11016#00000000
VD11416#00000000
VD11816#00000000
VB12216#00
VB12316#00
VB12416#00
VB12516#00
VB12616#00
VB12716#00
//--------------------------------------------------------------------
--
// Network Data Block Section
//--------------------------------------------------------------------
--
VW12816#0026
VB13016#00
VB13116#03
VB13216#0F
VB13316#0F
VB134'W=5,VB500,VB500' // Message 0 for Connection 0.
VB149'R=5,VB500,VB500' // Message 1 for Connection 0.
VW16416#D0C3
//--------------------------------------------------------------------
--
//Internet Data Block Section
//--------------------------------------------------------------------
--
VW16616#0043
VB16816#32
VB16916#02
VB17016#02
VB17116#02
VB17216#02
VB17316#81
VB17416#00     //Administrator Web access flag
VB175'root$00$00$00$00$00$00$00$00$00$00$00'//Administrator Login
VB191'R33~R33~$00$00$00$00$00$00$00$00$00$00$00$00$00$00$00$00$00
$00$00$00$00$00'         //Administrator Password
VW22316#0000     //SMTP Client enable flag
VW22516#0000     //FTP Client enable flag
VW22716#0000
VW22916#0000//HTTP Server enable flag
VW23116#9E28
//--------------------------------------------------------------------
--
//Symbol Initializations
//--------------------------------------------------------------------
--
VB2330
VB2340
VB2351
//--------------------------------------------------------------------
--
VB500'CP243'// Module ID for testing
```


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Appendix C - Timeouts

C

The values in the following tables represent times after which the the related actions must have been triggered.

On Ethernet

Meaning	Action if timeout occurs	Fixed set time in seconds
Maximum wait time after which a frame must be completely received via TCP/IP.	Reject frame fragment. CP shuts down the connection	3
Maximum wait time after which a frame must be completely sent via TCP/IP.	Abort sending. CP shuts down the connection	3
Maximum wait time of the CP until a request sent to the CPU by an external client is replied to by the CPU.	Reject action. CP waits for new requests. Client receives no response	60
Logout time when all channels are busy and MW is not yet connected. (So that MW can always establish a connection)	Oldest of the connected TCP/IP servers that could not yet be assigned via TSAP interrupts the connection and waits for a new connection to be established	60
Interval at which incoming connection establishment requests are processed.	Delay of the next connection establishment	1
Wait time after an unsuccessful attempt by a client to establish a connection	Attempt to establish a connection is repeated	10
Wait time of a client for confirmation of a request to establish a connection	Client shuts down the connection and connects again	6
Maximum time for a successful BOOTP/DHCP request	Renewed attempt to obtain a valid configuration either from the memory of the S7-200 CPU or via a BOOTP/DHCP server	24 attempts at intervals of 2.5 seconds = 60 seconds
Maximum wait time for confirmation of sending the test e-mail	The e-mail is not transferred, an error message to this effect is returned.	30
Idle time of an FTP connection. When this time expires, the connection is terminated by the FTP server if a new FTP client wants to establish a connection	Termination of existing FTP connection and establishment of a new FTP connection to the new FTP client	60
Maximum wait time of the FTP server for the establishment of a data connection	The FTP client not establish a data connection.	90

Timeouts on Ethernet

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On the S7 bus

Meaning	Action if timeout occurs	Fixed set time in seconds
Maximum time for one communication cycle between the CP 243-1 and the S7-200 CPU via the S7 bus Note: Three cycle times are usually required per read/write request in the client use case, one cycle time is required in the server use case. Long execution times of the read/write requests must be expected with user programs which require an extreme amount of time and simultaneous communication via a lot of channels.	Request rejected, CP 243-1 restarts	10 (per cycle)
Timeout for the successful transfer of CDB/NDB when CP starts up	CP 243-1 restarts	120
Time after which S7 CPU must detect the CP 243-1 physically during a CPU restart	CP 243-1 restarts	1
Maximum time by which the configured e-mail server must have accepted a connection establishment request.	Connection is not established, the CP 243-1 reports an error	20
Maximum time by which a configured FTP server must have accepted a connection establishment request.	Connection is not established, the CP 243-1 reports an error	20

Timeouts on the S7 bus

On the user interface

Meaning	Action if timeout occurs	Fixed set time in seconds
Latest time after which an error or message code is returned by the ETHx_CTRL subroutine with the Error return parameter, must be reset by the CP 243-1. This code is also always located in the SM memory area used by the CP 243-1 in the two bytes with the offset 20 and 21	Error or message code is set to 0	60

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Appendix D - Compatibility

D

Standard (STEP 7) supported access from S7-300/400 clients to:

	S7-200 with CPU222, CPU224, CPU 226/XM		
CPU firmware version	<1.21	1.21	>1.21
Data types			
BOOL	√	√	√
BYTE	√	√	√
CHAR	X	RO	√
WORD	√	√	√
INT	X	RO	√
DWORD	√	√	√
DINT	X	RO	√
REAL	X	RO	√
Memory areas			
INPUT	√	√	√
OUTPUT	√	√	√
BIT MEMORY	√	√	√
DATA BLOCK			
VARIABLES*	√	√	√
ANALOG INPUT			
SPECIAL MEMORY			

Character	Meaning
√	supported
	not generally supported
X	not possible if CPU with this firmware version is used
RO	"read-only access"
*	The access to VBxx should be formulated as DB1.DBBxx (standard STEP 7)

STEP 7 Micro/WIN 32 wizard supported CP 243-1 access as client to...

	S7-300/400	S7-200 with CPU222, CPU224, CPU 226/XM		
CPU firmware version		<1.21	1.21	>1.21
Data types				
BOOL				
BYTE	√	√	√	√

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	S7-300/400	S7-200 with CPU222, CPU224, CPU 226/XM		
CHAR				
WORD				
INT				
DWORD				
DINT				
REAL				
COUNTER				
TIMER				
Memory areas				
INPUT	√	√	√	√
OUTPUT	√	√	√	√
BIT MEMORY	√	√	√	√
DATA BLOCK	√			
VARIABLES		√	√	√
ANALOG INPUT				
SPECIAL MEMORY				
S7 COUNTER				
S7 TIMER				

Character	Meaning
√	supported
	not generally supported
X	not possible if CPU with this firmware version is used

JAVA Beans supported CP 243-1 access to...

(The JAVA Beans are a shared package for SIMATIC 200/300/400 communications processors)

	S7-300/400	S7-200 with CPU222, CPU224, CPU 226/XM		
CPU firmware version		<1.21	1.21	>1.21
Data types				
BOOL	√	√	√	√
BYTE	√	√	√	√
CHAR	√	X	RO	√
WORD	√	√	√	√
INT	√	X	RO	√
DWORD	√	√	√	√
DINT	√	X	RO	√
REAL	√	X	RO	√
COUNTER	√			
TIMER	√			

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	S7-300/400	S7-200 with CPU222, CPU224, CPU 226/XM		
Memory areas				
INPUT	√	√	√	√
OUTPUT	√	√	√	√
BIT MEMORY	√	√	√	√
DATA BLOCK	√			
VARIABLES		√	√	√
ANALOG INPUT				
SPECIAL MEMORY		√ (RO up to address 30)	√ (RO up to address 30)	√ (RO up to address 30)
S7 COUNTER	√			
S7 TIMER	√			

Character	Meaning
√	supported
	not generally supported
X	not possible if CPU with this firmware version is used
RO	"read-only access"

E-MAIL tags (STEP 7 Micro/WIN 32 wizard) supported access to...

	S7-200 with CPU222, CPU224, CPU 226/XM		
CPU firmware version	<1.21	1.21	>1.21
Data types			
BOOL			
BYTE	RO	RO	RO
CHAR			
WORD	RO	RO	RO
INT			
DWORD	RO	RO	RO
DINT			
REAL			
Memory areas			
INPUT	RO	RO	RO
OUTPUT	RO	RO	RO
BIT MEMORY	RO	RO	RO
DATA BLOCK			
VARIABLES	RO	RO	RO
ANALOG INPUT	RO / word	RO / word	RO / word
SPECIAL MEMORY	RO	RO	RO

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Character	Meaning
√	supported
	not generally supported
X	not possible if CPU with this firmware version is used
RO	"read-only access"
RO / word	"read-only access", but only as WORD access

SIMATIC NET OPC supported access to...

	S7-200 with CPU222, CPU224, CPU 226/XM		
CPU firmware version			
Data types			
BOOL	√	√	√
BYTE	√	√	√
CHAR	X	RO	√
WORD	√	√	√
INT	X	RO	√
DWORD	√	√	√
DINT	X	RO	√
REAL	X	RO	√
Access to data areas			
INPUT	√	√	√
OUTPUT	√	√	√
BIT MEMORY	√	√	√
DATA BLOCK			
VARIABLES*	√	√	√
ANALOG INPUT			
SPECIAL MEMORY			

Character	Meaning
√	supported
	not generally supported
X	not possible if CPU with this firmware version is used
RO	"read-only access"
*	The access to VBxx should be formulated as DB1.DBBxx (standard STEP 7)

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